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TOWARDS A COHERENT EUROPEAN APPROACH FOR SPACE

TABLE OF CONTENTS

| | |
|--|-----------|
| 1. INTRODUCTION | 3 |
| 2. THE CHANGING ENVIRONMENT | 4 |
| 3. AN ISSUE FOR EUROPE | 4 |
| 4. WHAT IS AT STAKE? | 5 |
| 5. THE WAY FORWARD | 6 |
| ANNEX 1 – PRELIMINARY CONCLUSIONS OF THE JOINT REPORT ON SYNERGY BETWEEN THE COMMUNITY AND ESA..... | 9 |
| ANNEX 2 - REPORT ON COMMISSION ACTIVITIES RELATED TO SPACE..... | 10 |
| SATELLITE COMMUNICATION | 10 |
| SATELLITE NAVIGATION..... | 16 |
| SATELLITE EARTH OBSERVATION | 22 |

The present document is a follow-up to the Council conclusions¹ on the third Communication on Space² in 1997 and reacts to last year's Council resolution³, inviting the Commission to implement practical measures to promote synergy between the European Space Agency (ESA) and the European Community. The Commission shared the view of the importance of such co-ordination, as an essential element to a more efficient way to respond to the new challenges of activities related to space.

The key element of the present working document is therefore to report on the joint reflection conducted by the Commission and ESA on practical measures to implement closer co-operation. Preliminary conclusions of this reflection are given in Annex 1 of this document.

The present document has been prepared in close co-ordination with the Agency in line with these conclusions, and therefore constitutes a working document, which identifies steps and methods for eventually designing a future new policy for space.

1. INTRODUCTION

The large diversity of activities of the Commission that have an impact on space gives a reflection of the growing strategic and economic importance of space-technology-enabled services and applications. Consequently a growing diversity of actors are taking an active or a passive interest in the decision-making process for new space projects. The way in which Europe is preparing a decision on the future satellite navigation project Galileo⁴ is an example of this effect.

The proposal for the Galileo project also demonstrates the imaginative use of the framework provided by the European Union allowing the actors to converge towards the wide consensus necessary to reach a decision. It indicates a new approach for projects that include an active contribution of the European space sector. The awareness that such endeavours not only benefit the end-users, but that they are also part of an overall approach aimed at preserving Europe's capability to be present in space, should play an important role in the process to reach consensus.

The objective of the current document is twofold. Firstly, it should complement the Communication of 1996 by reviewing the European space effort in a global context, but, secondly, it is intended to raise the awareness of the need for a coherent approach to space and to map out a way forward to develop such approach.

¹ Council Conclusions on the Communication "The European Union and Space: fostering applications, markets and industrial competitiveness", 22 -23 September 1997

² The three Communications on Space respectively published in 1988, 1992 and 1996 are: The European Community and Space: A coherent approach, COM(88) 417 final; The European Community and Space: Challenges, opportunities and new actions, COM(92)360 final; The European Union and Space: fostering applications, markets and industrial competitiveness, COM(96)617 final

³ 2109th Council meeting -Research - Luxembourg, 22 June 1998

⁴ Galileo: involving Europe in a new generation of satellite navigation services. COM(1999) 54 final, 10 February 1999.

To fulfil this second objective, over the years the Commission has established a consultative structure for space and space-related matters, in which ESA is present in every part. The document describes this consultative structure and reports on its usefulness for conducting a wide debate aiming at the establishment of a common future strategy and policy for space, as a framework for the various actors to develop initiatives and to act.

Finally, the considerable progress that has been made in the co-operation with ESA and the increasing number of activities with regard to Space are reflected in Annex 2, which reports on the Commission activities in the field of satellite communication, navigation and observation.

2. THE CHANGING ENVIRONMENT

Since the launch of the first satellite in 1957, step by step the use of space-technology-enabled services and applications has filtered through into everyday life: weather, TV, telephone, car-navigation, environment data collection are typical examples. Today new satellite systems even hold the key to opening a number of mass markets for equipment and services, and are increasingly used to obtain information of strategic economic importance for civil applications.

In this new landscape, space industry is restructuring and developing a more market-oriented approach to meet demands, which are increasingly subject to competition on a global scale and to private initiative, notably from manufacturers, operators and users.

In view of this industrial approach adapted to the new situation, the institutional and organisational approach to the sector becomes more and more perceived as a challenge to be addressed, notably to take into account the extended scope of space applications. In this context, national space agencies and ESA are discussing internally and amongst themselves the ways to adapt to this changing environment.

The United States has the advantage of one constant element in its space efforts: its National Space Policy, which states as an objective "to achieve and maintain global information dominance as a guarantee for national security".

By contrast, Europe shows a lack of consensus amongst the main actors in the space sector, which has led to delays in designing, financing and launching future projects or applications. Such consensus would help Europe to come to the definition of a more coherent policy as regards to space, thus creating the conditions necessary to take advantage of an increasing number of commercial opportunities in this field.

3. AN ISSUE FOR EUROPE

In the development phase of space technology the East/West confrontation provided a major driving force for the so-called "space race". To position itself during this phase, Western Europe (including both EU Member States and other European countries) combined its essentially scientific and technological ambitions in a number of technological development programmes. These were decided upon in a policy of so-called "package deals" and carried out under the auspices of ESA and the national space agencies. There were other concerns for independence of access and selective issues of security.

Europe's space programmes laid the foundation for its space capability today with a technologically competent industry at a cost of less than one fifth of the investments of the United States. Such a technological achievement, however, does not represent a space policy as defined above, i.e. a common strategy aimed primarily at meeting users' needs and increasing opportunities and applications in expanding markets.

Since the end of the Cold War, the stakes in the race have been shifting from prestige and military supremacy towards market shares and dominance for applications; notably information services and content.

European industry is assuming its responsibilities in this changing environment, but its new, more market-oriented approach should not be taken as a signal that the space sector is becoming wholly market-driven. Globally the space sector is still largely under the influence and supervision of governments. Especially in the United States, where industry can benefit from substantial government support through oriented technology programmes.

The challenge for the European space sector is threefold. On the one hand, the sector has to market its competence since it is no longer enough to be technologically competent. On the other hand, if the sector really wants to be competitive in critical aspects, it needs to find a substitute to drive development programmes at the end of a period with technology push as an unquestioned driver. Finally, the ability to respond to public and strategic interests as well as to commercial opportunities, will be the condition of a sustainable development of this sector.

4. WHAT IS AT STAKE?

Space-based information infrastructures are an increasingly important component of the information society, and space-technology-enabled applications and services are being integrated in every aspect of our daily lives. What really is at stake is a degree of independence and sovereignty not only in critical technologies but also in a full range of applications, to be guaranteed by a competent European industry.

In the telecommunication sector, satellites are integrated as part of global and regional infrastructure, providing communication and broadcasting services. Satellite manufacturers, telecom operators and content providers take private initiatives to develop new satellite systems. To maintain an independent position, European industry, both inside and outside the Union, needs active government participation in creating the regulatory conditions which can support the market, in defining standards in international fora, in preserving competition on a world market, in attributing frequencies and orbital resources, as well as in supporting to mobilise research and development for new systems, as addressed in the Commission's Satellite Action Plan⁵. The risk that Europe's industry finds itself as subcontractor deprived from key technologies in this market, and dependant on operators enjoying a dominant position in specific segments, should not be ignored.

Satellite positioning and navigation services and applications are being integrated as an asset for higher and more efficient mobility, providing added value and a full range of new

⁵ EU Action Plan: Satellite communications in the Information Society, COM(97)91 final, 5 March 1997; see also update report SEC(1999)250 final, 16 February 1999

commercial services and products. Certain parts of the transport sector will become partially or totally dependent on the functioning of satellite navigation systems. This situation has led Europe to seek consensus on the need to develop a global system with a strong European contribution. A European go-ahead for the development of Galileo⁴ will be an implicit recognition of the urgent need to protect oneself from a monopolistic situation for global strategic infrastructures, as well as the recognition of the market potential for value-added pay-services in this domain. This decision would also allow offering adapted services to an expanded base of users,

Increasing concern about the environment, the understanding of its functioning and sustainable use of its resources, is imposing monitoring tasks that require ever more precise long-term and continuous information on environmental parameters. For some of those, satellites provide additional data; others can exclusively be monitored from space. An increasing dependence on third countries for the provision of ample means to underpin political and policy decision in this domain not only calls in question Europe's concern for the global environment but also might prove economically costly. In this context Europe is still missing its own independent global environmental service using data from space and ground-based instruments. A global strategy in this field might prove a valuable asset for exploiting and protecting natural resources and for defining and enforcing the most cost-effective policies on various environmental issues and on a strategy to control global industrial or natural risks.

The development and exploitation of space technology, services and applications is also an element of several initiatives in the context of international co-operation – for example use of data from observation satellites in the South East Asian region, use of space techniques to aid development in the region of the Mediterranean basin, the ACP countries and in Latin America, interest in the field of satellite navigation from for instance Russia, Japan, Australia, India and Latin America. Of particular interest in this context is the EU-Russia Dialogue on space, initiated as part of the implementation of the Partnership and Co-operation Agreement (PCA) between the European Union and the Russian Federation.

Finally, the emerging tasks from the further development of a Common Foreign and Security Policy will lead to a more specific need for space-based information tools. Political debates in this context, notably those within the Western European Union (WEU), are likely to lead to a further identification and definition of needs in the security domain taken in the widest sense. The implementation of such policy and the necessary verification activities will bring along the requirement for a certain independence, stronger than in the other domains.

In view of all these interests, the conclusion seems justified that the European space sector is of importance for the whole Union.

5. THE WAY FORWARD

An integrated Europe with 400 million citizens and a land area of the order of 4 million km² must ask the question where it wants to position itself in space and space applications, and whether it wants to develop a vision for the future of its industry and service providers to preserve at least a dual-source situation in the world in order to ensure that competitive procurement remains an option.

Over the last four decades, Europe has invested around €150 billion in research and development⁶ to establish a high performance space industry through the efforts of ESA and national space agencies. But where industry is succeeding to integrate across Europe, the evolution of institutional arrangements is lagging behind. The issue is in fact to seek an approach at a European Union level for the sector and greater synergy between the nationally defined priorities, which is reflected in the Council's resolution calling for greater synergy between the Community and ESA⁷.

For some applications new initiatives are in the hands of this reorganised industry, but for others, in which satellite systems are more designed to serve the public interest, the first step needs to be taken at the instigation of the policy drivers. For instance, the way in which Europe is converging towards a decision for the development of a satellite system for navigation purposes shows the value of developing a common understanding of the need, and of following a multidisciplinary approach. A similar path could be envisaged for providing Europe with an operational global service for monitoring various environmental parameters and controlling industrial or natural risks.

The European Union must find new ways to mastermind a "policy for space" from requirements of the various relevant policies along the following axes in which space is a strategic issue:

1. satellite systems in the information society for telecommunications, navigation and transport and environmental monitoring with support for research and development as part of a co-ordinated strategy in each of these fields, taking into account the specificities in each of these fields through clearly identified projects in public/private partnerships having a wide European dimension;
2. satellite infrastructures as an asset for a Common Foreign and Security Policy where new space initiatives may bring considerable advantage to the defence sector through potential synergy effects;
3. technological projects for scientific purposes, also in a broader context of international co-operation.

The activities arising from the needs of the various policies within the Union along these axes constitute an industry policy for the sector, creating opportunities for industry, service providers and users to preserve and develop capabilities and to compete on the world market.

In support, an independent launch capability takes a central position and the successful European efforts in this field need to be pursued by a competitive industry provided with enough R&D opportunities to keep up with possible new developments for future launchers.

⁶ Sum of (1961-1998) annual figures, all expressed in 1997 economic conditions

⁷ Cooperation between the EU and European Space Agency – Council Resolution 2109th Council meeting – Research – Luxembourg, 22 June 1998

The Commission believes that the way forward is to structure the dialogue with all parties concerned, including the policy drivers. It should address questions relating to Europe's specific infrastructure and systems capabilities. It should define the objectives and a strategy centred on the user needs, which includes an analysis of political issues (autonomy, independence). It should mobilise the necessary means, promoting public/private partnerships with flexible sharing, taking into account the double nature of the applications of space as general interest service and commercial enterprise.

In this respect, the Commission in co-ordination with ESA recently initiated this approach with the establishment of three working panels of the Industry High-Level Panel "Space", to advise respectively on (1) Public private partnership structure and revenue streams for Galileo; (2) Generic financing, (including earth observation), R&D, and relations to space agencies; (3) Standardisation and market access.

To ensure the maximum return on Europe's research and development investment in the space sector during the last four decades, and to take into account the wider implications of space-technology-enabled services and applications, a new approach is needed.

Such a new approach must be based on a *consensus* that provides a policy framework for future projects supporting large-scale applications and the development of a long-term technology base. This must look beyond purely scientific needs and the strategic use of international co-operation, and encourage public/private partnerships.

To achieve consensus the Commission could consider the key policy issues with the various actors, using the already established *consultative structure* with the Member States and industry. The European Space Agency is active in every part of this structure.

The basic elements of this consultative structure are the following:

- the Space Advisory Group, dealing with the overall strategy and policy;
- an Industry High-Level Panel "Space" to develop a dialogue with industry;
- a High-Level Group advising on the conception and implementation of the necessary activities for EGNOS and GALILEO;
- a High-Level Group for the implementation of the Satellite Action Plan, on issues related to satellite communications, especially in the regulatory/market access domains;
- a High-Level Group in the domain of Global Environmental Monitoring Services based on Earth observation (under the auspices of the SAG);
- as civil/military applications remain an important issue in the definition of space systems, Council could agree to establish a link for the Western European Union and the Common Foreign and Security Policy to bring the various interests together in this consultative structure.

This consultative structure and the elements of the present working document constitute a contribution to a definition of a coherent European approach for space.

ANNEX 1 – PRELIMINARY CONCLUSIONS OF THE JOINT REPORT ON SYNERGY BETWEEN THE COMMUNITY AND ESA

The Commission and ESA have carried out a joint reflection on practical measures to implement closer co-operation and presented the outcome to the Space Advisory Group. Preliminary conclusions from a joint analysis of interactions between the Commission and ESA are that:

- EU policies provide more and more strategic orientation and a frame for ESA activities,
- increased synergy between the Community and ESA and hence between the activities of the Commission and those of ESA requires increased transparency.

A practical model for a modus operandi achieving the necessary transparency requires increased formalised interactions through:

- Consultation and co-ordination of space-related activities between the services of the Commission and ESA:
 - in particular in drafting relevant strategic orientation papers;
 - by systematic consultation to optimise the efficiency and avoid duplications within the respective technological/RTD programmes;
 - to invite where relevant, following the rules for selection of experts, participation of ESA evaluators to Framework Programme proposal evaluations and of Commission staff to the preliminary phase of ESA Tender Evaluation Boards (TEB).
- The establishment of symmetrical organic links between the two organisations in incremental steps:
 - by formalising communication and information exchange between ESA and the Commission;
 - through participation of a Commission representative in the ESA Council and relevant Committees or Boards, which has to be approved at the level of ESA;
 - by adapting the terms of reference of the Space Advisory Group of the Commission to give a suited role to ESA, and see how ESA could participate in the Space Co-ordination Group.
- The establishment of a formal exchange of information and consultation process in contacts with third countries.

ANNEX 2 - REPORT ON COMMISSION ACTIVITIES RELATED TO SPACE

SATELLITE COMMUNICATION

THE STRATEGIC IMPORTANCE OF SATELLITE COMMUNICATIONS

The rapid growth of information access and exchange in a global context as exemplified by the Internet, and the increasing trend towards mobility are opening up new prospects for the introduction of novel satellite communication systems aiming at providing advanced multimedia services with world-wide coverage to fixed or mobile users.

However, the annual turnover in the satellite manufacturing market segment is expected to remain more or less constant. This expectation is based on a predicted shift in the market, i.e. a declining turnover in the GEO market will be compensated by larger volumes of cheaper satellites planned for novel global systems serving the mobile or broadband multimedia markets. Since these systems as yet still have to demonstrate their technological and financial viability, this predicted shift in the market is still open to some speculation. Nevertheless, the service market is expected to be soaring from roughly €18 billion in 1997 to €150 billion in 2007.

The revenues from satellite communication in the total telecommunications market are expected to rise from around 3.5% of €800 billion in 1997 to a 6-10% share out of €1500 billion in 2007.

In this context of globalisation and accrued competition, the space industry in Europe has to maintain and possibly increase its competitive edge with the objective of capturing a significant share of the new markets, which will also ensure the development of highly skilled jobs in Europe. European governments and the EU may have a significant role to play in creating the conditions to bring this about.

Furthermore it is important to develop the downstream sectors, where the potential to develop new jobs is the most significant. At the same time, it is necessary to aim at developing novel global systems, offering credible alternatives to US initiatives and with a view to addressing these new global markets.

As a consequence it is of strategic importance for Europe to continue developing its space industry to guarantee a multi-polar situation in the world of satellite-based global information access and transport infrastructures and in the world of the global added value delivery chain for information and content.

In that context, action by public authorities in support of market access through WTO negotiations, access to frequencies, orbital positions and appropriate regulations are key elements to ensure successful development of the new markets.

THE CHANGING ENVIRONMENT

Industrial reconfiguration

The structure of the European space industry as well as its involvement in satellite communication projects are evolving rapidly. Global patterns of ownership structure are taking shape at the level of space activities as well as at the overall level of the aerospace

and defence industry. At the same time, consolidation is taking place in the major new projects for broadband links for multimedia services (entry of European partners in the Teledesic project and inclusion of partners from the U.S., Canada and Japan in the European-led Skybridge project).

These global broadband multimedia projects introduced a set of requirements to win contracts for the manufacturing of satellites different from those in the past:

- multimedia and satellite PCS systems require participation of global industrial associations to secure access to a global clientele, necessary for their economic viability;
- new markets require the provision of a turnkey system, with in-orbit delivery (which implies the provision of launch services and in-orbit services to verify satellite performance). The major US satellite manufacturers have already linked up with, or own leading satellite system operators with the intention to develop this area further for future business opportunities;
- a new requirement to win contracts is to make strategic investments in the projects. This asks for financial engineering services beyond those, which have been necessary in the past.

These trends have developed strongly since the publication of the last Communication on Space² in 1996, underlining the need for reinforced collaboration with industry.

International Satellite Organisations (ISO) Privatisation

An important development in the world of satellite communications is the ongoing restructuring reform of the three major international satellite organisations (Intelsat, Inmarsat –privatised as of 15 April 1999– and Eutelsat), aimed at transforming the operating parts into public companies, possibly to be followed by public offerings of shares.

Currently these operators count respectively 143, 84 and 47 member countries (parties, signatories) respectively. The signatories of each country (often the incumbent national telecommunications provider) own a share in the organisation proportional to its usage of the overall system. The signatories also act as distributors of the services to final customers or to sub-distributors. Within the EU, the Directive 94/46/EC had introduced the principle of direct access to space segments of ISOs and the possibility of multiple signatories.

The intention is that the spin-off companies from these organisations, over time, should not enjoy a privileged position on the market (immunities from competition and other regulatory schemes, tax exemptions etc). The commercial operations will have to be run at an arm's length from the current signatories' assemblies. Also, it is expected that the public participation in these operations will be diluted over time, thus reducing the possible conflict of interest between the former signatories' role and their role as distributors of services.

Their restructuring plans are progressing under continuous review by the Commission under the EC competition rules, to ensure a level playing field and to prevent the leverage of existing market power of signatories, i.e. future shareholders, into the area of satellite communications.

THE SATELLITE ACTION PLAN - REGULATORY DEVELOPMENTS AND INITIATIVES

Satellites are an essential component of the global communication infrastructure, together with other means such as optical fibre but offering also unique characteristics. Important issues associated with global reach, and the difficulty of controlling the content, as well as national authorisations, may hamper the development of a much-needed infrastructure. Thus, it is the effectiveness of full competition at EU level together with prospects of removal of market access barriers in other regions as a result of the GATS agreement on basic telecommunications, which should help the satellite industry to expand both within the EU and beyond.

The Commission has been trying to give consistent and effective support to industry through focused actions. The Satellite Action Plan, in particular, has been widely accepted by the industry engaged in satellite communications and led to a series of concerted efforts in order to improve the regulatory framework for industrial development.

Because of the fact that the area of satellites goes beyond mere telecommunications and involves other service applications, and related industries such as space launch and defence, there are arguments for treating satellites as a 'strategic' industry. Nevertheless, it seems appropriate to work towards integrating satellite communications into mainstream regulatory policy on telecommunications, due to the convergence and increasing competitive relationship between terrestrial and space-based communications systems.

Focus of Commission action

There is a clear need for more effective implementation of existing legislation. This is relevant not only for EC legislation, but also CEPT measures, the application of which is non-binding and non-enforceable by operators. Here, the Commission exerts its influence in order to obtain adherence by Member States if and where Community policies are at stake.

There is also a continuing need for improvement of the regulatory environment at the European (EU and CEPT) level, in order to facilitate the co-ordinated introduction of global systems in Europe on a permanent basis and to provide the necessary legal certainty in a timely manner. In particular, the frequency planning and licensing process (European frequency table, authorisation conditions and procedures, one-stop shopping) needs to be pursued vigorously and in a non-discriminatory manner. In certain cases, it is currently still very cumbersome and time-consuming to obtain the necessary regulatory approvals needed for the provision of Europe-wide services.

The dismantling of barriers to market access in third countries, as well as a strengthened support for EU policies in the area of radio frequencies will remain high on the list of priorities for the Commission in its external relations and international regulatory aspects.

The key objectives that should guide action are the need to consolidate the regulatory environment applicable to satellite communication, to contribute to make available scarce resources (spectrum, orbital slots), taking into account anticipated future systems at an early stage, and to ensure the accessibility of markets in third countries.

The ongoing debate in a number of policy areas will shape the conditions under which the satellite communications industry will develop over the years to come. Key areas include

- the review of the EU regulatory framework for telecommunications. This will also raise a number of satellite-specific issues, such as whether the current provisions of the Licensing Directive are adequate and sufficient, or whether new regulatory

measures should be considered, in particular after the expiry of the S-PCS decision in the year 2000 ;

- the effectiveness of the existing mechanism to defend European interests at international fora such as the WTO, or the ITU in the next World Radiocommunications Conference, in spring 2000 ; and
- the frequency policy, at global, European and national level, and including issues such as efficient use of spectrum (sharing versus band segmentation), spectrum pricing and trading, etc. The consultation launched with the Green Paper on radio spectrum policy⁸ should provide orientation for further course of action in the course of 1999.

R&D FOR THE SATELLITE COMMUNICATIONS SECTOR

Today in satellite communications, industry proposes complex satellite systems to provide global or multi-regional access to innovative services. Investment in these systems is still considered a high-risk business. The currently deployed S-PCS systems will represent a test case for the technology as well as for the commercial viability. Nevertheless, R&D in new technologies is an essential activity to create the necessary confidence in the feasibility of these systems for potential investors.

A key element for the further development of the satellite communications sector, is openness between space and terrestrial telecommunication communities. Satellite industry could take more advantage of the possibilities opened up by 'terrestrial' Information and Communications Technologies (ICT). Reciprocally, the main 'terrestrial' ICT players are often sceptical of or little aware of the potential of global satellite communication system.

The majority of future commercial satellite communication systems conceived today are based on technologies and systems developed for terrestrial applications (Iridium is based on GSM, Skybridge plans to support ATM technology, digital satellite broadcasting uses the MPEG standard originally conceived for terrestrial broadcasting).

Considering the necessary integration of satellite communications in the "traditional" telecommunication programmes, the space communication community will have to develop 'satellite friendly' standards and interoperable systems in co-operation with the terrestrial telecom community. Therefore, collaborative work between the two communities will be beneficial and has to be fostered actively.

The telecommunication projects supported under the Framework Programme have been successful in bringing together these communities, as involvement of all actors in the ICT value added chain is a requirement. The increasing participation of satellite industry in the Framework Programmes is a demonstration of an enhanced interaction between the terrestrial and the space telecommunication communities. Main R&D actions in support to the sector under the 4th Framework Programme totalled about 65 M€, primarily through ACTS (50) and ESPRIT (15).

⁸ Green Paper on Radio Spectrum Policy in the context of European Community policies such as telecommunications, broadcasting, transport, and R&D, COM (1998)596 final, 9. December 1998

The SWG implemented under the Satellite Action Plan has been working with the objective of identifying R&D actions best addressed under space agencies work programmes and those areas, where the 5th Framework Programme (FP)⁹ would provide significant added value. Its report¹⁰ outlines (i) the R&D priorities in the satellite communication sector at large, (ii) the actions to be preferably addressed by space agencies, especially for specific satellite technologies developments, (iii) the actions suitable under the FP, in particular in the field of full scale systems validation, services and application trials and (iv) an overview of related R&D in other regions (US and Japan).

Furthermore, complementary actions from the TEN Telecom programme will provide additional support for these industrial initiatives, involving all actors of the value added chain (industry, operators, users, and content providers).

CO-ORDINATION WITH INDUSTRY AND SPACE AGENCIES IN FP5

The satellite telecommunications part of the space sector is the only part which is facing a situation in which large infrastructure is deployed directly on a commercial basis through initiatives of industry and operators. Through these initiatives, industry itself is becoming the centre of gravity for co-ordination.

The other actors are ESA and national space agencies, as the central points for the development of space technology and the Commission with its the Framework Programme, complemented by TEN Telecom initiatives, providing a key support instrument in the field of applications development, system/services integration, demonstration and validation.

To facilitate the information flow between the different actors, the Commission has several groups bringing together representatives of public authorities, industry, telecom operators and space agencies:

- the Space Advisory Group (SAG), where detailed FP/ESA activities can be presented to Member States;
- the Information Society Technology Advisory Group (ISTAG), where space/non space activities of the FP can be presented and discussed;
- the Satellite Action Plan (SAP) High Level Group, and its related industry working groups, with members from space and terrestrial communication communities, and which has provided very valuable inputs to the satellite R&D activities in FP5 as well as on regulatory matters;
- the recently established Industry High-Level Panel Space to which details of FP space activities can be disseminated.

From an operational point of view, the concertation groups remain one of the key instruments to foster co-operation between space and non-space industry and to promote

⁹ see: <http://www.cordis.lu/fifth/home.html>

¹⁰ of April 1998, see <http://www.ispo.cec.be/infosoc/telecompolicy/en/Study-en.html>

co-ordination with ESA. These can be assisted by a few accompanying measure projects, tightly involving the space agencies.

In addition, other ad-hoc mechanisms may be considered with the aim of facilitating the access to information, raising the awareness to specific issues (e.g. S-UMTS), or as a catalyst to specific actions that may be taken at public level. These include conferences, workshops, task forces, etc. The Commission services guarantee the functioning of the *mechanism* in close consultation with the other actors.

A more extensive report on activities in the fields of satellite communications is provided in the recently published update to the Satellite Action Plan¹¹.

¹¹ The EU Action Plan : Satellite Communications in the Information Society - Recent activities, present situation and outlook, SEC(1999)250 final

SATELLITE NAVIGATION

The Commission activities in the area of satellite navigation are based on the strategy and Action Plan presented in the Communication¹² of 1998 and the subsequent conclusions of the Council¹³.

The co-operation and co-ordination efforts of the Commission have had an important knock-on effect in Europe: a convergence in the different points of view in Europe and an increased awareness of the need for a rapid decision on the implementation of a satellite navigation system taking into account the international and European context.

Accordingly, the Commission proposes to Council the necessary elements to take a decision on the way forward in the first part of 1999 in a new Communication⁴. This section mainly summarises the work accomplished to achieve this objective.

STRATEGIC IMPORTANCE OF SATELLITE NAVIGATION

The two existing navigation systems, GPS and GLONASS, respectively under the control of the United States and of the Russian Federation, do not give sufficient guarantees for the -often strategic- user applications in Europe. Moreover, Europe's absence in the definition of the space segment of these systems places its industry more and more in a disadvantageous position in the rapidly expanding markets for user equipment and value-added services.

Therefore the Commission proposed a two-phase approach:

- the first phase, GNSS-1, carried out by the Commission in co-ordination with ESA and Eurocontrol in the European Tripartite Group, consists of developing and implementing the EGNOS system¹⁴, complementary to GPS and GLONASS. This will make it possible to improve their performances and in particular the integrity of the information provided to users;
- the second phase, GNSS-2, consists in developing and implementing a satellite navigation system under European control, which will make it possible to meet the user needs and at the same time will facilitate access for European industry into the global market for systems and services. This European project has been provisionally called Galileo.

¹² Towards a Trans-European Positioning and Navigation Network, including a European Strategy for Global Navigation Satellite Systems (GNSS), COM(98)29 final, 21 January 1998.

¹³ Council meeting – Transport, 17 March 1998, Conclusions on a European Strategy for Global Navigation Satellite Systems (GNSS)

¹⁴ European Geostationary Navigation Overlay Service.

THE CHANGING ENVIRONMENT

Scope for international co-operation

Following the Council conclusions, Commission services intensified the discussions with the main potential partners: the United States, the Russian Federation and Japan, to propose credible scenarios for GNSS-2 implementation. These exploratory discussions are held in association with ESA and Eurocontrol and in close consultation with the Member States through the High Level Group.

The discussions with the US have clarified the options for co-operation. It turns out in particular that it is unlikely that the US would grant a substantial role in the control of the current GPS constellation. However, options such as the implementation of GPS-like complementary satellites by Europe, and even co-operation in the development of a new civil GNSS navigation system, remain open. Consequently whilst an approach of joint control and ownership is excluded, there are sufficient common interests for a close co-operation between Europe and the United States.

The discussions with the Russian Federation indicate that a co-operation is possible with the aim of developing a GNSS system initially based on GLONASS and EGNOS, which would evolve into a new GNSS system. A sound evaluation of the consequences of this approach is not yet available.

Discussions with Japan are in progress. Various scenarios for interoperability between EGNOS and MSAS are being analysed from a technical-economic point of view. Furthermore, preliminary reflections have started on GNSS-2 concepts envisaged by Japan and Europe.

The possibility of extending the EGNOS service area to other regions by the addition of complementary ground-based infrastructure is being discussed with India and several Latin American and African countries.

Elaboration of the different implementation schemes in the course of 1998 has clarified the different options for co-operation. It will be necessary to agree on the degree of compatibility and interoperability with GPS and on the possibility and the nature of co-operation with Russia. Security and defence requirements of the Member States will have to be taken into account and there are numerous civil applications with a critical or strategic character.

The commercial landscape

The potential market for user equipment and value-added services is considerable. Certain estimates show indeed that the potential market covering user equipment and associated services for the coming decade would be about €35 billion. Almost half of this market would concern the road sector, with the military and geodetic applications also representing a significant share. However, the size of this market will be strongly dependent on the selected development scenario: the minimum if Europe remains dependent on GPS, the maximum if Europe leads into in the development of a new Galileo system. In the latter case there will be significant revenues from:

- the user segment: navigation equipment with their integration to other functions;

- the use of new navigation services thanks to the participation in system design, and also to association with other functions like telecommunications and other fully new applications in different domains.
- the ground segment: development and maintenance of ground equipment, and integration of this equipment with conventional navigation aids;
- the space sector: development of the satellites and of the payloads, maintenance of the constellations;
- the operation of the system: maintenance, performance assessment, day-to-day operations;

The industrial activity is supported by different contracts managed by the Commission, the Member States and ESA, until the now mainly focused on GNSS-1. The industries likely to take part in a possible GNSS-2 programme were represented in the Forum and also contribute to the ESA Study, referred to before. The implementation of Galileo will benefit directly from the current industrial reorganisations in the aerospace field.

GNSS-2 FORUM: CO-ORDINATION WITH USERS, SPACE AGENCIES AND INDUSTRY

The principal activity of the Commission in 1998 was assembling all relevant elements at the institutional, technical, operational, financial and security level, to draw up a coherent proposal for the ambitious GNSS-2 objective. To this end the Commission set up the GNSS-2 Forum. The Forum mobilised, over the period July to December 1998 users, government agencies, academics, and industrialists from the various sectors and the services of the Commission. Without entering into details of results, the Forum met in plenary and Working Groups sessions:

1. Institutional and legal aspects, addressing the nature of the management structure to be set up for the operational management of GNSS-2 has been analysed (extension of existing bodies or creation of new entities). Legal and institutional issues have been examined against key criteria, such as capacity to separate regulatory and operational functions, safety enhancement, operational cost effectiveness, adaptability to multi-modal user requirements.
2. Technical and financial aspects, making a comparative analysis of the possible options for GNSS-2 has been made, taking into account conformity with user needs, certification, estimated development and recurrent costs. After identification of the key advantages and drawbacks of each option, a recommendation for an optimal type of constellation has been made, taking into account discussions of co-operation with the U.S., Russia and Japan.
3. Questions of security and defence, addressing two key concerns: (i) the need to protect access to the signal for users with safety-critical needs because of potential threats and (ii) the security risk resulting from the potential use of the highly accurate navigation signal by hostile users and the need to be able to deny access to such users.
4. User needs, establishing a summary of the needs of the aeronautical, maritime and land user communities in the transport sector but also in other sectors including an evaluation of potential markets. Position or navigation information alone does not

always satisfy user requirements. As a consequence, combinations of these functions with others will have to be examined such as communications and monitoring, which would lead to added value for many products.

The objective of the Forum was to bring a coherent synthesis of the specific approaches of the various Working Parties, with the aim of proposing a plan for the adoption of a GNSS-2 system, with optimisation of the development and running costs in an agreed context of international co-operation. This synthesis has integrated all the work carried out in Europe, in particular the comparative study launched by ESA and has contributed to shape the opinion and recommendations of the Commission.

ACCOMPLISHMENTS IN GNSS-1 AND 2

Activities carried out by the Commission

Besides the role of initiator, of conducting the work of the Tripartite Group for GNSS-1 and the GNSS-2 Forum, the Commission services are also directly involved in specific studies:

- Certification: setting up of an approach to certification of GNSS;
- Civil/military interface: definition study related to security and protection topics already described;
- Transinpol: study of the impact of the introduction of space technologies (communications, navigation) in EC Transport Policy;
- Magnet: development of user terminals able to receive the GPS, GLONASS and EGNOS signals and demonstration in real environment (air, sea, rail);
- Ines/Euronav: identification of Telematic Constellation architectures of GNSS2

The GNSS activities foreseen are mostly planned within in the 5th Framework Programme and the TEN programme. These tasks also take into account the action plan in the Commission Communications, the objectives of the Trans-European transport network, and more generally the studies undertaken in Europe in particular by ESA.

The studies envisaged by the Commission fall in three principal categories:

- Promotion of the applications: in all transport sectors, with a view to also setting up new services, and in other fields like network synchronisation, construction.
- Support for the development activities on subjects such as preliminary demonstrations in orbit, evaluation of additional services, interoperability with other regional systems and definition of a civil/military interface.
- Co-ordination: covering all the promotion activities and co-ordination of work in Europe including overall management of the tasks.

Lastly, for the financing of the GNSS programme and of the associated activities, the Commission is careful to ensure the coherence of the financing plans resulting from the

principal programmes: TEN (Trans European Network), 4th and 5th Framework Programmes, TACIS (including ISTC, STCU activities), the Lomé Convention.

Co-ordination of work with ESA

Co-operation between ESA and the Commission in the field of navigation has been consolidated over several years and is partially reflected in the tripartite agreement concluded between the EU, ESA and Eurocontrol. Member States' objectives to strengthen synergy between the European Commission and ESA is demonstrated by:

- Council approval of the Commission Communication requesting the development of a European strategy for GNSS-2;
- ESA Council's adoption of the resolution on synergy between ESA and the European Community on 23-24 June 1998, quoting explicitly the subject of satellite navigation;
- approval by the ESA Council of an initial work programme in support of the Commission activities on GNSS-2.

For the GNSS-1 activities, the respective responsibilities for ESA and for the Commission are well defined in the tripartite agreement. The monitoring of work is ensured by a committee of the Directors concerned in each organisation and by a secretariat for the administrative and technical support.

ESA launched an ambitious study with the aim of comparing the various options for GNSS-2. The links between the development plan of this study and the Commission timetable, are the following:

- First stage: (completed at the end of 1998) preliminary results of ESA Study in line with the timetable of the Forum. Participation of ESA and EC experts in both activities.
- Second stage (to be completed during-1999): study of preliminary definition of GNSS-2 concept by the industrial consortium in charge of ESA study on the basis of the recommendations of the Galileo Communication.

Thus, the definition of Galileo and its development plan will be worked out by a management board in line with the strategy approved by the EU Council.

The importance of the issues in GNSS-2 will probably result in addressing specific co-operation mechanisms during 1999. Factors to be taken into account in this process are: the financing mechanisms and budget contributions, international co-operation scenarios and the operational management structure envisaged for the longer term.

GALILEO: A PROPOSAL TO COUNCIL

The European Commission has played so far an important role in the definition of a coherent strategy for the development of a civil GNSS involving the various parties concerned: public bodies, industrial suppliers and users, in order to have final decisions during the first six-months of 1999.

The Communication of 10 February 1999 sets out a strategy to secure a full role for Europe in the development of the next generation of Global Navigation Satellite System (GNSS) and so full opportunity in the related market. The central recommendation is that Europe should develop a new satellite navigation constellation, combined with appropriate terrestrial infrastructure: Galileo.

The international context, in particular the development of GPS and the future of GLONASS, obliges Europe to define its strategy carefully.

The EU is faced with a formidable challenge but also with a major opportunity in respect of global satellite navigation, which is becoming central to all forms of transport and many other activities. These systems will play a crucial role in creating the integrated European transport system that is crucial to support the single market. Furthermore, Member States of the Union have public obligations to provide safe navigation services and other public services.

The issue is not, therefore, whether Europe should rely on satellite navigation systems for the future, but what socio-economic benefits Europe would gain from playing a full role in development of the system (jobs, new products and services) and what degree of control it will have over the systems on which its safety critical services will depend.

The shape of the recommended approach for the system is therefore as follows:

- it must be an open, global system from the outset, fully interoperable with GPS, but independent from it, with a role to be defined for the Russian Federation;
- it should be based on medium Earth-orbit (MEO) satellites combined with appropriate infrastructure and terrestrial systems with a currently estimated cost of between €2.2 and 2.9 billion;
- it should be developed as a public private partnership, with significant funding at European level, and reliance on creating new revenue streams.

The Commission considers that this approach provides a means of achieving Europe's strategic, commercial, transport and employment objectives at an acceptable cost.

This proposal was extensively discussed at the informal Council of EU Transport Ministers at the end of April, and received a positive response. The ESA Ministerial on 11-12 May 1999 is expected to put in place its contribution to the project. A firm commitment to Galileo, together with arrangements for the definition phase, running to the end of 2000 are expected at the June Council of EU Transport Ministers.

SATELLITE EARTH OBSERVATION

STRATEGIC IMPORTANCE OF SATELLITE EARTH OBSERVATION

As the move towards a more integrated global information society continues, satellite-based observation is offering a key resource to observe the surface and the environment of the Earth with a strategic importance in several contexts.

A resource for more effective implementation of EU policies

Earth observation provides key information in support of several EU policies and has the potential to offer a great deal more. Actual or potential examples are the common agricultural policy including the integrated administration and control system, environmental policy, legal and diplomatic negotiations over fisheries, transport and trans-European networks, economic and social cohesion policy, humanitarian aid (ECHO) and development co-operation policy. Furthermore, policy evolution is leading to new information needs for instance in relation to the expansion of the EU to the east. This will require, amongst other things, improved land-cover information and information relating to agriculture, forestry, the environment, and natural and man-made risks and hazards.

A strategic asset for global monitoring

Heightened public awareness of environmental security is making it an issue of economic, social and political importance. Space-based observation provides a source of information to add to the battery of other sources needed to monitor the health of the environment. Whilst the value is difficult to express in financial terms, the economic stakes at the bargaining table could be high, for instance in negotiations on carbon sinks and sources arising from the Kyoto Protocol to the UN Framework Convention on Climate Change. In this context Europe is still missing its own independent global environmental service using data from space and ground-based instruments.

A scientific necessity for measuring the environment

European scientists are among the world leaders in clarifying how the Earth system functions. Information obtained through earth observation plays an essential role in a global co-operative effort to understand our planet. In many cases, it is the only practical means by which scientists can inventory and monitor key variables that indicate the status and trends of important environmental indicators. To maintain and improve the understanding of the planet, Europe is obliged to contribute to the global observing capacity.

An economic advantage through quality information

The main potential profit from satellite remote sensing lies not in data sales but in the subsequent use of the derived information, which can be used to improve the competitive position of European industry and of the European economy.

In the information society, businesses depend on the quality and timeliness of the information they use to make decisions and earth observation can provide information that would be too expensive or impossible to attain in any other way.

To develop a competitive information-based industry, Europe must have access to information sources that are not dependent on any control imposed by foreign governments.

THE CHANGING ENVIRONMENT

The European Space Agency is at the core of Europe's civil space programme. Among other successes, the European Remote-sensing Satellites (ERS) have proved that Europe is capable of providing world-leading observation satellites. Envisat will continue this demonstration into the first decade of the 21st century. ESA has put forward a programme called "The Living Planet" which includes initiatives on Earth Explorer and Earth Watch missions, but has still to meet adherence from its Member States. At this stage, no European satellite is planned after Envisat.

The main objective of Eumetsat is to launch, maintain and exploit operational meteorological satellites. It finances and operates the Meteosat series of satellites, and is developing a new generation of satellites through ESA. The Eumetsat Council has extended the organisation's mandate to include a responsibility to monitor climate. Eumetsat has also embarked on a programme of Satellite Application Facilities whose remit is to study the requirements on satellite services in various thematic areas and to carry out research to improve the services offered.

Some Member States, in addition to their co-operation in ESA run programmes of their own to acquire, process, archive, distribute and promote earth observation satellite data, and some also finance earth observation instruments. The SPOT series of satellites, led by CNES and funded by several of the EU Member States, is the only fully operational earth observation resource in Europe that is designed to observe the planet's surface. The latest in the series of SPOT satellites, SPOT 4, launched in 1998, carried an innovative Vegetation Monitoring Instrument.

Major consolidation has been taking place recently in the space industry. In the field of earth observation, there are also signs of a greater vertical integration, enabling large industrial organisations to provide end-to-end services to users of the information.

The value-adding companies in Europe benefit of providing tailor-made software, images and services to their customers and from opportunities provided by public authorities. Many companies are seeking innovative, specialised niche markets in information services. Increasingly, they have been exploiting earth observation in convergence with information society technologies, to provide services in the geo-spatial market. A major effort by the Commission, aiming at developing new applications, has contributed to the appearance of a lot of start-ups. Yet, this immature sector has seen the failure of many companies.

The USA is currently positioning itself to become the only important player in the field. It has stated its intention to use public and private resources for satellite imagery to develop competitive advantage in the field of information gathering from space. Canada, China, India, Israel, Japan, Russia all have observation satellites, but their efforts in this field are not likely to challenge the US initiatives. It is Europe's interest to guarantee the existence of multiple sources for information from space-based observation.

ACCOMPLISHMENTS SINCE THE LAST COMMUNICATION ON SPACE

The Commission has fostered the use of earth observation as an effective information source for developing and implementing EU policies by the services of the Commission, national administrations, and other bodies such as the European Environment Agency.

A study into EU geo-spatial and environmental information needs

In the first half of 1998 a Commission working group investigated the potential role of earth observation in contributing significantly to the information required by EU policies, both internal and those related to international co-operation. The working group was supported by an Industrial Focus Group, including representatives of European trade associations, which reviewed and commented on the work in progress. A representative of ESA has been associated to this study.

It was found that the requirements could be consolidated into five thematic areas or "cases": spatial planning and other aspects of regional development; land resources management (including agriculture); environmental conventions; environmental indicators, and security (including environmental risks and hazards).

The study findings have been presented at a number of forums, including the ESA Programme Board for Earth Observation.

Operational activities in the agricultural domain

Verification of subsidy claims: The activity, co-funded by the Commission and the Member States, continued in 1998 with a total of 104 sites in 13 Member States checked using earth observation, involving the purchase and delivery of 725 satellite images. Although co-funding of this work by the Commission will finish in 1999, most Member States have confirmed the continuation of this operation under their own budgets and with the technical support of the JRC. Furthermore, in the frame of these verification operations, the supply of images by the Commission to the users will be ensured on the EU budget.

Agricultural Statistics: The Commission confirmed in its report to Council the decision to suspend the present operational activity concerning the rapid area estimates at the European Level. However, research and 'technical watch' activities will continue.

Olive registers and specific surveys: Preliminary work to provide unbiased and homogeneous estimations of olive production in the five producer countries is underway.

Space techniques for Environmental Monitoring and Research: (Environment & Climate and INCO RTD programme)

The year 1998 marked the final phase of these RTD actions. As regards the Environment and Climate programme, a total of 100 shared-cost projects have now been concluded with a total Community contribution of €108 million. Basic methodological research, feasibility studies and pre-operational pilot projects have been organised into informal clusters addressing the thematic areas of forestry, land cover, ice monitoring and the marine environment. The focus has been on bringing industry and users together to help identifying opportunities and both sides becoming stakeholders in possible exploitation. Projects involve national administrations implementing aspects of EU policy, including co-operation on behalf of developing countries and components of the European Environment Agency network.

Through the INCO programme, and indirectly through Commission support of INTAS, a significant number of joint research activities were supported on similar themes, focusing third countries in Central and Eastern Europe, the Mediterranean, Asia, Sub-Saharan Africa and Latin America. In addition a large number of accompanying measures targeting global change issues were supported by ENRICH, with joint funding from the Environment & Climate, Mast and INCO RTD programmes.

Centre for Earth Observation (CEO)

The combination of shared-cost projects and direct-cost work in the context of the CEO has been closely monitored by the Member States with regular plenary and *ad hoc* meetings of the oversight committee. The CEO initiative has shown that user requirements can be met using satellite data: 44 shared cost action projects have been supported by the Environment and Climate Programme; 8 direct action projects have focussed on the needs of Commission services and 14 studies have addressed aspects of product and market development.

With a view to fostering the development of a sustainable earth observation market, 9 new user segments have been explored and 23 education and training projects undertaken. Finally, an operational system to improve on-line access to data, information and services is being implemented.

Vegetation Monitoring Instrument

The first images of the Vegetation Monitoring Instrument, which was co-funded by the Commission, France, Sweden, Belgium and Italy, were acquired only seven days after the launch of SPOT 4 in March 1998. The main mission of the instrument is to continuously observe and monitor the entire continental biosphere on both regional and global scales. The image processing and central archiving centre (CTIV) was officially opened in June 1998. Full production capacity was attained in March 1999. An information day was held in Brussels to publicise the opportunities offered by this new data source.

Studies for new missions

Shared-cost work to help specify and develop new missions has continued, with 6 new contracts awarded in 1998. ESA is represented at the working level in all feasibility and mission studies, several of which are expected to lead to proposals for follow-up in ESA programmes. The current and completed projects were presented in a workshop with ESA in early 1999.

Telematics Applications for Environment

In 1998 cost shared activities for earth observation applications such as for oil spill detection and forest fire management have been successfully continued or completed. A new activity addressing the interoperability between the catalogue of data sources of the European Environmental Agency with the operational system for data access of the CEO has been launched. The service to be provided will allow any user to search and retrieve environmental data from both space and non-space related sources.

TEN-Telecom

The 1998 work plan of TEN-Telecom included for the first time applications and services related to environmental management. The focus of these validation and deployment activities is to support the stimulation of new markets. The projects aim at services

exploiting satellite information sources for multi-lingual, high-quality weather forecasts, monitoring of ground level UV radiation, and safety and emergency services related to volcanoes.

De-mining

Methodologies have been investigated to detect and analyse the positions of anti-personnel land mines. An international conference addressing the technical, social and political issues surrounding the problem of mine detection and clearance was held in Ispra in September 1998.

PREPARING USERS AND INDUSTRY FOR FUTURE SUSTAINABLE SERVICES

The breadth of the Commission's mandate, together with the market links between ground and space activities, means that it cannot restrict its focus to applications. The Commission therefore acts to help bridge the gap between the users and the space segment. The emphasis is on defining and marshalling requirements, and on policy initiatives designed to encourage a sustainable European sector.

5th Framework Programme

Activities related to earth observation will be developed and refocused in line with the problem-solving approach of the new programme. A funding line dedicated to earth observation generic technologies will focus on further opening the market by developing applications for EU policies linked to the "cases" identified in the study into EU requirements mentioned above. At the same time, earth observation will be used as a tool alongside other technologies to help meet the objectives of a number of key actions across the programme. Key actions on global change, water and marine ecosystems give special attention to the co-ordinated development of a European capability for long-term environmental monitoring

Towards a European global observing system

After consultation of the various External Advisory Groups, the *Energy, Environment and sustainable development* Work-Programme in the 5th Framework Programme has been completed. This led notably to an important preparation phase for the key action "global change, climate and biodiversity", giving priority to the establishment of a European component in global observing systems for climate, terrestrial systems and oceans.

The objective of this phase is to support the development of the European component of global observing systems, notably by identifying and help filling gaps in existing observation system capacity, to ensure that long-term consolidated data sets are collected in a co-ordinated manner, and made available to predict and assess the impact on and to formulate response options to global change. The emphasis has to be put on meeting the requirements and priorities of users, and on integration with other activities in this key action.

Two of the selected RTD priorities are closely interconnected and might pave the way to the development of a European component in global observing systems, thus contributing to a better positioning of European industry in world markets for such systems:

- better exploitation of existing data and adaptation of existing observing systems. This includes co-ordination of current observing facilities, improved data management and

access to archives, development of tools and techniques for the integration of existing data from different sources for multipurpose use, as well as design and implementation of innovative applications using current observing capacity for the collection of data on new variables.

- **development of new long-term observing capacity.** The target is to identify the need, and where necessary to help deploying new cost-effective observation systems. This includes identification of requirements, priorities and the value of information, assessment of options for long-term operation (including future financing scenarios and, possible public-private partnerships), as well as development of essential elements for both in-situ and remote sensing observing systems.

Calls for proposals have already been launched or are expected to be launched before the end of the year inviting projects that envisage a contribution to the scientific and experimental base for implementing a capacity for global observation and environmental services.

These research efforts will be complemented in the same programme by projects falling under research and technological development activities of a generic nature. These projects specifically aim at the development of generic Earth observation technologies to monitor, understand and protect the environment, to develop a market for new operational products and services, and hence foster a sustainable European capability of operational services for environmental monitoring from space. The emphasis will be on "pilot projects" which seek to develop and demonstrate operational systems with the involvement of end-users.

A European Policy for Geographic Information (GI2000)

Various actors involved in geographic information, including the national mapping agencies, have identified the need to agree on or to co-ordinate at EU level the rules, standards, or procedures to collect, exchange and use geographic information. Applications of earth observation, notably within the context of the specific programme on Information Society Technologies of the 5th Framework Programme, should contribute to this, and identify further the possibilities for co-ordination.

CO-ORDINATION WITH THE SPACE AGENCIES

A co-ordinated approach strengthens the impact of the Commission actions and those of the other European actors in this domain.

Co-ordination with other European agencies

Over the past few years, Europe has made attempts to move towards a policy in earth observation. In 1995 ESA, Eumetsat and the Commission worked out a tripartite framework for European co-operation in earth observation¹⁵. Within this framework three main objectives were established, i.e. to satisfy user needs through operational satellite services, to promote the widest possible market for earth observation derived services, and to ensure guaranteed access to strategically important information. These common

¹⁵ *Proposal for a European Policy for Earth Observation from Space, ESA/PB-EO(95)7rev.2, presented to the ESA Ministerial Council in Toulouse, October 1995.*

objectives remain valid, but there is a continued need to mobilise a driver for future action in this context beyond the scientific community.

In the spirit of this framework the Commission has held bilateral meetings with ESA and Eumetsat to detect and, where possible, eliminate unnecessary overlap in RTD, to identify gaps in the work financed by the three organisations, and to plan the way forward.

In 1997 Council¹ welcomed the Commission's approach and encouraged further elaboration and implementation of "Action Plans for satellite communications, navigation and earth observation and environmental monitoring, in close consultation with the Member States, ESA and national space agencies, industry, users, operators and service providers".

Subsequently, the Commission prepared a draft action plan for earth observation and solicited reactions from Member States, ESA and Eumetsat in the Space Advisory Group. The current scope allows implementation of the plan under the Commission's remit for the execution of the Framework Programme and may develop further.

A Commission representative participated in the deliberations of an ESA Task Force to examine the future strategy of the Agency in the field of earth observation. The Commission was also regularly represented as observer in ESA's Programme Board for Earth Observation. The ESA/EC Working Group on Earth Observation and the Environment have met several times, addressing among other issues possible linkages between the ESA programme and the 5th Framework Programme.

The Commission was represented as observer for the first time at the Eumetsat Council in 1998, and regular bilateral meetings have been held. The JRC has concluded an agreement with Eumetsat concerning technical co-operation on the Meteosat Second Generation (MSG).

Committee on Earth Observing Satellites (CEOS)

For the first time in 1998, a European co-ordination meeting in preparation for the CEOS plenary is to be co-convened by ESA, Eumetsat and the Commission. The Commission was present at plenary meetings, and, at the technical level, the Commission chairs the CEOS working group on Calibration and Validation, and will shortly chair the group on Information Systems and Services.

International Global Observing Strategy (IGOS)

The Commission has been involved in the Strategic Implementation Team, which brings together both CEOS members and the International Global Change Funding Agencies, and has helped chart a way forward for the IGOS concept. The Commission has also been active in the development of two IGOS pilot projects, which attempt to investigate the potential for international co-ordination in the areas of global forest cover, and disaster management.

World Radio Conference

The WRC-97 (World Radio Communications Conference 1997) discussed *inter alia* the world-wide allocations to the earth exploration satellite and space research services in the

frequency band 18.6-18. GHz. For the purpose of preparing the next WRC the Commission has issued communications^{8,16} to the European Parliament and the Council on radio frequency requirements for Community policies in the context of the WRC-2000 and on radio spectrum policy.

A multi-agency initiative in the area of environmental security

At the annual JRC/SAI Users Meeting, held in May 1998 in Baveno, Italy, the Commission invited high-level representatives from European space agencies and related organisations¹⁷ for an informal meeting to examine the implications of the various activities in Europe with regard to earth observation. The participating organisations agreed that their efforts in earth observation could and should strengthen the environmental information input to the development and implementation of relevant policies in the European Union. The Kyoto Protocol to the UN Framework Convention on Climate Change has been identified as an initial area for attention.

¹⁶ "Radio frequency requirements for Community policies in the context of the WRC-99", COM(1998)298 final

¹⁷ ESA, Eumetsat, BNSC, CNES, DLR, EARSC, later joined also by ASI