Resolution on the European Space Policy

ESA Director General's Proposal for the European Space Policy

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Twenty-nine European countries unveiled a new space policy on 22 May 2007. The European Space Policy has for the first time created a common political framework for space activities. Jointly drafted by the European Commission and ESA's Director General, Jean-Jacques Dordain, the European Space Policy sets out a basic vision and strategy for the space sector, and tackles issues such as science, applications including security and defence, access to space and exploration.

Based on that European Space Policy, the Resolution adopted by the 'Space Council' of ESA and European Union ministers defines a vision for Europe in space and provides guidelines for implementing that vision.

Contents

Resolution on the European Space Policy

THE COUNCIL

HAVING REGARD to the Framework Agreement between the European Community and the European Space Agency, entered into force in May 2004 and the increasing cooperation between the two parties,

RECALLING the orientations of the 'Space Council' meetings of 25 November 2004, 7 June 2005 and 28 November 2005,

RECALLING the decisions of the ESA Council at Ministerial level in 2005 and the adoption of the European Community's Seventh Framework Programme in 2006, implying a long term commitment to support the development of the GMES space component and for GMES data access,

HAVING REGARD to the United Nations Outer Space Treaty framework,

I Vision for Europe and General Strategy

HIGHLIGHTING that the space sector is a strategic asset contributing to the independence, security and prosperity of Europe and its role in the world and RECOGNISING the actual and potential contributions from space activities towards the Lisbon strategy for growth and employment by providing enabling technologies and services for the emerging European knowledge society and contributing to European cohesion,

EMPHASISING the unique contributions space-based systems can provide to the overall research effort and to applications responding to European policies and objectives, RECOGNISING that the exploration of space contributes to answer far-reaching questions on the origin and evolution of life in the Universe as well as on the fundamental laws of physics,

UNDERLINING that space represents a significant element of Europe's Sustainable Development Strategy and is relevant to the Common Foreign and Security Policy, supporting their goals by providing vital information on critical global issues such as on Climate Change[1] and humanitarian aid,

RECOGNISING that for these reasons Europe cannot afford to lose out securing the benefits of space for its citizens and its policies and that Europe's space policy will allow Europe to continue to develop and make the best use of world class space infrastructures and applications, in order to stay a major player, solve global problems and improve the quality of life,

EMPHASISING that all of Europe's space activities contribute to the goals and fully respect the principles set out by the United Nations' 'Outer Space Treaty', in particular:

- the exploration and use of outer space for the benefit and in the interests of all countries and the recognition of outer space as a province of all mankind,
- the use of outer space for exclusively peaceful purposes,
- the promotion of international co-operation in the exploration and use of outer space,

and that Europe supports the on-going efforts of the United Nations' Committee on the Peaceful Uses of Outer Space (COPUOS) on the mitigation and prevention of space debris,

RECOGNISING the inspirational ability of space activities in attracting young people into science and engineering,

1. *With reference to the recent report of the United Nations' Intergovernmental Panel on Climate Change and the significant contribution space-based information systems can provide in this context for the future of our planet.*

HIGHLIGHTING the rapid growth of the markets for satellite-based navigation and telecommunication applications,

EMPHASISING that Europe is among the leading space-faring actors in the world and remains committed to maintaining its position both via strengthened intra-European and international cooperation,

1. WELCOMES AND SUPPORTS the document on the European Space Policy, presented as a proposal of the ESA Director General and as a Communication of the European Commission, as a next step in establishing a coordinated and effective European space effort at the service of the European citizens,

2. TAKES NOTE OF the 'Preliminary elements' of the European Space Programme associated with the ESP as a strategic planning tool, comprising all major space activities in Europe thereby supporting the optimization of public resources and skills when deciding and implementing the space policy,

3. INVITES the Member States to continue to support European objectives and European-level programmes including, where appropriate, with their national programmes and activities, thereby ensuring effectiveness and complementarity as to the European effort,

4. INVITES the European Commission, the ESA Director General and Member States, within the scope of the Framework Agreement, to monitor and evaluate the implementation of the European Space Policy,

II Further Steps – Programmes and Implementation

A. APPLICATIONS

5. WELCOMES the combined efforts of ESA and the European Union to implement large user-oriented initiatives such as GMES and Galileo as well as the beginning efforts for increased development and exploitation of space related integrated applications, including in particular satellite communication services,

   WELCOMES the European Commission's activities to further federate user-driven institutional demand in Europe, stemming from the policies of the European Union,

   CALLS FOR the introduction of regular independent quality and cost-efficiency assessments of large user-oriented space-based initiatives, involving users and Member States, with the objective of validating quality, relevance and cost-efficient performance of the overall systems and their services in the operational phase in order to further strengthen the user oriented approach,

6. RECOGNIZES the strategic value of sustainability for GMES and REAFFIRMS the objective for an operational and autonomous capability for GMES before the end of 2008 and EMPHASISES that the European Commission needs to propose for GMES in due time and after full consultation with Member States and ESA, arrangements for:

   (i) financing, including facilitation of funding by the users

   (ii) operational infrastructures, and

   (iii) effective management – to become fully operational and to ensure sustainable services responding to identified user needs,

WELCOMES the initiatives under the Austrian and German EU Presidencies towards the European Earth Observation Services GMES (i.e. the Graz Dialogue and the Munich Roadmap),

WELCOMES the approach to set up a preparatory action of the European Commission for the operational phase of GMES,

REAFFIRMS that GMES will use to the maximum extent possible existing capacities on European and national level, complementing each other.

7. SUPPORTS the joint efforts of the European institutions, ESA and the European industry to establish in the coming years a commercially sustainable global civil navigation satellite system under European civil control,

B. SECURITY AND DEFENCE

8. RECOGNIZES that space technologies are often common between civilian and defence applications and that Europe can, in a user-driven approach, improve coordination between defence and civilian space programmes, pursuing in particular the synergies in the domain of security, whilst respecting the specific requirements of both sectors and the independent decision competences and financing schemes,

AFFIRMS the need to set up a structured dialogue with the competent bodies of the Member States and within the EU Second and Third Pillars and the European Defence Agency for optimizing synergies between all aspects of the European Space Policy within the framework of the existing attribution of competences,

RECOGNISES that the uses made by any military users of Galileo or GMES must be consistent with the principle that Galileo and GMES are civil systems under civil control, and consequently that any change to this principle would require examination in the framework of Title V/TEU and in particular Articles 17 and 23 thereof, as well as in the framework of the ESA Convention.

C. ACCESS TO SPACE

9. EMPHASISES the vital importance for Europe to maintain an independent, reliable and cost-effective access to space at affordable conditions, as underlined in the EC-ESA Framework Agreement and in the Resolution on the evolution of the European launcher sector adopted during the ESA Council at Ministerial level in 2005, bearing in mind that a critical mass of launcher activities is a precondition for the viability of this sector,

RECOGNIZES the need for Europe to take advantage in a coherent way of the launcher assets under its control,

INVITES the ESA Director General to ensure continued development and coordination of European technological capabilities in order to pursue the long-term competitiveness of the European launcher sector with the objective to maintain and increase the presence in the commercial market,

D. INTERNATIONAL SPACE STATION AND EXPLORATION

10. EMPHASISES the political and scientific importance of the International Space Station (ISS) and of exploration, and REAFFIRMS the continued strong and unified European commitment regarding its ISS contributions undertaken by ESA and its Member States,

CALLS on the international partners to the ISS to continue their support to ensure that the objectives of ISS partnership are maintained in their entirety, and STRESSES that the continuity of such partnership is an asset for future exploration endeavours,

ENCOURAGES the utilization of the ISS for research and development in the European Community's research framework programme,

EMPHASISES the importance of a proactive ESA participation in the preparation of future international exploration programmes, with the objective of ensuring a significant targeted and coordinated European role in this endeavour,

E. SCIENCE AND TECHNOLOGY

11. STRESSES the goal of maintaining world class scientific programmes and a clear European leading role in selected areas contributing to the build-up of the European Research Area,

RECOGNISES that the existing combined European skills and efforts, in particular in the frame of ESA, allow Europe to succeed in the most challenging enterprises and to reach a level of excellence for discovery and innovation in the global context,

CALLS on the European Commission, ESA and Member States to stimulate educational programmes in Europe,

EMPHASISES the importance of innovation and technological development also for the competitiveness of industry and the commercial success of its products and services,

STRESSES the need for a targeted approach for the development of strategic components, concentrating on selected critical components, for which dependency of European industry on international suppliers should be avoided, in order to achieve the optimum balance between technological independence, strategic cooperation with international partners and reliance on market forces,

F. GOVERNANCE

12. APPRECIATES that ESA has, for more than 30 years, provided an efficient structure for European cooperation on joint space projects, which could require though further flexibility and some evolution, and NOTES that the independence and reliability of ESA, thanks to the growing support of its Member States, contributes to the increasing role of Europe through the successful development of the European space sector and to the strong position of European space industry on world markets,

REAFFIRMS the roles and responsibilities of the European Union, ESA and Member States, as identified in the Orientations of the second meeting of the 'Space Council'. On the basis of such roles and in order to draw advantage of ESA experience and institutional setting, CALLS on the European Commission to draw on the management and technical expertise of ESA for managing the European Community-funded R&D space infrastructure programmes with ESA coordinating the relevant agencies and entities in Europe,

Such ESA role should also include:

– supporting the European Commission as technical expert in the elaboration of European Community initiatives involving space-related activities and relevant work

programmes, and in the selection and monitoring of relevant work contractors,

– the management by ESA of European Community space-related activities in accordance with the rules of the European Community,

INVITES Member States – under the coordination of ESA – and in the case of significant European Community activities, in close cooperation with the European Commission:

– to provide the best expertise for European space programmes (such as GMES-Space Component, exploration programmes and future launcher programmes),

– to increase synergy between national, ESA and EC contributions to these programmes leading progressively to an integrated programmatic approach while respecting national sovereignty,

SUPPORTS the continuation of the Framework Agreement beyond May 2008 as the basis for the cooperation between the European Community and ESA, in the understanding that the Framework Agreement and its implementation will be periodically assessed and improved, if necessary, and RECALLING the invitation expressed in the orientations of the second meeting of the Space Council for a wide-ranging appraisal of possible cost-efficient scenarios for optimizing the organization of space activities in Europe, INVITES Member States, the European Commission and the ESA Director General to look for possible improvements of this cooperation, in order to further develop the orientations of the second meeting of the Space Council into more operational and practical arrangements, notably with regard to the issues listed in Annex 1,

13. RECOGNIZES the valuable contribution to the European Space Programme made by EUMETSAT, and INVITES EUMETSAT to keep participating in future meetings of the Space Council as an observer,

G. INDUSTRIAL POLICY

14. RECOGNIZES that ESA has a flexible and effective industrial policy based on cost efficiency, competitiveness, fair distribution of activities and competitive bidding, which secures adequate industrial capacities, global competitiveness and a high degree of inner European competition for efficient European cooperation on joint space projects, thus providing the basis for the successful development of space in Europe,

EMPHASISES in this context in particular the political and economic dimension of ESA's 'fair return' principle; and the importance to assess and improve, when necessary, the implementation of the 'fair return' principle in view of the future challenges for industry to remain competitive in a changing environment worldwide while maintaining, and possibly increasing, Member States' motivation to invest in space,

15. EMPHASISES the crucial role of SMEs and the supplier industry for innovation and the exploration of new market opportunities,

16. INVITES the European Commission to develop adequate instruments and funding schemes for Community actions in the space domain, addressing notably the issues listed in Annex 2, taking into account the specificities of the space sector, the need to strengthen its overall and its industry's competitiveness and the necessity of a balanced industrial structure,

H. INTERNATIONAL RELATIONS

17. INVITES the European Commission, the ESA Director General and the Member States to develop and pursue a joint strategy and establish a coordination mechanism on international relations. This strategy should be consistent with Member State activities and is aimed at strengthening Europe's role in the global space field and at benefiting from international cooperation, notably with respect to the issues listed in Annex 3,

I. IMPLEMENTATION

18. INVITES the European Commission and the ESA Director General to propose an implementation plan for the European Space Policy in order to establish a process of regular monitoring and priority setting, taking also into account the issues listed in the Annexes.

Annex 1

1. **Key issues for further developing the orientations of the second meeting of the Space Council into more operational and practical arrangements:**

   - Developing financial instruments suitable for an efficient implementation of space projects,

   - Identifying final users of GMES services and their needs; develop an integrated and customized offer, including also the regional and local level,

   - Defining the conditions under which satellites belonging to Member States and their data and services will be made available to GMES; the treatment of the contributions of national programmes to EU-initiatives, here in particular GMES.

Annex 2

2. **Key issues to be considered in the implementation of instruments and funding schemes for Community actions:**

   - Developing a coherent data policy – including data access and pricing – conducive to the rapid development of the space services sector,

   - Encouraging new financing schemes such as Public/ Private Partnerships in the market for space applications and services, including through public support for R&D,

   - Provision of suitable measures in support of technological innovation, involving lead market initiatives, public procurement and support for suppliers and small and medium sized companies and industries,

Annex 3

3. **Key issues to be considered in the development of a strategy for international relations:**

   - Improving access to third markets for European space products and services,

   - Reducing the cost of acquiring space systems by the targeted use of international cooperation,

   - Enabling Europe to participate in ambitious programmes the cost of which is too great for any one space power,

   - Attracting international partners to European conceived programmes, like in the case of Galileo and reinforcing the contribution of Europe to global initiatives, like in the case of GMES,

   - Making full use of the potential of space systems for sustainable development, namely in support of developing countries, in particular in Africa.

ESA Director General's Proposal for the European Space Policy

This is a document developed jointly with the European Commission and issued on 26 April 2007 as a Communication from the Commission to the Council of the European Union and the European Parliament under reference COM(2007)212.

1

INTRODUCTION

'In the middle of the 20th century, we saw our planet from space for the first time. Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset the human self-image by revealing that the Earth is not the centre of the Universe. From Space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery and soils'.[1]

Space helps us understand the fragility of our planetary systems and their complex interrelation. It also gives us the tools to address many other challenges of the 21st century. It is essential and urgent to make effective use of these tools in the implementation of a wide range of policies. Space-based systems provide improved weather forecasts, satellite broadcasting and advanced navigation services; they open up new opportunities in tele-education and tele-medicine. They are critical to key areas of the economy: communication systems, electrical power grids, and financial networks all rely on satellite timing for synchronisation. Satellite communications will bring benefits for every citizen by providing cost-effective solutions for services such as high-definition TV, broadband or mobile TV, in particular for remote and rural areas. Space also contributes to the knowledge-based society, providing the tools for understanding our planet, its origins, its environment, the Solar System and the Universe. Space can contribute to European cohesion and identity, reaching citizens across all countries. It can also provide valuable support to European external policies, particularly humanitarian aid and sustainable and development policy.

Space in Europe has been successfully developed over 30 years in the framework of ESA. However, at a time when new powers are emerging with high ambitions and capabilities as regards space, Europe cannot afford to lose out on securing the potential economic and strategic benefits of space for its citizens. Europe must make further efforts to preserve and improve its global competitive position. It must remain a leader in space systems and hence an indispensable international partner providing first class contributions to global initiatives.

With the arrival of the new millennium, the need to establish a comprehensive European Space Policy to respond to these challenges has been widely recognised by the EU, ESA and their Member States. It has been endorsed by EU Heads of State and Government and was affirmed at the second meeting of the Space Council in 2005. The European Space Policy should allow the EU, ESA and their Member States to increase coordination of their activities and programmes, and organise their respective roles relating to space, providing a more flexible framework to facilitate Community investment in space activities. This is equally true in the areas of security and defence space programmes and in the integration of space policy into a range of the EU's external relationships.

Important steps have been taken to strengthen the relationship between ESA and the EU, including the establishment of the EC-ESA Framework Agreement[2] and launching the European flagship projects Galileo and GMES[3].

The Commission set out the preliminary elements of the space policy in its communication of May 2005[4]. The Competitiveness

1. *Our Common Future: Report of the World Commission on Environment and Development, UN 1987*
2. *Council Decision on the signing of the Framework Agreement between the European Community and the European Space Agency (12858/03 RECH 152 7 October 2003)*
3. *Global Monitoring for Environment and Security*
4. *European Space Policy - Preliminary Elements COM(2005) 208 final, 23.05.2005*

Council of the EU and the Ministerial Council of the ESA, meeting in June 2005 under the Framework Agreement as the 'Space Council', responded by setting out guidance on the content and nature of the European Space Policy and the accompanying preliminary elements of a European Space Programme.

Accordingly, this document has been compiled in consultation with the Member States of both organisations and other interested stakeholders. This first-ever European Space Policy is a joint document of the European Commission and the Director General of the ESA.

2

Strategic Mission of the European Space Policy

The development of a truly European Space Policy is a strategic choice for Europe, if it does not want to become irrelevant. **Space systems are strategic assets demonstrating independence and the readiness to assume global responsibilities. Initially developed as defence or scientific projects, they now also provide commercial infrastructures on which important sectors of the economy depend and which are relevant in the daily life of citizens. However, the space sector is confronted with high technological and financial risks and requires strategic investment decisions.**

Europe needs an effective space policy to enable it to exert global leadership in selected policy areas in accordance with European interests and values. To fulfil such roles, the EU increasingly relies on autonomous decision-making, based on space-based information and communication systems. Independent access to space capabilities is therefore a strategic asset for Europe.

The space sector is a driver and enabler for the Partnership for Growth and Jobs. Space is a €90 billion market worldwide, growing at 7% per annum. European companies secure 40% of the commercial markets for satellite manufacturing, launch and satellite services. Space also offers great scope for high-technology innovation in selected areas, opening the possibility for the development of lead markets.

To respond to the challenges described above, **the strategic mission of a European space policy** will be based on the peaceful exploitation of Outer Space by all states and will seek:

- to develop and exploit space applications serving Europe's public policy objectives and the needs of European enterprises and citizens, including in the field of environment, development and global climate change;
- to meet Europe's security and defence needs as regards space;
- to ensure a strong and competitive space industry which fosters innovation, growth and the development and delivery of sustainable, high-quality, cost-effective services;
- to contribute to the knowledge-based society by investing strongly in space-based science, and playing a significant role in the international exploration endeavour;
- to secure unrestricted access to new and critical technologies, systems and capabilities in order to ensure independent European space applications.

To achieve this strategic mission will require the EU, ESA and their Member States to improve the efficiency and effectiveness of their space activities **by taking significant new steps in:**

- establishing a **European Space Programme and the coordination** of national and European level space activities, with a user-led focus;
- **increasing synergy between defence and civil space** programmes and technologies, having regard to institutional competencies; and
- developing a **joint international relations strategy** in space.

3

Applications

The key to securing the maximum political, economic and social return from investment in space technologies lies in the development and exploitation of space applications, meeting the objectives of EU policies and the needs of European enterprises and citizens. The evolution of European user needs requires the development of integrated space systems, seamlessly linking satellite and terrestrial telecommunications, positioning and monitoring in areas of strategic, economic and societal value.

3.1 Satellite Navigation

Europe is committed to establishing a sustainable global civil navigation satellite system under the control of the EU. Global markets for satellite navigation equipment and services are estimated to reach €400 billion by 2025. Following the establishment of EGNOS[5], Galileo has been developed as a joint initiative of the EU and ESA. Being a strategic infrastructure[6], Galileo incorporates in its management structures all the necessary instruments to ensure the security of the system.

Governance structures will have to be adapted to ensure the best value for money in the deployment and operation of Galileo, and the most effective involvement of both public and private partners. Many non-EU countries are seeking to become partners in the programme. Collaboration will be based on the principles of non-discrimination and loyal cooperation.

Technological support for Galileo will continue through applications research and a coherent system evolution programme. In order to provide safe and guaranteed applications, the necessary framework in terms of certified services and products, global standards and interference monitoring capabilities has to be implemented.

It is essential to ensure that Galileo will be deployed without further delay and that it strives to provide safe and state-of-the-art solutions. Galileo will grant fair and non-discriminatory access and continuity and safety of service.

3.2 Earth Observation

Autonomous access to information relating to environment, climate change and security is of strategic importance for Europe. Substantial economic and social benefits are associated with improved use of Earth observation-derived information. It can be used to manage natural resources and to support timely preparation by public authorities in order to reduce the effects of adverse weather conditions and climate change, as well as for crisis management.

GMES will improve Europe's monitoring and assessment capacity in environment policy and contribute to addressing security needs. It will facilitate decision-making at all levels of government by improving the evidence base in policy areas across all three pillars of the EU Treaty. Monitoring is also a key element of the fight against climate change. The Global Earth Observation System of Systems (GEOSS) aims at global synergy of Earth observations to which GMES represents the main European contribution. The scope of the mutual contribution between GMES and GEOSS will be embedded in the GMES international strategy.

5. *European Geostationary Navigation Overlay Service*
6. *European Council, Laeken, 14 December 2001*

The Commission has set out a strategy for delivering GMES[7] according to the Council mandate[8]. This will optimise planned European space and in-situ infrastructure and fill identified gaps to respond to the requirements of service users. Decisions already taken start the process of securing the availability of the space component, to be co-funded by ESA and the EU and coordinated and implemented by ESA. Europe will in parallel enhance its meteorological infrastructures and services.

For GMES to become fully operational, the EU and Member States will establish appropriate funding arrangements, policies, operational infrastructures and management arrangements to ensure sustainable services responding to identified user needs.

3.3 Satellite Communications

Satellite communications, driven by private sector investments, most notably from the broadcast and telecommunications sector, represent 40% of the current revenues of the European space sector. They are an integral part of the Information and Communication Technologies, such as the modernisation programme of the Air Traffic Management in Europe. Cost-effective communications systems rely on a complementary mixture of satellite and terrestrial networks. Operational applications are market-driven. European companies are successful in global markets for both fixed and mobile satellite services, which exhibit high value-added characteristics, strong productivity growth and strong profit margins. Many new applications will emerge in the coming years, associated with high risk and long-term investment.

European policies will facilitate the introduction of innovative services, including aggregating demand in remote and rural areas in order to permit satellite services to be as viable as terrestrial solutions. The space industry's technical capabilities need to keep pace with global competitors, many of which are underpinned by defence investments. The EU will invest in advancing technology developments to achieve convergence and interoperability between terrestrial and satellite-based networking sectors.

3.4 Security and Defence

The EU Security Strategy[9] highlighted that Europe faces constantly evolving threats which are more diverse, less visible and less predictable. The Commission has identified security of EU citizens as one of the three main objectives in its work programme. To tackle these constantly evolving threats requires a mixture of civilian and military solutions. Space assets provide a significant contribution to this.

The EU approach to crisis management emphasises the synergy between civilian and military actors. Space system needs for planning and conducting civilian and military Crisis Management Operations overlap. Many civilian programmes have a multiple-use capacity and planned systems such as Galileo and GMES may have military users. The Member States in the Council[10] have identified Europe's generic space system needs for military operations and stressed the necessary interoperability between

7. *'Global Monitoring for Environment and Security (GMES): From Concept to Reality' - COM(2005) 565*
8. *Council Resolution 2001/C 350/02 (13 November 2001)*
9. *'A Secure Europe in a Better World – The European Security Strategy'*
10. *'ESDP and Space'*

civilian and military users[11]. Military capability will continue within the remit of Member States. This should not prevent them from achieving the best level of capability, within limits acceptable to their national sovereignty and essential security interests. Sharing and pooling the resources of European civilian and military space programmes, drawing on multiple-use technology and common standards, would allow more cost-effective solutions.

The economy and security of Europe and its citizens are increasingly dependent on space-based capabilities which must be protected against disruption. Within the framework of existing EU principles and institutional competencies, Europe will substantially improve coordination between its defence and civil space programmes, while retaining primary end-user responsibility for funding.

11. European Council Committee for Civilian Crisis Management

4

Foundations

4.1 Science and Technology

The EU, ESA and their Member States have to continue to invest strongly to maintain leadership in space-based science. In this way it will constantly stretch the boundaries of technology, feed through to applications and so directly contribute to industrial competitiveness. European scientists have identified their current priorities. For the science of space, they are set out in ESA's 'Cosmic Vision' and focus on the conditions for life and planetary formation and the origins and fundamental laws of the Universe. For science in space, priorities are basic and applied research in disciplines such as fluid and combustion physics, materials sciences and human physiology. Priorities for Earth science have been agreed in ESA's 'Living Planet' programme and FP7 and include polar ice, ocean circulation and the physics of the Earth's interior. Science frequently involves international cooperation, leading later to more strategic relationships. In addition, strengthening the foundations of space science and technology has been included in the EU's FP7.

Europe will be ambitious in terms of innovation, identifying critical technologies and guaranteeing their funding. Technology transfers must be closely monitored both for security and commercial reasons. Synergies with non-space technologies will be maximised, with appropriate support for space qualification of new technologies. New technology developments may provide important niche opportunities for EU Member State industries, notably in Central and Eastern Europe. The ESA-led process of harmonising technology development programmes provides transparency on research across Europe and paves the way for improved coordination. The EU will engage in complementary activities through FP7.

The maintenance and development of know-how across the European space industry are essential if systems are to be developed based on European policy requirements and industry is to compete successfully. Space technology is institutionally driven. Countries such as China and India are rapidly mastering space technology, becoming challenging competitors in the commercial market. The goal of Europe's technology development strategy will be to ensure sustained and coordinated investment while achieving a better balance between technological independence, strategic cooperation and reliance on market forces.

Europe faces a severe reduction in the interest in Science, Engineering and Technology (SET) among young people as well as in the pursuit of SET careers. Without a sufficient quantity and quality of human capital in SET-related areas, the knowledge-based economy in Europe will be jeopardised. Education programmes and creative learning environments developed around cutting-edge space projects inspire and motivate students to pursue careers in SET[12], as well as widening the understanding of science among the public.

Space-based activities are strongly evocative of frontier technology and have the potential to attract the interest of the younger generations. The Commission is committed to increasing the interest of young people in SET. To this end, recommendations are discussed in the High Level Group on Science. The ESA 'European Space Education Resource Office' (ESERO) project is already working with educational experts in

The pursuit of world-class science is crucial to expand the knowledge base; to develop new technologies and applications; and to attract young people into science and engineering.

12. 'Pupils' and Parents' Views of the School Science Curriculum', King's College London, January 2000

several Member States to supply the specific educational needs of the region concerned and to get easy access to the existing national networks. Europe will build further on this and other links with the education sector.

4.2 International Space Station (ISS) and Exploration of the Solar System

The international exploration endeavour has a significant political appeal in a vision of European identity, due to its potential to contribute to the creation of new knowledge, to foster innovation and to engage new companies and research organisations in space activities. The US, China and Russia have moved forward with ambitious space-exploration plans. Now, Europe needs to respond urgently to these challenges.

Human spaceflight and exploration are emblematic aspects of space. The ISS offers unique opportunities for fundamental and applied research using the conditions available in space. The European participation with the Columbus laboratory module and the Automated Transfer Vehicle and the presence of European crew secures a visible European role in this venture. The knowledge and insights gained on the ISS are translated into innovative applications for the benefit of people on Earth, e.g. for the development of new materials and new therapies in medicine, and in the preparation for future planetary missions.

Europe needs to achieve optimum utilisation of the International Space Station; prepare for a visible, affordable and robust exploration programme, involving the development and demonstration of innovative technologies and capabilities and the robotic exploration of Mars, to search for evidence of life and understand the planet's habitability.

4.3 Access to Space

Access to space requires stable political support for a sustained European launcher programme, ensuring availability of the related ground infrastructure. Investments will be made to improve existing launchers and develop new launcher systems, based on an evaluation of the long-term options for strategic cooperation. Continued commercial success in world markets is crucial to ensure affordability. But a relatively small and open domestic institutional market exposes the European launcher sector to severe peaks and slumps in the commercial market, putting the industry at risk.

Europe needs to take advantage in a coherent way of the launcher assets under its control. The decision concerning launch services for ESA missions, taken during ESA's 2005 Ministerial Council, was an important step. The European Space Policy will stimulate demand for applications satellites and launch services. Progressively, a flexible range of launchers will be made available through a single operator from the European spaceport Guiana Space Centre, with the ESA-developed Vega launcher and the Russian Soyuz launcher joining Ariane-5.

Independent and cost-effective access to space needs to remain a strategic goal for Europe, which will look first to its own launcher resources when defining and executing European programmes, based on cost-efficiency, reliability and mission suitability.

5

A Competitive European Space Industry

A competitive European space industry is of strategic importance. Europe needs strong and globally competitive companies in the development and manufacture of space systems and the provision of satellite capacity and value-added services. To achieve this goal, it is essential that European public policy actors define clear policy objectives in space activities and invest public funds to achieve them. This public investment could help create a critical mass stimulating further public and private investment. A focused industry policy for space will also stimulate companies competing throughout the full value chain and help industry to manage the highly cyclical variations in demand typical of the space sector, invest in technology and ensure the maintenance of critical capabilities.

An effective industry policy needs to cover many factors including regulation, public procurement and R&D.

5.1 The Regulatory Framework

Several key factors determine the regulatory framework specific to the space sector:

- **Standards give clarity regarding future markets, as a basis for investment.** Where public authorities are the major users of space, they have to drive the development of standards.
- **Full interoperability between national and European space and ground-based systems is urgent,** if Europe is to take maximum advantage of its different space assets. Interoperability and standardisation are intertwined issues.
- **Access policies, in particular data access policies, will be developed,** in keeping with the INSPIRE directive, to facilitate acquisition and exploitation by service providers and users, while at the same time guaranteeing the control of the dissemination of sensitive information through clear protocols.
- **Export and import controls are intrinsic to a** sensitive sector but should not unintentionally hinder the flow of technologies.
- **Pan-European licensing of services, spectrum and content is needed, as well as a more flexible, market-based regime for allocating radio spectrum.** An active approach by Member States to reallocating under-utilised spectrum that is currently allocated for public services and the military would permit demands between space-based and terrestrial infrastructures to be met in a more balanced way and allow safeguarding of scientific frequency bands[13].

5.2 Public Investment in Space

Space is a lead market in which public authorities can create conditions for industry-led innovation[14]. **The efficient and cost-effective aggregation of public policy needs for space is essential and urgent** to secure the potential economic benefits and attract further public and private investment. Intergovernmental and European Union funding lines will each prove crucial, as will national and multilateral programmes. Given its relatively limited investment in space, Europe is more than ever challenged to

13. The Radio Spectrum Policy Group Report and Opinion of 25 October 2006
14. 'Putting knowledge into practice: A broad-based innovation strategy for the EU' (COM(2006) 502)

avoid unsustainable duplication. Non-discriminatory access to publicly funded infrastructure must also be ensured.

SMEs are crucial to innovation and to exploring new market opportunities. They perform a strong role in the development of new applications and services. Both EU and ESA Programmes successfully encourage participation by SMEs.

The EC is increasing its expenditure on space. During 2007–2013, it will dedicate over €2.8 billion to space applications and activities. Community funds, including those managed through ESA programmes, are governed by the EU Financial Regulation on the basis of open competition.

Member States invest a little under €3 billion annually through ESA, and a similar amount in national programmes. ESA programmes are governed by the industrial policy principles established in the ESA Convention, in particular by exploiting competitive bidding while distributing industrial contracts in proportion to funding from Member States ('fair return'). This provides governments an incentive to invest in European R&D space programmes and may contribute to maintaining competing suppliers within Europe, limiting the risk associated with the emergence of monopolies. It has enabled the leveraging of funds, competitive industries and the convergence of national priorities. It has, however, limited rationalisation of facilities within prime contractors and limited specialisation among suppliers of subsystems.

With the objective to improve further the efficiency, specialisation and competitiveness of European industry and after an assessment of the most recent reform, the process of introducing additional flexibility into the ESA rules should continue to develop, taking into account in particular the anticipated expansion of ESA's membership.

6

Governance

6.1 Institutional Framework

The EU will use its full potential to lead in identifying and bringing together user needs and to aggregate the political will in support of these and of wider policy objectives. It will ensure the availability and continuity of operational services supporting its policies. It will contribute to the development, deployment and operation of corresponding European space infrastructure, while making maximum use of existing and planned assets available to Europe, including those of EUMETSAT[15]. Community investment has been made under existing competences and has been additional to that of the Member States and this should continue. The newer EU members are keen to expand the benefits of space to their societies and economies; several are applying for full membership of ESA.

ESA and its Member and Cooperating States will develop space technologies and systems, supporting innovation and global competitiveness and preparing for the future. Their activities will focus on exploration of space and on the basic tools: access to space, scientific knowledge and technologies. They will pursue excellence in science and support the technological preparation and validation of space systems responding to user needs, including those of EU policies. Accordingly, for implementing the R&D space component programmes which it funds, the EU will rely on the management and technical expertise of ESA, which will coordinate other relevant agencies and entities in Europe.

The different approaches, separate legal processes and divergent membership of the EU and ESA can lead to cumbersome decision-making processes, as experience to date has shown in Galileo. The Framework Agreement has provided significant advances in the working between the EC and ESA, and with the Member States, in policy development. The Agreement will be assessed and improved if required.

A clear framework to ensure efficient policy making and programme management is essential for the government bodies involved and for the sector's investors and users. This framework should continue to encompass activities in which Member States would participate optionally under intergovernmental arrangements, while drawing on additional resources from research and, as appropriate, operational Community budgets. Suitable administrative arrangements would be necessary to accommodate all EU and ESA Member States. The EU framework should be explored to see how it could permit such effective coordination arrangements.

The EC-ESA Framework Agreement provides a solid base for coordination arrangements between intergovernmental and Community actions. As space increasingly will gain an EU dimension, the goal remains for the EU and ESA to pursue closer and more efficient cooperation, in particular to develop space systems and sustain associated services responding to relevant EU sectoral policies.

6.2 Coordinated European Space Programme

The European Space Programme will become a common, inclusive and flexible programmatic basis for the implementation of all space-related activities. EUMETSAT and other relevant entities will be associated in this process. Each project in the Programme remains subject to the legal and financial constraints of the body funding it. The role of the private sector in the

15. *European Organisation for the Exploitation of Meteorological Satellites*

development of products and services will be maximised; risk-sharing public private partnerships will be explored wherever possible.

Europe needs consistently to achieve maximum complementarity and transparency among all space programmes, while avoiding both the creation of monopolistic structures and over-capacity. Member States should continue to orient their national programmes towards shared European objectives. Users should be a driving force for the process.

6.3 International Relations

Europe needs to remain an indispensable international partner providing first-class contributions to global initiatives and exerting leadership in selected domains in accordance with European interests and values. Within an open attitude towards cooperation, Europe must take judgements on when to rely on partners and when to retain independence. Europe will assess opportunities for cooperation according to: the access they bring to complementary capabilities or to markets; a fair sharing between partners of efforts, costs and risks; their contribution to EU external policies, particularly sustainable development, cooperation with developed countries, stability and humanitarian aid, with particular focus on Africa and the European neighbourhood; and their relevance to programmatic priorities. In pursuing these objectives, it is fully committed to complying with UN Treaties and Conventions.

The EU will take the lead in the overall representation of applications programmes for its policies (in particular Galileo and GMES), while ESA will take the lead in the overall representation of Europe on programmes in the areas of science, launchers, technology and human spaceflight, each in consultation with the other and with Member States and, as appropriate, other relevant partners such as EUMETSAT.

Annex 1:

Key Actions

The implementation of the European Space Policy during the short-term will involve a number of specific actions. These have been identified and are listed below.

1. During 2007, the Commission will draw up an action plan on the basis of the public response to its Green Paper on **Galileo** applications; and will also propose the appropriate legal and managerial framework to address the requirements of international partners, while safeguarding European interests.

2. The first three operational **GMES** services covering land, marine and emergency response will enter pilot phase by 2008, funded under FP7. The Commission will make proposals by 2009 on the programmatic and institutional framework for a sustainable GMES system, after close consultation with stakeholders. ESA will continue to coordinate and implement the development of the GMES space infrastructure in line with identified needs of service users and by 2008 will also propose, in close cooperation with EUMETSAT, activities for the **Meteosat Third Generation.**

3. On **integrated space applications,** ESA and the EC will propose new R&D projects, including integration with terrestrial systems, before end-2008. SESAR, the Single European Sky Air Traffic Management Research Programme, will represent an example of structured demand for integrated services.

4. The EU will invest through FP7 on development of integrated **satellite communications** networks and services, to ensure interoperability with terrestrial networks for new market opportunities. ESA will invest in new technologies, system design capabilities and innovative services in the framework of its telecommunications R&D programme.

5. The different actors concerned with **security and defence** will continue to implement the 'ESDP and Space' Roadmap[16] and will set up a mechanism to exchange information and identify opportunities for increasing coordination and synergy. Before end-2007, the EU Council will identify the requirements within the ESDP framework relevant to GMES services dedicated to security users. ESA will propose a programme to develop common security technologies and infrastructures.

6. On **space science and technology,** ESA will prepare funding proposals in support of the Cosmic Vision Programme by 2008 and propose new technology R&D activities, in coordination with the EC through FP7, aiming to reduce dependence on critical technologies from non-European suppliers.

7. Europe will pursue the effective exploitation and utilisation of the **International Space Station** from 2007 onwards based on the launch of Automated Transfer Vehicle-based services and the Columbus module. By 2008, ESA will produce proposals for the involvement of Europe in the **international exploration endeavour,** presenting options in planetary exploration and in cooperative development of human transport capabilities.

8. ESA will prepare scenarios and propose programmes to develop technologies for **next-generation launchers** through 2008, while supporting the exploitation of existing systems. During 2007, the Commission will evaluate the benefits of

16. 'Initial Roadmap for Achieving the Steps Specified in the European Space Policy: ESDP and Space' (9505/05)

negotiating reciprocal opening of public sector markets in its dialogues with major space partners.

9. The Commission envisages asking the European standards organisations to make a systematic assessment of necessary future **standardisation** in support of the regulatory framework; it intends to evaluate the need to legislate at European level to achieve the **control of satellite-derived data** dissemination or other harmonisation of legislation; to further encourage the move to a flexible, market based approach for spectrum allocation and to encourage pan-EU approaches to **spectrum use**; and to discuss with Member States and international partners how **export control regulations** can be better streamlined.

10. The Commission and ESA will propose to the Member States by 2008 a **coordination mechanism covering all programmes**, to operate in close coordination with EUMETSAT and other relevant entities, with a view to reinforcing and regularly updating the European Space Programme.

11. The EC-ESA **Framework Agreement** may be complemented as needed on the basis of an evaluation of experience to date. In addition, the Commission and ESA are conducting an **appraisal of the main possible cost-efficient scenarios** for optimising the organisation of space activities in Europe and adapting the EU-ESA relationship accordingly, in accordance with the request made by the Space Council at its second meeting in June 2005.

12. The EU, ESA and their Member States will establish a coordination mechanism **on international relations** by end-2007, involving other relevant entities as appropriate, and develop a joint strategy for international relations in space by the end of 2008.

Annex 2: Glossary

Ariane	Europe's heavy-payload space launcher. There have been several versions of the launcher from the first in 1979 to today's Ariane-5.
ATV	Automated Transfer Vehicle: multipurpose support spacecraft under development by ESA to be launched on Ariane-5 to transport supplies and propellants to the International Space Station.
CFSP	Common Foreign and Security Policy, established and governed by Title V of the Treaty on European Union.
Columbus	The European Space Agency's multifunction laboratory and largest contribution to the International Space Station.
Cosmic Vision	ESA's long-term plan for space science.
CSG	Centre Spatial Guyanais, Europe's spaceport operated by Centre National d'Etudes Spatiales (CNES) under an agreement with the European Space Agency. Strategic facility aimed at providing Europe with access to space with the optimal geographical conditions for geostationary launches.
EC-ESA Framework Agreement	Framework Agreement between the European Community and the European Space Agency: approved on the EC side by Council Decision (12858/03 RECH 152 7 October 2003); came into force May 2004.
EGNOS	European Geostationary Navigation Overlay Service, an augmentation signal to work in conjunction with the US Global Positioning System (GPS) and the Russian Global Orbiting Navigation Satellite System (GLONASS) military navigation satellite systems.
ESDP	European Security and Defence Policy.
'ESDP and Space'	Council 11616/1/04 ESDP and Space Roadmap. Initial roadmap for achieving the steps specified in the European Space Policy: ESDP and Space (9505/05 dated 30 May 2005).

EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites, an intergovernmental organisation established by Convention. It currently has 20 members and 10 cooperating states.
European Security Strategy	'A Secure Europe in a Better World – The European Security Strategy'; approved by the European Council on 12 December 2003.
FP7	The Seventh EU Framework Programme for Research and Technological Development.
Galileo	Europe's global radionavigation satellite system. Joint EU/ESA development composed of a constellation of 30 satellites in medium Earth orbit. Galileo will provide users with highly accurate timing and positioning services.
GEOSS	Global Earth Observation System of Systems. The purpose of GEOSS is to achieve comprehensive, coordinated and sustained observations of the Earth system, in order to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behaviour of the Earth system.
GMES	Global Monitoring for Environment and Security. GMES is a joint EU/ESA initiative combining space and in-situ observing systems to support European goals regarding sustainable development and global governance. ('GMES: From Concept to Reality', COM(2005) 565 final (10 November 2006)).
GNSS	Global Navigation Satellite System, a generic term for satellite systems providing global positioning and timing services.
GSA	GNSS Supervisory Authority, created by an EU Council Regulation to manage the public interest in the Galileo project.
INSPIRE	'INfrastructure for SPatial InfoRmation in Europe', European Commission Proposal for a Directive.

ISS	International Space Station: a research laboratory orbiting the Earth, currently being built through an international partnership.
Living Planet	ESA's long-term programme for Earth science.
Meteosat	METEOrological SATellite, Europe's geostationary weather geostationary satellite system, developed by the European Space Agency and now operated by EUMETSAT.
Partnership for Growth and Jobs	See Lisbon Action Programme for Growth and Employment, 'Working Together for Growth and Jobs: a New Start for the Lisbon Strategy' COM(2005) 24, 2 February 2005.
RSPG	Radio Spectrum Policy Group, see Commission Decision No 2002/622/EC of 26 July 2002 establishing a Radio Spectrum Policy Group (Official Journal L 198 of 24 July 2002).
SESAR	Single European Sky Air Traffic Management Research Programme.
Soyuz	Russian space launcher being introduced to CSG under agreements between CNES, the Russian space agency and ESA.
Space Council	The concomitant meeting of the Competitiveness Council of the EU and the Ministerial Council of the ESA, as established by the EC-ESA Framework Agreement.
Vega	Small launcher currently under development by ESA, designed to place 300–2000 kg satellites into low-Earth orbit.