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**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE
EUROPEAN PARLIAMENT**

“TOWARDS A EUROPEAN SPACE POLICY”

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Space in Europe has entered a new phase. Beyond the emblematic success which the Ariane launcher represents, space activities have evolved from being a research endeavour to offering a unique and critical technology enabling Europe to address and achieve a large number of goals embedded in policies related to economic growth, the information society, transport infrastructure, environmental protection and peace-keeping.

Its contribution to the everyday life of citizens is increasingly important. Furthermore, space provides the means to support the efforts linked to Europe's enlargement and to enable the EU to increase its independence, to spread its influence and consolidate its role on the world scene.

Space has the potential to become an integral component of the Union's core policies. The first benefits of such a development are already highlighted by the GALILEO and GMES EU initiatives, respectively in the field of navigation by satellite and global monitoring for environment and security.

A political process is on the move to support this trend. Following last year's Communication¹ *“Europe and Space: Turning To a New Chapter”* and the subsequent EU and European Space Agency (ESA)² Council Resolutions, the European Commission and the ESA Executive have set up a Joint Task Force. Its aims are to further develop the European strategy for space, to elaborate proposals for its implementation and to report to the EU and ESA Councils and the European Parliament at the end of 2001 on the progress achieved.

The report in the annex to this Communication presents the analysis and recommendations elaborated by the Joint Task Force. It underlines the economic, societal and political role of space systems at the service of European citizens; it identifies objectives and priorities for the enhancement of European capabilities; it also describes how they could develop in a global context.

The document covers in particular the three components of the European strategy for space: (i) strengthening the foundations of space activities; (ii) enhancing scientific knowledge; (iii) reaping the benefits for markets and society; as well as horizontal issues mainly addressing industrial policy, international aspects and the future relation between the EU and ESA.

A key conclusion is that, confronted with the competitive pressure coming from other regions of the world, the European space actors cannot afford to address issues in a dispersed and fragmented way. In order to play its full role as a major space power, Europe must be able to do better with the means at its disposal and to optimise the political and institutional

¹ COM(2000)597

² ESA is an intergovernmental organisation. It involves 13 of EU Member states as well as Switzerland and Norway. Greece and Luxembourg do not participate in ESA.

framework that sets its operating conditions in the space sector. This process will take time, but its dynamics will open new opportunities and developments.

As a matter of fact, space activities have become such an important cross-sectorial strategic asset and tool for the implementation of the Union's overall policies that the question must now be raised whether they deserve their own policy.

From this perspective, Europe would have to commit to supporting a genuine European space policy, combining the strategy per se, as sketched in last year's Communication, a European space programme and a set of implementing rules.

Such a European space policy would strengthen European space activities, through the concerted effort of all space actors, public and private, with the aim of increasing efficiency and to avoid unnecessary duplication of efforts and resources.

Major steps need to be taken to reach such an objective. Critical to the success of the development and implementation of the European space policy will be a sustained public and private sector commitment and a reinforced co-operation between the EU and ESA, which should lead to an increase in joint programmes and projects.

ESA has a record of technical achievements and know-how. Over the last decades, it has proved to be an efficient instrument for channelling the efforts of its Member states and developing the competitiveness of the European space industry.

However, the time has come for space issues to acquire their full political legitimacy. This will require a closer co-operation of ESA with the EU, to allow the integration of space activities into a wider political, economic, scientific and social frame and to put space-related activities even more directly at the service of European citizens.

It would also create the opportunity to bring space issues to the attention of the highest political level in Europe, i.e. the EU Council and Parliament. The volume of financial resources involved, the type of future questions to be addressed, for example security, all call for this high-level political debate.

The European Commission has already entered in an operational relationship with ESA. The analysis performed by the Joint Task Force, based in particular on the GALILEO experience, confirms that actions are needed to ensure that institutional differences do not hinder the potential for co-operation. An efficient and "seamless" use of the respective instruments available must be achieved.

This may require the conclusion of a framework agreement between the EU and ESA for the establishment of a formal relationship between both entities, leading to an effective co-operative structure with a clear partitioning of roles regarding the policy-shaping and policy-making responsibilities.

In this context, a definition of ESA's potential additional role as "implementing agency" for the European Community, taking into account the experiences drawn from GALILEO, GMES and the co-operation in telecommunication, may be appropriate.

A number of these orientations were endorsed by ESA in their Resolution at the Edinburgh Ministerial conference (14-15 November 2001), adopted in the presence of the President of the European Commission.

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The recommendations given in the Joint Task Force report represent a milestone in establishing a coherent approach for space in Europe. Further developments will depend on the endorsement of all relevant actors in Europe, in particular Member States, and their commitment to actively support the proposed set of actions.

The European Commission is ready to establish a strong and dynamic partnership with ESA and is determined to take forward the development of an ambitious European space policy.

EUROPEAN COMMISSION AND THE EUROPEAN SPACE AGENCY JOINT TASK FORCE REPORT

1. INTRODUCTION

During the year 2000, the European Commission and ESA Executive jointly developed a European Strategy for Space (ESS). This Strategy formed the basis of a Commission's Communication "*Europe and Space: Turning to a New Chapter*" and of an ESA Council document, both of which were received positively by EU and ESA Member States, public authorities and industry throughout Europe.

The EU and ESA Councils adopted in November 2000 two complementary Resolutions endorsing this Strategy. A key request was to further its development, in particular through the creation of a Joint Task Force (JTF) tasked with monitoring the Strategy's implementation and proposing a permanent joint co-operative structure between ESA and the European Union.

The Strategy for Space constitutes now a reference for a broad range of space-based activities such as GALILEO and Global Monitoring for Environment and Security (GMES), which illustrate this approach.

The context described one year ago has further evolved. New developments, scientific, technical and economic, new challenges such as the reinforced competition on certain space activities, and new opportunities such as the prospect to establish important partnerships, motivate the Strategy for Europe in Space to aim at a higher political visibility.

In line with last year's Resolutions, a Joint Task Force (JTF) has been formed between the ESA Executive and the European Commission during the first quarter of 2001.

This JTF has established intensive co-operation between the two entities. Based on its work, this Report has given rise to the consultation of the EU and ESA Member States through the newly created Joint Space Strategy Advisory Group (JSSAG) and to a dialogue with industry.

The purpose of this Report is twofold:

- To report on, and draw lessons from, the implementation of the European Strategy for Space developed in 2000;
- To make proposals for the next stage through a set of recommendations, including a new setting for the EU-ESA relationship and a staged approach for its implementation.

2. SPACE IN THE POLITICAL CONTEXT: RECENT EVOLUTIONS

With the growing importance of space systems for society and markets world-wide, European leaders increasingly recognise the need to integrate space activities into the wider political and economic strategy. The European Union provides a political frame in which to do this.

Recently, a number of issues have emerged on the European political scene that are of relevance to space-related matters. Most of these arose at recent European Councils, where the Heads of States and Governments have set ambitious goals for Europe.

The main highlights are:

- ***a knowledge-driven economic growth, favourable to sustainable development***

- *knowledge-intensive economy*: the Union has set itself for the next decade the goal to become the most competitive and dynamic knowledge-based economy in the world. One key component in this respect is the European Research Area initiative, which applies in particular to research and knowledge-intensive issues such as space (see e.g. the 6th Framework programme for research and technology development (RTD) which will, for the first time, consider space as a thematic priority);
- *information society*: space assets are critical and enabling factors of the European economy for implementing and developing the Information society, because of their capability to generate and transfer information at regional and/or global scales. Current or future applications can be found in the world of satellite telecommunications and broadcasting, as well as navigation (for example the proposed GALILEO programme);
- *sustainable development*: At the Gothenburg Summit, sustainable development has been raised to a priority level. Sustainable development requires by definition global solutions. Space activities are global by nature and provide unique, effective and non-invasive means to assess and monitor the environment at regional and global level (for example the “Global Monitoring for Environment and Security”, GMES, initiative).

- ***an independent Europe, more influential on the world scene:***

- *independence, security and defence*: linked to the desire to reinforce the European political and cultural identity and the importance of shared values within the Union, expectations are building for a more influential Union on the world stage.

Regarding security, the interpretation of the concept has significantly expanded. It now encompasses protection of people and goods against global threats such as natural disasters, planetary environmental risks, climate change, large population and refugee migrations, and acts of terror against populations.

Space systems can contribute not only to environmental or information security. Through their capability to efficiently provide information, communication, monitoring, detection and control, space technologies have widened their potential to effectively serve security policy objectives. They will also, when the Union so decides, be able to make even more important contributions to the developments of the Union’s Common Foreign and Security Policy than is already the case; in the Community’s sphere, they can contribute significantly as regards civil security. Confronted with the risks of terrorism to civilian populations, the EU will develop its means of information gathering and detection, including space instruments.

In addition, the EU has decided to enhance its Common Foreign and Defence Policy, in particular as concerns the so-called “Petersberg tasks”³, by incorporating the WEU Torrejon Satellite centre as an Agency under the Council.

Access to global information influences the economic, political and strategic position of a country or region. The Union, being ever closer integrated, has an expressed need to obtain such information independently in support of its policies. Europe’s autonomous access to space, as secured by ESA and its Member States, enables the European Union to use space technologies accordingly.

- *Enlargement*: the forthcoming enlargement of the Union requires modernisation of the institutions, economies and infrastructures of the candidate countries, for which space-based applications are expected to play a significant role. The EU will have to adapt its own structures to cope with the admission of new Member States.
- *external relations and international co-operation*: more and more, the countries of the Union need to speak with a single voice concerning all space-related issues (e.g. in international and regional fora, for frequency allocations, on the Kyoto agreement or on competition policy). Europe is also at a crossroads regarding its co-operation with other space powers (e.g. Russia, for which a milestone event on Europe-Russia Space co-operation took place at the Duma in June 2001).
- ***more involvement of citizens in policy-making (“governance”)***
 - *providing a vision and a clear policy*: European leaders acknowledge that European citizens need better to understand the political ambitions that underpin the actions with respect to space, for which considerable investments are requested. Europe's citizens need to regain enthusiasm for the adventure of knowledge that space represents, and to see more clearly the value of its applications to modern and future life. Space policy should increasingly take into consideration citizens’ needs from its inception as well as the need to inform them on the challenges at stake and on the benefits of space technologies, for example by providing an easy access to information on the state of our environment.

These various political trends, together with the intense competitive pressure coming from other regions of the world on space matters, emphasise the fact that a sustained commitment and investment is needed from public authorities as well as from the private sector in the forthcoming period. It also indicates that the time is ripe to consider the definition of a genuine new European Space policy and identity, transparent and beneficial to citizens, supportive of European policies and to Europe’s influence on the world scene.

³ Petersberg tasks: humanitarian and rescue tasks, peacekeeping tasks and tasks of combat forces in crisis management, including peacemaking.

3 IMPLEMENTATION AND FURTHER DEVELOPMENT OF THE EUROPEAN STRATEGY FOR SPACE

Over the last decades, ESA and the various European space actors have successfully developed and implemented an impressive set of space programmes, activities and assets, despite limited public budgets as compared to other players (cf. the US, but also Japan, in terms of budget per inhabitant).

In order to maintain and further strengthen Europe's effectiveness in this field, a better co-ordination amongst the different components and players of space activities must be ensured throughout the whole European space system. The European Strategy for Space must be implemented and further developed as the common baseline for all the European space actors to define their respective plans and actions.

This chapter presents the analysis and state of play of the activities carried out in pursuance of the objectives of the European Strategy for Space as defined in 2000. Furthermore, it provides recommendations for each of the three objectives of the strategy as well as for horizontal aspects, with a view to improving its implementation.

3.1 Objective "Strengthening the foundations of space activities"

3.1.1. Access to Space

Analysis

Access to Space is the key enabling asset in order to undertake space projects and missions and to develop space-related services. Therefore particular attention and support has to be given to this field of activity. Europe has developed two major assets in this sector: (i) the Ariane family of launchers, which represents a technical and commercial success; (ii) the launch base in Kourou, competitive thanks to its geographical location and modern and powerful infrastructures. Thus the need for an independent and competitive access to space for Europe has been stressed in the European strategy for space and the subsequent EU and ESA Council Resolutions.

Ariane 5 is a modern launcher with a significant growth potential for the next 20 years. Its initial geostationary transfer orbit payload capability (6 tons) will be doubled by 2006, depending on decisions at ESA's Council Ministerial meeting in November 2001. ESA will complement Ariane 5 with a small launch vehicle, Vega, operational by 2006.

Ariane 5 mainly addresses the market of geostationary communication satellites. Arianespace is currently the market leader with a share of 50 % of the open market. However this only represents a share of 20 % of the total market; the remaining 80 % consists mostly of US governmental satellites (launched by US launch vehicles in accordance with the "Commercial Space Act") and Russian governmental satellites (launched by those Russian vehicles which have not yet been brought into joint ventures with international partners).

Less than 10 % of its launches being of governmental origin, Ariane's success critically depends on its performance on the open commercial market, which is now facing a situation of overcapacity. The market offer continues to grow, with the arrival of Delta IV and Atlas V from the US, alliances of Russian and US operators, and continued improvement of Chinese and Japanese vehicles.

As a consequence, launch prices have significantly dropped. Against this background, European stakeholders, in order to ensure the commercial success of Ariane 5, have committed themselves to phase out Ariane 4 by 2003 and drastically to cut down Ariane 5 production costs. To ensure its position on the market, Arianespace must win contracts to launch at least 14 to 16 satellites a year (2 institutional, 12 to 14 commercial) whereas the US competitors can rely on their governmental orders whilst planning for an aggressive comeback on the open market.

European industry is making remarkable efforts to reduce the launcher cost. However Arianespace is still disadvantaged vis-à-vis its competitors: for instance, in the cost of an Ariane launch, 10 to 12 M€ are contributed to launch base operations, whilst for a US civil launch vehicle, where overall range costs are paid by the US Air Force, this contribution is about 1.5 M€.

European governments have to step up their role in the launcher sector in order to ensure that Ariane is on an equal footing with its competitors. In addition to the investments made through ESA for developing technologies and for maintaining a competitive launch base, political actions are necessary to arrive at a level playing field world-wide as well as to encourage private investment (e.g. through tax incentives or loan guarantees, controlling technology exports). Such actions must be taken at EU level, making full use of the closer relationship developing between ESA and the European Union.

To respond to the US-Russian commercial alliances, Europe should break away from its current isolation and develop international alliances that would contribute to increase the competitiveness of European launch services and the accessible market. One possibility could build upon the Starsem European-Russian venture involving the operation of the Soyuz launcher from Baïkonour. Transferring the commercial exploitation of Soyuz to Kourou, under the control of Arianespace, would possibly increase the performance of Soyuz for the geostationary market and provide Arianespace with complementary capabilities.

Exploiting Soyuz from Kourou would potentially be meaningful in the perspective of a longer-term strategic co-operation with Russia in the launcher sector, justifying investment from the public sector. Other international co-operations with the USA, Japan, etc., could be investigated for the next generation of launchers.

Most European efforts on launcher development are today focused on upgrading the Ariane 5 system to match market evolution. It will be important, however, to initiate projects, including demonstrators, to anticipate new breakthrough developments leading to drastic cuts in the launch costs and, in consequence, to a competitive advantage for all European space-related activities.

Recommendations

- *European launcher and satellite industry to jointly assess the present situation in the commercial market and to submit to EU and ESA a set of recommendations for public actions in order to ensure a strong, independent, affordable and competitive European access to Space.*
- *Investigate possibilities to maintain a competitive launch base in Kourou (French Guyana).*

- *Devote a significant effort on technological developments that would reduce dramatically launch costs and therefore expand the development of new launch services.*

3.1.2. Space technology

Analysis

Technology development is concerned with providing the necessary technical tools for space projects and space-related services. Actually this development is twofold, with on the one hand the development of specific technologies to support current programmes, and on the other hand the identification of innovative technologies to support future services and applications and the demonstration of these new technologies. Therefore, it has to be seen as an important component in Europe's efforts to ensure the future competitiveness of its space industry.

However, technologies for space must also be considered as part of a wider technology development, thus raising the need for a permanent watch of terrestrial technologies and a dialogue with non-space sectors, in particular service providers. Such a dialogue would be also beneficial in order to identify the most promising fields for targeted innovation. In parallel, efforts to harmonise space technology developments must be increased across Europe so as to maximise efficiency and to ensure that areas deemed strategic are covered.

Against this background, ESA has already deployed a large set of tools. Technology R&D programmes address generic technologies as required for the spacecraft bus, ground segment, payload data exploitation and engineering tools as well as specific developments for programmes. ESA has also specialised R&D programmes contributing to the three objectives of the European strategy for space in Earth observation, telecommunications, navigation, science and exploration, manned space and microgravity, and space transportation.

ESA has also set up a technology strategy process leading to a regularly updated European Space Technology Master Plan (ESTMP), aiming at gathering technology requirements, capabilities and plans from all actors throughout Europe (space agencies, industry) to produce a consistent and harmonised master plan for technology at European level.

A process defining priorities leads to dedicated technology plans (e.g. for solar cells), to the completion of which some or all partners commit themselves. The technology plans are pursued in "variable geometry", involving national activities. The inputs to the ESTMP are frequently updated and the progress is regularly monitored. On the other hand, the next EU R&D Framework programme will for the first time address space as a priority, notably under the thematic priorities "Aeronautics & Space" and "Information Society Technologies". Activities will concentrate on GALILEO, GMES and Satellite Telecommunications.

Recommendations

- *EC fully to participate in ESA's European Space Technology Master Plan and provide its space-relevant technology data, analyses and studies as inputs to that Master Plan.*
- *EC to participate in the prioritisation and selection process within the ESTMP, and to agree with ESA and other partners, e.g. industry and academia, on dedicated plans for specific technologies (which might be led jointly by ESA/EC).*

- *ESA to take a larger role in the New Framework Programme’s activities related to space technology, through upstream consultation in the work programme preparation and in the implementation of integrated projects and networks of excellence in that field.*
- *Consolidate the efforts (which presently amount to approx. 10% of total public investments in space) to be dedicated to technology R&D, with a specific emphasis on targeted innovation and preparation of future services.*

3.2. Objective “Enhancing scientific knowledge”

Analysis

Basic science aims at providing access to knowledge. It is a domain of strategic importance from a technological, economical, cultural and educational point of view. It can also be a tool to materialise the political ambitions of Europe: the Union’s strategic goal for the next decade to become “the most dynamic knowledge-based society in the world” requires a sustained investment in basic science. In particular, the ratio between the European and American space-based science investment should not degrade further.

Space-based science is a trilogy, i.e.: **(i)** science of space: understanding the Universe, our Galaxy and Solar System; **(ii)** science in space: using the characteristics of space, essentially microgravity, to perform experiments in physics and life sciences; **(iii)** science from space: placing observatories in Earth orbit to study the Earth, its climate, atmosphere and overall environment so as to better understand its functioning.

As such, space-based science encompasses ESA and Member State programmes dealing with space science, manned spaceflight, life and physical sciences, and Earth sciences. Furthermore the new European exploration initiative, “Aurora”, should contribute to the scientific exploration of the Solar System by developing the relevant critical technologies and providing the required programmatic tools, and its long-term objectives could have significant political appeal in a vision of European identity.

Basic science is symbiotic with applied science. Non-space industries have a growing interest to access space-based science and instruments for exploitable applications. Although the outcome of such activities is not easily predictable, space-based science directly contributes to technological innovation and industrial competitiveness in setting new and more ambitious scientific targets. It contributes to technological development and enables further exploitation: Earth sciences for instance, using data from remote sensing satellites, prepare the scientific basis for public or commercial environmental services.

Space-based science activities in Europe are part of long-term plans combined in a flexible manner within an overall framework (the “Horizon” concept). All programme activities have priorities set according to the “best-science principle”, on a “peer-review” basis.

Member States are invited to contribute to the ESA missions either via scientific payloads developed and funded by national programmes or via additional funds to complementary ESA programmes. These activities feature a high degree of European integration but should be harmonised in a larger frame of co-ordination such as the European Research Area (ERA) to avoid fragmentation and duplication, to help the scientific community to have better access to space infrastructure and systems and to promote synergies between space and ground activities.

One of the ERA objectives is to establish, on a European scale, a new relationship between science and the citizens, by strengthening the link between research activities, policies and the long-term needs of society. This applies to space based science: achieving a better understanding of the Solar system and the Universe, of our planet, its origin and environment respond to citizens' expectations. Space-based science is strongly evocative of frontier technology and should attract more the interest of the young generations. A concerted effort must be made by all involved entities to improve European citizens' awareness of the positive impact of space-based science to everyday life.

Lastly, it is essential for Europe to stay competitive in space science in order to remain an attractive partner for international co-operation and in global scientific endeavours. This must be preserved and reinforced. This includes attracting promising researchers from third countries, to promote the training of European researchers abroad and then to facilitate their return.

Recommendations

- *Consolidate the position of the European Space Science community vis-à-vis world-wide co-operation and competition. ESA and the EC to network and co-ordinate national and international space-related RTD programmes, to co-ordinate centres of excellence, to launch large integrated strategic projects, and to foster international co-operation programmes beyond today's ESA/EU border, in particular with Eastern European countries, Ukraine and the Russian Federation.*
- *Assess synergies with the European Space Science Committee of the European Science Foundation.*
- *Improve access of research teams to existing state-of-the-art infrastructures, by taking advantage of the newly created EIROforum (European Intergovernmental Research Organisations forum), and by proposing a mechanism for joint infrastructure development promoting the use of the GRID through pilot projects. ESA and the EC to prepare a joint database of ground-based facilities.*
- *Make full use of the International Space Station, with special support for deriving Earth-based applications or preparatory research in particular for non-space industry. Co-ordinate these activities with national programmes in the same domain.*
- *Jointly develop a long-term Action Plan on human resources for space-based sciences and technologies, building on existing organisations (e.g. Euroscience), with the main aim to strengthen human capital and its education and training, to further the dialogue on science, society and citizens, to stimulate the interest of young people and to promote gender balance in space science.*

3.3. Objective “Reaping the benefits for markets and society”

3.3.1. GALILEO

Analysis

The development of a European satellite navigation, positioning and timing infrastructure stems from the political determination to ensure an independent capability in that field. GALILEO, as proposed by the European actors, is a global system, controlled by civilian authorities, to be operational by 2008. Its aim is to offer state-of-the-art, reliable, certified and guaranteed services, fully integrated at local level, and tailored to user needs as identified from the definition phase.

By the time GALILEO will be operational, satellite navigation markets will have reached maturity thanks to existing satellite-based navigation systems such as GPS, GLONASS and their respective regional augmentations (EGNOS). This will allow an early take-up of GALILEO services; GALILEO’s compatibility with GPS should attract a large customer base that will benefit from service improvements stemming out of double constellations, technically independent from each other, and from the service-oriented approach of GALILEO.

GALILEO can support a wide range of policies and users. The system will impact on the Transport Policy and the various transportation modes, and will represent a key component of the Trans-European transport network. Other policies and activities (environment, agriculture and fisheries, energy, research, customs, anti-fraud, monitoring of dangerous goods, ..) will also benefit from its services. Consequently, the EU has to play a decisive role in the overall strategic and political monitoring of the project.

Following the current proposal, the EC provides the political guidelines and overall monitoring of the programme; it also takes care of the viability of the infrastructure whereas ESA will manage the development of the space segment and the associated ground segment.

While the development and validation phase (2002-2005) is expected to be mostly covered by public funds (550 M€ from the EU Trans-European Network budget and 550 M€ from ESA’s budget), a significant investment will be required from the private sector for the deployment phase, according to modalities still to be confirmed.

Although it is too early to draw conclusions, several observations can already be made. Firstly, too much complexity in the decision-making process exposes the project to political fluctuations and procedural delays; secondly, the respective roles of the different parties involved have to be clearly specified early. Lastly, mixing different financial instruments, subject to different rules, timing and decision authorities may be delicate to operate.

To cope with some of these issues and to establish a single management authority, the Commission has proposed, using for the first time article 171 of the EU Treaty, the set up of a single body (“Joint Undertaking”) which would have the overall responsibility for GALILEO during the development and validation phase. The formal decision is expected to be approved at EU Council level in December 2001; conditions of participation of the private sector and third countries in this entity also remain to be confirmed.

ESA has proposed solutions in agreement with Article 171 of the EU Treaty and with the ESA Convention.

Until a final decision (early 2002), the GALILEO interim support structure will provide a support to the Commission to monitor the programme.

Regarding security, in GALILEO terminology, the concern is on the protection of the infrastructure against misuse and intentional threats, these aspects being part of its definition. Security Boards have been created both at EU and ESA levels to address these matters.

Recommendations

The complexity of the GALILEO programme requires a simple and robust management scheme to be set up. The activities listed below confirm the need for a longer-term management arrangement to be adopted:

- *Public funding: Secure funding possibilities from the EU Trans-European Network budget and ESA budget; identify potential research funding possibilities from the next Framework Programme for GALILEO-related activities (services, applications, receivers) other than the development and validation of the space and related ground segment. For the period 2001 – 2006, indicative sources of financing at European level have been identified. As far as 2007 is concerned, the contribution of the Community budget to the funding of Galileo might be examined as part of the process of preparing financial forecasts relating to the period after 2006.*
- *Private sector involvement: develop downstream activities before the GALILEO system is fully deployed in order to attract private investors and early customers. Ensure an adequate private sector involvement in the development of a market approach to GALILEO.*
- *Political dimension: address security aspects in a timely manner and establish the appropriate security mechanism across all phases of the programme. Establish an appropriate dialogue on security issues between the Directorates-General of the Commission, the Secretary General of the Council of the EU/High Representative for CFSP, the Director General of ESA and relevant authorities in Member States. Define the future role of ESA with respect to these issues. Build GALILEO in coherence with the European Strategy for Space and with the political evolution of the European Union.*
- *International dimension: Set up an agreement with the U.S. and with the Russian Federation for system interoperability; promote partnership with third countries; establish guidelines for the participation of these countries and allow them to contribute directly to the programme.*
- *Application dimension: Develop a European Radio-navigation Plan incorporating all navigation means in Europe and ensure standardisation in all application domains.*

3.3.2. Global Monitoring for Environment and Security (GMES)

Analysis

The EU and ESA Councils have emphasised the strategic importance for Europe of independent and permanent access to global information relating to environmental management and monitoring, risk surveillance and the enhancement of safety and civil security. Relevant and timely information will be critical for the definition and implementation of policies within the European Union on the environment, global climate change, agriculture and fisheries, research, sustainable development, regional and international development, humanitarian aid, conflict prevention, crisis management and external relations.

As proposed, GMES is an ambitious concept, reconciling the political demands arising out of environmental and security questions and the scientific and technological capabilities of Earth observation and the information society. The themes of global change, environmental stress and natural and man-made disasters are addressed by the initiative, which will be focussed around the operational needs of European public organisations.

Furthermore, partnerships should be developed with international organisations and groupings such as CEOS (Committee on Earth Observation Satellites) and the IGOS-P (Integrated Global Observing Strategy Partnership).

The aim is to establish by 2008 a European capacity for global monitoring of environment and security and to support the Union's political goals regarding sustainable development and global governance, by facilitating and fostering over the next decade the operational provision of enhanced quality data, information and knowledge.

GMES will establish the foundations for the more efficient collection, integration, and use of geographical information and observations on the state of the environment collected by space, airborne and ground based systems and methods.

GMES brings together the European Commission, the European Space Agency, EUMETSAT, the national space agencies, the European Environment Agency, industry, the national administrations and the scientific communities. The EC and ESA have jointly created an implementation strategy and are defining complementary implementation plans around three main lines of action: **(i)** the supply of information and services corresponding to user needs; **(ii)** the ongoing assessment of needs and production processes and facilitation of the dialogue between users and information providers; **(iii)** the development of the required infrastructures and improvement of services.

To achieve the objectives of GMES, Europe's strength in the R&D domain, built up over many years, will need to be transferred in a sustainable and cost-effective manner to the operational domain. Therefore, right from the beginning, a clear focus on user needs and a strong involvement of industry as main future operator are essential. However:

- Very few user-driven and sustainable information services have been developed so far using Earth observation data (with the notable exception of EUMETSAT services);

- A major challenge lies in the co-ordination of the various emerging national, intergovernmental or international initiatives and systems and their resulting compatibility;
- The sources, instruments or mechanisms for long term funding of GMES are largely unknown and require investigation;
- The security and dual use dimensions of GMES have not been adequately investigated thus far;
- Gaps in the current European Earth observation monitoring capacity are likely to occur as soon as 2006 (end of on going and under development optical and radar imagery missions).

A key concept of GMES is the development of operational, sustainable information services based on a synergy of Earth observation with other technologies (such as information and communication technologies). In this respect, lessons can be drawn from the development of operational meteorological services using satellite data and the subsequent creation of EUMETSAT. This requires the establishment of a sound user base, the accompanying legal and policy framework, the development of technology to provide operational information services, and, finally, the implementation of such technologies into the operational information collection cycle of the user community. A close co-operation between the EC, representing and federating the demand side (user and policy domain), and ESA, representing partially the supply side (Earth observation from space), and other suppliers of environmental and related data is mandatory in this process.

Recommendations

- Set up rapidly robust and effective organisations, institutional arrangements and procedures for *involving the GMES stakeholders (in particular users) and for defining and meeting the needs of users for operational services (e.g. GMES Support Team and GMES Steering Committee).*
- *Establish a close co-operation between ESA and EC in the implementation of the Sixth Framework Programme activities related to Earth Observation through upstream consultation of ESA in the work programme preparation and evaluation of the activities, and EC involvement in the relevant ESA activities.*
- *Identify potential funding possibilities for the programmes required to provide the identified operational services to public sector users. Identify potential funding possibilities from the ESA budget and from the current and next Framework Programmes for GMES-related activities.*
- *Establish an appropriate dialogue on security and dual use issues between the Directorates-General of the Commission, the Secretary General of the Council of the EU/High Representative for CFSP, ESA and relevant authorities in Member States. Determine the future role of ESA with respect to these issues.*
- *Involve industry as soon as possible in the definition of the appropriate tools and services in order to create sustainable and cost effective services and to ensure European competitiveness.*

- *Explore, where appropriate, and take into account both the need for autonomous access to information in some strategic fields and the possibilities for international co-operation (e.g. in the frame of CEOS) in fulfilment of EU policies on global environmental monitoring, climate change, security, external relations, aid etc.*

3.3.3. Satellite communications

Analysis

Fuelled by the Internet expansion, the demand for telecommunications services in both business and residential markets has grown considerably, producing an overall turnover in 2000 of more than €1 trillion. More recently, the burst of the 'Internet bubble' and the uncertainties faced by the mobile industry have raised doubts on the continuing growth of the sector and have highlighted the critical impact of the regulatory context and of technological maturity on market developments.

There is, however, little doubt that the trend towards obtaining more broadband, generalised Internet access, the availability of sophisticated applications and the general increase of mobility will continue.

Satellite based services constitute a relatively small but important part of the overall telecommunications market. Total satellite communications industry revenues accounted for €30 billion in 2000 and are expected to grow to almost €110 billion by 2007. More than 50% of the overall satellite capacity is dedicated to broadcasting, with some 100 million European homes receiving TV from satellites either directly or by means of cable distribution systems connected to master satellite system receivers.

The majority of future industry growth is expected to occur in the following fields: **(i)** interactive multimedia (use of satellite services to by-pass terrestrial bottlenecks and to provide access in areas beyond the reach of terrestrial technologies); **(ii)** mobile voice and data services; **(iii)** digital audio radio systems, to offer multiple, high quality radio channels and data services.

Convergence of mobile and broadcasting services is also considered as a promising avenue to open up new markets and applications. This evolution towards the mass market provision of telecom services will have the following consequences: **(i)** a growing requirement seamlessly to integrate terrestrial systems with satellite systems; **(ii)** a changing role for the satellite communication operators, who will have to manage end to end services, rather than just selling capacity; **(iii)** a growing need for standards, so as to avoid addressing mass markets with different terminals for satellite and terrestrial usage.

In the communications satellite manufacturing sector, European industry has acquired a strong position on the world market, winning a large share of the open market for geostationary satellites. European operators are also major world players. The challenge is now for them to continue to increase their market share in a rapidly changing environment, which implies considerable investments in R&D.

Integration of space navigation and earth observation with satellite telecommunications may prove beneficial, allowing for the development and implementation of many specific value-added services with high potential economic and, in some instances, strategic value. This, however, requires further analysis, in particular regarding the respective positioning of satellite and terrestrial communication for the provision of these integrated services.

By and large, satellite telecommunications must be seen in the broad context of Community policies such as: information society (for regulatory framework), competition, trade (for commercial and international regulatory agreements), development aid, culture, transport and environment. In this context, the information society regulatory policy encompasses the Community's efforts to foster a competitive market for satellite communications and the establishment of a new framework for a co-ordinated spectrum policy at Community level, frequencies being a scarce resource critical to all satellite communication systems.

Regarding the research policy an improved co-operation between the Community and ESA is required, since European actors do not benefit from the same level of public investment as the USA, where most of the R&D budget (10 times larger than that of Europe) comes from the Department of Defence, with a substantial transfer of dual use technology to civil applications.

Up to now, ESA programmes have brought the space industry together around ambitious satellite communication programmes and fostered the emergence of a competitive satellite communication sector in Europe. They now aim to support future evolution of satellite communication towards the provision of broadband interactive services in the mobile, fixed and broadcasting communication domains.

The information society technologies' programme of the EU Framework Programme does not address space borne equipment in an isolated manner but aims at validating the related technologies and services in a mixed satellite-terrestrial environment, and at optimising interoperability. This scheme provides the space industry with a unique opportunity to have a direct access to the evolution planned by the terrestrial sector and to establish further links with terrestrial players. Another main objective is to reach industry consensus on key technological issues and associated standards (e.g. UMTS) with adequate linkage to relevant regulatory issues.

Up to now, co-ordination of EC and ESA activities has been done on an ad-hoc basis. Contrary to earth observation or navigation where the deployment of space infrastructures is supported by public entities under a political initiative, there is no obvious publicly-led co-ordination framework for telecommunications, where operational infrastructures are directly deployed by the private sector.

Recommendations

- *Foster the development of satellite communications to provide advanced services to European citizens in the context of policies supported by the Union such as Education, Health, Transport, Environment and e-Europe.*
- *Ensure that appropriate consultation takes place between the joint EC/ESA space policy and the co-ordination scheme to be established in the field of frequency spectrum policy.*
- *Jointly study potential value-added services taking benefit from the integration of European space infrastructures in telecommunications, navigation and earth observation.*
- *Continue to use the existing Satellite Action Plan group, with strong support from industry and operators, as a focal point for the above-related issues and for the*

implementation of the ‘non research policy issues’ of the European Strategy for Space in the telecom domain.

- *Organise a joint consultation with industry on the topics to be addressed under a joint EC/ESA scheme.*
- *ESA to take a larger role in the implementation of the next EU R&D Framework programme activities related to satellite communications, through upstream consultation in the work programme preparation and by taking a leading role for the implementation of potential integrated projects or networks of excellence in the field of satellite communications.*
- *Identify potential funding possibilities for the implementation of jointly developed projects in the short-term.*

3.4. Horizontal Aspects

3.4.1. Industrial aspects

Analysis

During recent years, globalisation and the increasing commercialisation of space caused a significant restructuring of the industrial space sector both world-wide and in Europe. The European space industry shows balance between commercial and institutional activities, in contrast to the US industry operating mainly in institutional activities, which represents nearly 80% of its turnover.

In the light of this restructuring, Europe’s industrial policy has to ensure the existence of the necessary technological and industrial base in space, in order to ensure European independence in strategic key areas and a high degree of global competitiveness and cost-effectiveness, as well as to meet Europe’s developing common security and defence requirements.

Today, industrial policies of the European Union and ESA show some significant differences. While the Union’s policy is dedicated to establishing an over-all European framework for industry in general, ESA’s industrial policy is strictly dedicated to the space sector. It features elements (especially geographical return) known from related sectors like defence, where European independence and Europe’s wish to be present in a strategic market are key objectives. The priorities of ESA’s industrial policy are to support the competitiveness of European industry and foster a balanced European space industry; to ensure fair access to ESA activities for all firms; to enhance the cost effectiveness of ESA programmes; and to ensure equitable participation by each State commensurate with its investments in ESA programmes.

The Community’s broad notion of industrial, or as it is now called, enterprise policy, has always been considered to encompass all of the policy areas which have a direct impact on the life of enterprises and the conditions for their competitiveness (i.e. policies on the Internal Market, Economic Affairs, Competition, Trade, External Relations and other areas, as well as R&D where an explicit reference is set out in Art. 163 of the Treaty).

Areas for harmonisation, co-operation, synergies and joint actions between the European Commission and the European Space Agency with respect to enterprise policy have been identified. Furthermore, the EC and ESA should use the GALILEO and GMES programmes

to better understand and harmonise their industrial policy requirements and their implementation.

EC and ESA share in particular the view that small and medium enterprises (SMEs) can play an important role in the exploitation of the technologies developed under institutional funding because they are close to the market and users, present everywhere and are capable rapidly to innovate and adapt to needs. Both institutions intend to encourage this exploitation in particular in the fields of navigation, telecommunications, environmental security, risk monitoring and civil security.

Recommendations

- *Establish an institutionalised co-operation between the EC and ESA actions in favour of SMEs. This co-operation will cover joint actions to boost the technological capacities of SMEs and their ability to operate on a European and international scale in the space and non-space sectors. A detailed action plan will be established by the end of 2001.*
- *Publish from 2001 on a bi-annual basis joint reports on the status of the space industry. The next ESA study on the structure of the European space industry (focusing on the satellite equipment manufacturers, the launch sector, the software sector and the ground segment providers) should involve all concerned EC services during the progress meetings.*
- *Regarding space, in EC cases related to competition, ESA is invited to comment following publication in the Official Journal. The Joint Task Force may further investigate how to organise ESA support.*
- *EC and ESA to define joint actions to maximise the benefits that space industry can draw from the EC Multiannual Programme for Enterprise and Entrepreneurship.*
- *Building on existing elements such as High level Space Industry Panel, EC and ESA to establish a structured joint process of dialogue with industry on matters of common interest between the two organisations and in particular the development and implementation of the joint strategy.*

3.4.2. International aspects (co-operation and enlargement)

Analysis

The European Strategy for Space as developed in 2000 underlines the need for Europe to show coherence vis-à-vis third countries. This means that on the space scene – be it regional or global – Europe (i.e. the EU, ESA and the Member States) has to speak in unison in order to enhance its credibility and the effectiveness of its activities. This requires a greater transparency and a better information flow before any European actor engages in non-commercial co-operation with an outside partner. This latter aspect not only applies to Europe's co-operation with the US, its most important partner, and other space powers like Russia, Japan, China and India, but also to Europe's increasing co-operation with emerging space nations.

The biggest step forward could be achieved with Russia, in line with the political will of the EU to build a strategic partnership. ESA would become an instrument for the concrete and effective implementation of such a partnership for Space. This new co-operation with Russia

focuses on GALILEO, GMES and launchers. It is now in the process of being embedded into the overall foreign policy of the Union with Russia (Partnership Co-operation Agreement, Science & Technology Agreement, and then Space Dialogue).

The association of Canada to ESA and the long-standing co-operation with the USA in space science and the International Space Station must be reflected in this new approach to embrace space in the EU policies for international co-operation.

Closer to the Union, the Enlargement process facing the EU, and ESA potentially, poses a unique challenge, without precedent in terms of scope and diversity: the number of candidates, the area (increase of 34%) and population (increase of 105 million), the wealth of different histories and cultures. The use of space systems can speed up the modernisation of candidate countries infrastructure (e.g. broadcasting, transport management, customs, civil protection).

With the endorsement of the new European Co-operating States model agreement (ECS) by ESA Council in March 2001, which will help to strengthen the link between ECSs and the Agency in order to facilitate their potential future accession to ESA, it will be possible to harmonise the schedules and to benefit from mutual synergies for full accession of candidate states to the Union and ESA.

Recommendations

- *Explore the possibilities to embed the co-operation in Space into the overall foreign policy of the EU. Perform a joint analysis to be submitted to the Union's appropriate group/committee dealing with external Relations and ESA's International Relations Committee.*
- *EC and ESA to elaborate further the detailed contents of the future co-operation in Space with Russia, with a view to achieving a new strategic partnership.*
- *EC and ESA to investigate the benefits of Space applications with respect to Enlargement of the Union. ESA and EC to initiate before mid-2002 a study together with candidate countries on the potential benefits of space in the adaptation of infrastructures.*
- *EC and ESA to co-ordinate closely the activities of their representations and delegations in third countries.*

4 TOWARDS THE NEXT STAGE: SETTING UP OF A POLITICAL AND INSTITUTIONAL FRAMEWORK CONDUCTIVE TO THE ESTABLISHMENT OF A EUROPEAN SPACE POLICY

Space in Europe has entered a new phase. It has evolved from being a research endeavour and instrument to become a unique and critical technology enabling Europe to address and achieve a large number of the goals embedded in policies such as economic growth, information society, transport and energy infrastructure, environment protection and peace-keeping.

Space must become an integral component of the European Union's core policies. The first benefits of such a development are already highlighted by the GALILEO and GMES initiatives. Furthermore, Space provides the means to support the efforts linked to Europe's

enlargement and to enable the EU to spread its influence and consolidate its role on the world scene.

Confronted with the competitive pressure coming from other regions of the world, the European space actors cannot afford to address space issues in a dispersed and fragmented way. In this respect, Europe must now commit to support a clear European space policy and identity. In the spirit of subsidiarity, all efforts and resources, be they public or private, undertaken at regional, national or European level, must fit within a coherent, common vision, strategy and policy.

In order to play its full role as a major space power, Europe must be able to do better with the means at its disposal and to optimise the political and institutional framework that sets its operating conditions in the space sector. This process will take some time, but its dynamics will open new opportunities and developments.

The European Strategy for Space, as defined in 2000, underlines the importance of Space as a cross-sectorial strategic asset and policy instrument. It should lead to the definition and establishment of a genuine European Space Policy, which would combine eventually the strategy per se, a European Space Programme (an essential element due in particular to its structuring effect on the space constituency), as well as a set of implementing rules. It would initially build on a detailed review of concrete on going or planned initiatives such as GALILEO and GMES, and on the general status of implementation of the European Strategy for Space. It would also provide a broad view at all levels (EU, ESA and national). Regarding its implementation, a prominent role would be foreseen for the Network of Centres (including European and national organisations) led by ESA, in line with the European Research Area concept.

To progress on this way, a series of actions need to be considered:

- ESA has proved to be an efficient instrument for channelling the efforts of its Member States and developing the competitiveness of the European space industry. The flexibility of its programmes must be maintained, making it possible for different programmes to be initiated by different national or other configurations (“variable geometry”). The Community should, where appropriate, contribute to ESA programmes. In this respect, it should be granted an appropriate status within the ESA Council.
- ESA’s effectiveness, which must be preserved, should be applied to a broader scope. In line with the rapid developments occurring in the field of security (e.g. the newly created EU Satellite Centre), its activities should be extended to programmes related to the development of a European Foreign and Security Policy, considering the dual aspects of technology, systems and industry.
- To improve the political decision-making process and guidance, especially for relations between the EU and ESA, it appears beneficial to convene in future joint informal meetings of the EU Council and ESA Ministerial Council, based on an appropriate joint preparation.
- In order to maintain the momentum of the current strategy, the European Space Policy as defined above should be jointly and urgently developed by all parties involved, i.e. the European Commission, the ESA Executive and EU and ESA Member States, in compliance with their respective roles. The Secretary General of

the Council of the EU/High Representative for CFSP should also be involved for security and defence aspects⁴. The European Space Policy would be reviewed by a joint informal meeting of the EU Council and ESA Ministerial Council.

- To reach an optimum integration of space capabilities and infrastructures into the Union's overall policies and to support the focussing of space activities towards the needs of the users and citizens, this European Space Policy has to be presented at the highest level for political endorsement. It is only Heads of State and Governments, meeting at their European Councils, who can consider the European Space Policy in full, including security and defence aspects. This policy could be presented for the first time at the European Council in the second half of 2003. Later on, it should be regularly updated (every three to five years) so as to be politically validated by the European Council.
- It has become clear that the policy development process and its implementation depend firstly and critically on the co-operation between the European Union and ESA both at political and executive levels. The formalisation of their co-operation has, therefore, to be immediately addressed. In a first step, a Framework agreement between the two entities, outlining both the policy development and implementation issues, is necessary.
- Looking to the longer term, the on-going debate on the future of the European Union may provide an opportunity to consider whether the development of the European Space Policy can be assisted by modifications to the current EU Treaty. However, for a successful introduction of such modifications, the political debate has to be entered as early as possible.
- At Community level, one particular issue related to the future Treaty may be the consideration of whether decisions relating to the European Space Policy are taken under co-decision by the EU Council and European Parliament.
- If changes to the EU Treaty were to be made, consequential changes to the ESA Convention could be needed.

Recommendations

Short-term (up to the end of 2002):

- *Explore the possibilities to negotiate and conclude a Framework agreement between the European Community and ESA to take forward the process of developing the future European Space Policy as well as ESA's additional role as the "implementing agency" (see glossary in Annex) of public programmes under the initiative of the EU.*
- *Perform a thorough analysis to define ESA's future additional role as the "implementing agency" of the EU taking into account the experience acquired in the on-going co-operation in GALILEO and GMES. This should also take into account the latest developments regarding the Community's 6th Framework programme for RTD and the on-going ESA activities and possible future programmes.*

⁴ These latter aspects are only partially addressed in this Report due to current existing institutional limitations.

- *Prolong the mandate for the JTF and JSSAG until the conclusion of the Framework agreement. The agreement could include the definition of a permanent structure as follow-on to the Joint Task Force, instrumental in the shaping of the European Space Policy.*
- *Hold the first “Space Council” (i.e. a joint informal meeting of the EU Council and ESA Ministerial Council) before mid-2002, to discuss in particular institutional issues and Space Policy related matters.*
- *Establish a regular platform for dialogue between the European Commission, ESA Executive, EU and ESA Member States and the Secretary General of the Council of the EU/High Representative for CFSP.*

Medium Term (2003):

- *Present the European Space Policy to the European Council, taking account of the views of the “Space Council”.*

Long Term (beyond 2003):

- *Profit from the general debate on the future of the Union to consider whether the development of the European Space Policy can be assisted by modifications to the current EU Treaty. Were changes to be made to the EU Treaty, the ESA Convention could be amended accordingly.*

ANNEX

GLOSSARY:

European Council: Regular meetings (usually held once or twice under each EU Presidency) of the EU Heads of State and Governments.

European Space Policy: The European Space Policy is mainly composed of the European Strategy for Space, European Space Programme (ESA and national Programmes), implementing process and associated budgets.

European Strategy for Space: The Strategy provides the major guidelines for establishing a coherent approach for space in Europe. It constitutes a strong political reference for public and private actors to act in the field of space and for their individual and co-operative efforts to build a coherent and effective space infrastructure. It also constitutes a basis for consulting and mobilising society at large on the benefits that can be derived from space-based information and knowledge.

Framework Agreement: Agreement defining the frame of the political and financial co-operation between the European Community and ESA.

Implementing Agency: In the Space Strategy context, this terminology refers at a public institution, having specific competencies in space and related domains, to which the implementation of a relevant initiative (required for a project or policy of which another public institution is in charge), is entrusted, under specific conditions agreed with this other institution.

JTF: The Joint Task Force, set up by the ESA Executive and the Commission, reviews the strategy and its implementation and elaborates proposals for framework arrangements for the management of joint projects. The JTF is composed of staff from the ESA Executive and the Commission services.

JSSAG: The Joint Space Strategy Advisory Group advises and accompanies the work of the Joint Task Force on all issues related to Space, notably on the further development and implementation of the European Strategy for Space. The JSSAG is composed of representatives from EU and ESA Member States. It is convened and co-chaired by the Commission and ESA Executive.

Space Council: Informal meeting of EU Council and ESA Ministerial Council. The Space Council provides the European Space Policy with the necessary impetus for its development and sets out general political orientations for that policy.