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COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

"THE EUROPEAN COMMUNITY AND SPACE: CHALLENGES, OPPORTUNITIES AND NEW ACTIONS"

CONTENTS

EXECUTIVE SUMMARY

1. European nations have made significant investments in space. Thanks to the European Space Agency (ESA) and complementary national programmes, Europe has developed a reputable technological and industrial capability in space. This has led to important successes and has established Europe as a major partner in international space programmes.

2. However, the European space effort has reached a point where it faces a number of important challenges; but at a time when it also has new opportunities:

   a. Europe must ensure the successful exploitation of space applications. In a variety of areas new demands are being made for space techniques and space-derived information; and governments are coming under increasing pressure to justify their support for space programmes in terms of the potential economic importance of the key applications:

      * Earth observation in particular is rapidly emerging as a major tool for resource management and environmental monitoring.

      * For satellite communications, there is a need to ensure the appropriate conditions that will allow the emergence of new services.

   b. Increased international competition is being felt in the areas of launch services, ground equipment and increasingly in satellites. While the main competition comes from the United States and Japan, the emergence of new spacefaring nations and the entry into commercial markets by former Soviet republics and China is bound to intensify it.

      The competitiveness of the European space industry is fragile in the areas of satellites and ground equipment due to the relatively small size of the European market, the fragmentation of both the European and the world markets, and also to the weakness of the components industry. Moreover, vulnerability to increased competition is made worse by the absence of multilateral trade discipline, particularly for launch services.

   c. Publicly financed space programmes also face growing budgetary constraints. Infrastructure programmes are particularly expensive and costs tend to rise during project implementation, making it difficult to maintain a balanced allocation of budgets between these programmes and the science and applications programmes.

      This has drawn attention to the need to ensure the continuous funding of operational Earth observation systems, particularly by involving the end-users.

      A debate on the allocation of funds between the different space objectives took place at the last ESA Council meeting at ministerial level (Munich, November 1991), prompting a reassessment of the best way for Europe to achieve its goals,

in particular by seeking broader international cooperation, including the former Soviet republics.

3. With the maturing of space applications and the emergence of new operational and commercial activities, it is clear that some of these issues require actions which lie in part beyond the responsibilities of space agencies, since their main competence is research and development and the demonstration of space technologies and systems.

   In the earlier phase of Europe's space effort, the space agencies had an essential, almost exclusive role, since the main aim was to establish a technological and industrial capability (technology-push). Europe must now move progressively towards a demand-pull approach in order to integrate space activities into the broader socio-economic fabric of Europe. Space applications programmes should be oriented according to objectives defined outside the space sector, and there should be a better technological synergy between space and non-space programmes.

4. The European Community already plays a role in the European space effort since its competences and policies have a bearing on space activities. Decisions taken at Community level relating to the internal market and industrial affairs, trade aspects, environmental policy, telecommunications policy, audio-visual policy, and research and technological development (R&TD), for example, will increasingly impact on Europe's space effort.

   At the same time, space is making its impact felt on the implementation of Community policies. The use of space-derived information will grow, particularly in areas such as environmental research and monitoring, aid to developing countries, agricultural monitoring and the development of the Community's less-favoured regions.

   The Community's international role has also increased, with growing implications for Europe's space activities. This includes multilateral and bilateral trade relations, scientific and technological cooperation, international collaboration on environmental protection and global policies relating to sustainable economic development.

5. We are therefore at a stage where there is both an opportunity and a need for the Community to contribute more towards the successful further development of the European space effort, in particular in the definition and implementation of a European space policy.

   Within the scope of its competences, the Community's contribution to the space effort will aim at the following five objectives:

   a) To encourage and support the optimal development and exploitation of Earth observation applications, particularly by initiatives contributing to the establishment of a European operational system for the study and monitoring

of the environment; to increase and intensify the use of satellite data within the framework of various Community policies.

b) To ensure the appropriate regulatory conditions allowing the development of new markets for satellite communication services.

c) To develop the complementarity and synergy between Community R&TD programmes and the space programmes of ESA and Member States in order to reach a greater efficiency in European R&TD efforts.

d) To encourage the consolidation and growth of a competitive space industry and to promote its interests at international level, within the framework of Community industrial and commercial policies.

e) To encourage the widening of balanced international cooperation, particularly taking into account the new opportunities for cooperation with the former Soviet republics and the countries of Central and Eastern Europe.

6. The present Communication is both an update and an extension of the Commission's first Communication on space. It builds on the work done by the Commission since 1988, taking account of the new issues and opportunities which have arisen, together with the views of the European Parliament, ESA, national space agencies, industry and other organisations involved in space, and the report of a panel of senior independent experts.

It reviews the different space sectors of interest to the Community and the impact of the changes which have taken place. It establishes guidelines for the Community role and proposes concrete action lines which will support and complement those of ESA, Member States and other organisations.

7. Considering the various dimensions of the Community interest in space, the Commission will establish an *ad hoc* space consultative committee to inform and seek guidance from the Member States during the preparation and implementation of Community actions.

CHAPTER I

THE EUROPEAN SPACE EFFORT AND THE NEED FOR COMMUNITY ACTION

A. The importance of space for Europe

1. European nations have made significant investments in space, largely through a collaborative effort. Thanks to the European Space Agency (ESA)[1] and complementary national programmes. Europe has developed a reputable technological and industrial capability in space.

   This has led to important successes (e.g. Ariane, Meteosat, Giotto, SPOT, ERS-1, ECS) and has established Europe as a major partner in international space programmes.

   Space activities have contributed to the construction of Europe as a political and economic entity on the world stage, and will continue to do so in the future.

2. Europe's space effort encompasses a wide range of activities from launch capability and space infrastructure (including human activities in space) to space science (seeking a better understanding of the solar system and the Universe in general), and space applications (Earth observation and telecommunications).

   The political, socio-economic and industrial benefits associated with the mastery and exploitation of space applications are of growing importance. The use of space techniques can contribute to economic development in general; to enhanced global communications; to the study and monitoring of the environment; to a more efficient management of the Earth's resources; and to greater security.

3. Space is still largely financed from public sector budgets (civil and defence). Political factors directly influence the size of these budgets and determine to a large extent the prospects for growth in this sector.

   Governments are coming under increasing pressure to justify their support for space programmes in terms of the potential economic importance of a growing range of

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[1] Members: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom. Finland is an associate member. Three Member States of the European Community (Greece, Portugal and Luxembourg) are not members of ESA. Canada participates in some ESA programmes through a cooperation agreement.

applications. Earth observation in particular is rapidly emerging as a major tool for resource management.

4. As the exploitation of space grows, its industrial and commercial importance increases. Satellite communications are developing on a commercial basis and generating significant private sector markets. Earth observation is reaching a greater level of maturity; and while it will continue to be driven largely by the public sector, there is plenty of scope to encourage a greater role for the private sector.

B. The weaknesses of Europe's space effort

5. The success of Europe's space effort over two decades should not, however, be allowed to conceal its weaknesses.

   Firstly, the competitiveness of the European space industry has been inadequate in the areas of satellites and ground equipment due to the relatively small size of the European market, the fragmentation of both the European and the world markets, and also to the weakness of the components industry. Moreover, vulnerability to increased competition is made worse by the absence of multilateral trade discipline, particularly for launch services.

   Secondly, the regulatory environment does not yet encourage the development of new satellite telecommunication service markets at the European level.

   Thirdly, there has been insufficient and dispersed public support for the development and exploitation of Earth observation, in particular for the study and monitoring of the environment.

   Fourthly, the high and increasing cost of infrastructure programmes hinders a balanced allocation of budgets between these programmes and the science and applications programmes.

6. In the earlier phase of Europe's space effort, the main aim was to establish a technological and industrial capability. Inevitably, this period was characterised by a strong "technology-push" approach.

   The space agencies had an essential, almost exclusive role in this process. The approach was successful and Europe acquired a strong space capability; but it had the disadvantage of encouraging a tendency to treat space in relative isolation from other sectors.

7. In addition, ESA applies the principle of "juste retour" which is an obligation determined by its Convention.[2] This principle has proved to be a key condition for

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[2] The principle of "juste retour" guarantees the participating states industrial contracts commensurate with their level of contributions to ESA's programmes.

cooperation within ESA. But while it has allowed the development of a distributed technological and industrial capability in Europe, it does not always encourage evolution towards more efficient industrial structures.

8. With the maturing of space applications and the emergence of new operational and commercial activities, it is clear that there are limits to the capability of space agencies to meet the demand for operational uses of space systems.

   In a variety of areas new demands are being made for space techniques and space-derived information; and the successful exploitation of applications is rapidly becoming a major space challenge for the 1990s. Consequently, space policy and decision-making mechanisms need to be adapted in order to respond to the "demand-pull" being felt increasingly both in satellite communications and Earth observation.

9. To ensure the continued success and relevance of the European space effort there is a need for a broader approach in order to encourage: the orientation of space applications programmes according to objectives defined outside the space sector; the emergence of public or private customers who will fund operational systems; and the development of technological synergy between space and non-space programmes.

C. The Community interest

10. The European Community already plays a role in the European space effort since its competences and policies have a bearing on space activities. Decisions taken at Community level relating to the internal market and industrial affairs, trade aspects, environmental policy, telecommunications policy, audio-visual policy, and research and technological development, for example, will increasingly impact on Europe's space effort.

    At the same time, space is making its impact felt on the implementation of Community policies. The Commission is already using information derived from Earth observation data in a variety of applications relating to its activities in key areas: land use, agricultural statistics, environmental research and monitoring, and aid to developing countries. The use of such information could be intensified and extended to other important policy areas such as the development of the Community's less-favoured regions. The Community is potentially a very large customer for space-derived information.

    Satellite communications are also used in the implementation of Community policies such as regional development, training (distance learning), and fisheries. This is likely to grow in the future.

11. The Commission's first Communication on space (July 1988)[3] established the principle of a Community involvement in Europe's space effort, and defined the main orientations for a role which would be complementary to ESA. It also specified six action lines which guided the Commission's work in this area.

12. After this Communication, cooperation between the Commission and ESA began to develop in a more systematic way with progress being made jointly in a number of areas: Earth observation and the environment, telecommunications, research and technological development (R&TD), industrial competitiveness and the internal market, external relations and commercial policy.

    The Commission has also consulted with other space organisations - both public and private - including national space agencies, EUMETSAT, EUTELSAT, and the space industry.

13. We are now at a stage where there is both an opportunity and a need for the Community to contribute more towards Europe's space effort, considering: the political, economic and industrial dimensions of the challenges and issues which need to be addressed collectively; the sectorial mission and competence of ESA, which is mainly an agency for the research and development of space technologies and systems; and the need to integrate space activities into the broader socio-economic fabric of Europe (especially Earth observation and satellite communications which are space-derived activities driven by objectives defined outside the space sector).

D. The changing context

14. Since the first Communication a number of factors have grown in significance and new ones arisen, and which together have changed the overall context in which the European space effort is undertaken. This has created new opportunities and challenges for European space activities, together with attendant problems and risks.

The rise of global environmental problems

15. It is now widely recognised that global environmental problems will need to be addressed in order to preserve human well-being on Earth, and can only be addressed effectively if we improve our ability to observe, model and understand the complexities of the global Earth system.

    Space techniques are essential for the systematic, synoptic and long-term gathering of data needed for research and monitoring on the required scale. The successful implementation of global change research programmes will require an unprecedented level of international cooperation in three areas: the long-term planning and funding of operational Earth observation systems to ensure a

[3] COM (88) 417 final

continuous data supply; an adequate decentralised ground infrastructure for the management and distribution of data, and rules for its operation; and scientific cooperation organised through research networks.

Changes in the geopolitical context and their implications

16. The shift in geopolitical relations that followed the momentous developments in the countries of Central and Eastern Europe and the former Soviet Union has enabled a reduction of the military threat that underlay East-West confrontation.

    At the same time new security challenges have arisen (partly as a result of the shift in the global balance of power) bringing new international responsibilities for Europe.

    This is leading to a review of the role of space systems in the prevention and limitation of armed conflict (verification of disarmament agreements; and crisis management). The current Western European Union (WEU) initiative points to the further European defence use of space. In developing its space defence capability, it will be essential, therefore, for Europe to ensure the optimum use of its resources by exploiting the synergies between civil and defence systems both for communications and Earth observation.

Rise of new space powers

17. The number of spacefaring nations is increasing as countries acquire a space capability either by developing their own technologies, or under licence. With the growing industrial and commercial importance of space activities, it is inevitable that this will bring new competitive pressures on the international markets.

    This comes from non-market economies and economies under transition as well as market economies. The pressures are particularly keen in the markets for launch services and ground equipment, and increasingly for satellites.

Budgetary constraints and changing space priorities

18. Space programmes face growing budgetary constraints, manifested *inter alia* in the recurrent uncertainties over the long-term future of the international Space Station Freedom. Infrastructure programmes in particular are extremely expensive and costs tend to rise during project implementation, with the risk of a negative impact on the scientific and applications programmes.

    This has drawn attention to the need to ensure the continuous funding of operational Earth observation systems, particularly by involving the end-users.

Faced with a difficult economic situation, governments are looking for ways to limit public financial commitments; and in the US there has been a debate on the allocation of funds between the different space objectives which is not yet conclusive.

Considerations of this kind also emerged at the ESA Council meeting at ministerial level in Munich (November 1991), prompting a reassessment of the best way for Europe to achieve its goals, and will be addressed again at their next meeting in November 1992.

The single European market and European Union

19. 1992 is a pivotal year in the development of the European Community. It marks the final year of its efforts to complete the single market. Industrial restructuring which is taking place in the space and space-related industries partly reflects these changing circumstances.

1992 also marks the beginning of the next phase of European Union following the decisions of the European Council in Maastricht on economic and monetary union and on political union. The agreements at Maastricht will strengthen the role of the Community in research and technological development and environment policy, both of which will have an important bearing on the Community's approach to space.

In particular, the importance of scientific data as the basis for environmental policy and the need for international action to help solve worldwide environmental problems were both recognised at Maastricht.

The international role of the Community

20. The Maastricht summit also recognised that the international role of the Community has grown, and this too is likely to have an impact on European space activities.

The Community has negotiated the agreement on a European Economic Area with the EFTA countries, which includes the four ESA members[4] which are not Member States of the Community. It has also signed cooperation agreements with most of the countries of Central and Eastern Europe and is preparing agreements with the former Soviet republics.

At the wider international level it has a crucial role to play in the efforts to complete the Uruguay Round of negotiations within the General Agreement on Tariffs and Trade (GATT).

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[4] Since the Communication of 1988, three of the four (Austria, Sweden and Switzerland) have applied for membership of the Community. Norway is considering applying.

Finally, the Treaty on European Union should increase the international responsibilities of the Community.

The republics of the former Soviet Union

21. Space is one of the sectors where Russia and other former Soviet republics have much to offer; and actively seeks both to develop cooperation with international partners and to commercialise its know-how. This creates new opportunities for cooperation which would help to maintain the science and technology capability of the new republics; and would allow Europe as a whole to do more by sharing tasks at the international level.

Failure to cooperate could lead to the disappearance of important space capabilities in these republics, thereby reducing the opportunities. At the same time there are other risks which must be properly assessed: e.g. unfair commercial competition; proliferation of missile technologies.

E. Industrial issues

22. In 1991, the European space industry had a turnover of around 2.5 billion ECUs and employed about 25,000 people. The same year, the US space industry had a turnover of 26 billion ECUs and employed more than 260,000. This large difference is due to the size of the government markets in the US which is 14 times greater than in Europe. With such markets not being open to international competition, the US space industry therefore benefits from a large captive market.

In particular, the US space industry enjoys access to a large military market which represents about 53 percent of the total sales of the US space industry. In Europe the military market is still limited and accounts for only 10 percent of sales. However, taking account of new military applications of space, Europe's space industry is likely to be a growing element of the defence industry in future.

As the table below shows, the size of the civilian public-sector markets also helps to account for the difference between the US and Europe. It is only in the commercial markets that the gap is much smaller; although it represents only 5 percent of the turnover of the US industry and as much as 30 percent of the European.

The interconnections between the public and commercial markets is nevertheless very strong. At the technological level, the R&D required for the development of space systems is largely financed through public programmes but is of direct benefit to commercial applications. The relationship also works at the industrial level through series effects: in both markets launchers use the same systems. For Earth observation and satellite communications the space vehicles are very similar, and much of the equipment is the same.

Breakdown of markets of the European space industry compared with the American space industry in 1991 (billion ECUs)

	US space industry	EUR space industry	Europe as % of US
Total sales	26 (100%)	2.5 (100%)	9.6%
Government markets	24.7 (95%)	1.75 (70%)	7.1%
- military	13.85 (53%)	0.25 (10%)	1.8%
- civilian	10.85 (42%)	1.5 (60%)	13.8%
Commercial	1.3 (5%)	0.75 (30%)	57.7%

(Exchange rate: 1 ECU = $ 1.166)
Sources: Aerospace Industries Association, Euroconsult, CEC

23. There exists, then, a very significant structural disadvantage for the European space industry, still in its infancy compared with the US space industry, and which strongly affects its apparent competitiveness on the commercial market.

Despite this disadvantage, the European industry was able to achieve a strong position in the commercial launcher market (more than 50 percent of the world market), having withstood the reintroduction of the traditional US launchers (during the grounding of the US Shuttle). This early success was due to the R&D programmes of ESA and to the integration of the European industry in a single industrial and commercial management structure: Arianespace. This position has come increasingly under attack with renewed competition from the US together with the arrival of China and Russia on the market, and in the absence of multilateral trade discipline.

The situation is less favourable for communications satellites which are the only other space market with a significant commercial dimension. The turnover of European industry in 1990 was close to 25 percent of the world commercial market, although this is accounted for largely by sales on the European market. In reality, the position of European industry is deteriorating rapidly and the immediate perspectives are not very encouraging. This is due to the structural disadvantage mentioned above and to the fragmentation of the industry which reflects the fragmentation of its markets.

1990 sales of commercial products by US and European space industry (million ECUs)

	US space industry	EUR space industry	Europe as % of US
Launchers:			
Total sales	1200 (100%)	560 (100%)	46.7%
Government markets	840 (70%)	84 (15%)	10%
- military	720 (60%)	28 (5%)	4%
Commercial markets (domestic and export)	360 (30%)	476 (85%)	132%
Communications satellites:			
Total sales	2230 (100%)	400 (100%)	18%
Government markets	1670 (75%)	160 (40%)	9.6%
- military	1450 (65%)	80 (20%)	5.5%
Commercial markets (domestic and export)	560 (25%)	240 (60%)	42.9%

Source: Euroconsult, CEC

24. Satellite communications also generates significant economic activity downstream of the space industry itself (e.g. ground stations, management of networks, services). These markets are larger than those for satellites and launchers themselves, and will grow rapidly as applications increase (private VSAT networks, direct broadcasting TV, links between mobiles). This market is not supplied by the space industry *stricto sensu* but by the telecommunications and electronics industries. The position of European industry in these markets is even less favourable than for the space segment.

The European space industry's share of worldwide commercial markets

	European market share (1985-90)	present trend	world market estimate 1991-2000 (ECUs)
Launchers	60%	uncertain	8-11 billion
Communications Satellites	25%	down (to 15-20%)	10-13 billion
Communications Ground stations	12%	down (to 8-10%)	40-60 billion

The deregulation of telecommunications in Europe should allow satellite communications and related services to expand. But its impact on the space segment will be limited. Taking account of the structural disadvantage of the European space industry, this market opening must be accompanied by further rationalisation of the European industrial structure.

25. For the whole range of its activities, the space sector relies on several key industrial sectors: aeronautics (in-orbit structures, stages of launchers, satellite bodies, and future space planes); propulsion (launcher and satellite engines); telecommunications (communication payloads, ground stations and services); materials (structures of launchers and satellites); electronics and opto-electronics (all systems); and software (systems management, for both ground and space segments). Space thus has an industrial impact due to its qualitative driving effect on other sectors.

Because of this integrating role, the effectiveness of the European space sector also depends on the competitiveness of these other industries. The weakness of the European electronics and components industries represents a growing handicap for the European space industry (especially for satellite communications and ground stations) given that Japanese industry is using its strength in microelectronics and components in order to enter the space sector.

Each of these aspects combine to give the European space industry an importance which is much greater than that suggested by the size of its turnover and employment.

F. Towards an increased Community contribution

26. On 22 October 1991 - following a special "Hearing" on space in which representatives of ESA, national space agencies, and the space industry were consulted - the European Parliament adopted a resolution[5] which recognised the importance of space for Europe, and called on the Commission to elaborate comprehensive actions to ensure the optimal development and exploitation of space applications.

27. Meanwhile, the Commission also sought the advice of a panel of senior independent experts. This panel provided a broad view of where Community action could best contribute, either directly or indirectly to the successful further development of Europe's space activity.[6]

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[5] PE 146 210/final.

[6] The report of this panel - "The European Community - Crossroads in Space" - was published in September 1991. (EUR 14010).

28. The present Communication is both an update and an extension of its predecessor. It builds on the work done by the Commission since 1988, taking account of the new issues and opportunities which have arisen, together with the views of the European Parliament, the advisory panel, ESA, national space agencies, industry and other organisations involved in space.

It reviews the different space sectors of interest to the Community and the impact of the changes which have taken place. It establishes guidelines for the Community role and proposes concrete action lines.

CHAPTER II

ANALYSIS AND ACTION LINES FOR THE COMMUNITY

A. Earth observation

29. Earth observation by satellite is rapidly becoming an essential tool in the management of the Earth's resources, and for the study and monitoring of its environment and climate. Space-derived information is also of increasing value for the implementation of public policy in many areas. Agriculture, forestry, urban planning, regional development and especially the provision of a sound scientific basis for environmental policy are all creating a growing demand for space data.

The importance of Earth observation for all of the above activities, in both the developed and developing world, derives from the unique ability to provide synoptic and repetitive measurements over very large geographical areas and over long periods of time.

30. Europe has built up an impressive Earth observation capability through ESA programmes and national initiatives, and is already a major supplier of Earth observation data. It will play an increasing role in the international data collection effort through the operation of SPOT, Meteosat, ERS-1 and planned future satellite systems. These and satellite systems from other countries will generate a major increase in data supply.

However, there are strong indications that the European capability for converting this stream of data into operationally useful information is inadequate. There is a real risk that unless action is taken, the demand for space-derived information may not be met. This requires a series of actions which lie in part beyond the responsibilities of space agencies.

31. The public sector will continue to be a major customer and driver in the market for applications of Earth observation data; directly to meet its own needs for operational services and indirectly through the funding of research which uses the data. This is particularly true of the Commission which, by its need to monitor adequately the implementation of Community policies, is already an important consumer of Earth observation data.

In terms of geographical coverage, volume of data processed and quality of analysis, the MARS, CORINE and TREES[7] projects are setting new standards

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[7] 'MARS = Monitoring Agriculture by Remote Sensing
CORINE = Coordination of Information on the Environment
TREES = Tropical ecosystem environment observations by satellites

for operational Earth observation. Extending the use of space-derived information in support of Community policy formulation and implementation requires further projects of this kind to define user needs and establish the operational feasibility of new applications.

32. Taking the sector as a whole, however, progress towards operational applications continues to be slow. This is reflected in the small size of the commercial value-added sector. A vigorous value-added industry to handle and process data could provide a vital service to operational as well as research users. The volume of this business in Europe is estimated at between 250 and 300 million ECUs, employing around 2000 people. Although it is expanding at around 25% annually, the commercial sector has yet to experience the growth seen, for example, in space telecommunications.

33. Europe has suffered from an imbalance between the efforts devoted to the space and ground segments, and a predominance of "technology-push" over "demand-pull." The main factors which are hindering development are as follows:

Insufficient user-input to Earth observation programmes

34. Actual and potential users are often unable to provide significant input to the planning and prioritisation by the space agencies of Earth observation programmes. They do not form a coherent community, particularly in the case of land applications[8], and they have little knowledge of the possibilities offered by sensing technology. In addition, no appropriate forums exist for users to receive and exchange information; or to articulate and coordinate their requirements for future missions.

Such forums could provide a vital link with the suppliers of data, and could ultimately lead to Earth observation becoming a "closed system", with user groups bearing direct responsibility for the initiation, development and funding of Earth observing systems.

Inadequate ground infrastructure to meet increasing data supply and demand

35. With the launch of the ERS-1 satellite we are already experiencing a significant increase in the volume of available data. When the new systems planned become operational, this increase in supply will accelerate. Estimates already suggest between a three and sixfold increase over current rates.

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[8] In contrast, the meteorological community is an example of a well organised group with a history of successful cooperation, accustomed to dealing with trans-frontier phenomena over large areas. It works together within a single organisation, EUMETSAT, making operational use of a series of dedicated satellites.

An effective ground infrastructure (including dissemination and archiving of data and data catalogues) is needed to enable the growing community of users to make optimum use of the available data, and to allow the emergence of operational applications.

Europe currently possesses some elements of the required infrastructure through the efforts of ESA/Earthnet, SPOT-Image, EUMETSAT, and others. However, these structures must develop further, and within a coherent framework, if the massive investment in the space segment is not to be jeopardised because of an inability to make full use of the data supplied.

Technical obstacles to operational data interpretation

36. Much of the development of data interpretation techniques has been carried out by inadequately funded academics with little incentive to develop robust processes of industrial quality. There is a strong preference for in-house development, particularly in the case of software. This has resulted in a wide range of incompatible, poorly characterised and unreliable processing systems.

The resulting value-added industry lacks breadth (common procedures and standards) and depth (reliable and validated procedures of industrial quality); and does not often offer products and services of sufficient quality to meet the exacting standards expected by operational and scientific users.

There is a need to improve the European technical capability to exploit Earth observation data; and this can be addressed by: research and development to solve well specified problems associated with the use of data from existing and new sensors; pilot projects to show that technically feasible applications meet the operational needs of specific users; and standardisation of data structures and procedures to produce derived information of assured quality.

Uncertainty over the conditions of access to data

37. At present, potentially incompatible or conflicting policies exist, or could develop, regarding the availability and pricing of data.

A data policy acceptable to both the suppliers and to the wide range of users of data and derived information is required for the sector to mature. It should be underpinned by a harmonised legal regime to protect the intellectual property and other rights associated with the data and derived information.

Lack of an overall European strategy

38. The lack of a coherent user-driven strategy, embracing both space and ground segments, underlies many of the problems of the Earth observation sector. An overall strategy is needed to address the continuity of data supply and the funding of operational systems, together with the development of a decentralised ground infrastructure and the related data policy issues.

Such a strategy should also address the mechanisms required to define needs and set priorities for future space missions; and the conditions necessary to promote private sector growth.

Community action:

Towards a European strategy

39. The Community is in a unique position to encourage the development of Earth observation in Europe. It has an important contribution to make in the definition and implementation of a European Earth observation strategy through initiatives and actions which complement and support those of ESA, national space agencies, EUMETSAT, user groups and industry.

The Commission will take the initiative to organise a flexible concertation mechanism to plan and agree such a strategy. This process will associate all parties concerned.

Specific actions related to the space segment

40. Acting as a major customer itself, as a proxy for other users (e.g. environmental scientists), and with a special concern to encourage the development of continuing operational services, the Commission will actively participate in the definition of future space missions to help ensure that the space segment meets users' needs.

41. In its proposals concerning future Community R&TD programmes, the Commission will include support for research on advanced sensor technologies and for the pre-competitive development of instruments of Community interest.

The development and construction of the "Vegetation Monitoring Instrument" (a satellite-borne sensor of relevance to applications of Community interest planned for integration into the SPOT satellite system), will be considered by the Commission as a test case for supporting the development of new instruments.

Specific actions related to the ground segment and data utilisation

42. The Community will encourage and support the development of a European decentralised network for space data management and access, with particular focus on data needed for the study and monitoring of climatic and environmental change.

Based on the results of a feasibility study on the concept of a Centre for Earth Observation, the Commission will make proposals for a Community network including the Joint Research Centre (JRC), to support the coordinated development of data centres in the Member States (including validated data bases, archiving facilities, catalogues and standards). This initiative is being prepared jointly with ESA and the national bodies concerned. It will be coordinated with and will support, notably, the activities of the planned European Environment Agency.

43. The Commission intends to intensify and extend the cost-effective use of space-derived data in the information systems needed for the implementation of Community policies in the areas of agriculture and forestry, environment, regional development and cooperation with developing countries. In particular, it will take action to integrate space-derived data into the European Statistical Information System. The JRC and the Statistical Office will play an important role in supporting this development. This action will also be coordinated with those national and regional authorities directly involved in the implementation of relevant Community policies.

As a major customer for data, and as a pioneer of certain operational applications, the Commission may have a stimulating effect on the development of the applications market. The Commission therefore recognises the importance of clearly identifying its needs, and of ensuring widespread diffusion of its experience.

44. The Commission will include actions to encourage and support the development of Earth observation applications in its proposals for future Community research, development and demonstration programmes. The overall aim will be to develop new applications and to improve the quality and cost-effectiveness of information derived from the data.

The proposed actions will include research on the technical feasibility of new applications, and pilot projects to demonstrate the operational use of Earth observation for applications of public interest.

These actions will be closely coordinated with the relevant activities of the JRC to ensure synergy and the optimal use of facilities such as the European Microwave Signature Laboratory and the European Airborne Remote Sensing Capabilities project. They will also encourage user involvement in projects, and cooperation between universities and industry.

45. Finally, in close cooperation with the various parties concerned, the Commission will seek to promote common European positions in international forums on issues such as those relating to data policy (ie. the legal and economic conditions of access to and exchange of data).

B. Satellite communications

46. Satellite communications have developed rapidly in Europe in recent years. They are now considered an essential element of the trans-European services and networks needed for the single market, and its enlargement to continental dimension following the agreement with EFTA countries on a European Economic Area.

Satellite communications will also help the countries of Central and Eastern Europe to overcome the absence of adequate terrestrial networks so that they can respond to expanding telecommunications needs.

47. The market for satellite communication systems consists of satellite equipment (the space segment), related ground-based equipment (the ground segment), and the provision of services.

The ground segment market alone is more important than the space segment. On a worldwide scale, it reached a total value of 2.2 billion ECUs in 1990, over twice the value of space segment investment that year (1 billion ECUs).

Forecasts indicate that between 1991 and the year 2000 the world civil market for satellites will be worth around 10-13 billion ECUs while the ground equipment market will be of the order of 40-60 billion ECUs. European industry is weak in both markets (especially in ground equipment), with world market shares 25% and 12% respectively. Forecasts for European markets alone are of the order of 3-4 billion ECUs by 1995 for ground equipment, and 4-5 billion ECUs by the year 2000 for satellites (40-50 satellites).

48. The market for satellite services in Europe (excluding television distribution) will be worth 440 million ECUs in 1992, which is only 0.5% of total telecommunications revenues in Europe. However, forecasts indicate growth rates of 25-30% per year if steps are taken to liberalise the regulatory environment.

A recent comparison of the demand for specialised satellite systems in the United States and Europe reveals the extent to which the European market is underdeveloped:

Private satellite networks:	US:	338
	Europe:	50
Programming networks:	US:	115
	Europe:	3
Satellite news gathering stations:	US:	350
	Europe:	50
Position fixing terminals:	US:	25,000
	Europe:	1,000

In addition to these markets is the growing use of satellites for the distribution of television services. In Europe, more than 80 channels are already distributed via satellite. The Commission is seeking to encourage the development of the satellite television market by aiming, among other things, at a greater legal security with regard to copyright and neighbouring rights for satellite broadcasters and cable operators.[9]

The Commission is also pursuing a strategy to encourage the introduction of advanced television services. Progress has been made with the adoption of a Council Directive[10] concerning standards for the transmission of television signals by satellite; and the approval of a Memorandum of Understanding between the broadcasters, satellite and cable operators and consumer electronics manufacturers on how Europe will move towards the distribution of advanced television services. The Commission has also made proposals for an Action Plan[11] to facilitate the introduction of these services.

49. Not only is the ability of European industry to export weak, but US industry supplies a significant part of the European satellite market. Furthermore, the Japanese industry (which is already leading in the ground equipment market) is rapidly building a competitive capability in satellite systems on the basis of its strong position in electronic components and telecommunications equipment. There is therefore a serious risk that European industry will lose further ground to US and Japanese competitors.

50. The underdevelopment of the European market and the weakness of European industry is the consequence of a regulatory regime that has restricted the potential growth of the satellite communications markets, together with a European internal market which is still fragmented. This has impeded the full exploitation of new

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[9] COM (91) 276

[10] Council Directive 92/38/CEE of 11 May 1992 (Official Journal L 137 of 20 May 1992).

[11] COM (92) 154

satellite communications technologies for the provision of Europe-wide systems and services.

The resulting lack of economies of scale and a comparatively complex industrial structure lead to higher costs (10-40%) than US producers, as well as longer lead times for satellite delivery.

US competitors benefit from a large national government market (including defence) which is reserved for the domestic industry, important production synergies between civil and defence activities, and considerable defence R&D support.

Finally, the space industry, like other high-technology sectors in Europe, suffers from the weakness of the components industry, particularly in electronics.[12] A significant and growing part of the components of communications satellites are imported from the US and Japan (imported components represent 10%, in some cases as much as 20%, of the cost of the satellite).

51. The emerging market for position fixing services is based on new technologies for locating mobiles, whether they are land-based, aircraft or shipping. They could make an important contribution to the development of more efficient, safer and integrated transport systems.

The Global Positioning System (GPS) is currently provided by a US military satellite network which has been made available for civil use. However, this arrangement is voluntary and could be halted at any time. The service is also provided free of charge as far as the space segment is concerned, thereby deterring any commercial alternatives.

In addition, accuracies available for civil use (approx. 100 metres as opposed to 10 metres or better for military use) would have to be improved with a view to integrating GPS into the civil air navigation system.

The development of this new market will depend on action to address these constraints.

52. Until now, satellite systems have been operated largely by national telecommunications organisations. In Member States which have liberalised their relevant regulatory regime (Germany, France, Netherlands and the United Kingdom), there is a growing number of private satellite service providers.

The Commission has a role in reviewing the regulatory situation within the framework of its overall telecommunications policy. At the end of 1990, it outlined

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[12] This problem affects the various space systems produced in Europe, but it is of particular concern in the case of satellite communication systems which constitute most of space commercial business.

its position in a Green Paper on satellite communications in the European Community[13], which envisaged:

a) Full liberalization of the ground segment, including both receive-only and transmit/receive terminals, subject to appropriate type-approval and licensing procedures where justified to implement necessary regulatory safeguards.

b) Free (unrestricted) access to space segment capacity, subject to licensing procedures in order to safeguard those exclusive or special rights and regulatory provisions set up by Member States in conformity with Community law, and based on the consensus achieved in Community telecommunications policy.

c) Full commercial freedom for space segment providers, including direct marketing of satellite capacity to service providers and users, subject to compliance with the licensing procedures mentioned above and in conformity with Community law, in particular competition rules. Access should be on an equitable, non-discriminatory and cost-oriented basis.

d) Harmonization measures as far as required to facilitate the provision of Europe-wide services. This concerns in particular the mutual recognition of licensing and type-approval procedures, frequency coordination and coordination with regard to third country providers.

53. After a period of consultation, the proposals of the Green Paper received a broadly favourable welcome from all parties concerned: Member States, regulators, operators, industry, users, etc. This was reinforced by the Council's unanimous adoption in December 1991 of a resolution[14] encouraging the Commission to bring forward the necessary legal texts to implement the policy lines of the Green paper.

Community action:

Industrial competitiveness

54. In commenting on the Green Paper proposals, industry expressed apprehension about the risk of a further influx of US and Japanese equipment and services into an open liberalised Community market and complained about the closed nature of the US and Japanese markets.

To this must be added the concern that the demonstration of new technologies may not be achieved in a timely fashion due to the budgetary constraints felt by the ESA

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[13] COM (90) 490

[14] OJ No. C8, 14 February 1992

telecommunications programme. Until now, this was the "driver" for satellite communications technology development.

55. To address these issues, the Commission will pursue the following actions. Firstly, it will seek to ensure that access to third country markets is open to European industry. This has already been done in Japan, Korea and Africa, and will continue as new requests for satellite systems are made (already Iran, Indonesia and Argentina are planning to buy satellites this year).

Secondly, it will continue to seek the inclusion of satellite communications systems in the agreement on services being discussed in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT).

Thirdly, it will consult ESA to see if its current satellite communications technology programme can be strengthened to respond to the continuing need for technology development and in-orbit demonstration; and to identify the technology elements of satellite and ground equipment that could be included in the research programmes of the Community.

Fourthly, it will seek consultations with all parties concerned (ESA, INMARSAT, users and industry) to examine the actions needed to ensure reliable and efficient position fixing services for European civil users.

Finally, it will carry out studies to provide further understanding of the changes in the satellite communications sector and their implications for the European industry.

Liberalisation

56. The Commission has already started to prepare draft directives which should be approved during 1992-3. The first will extend the principles of competition and the mutual recognition of type-approval to satellite terminals. This should liberalise and harmonise the satellite equipment supply-market in the next 3-5 years.

Subsequently, the Commission will make proposals for a harmonised regulatory framework which should provide for a "one-stop shopping" concept or its approximation, i.e. by offering satellite network and service operators the possibility of obtaining a single Community license for applicable satellite networks.

In addition, the Commission intends to propose measures in such areas as the transborder operation of satellite mobile and transportable Earth stations, and the use of unique frequency bands for VSAT services.

By the Resolution of December 1991, Member States were encouraged to participate actively in ensuring improved access to the satellite capacity of the intergovernmental organisations INTELSAT, INMARSAT and EUTELSAT. All three organisations have now established working groups to make their procedures

transparent, non-discriminatory and effective. The Commission is monitoring this closely and will report progress to Council.

As part of its efforts to achieve a unified telecommunications market, the Commission will continue to encourage the European Telecommunications Standards Institute (ETSI) to define generic standards for ground equipment (other than domestic receiving equipment). This will provide the basis for Commission proposals on the harmonisation of national legislation governing applicable technical standards, according to Article 100A of the Treaty.

C. Research and technology

1. Technology synergy

57. Space is a hostile environment which has obliged the space sector to develop technologies to meet its particular requirements. However, because these requirements have been so specific, the space sector has been slow to transfer technology to other sectors.

At the same time, the space sector has been using or adapting technologies and components which have been developed and used widely by other sectors because of their demonstrated reliability. However, the ability of the space sector to import technological solutions from other sectors has been somewhat impeded by its relative isolation.

58. Trends in technological innovation create opportunities for increased synergy between space and non-space sectors. Space programmes require an increasingly wide range of technologies (materials, robotics, sensors, control, micro-electronics, propulsion etc.) which are also of interest to other industrial sectors.

The pace of innovation in high-technology non-space sectors (e.g. electronics, materials) has been increasing; and a growing number of traditional sectors are catching up with the space sector in terms of high-technology intensiveness, and contribute more to the advancement of the technology base.

59. Budgetary constraints and the need to avoid R&D duplication, together with new opportunities for technological synergies, call for a more interactive and prospective approach in exploiting the potential for technological synergy between space and non-space sectors.

The trend towards a more flexible and modular design of space systems, instead of freezing technology at the design stage for reliability reasons, should allow a more rapid integration of new technologies in long lead-time projects.

60. In its first Communication on space, the Commission recognised already the importance of promoting a better synergy. Since then, cooperation with ESA has allowed the identification of areas of convergence between existing Community

programmes[15] and ESA's technological requirements, and has established the practice of regular information exchanges to facilitate access by the space industry to the results of Community programmes.

61. On the basis of this experience, it now appears desirable to move one step further, from "*ex-post*" coordination (i.e. coordination between programmes already defined) to "*ex-ante*" coordination by taking into account future space technological requirements in defining the content of future Community programmes.

With this aim in mind, a study has been launched, in association with ESA and national space agencies, to assess the areas of convergence of future technological requirements of both space and non-space sectors.

Community action:

62. The Commission will pursue cooperation with ESA to promote a better use of the results of Community programmes in the space sector, and will associate national space agencies in this effort.

The Commission will also take into account the future technological requirements of the space programmes in defining the content of its next programme proposals (Technological areas of particular interest include microelectronics, microprocessors, microsystems, advanced communications, mobile and personal communications, software engineering, robotics, advanced materials, manufacturing and control). This will be done in close cooperation with ESA and national space agencies, and in consultation with industry.

2. Microgravity

63. Experimentation in the virtual absence of gravity is a potentially important application of space that is still in the exploratory research phase.

Space agencies and space service companies provide a wide range of opportunities for microgravity experiments. Europe has autonomous capabilities for short-duration experiments (less than 15 minutes), but for experiments of longer duration European researchers depend on the US for the transportation of Spacelab and EURECA, and on Russia for the use of retrievable capsules and the MIR space station.

64. Europe's research effort is comparable in quality to the United States and Japan. While ESA's programme focusses mainly on the provision of flight opportunities and

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[15] Community R&TD programmes seek to improve the competitiveness of the European scientific and technological base by supporting precompetitive multisectoral R&TD in a wide range of key technologies. The Community R&TD budget is about 2,500 million ECUs per year.

multi-user experiment facilities, the funding for the ground-based research to prepare and evaluate an experiment is provided only at national level in some Member States.

65. Until a few years ago, the scientific and industrial prospects of microgravity research were overstated. It is now largely accepted that more basic research is needed before the industrial interest of microgravity can be properly assessed; and that industry cannot be expected, at this stage, to invest substantial resources in the research. Moreover, the needs and prospects of microgravity experiments cannot alone justify the large investments planned for the international Space Station Freedom.

    Microgravity programmes have tended to evolve in relative isolation from the mainstream of research. Researchers should be encouraged to associate industry in their projects to ensure the industrial relevance of their research and the rapid utilisation of the results.

66. Microgravity is a research tool of interest to various scientific fields covered in several Community research programmes (Information Technologies, Industrial and Materials Technologies, Biotechnology, Human Capital and Mobility).

    Studies and workshops involving experts from space agencies, universities and industry, have reinforced the Commission's view that for the moment it is more appropriate to encourage microgravity-related research projets to compete with other research projects in Community programmes rather than create a dedicated research action.

Community action:

67. Microgravity-related research projects are eligible for Community support, subject to the rules of the relevant programmes.

    Recognising the need to encourage cooperation in this field, the Commission will promote the formation of European networks of excellence for the most promising research themes.

    The Commission will continue to monitor this field, and cooperate with ESA to ensure complementarity and consistency of actions.

D. Launchers and launch services

68. Europe has developed a strong position in the international market for space launches, based on the Ariane programme of launchers, which was begun in the 1970s in order to give Europe autonomy in this area. It led to a period of notable commercial success in which Ariane was able to benefit from the difficulties of the US space shuttle and the delays in re-introducing traditional, expendable launchers.

Using its ability to carry two satellites in a single launch, Arianespace captured more than 50% of the western market for civil satellite launches.

This situation has come increasingly under attack in the last few years. Moreover, the size of satellites has tended to increase, so that Arianespace finds it increasingly difficult to carry two satellites in a single launch. This will affect its competitiveness until the larger Ariane V is operational.

69. In 1986, the US administration began to encourage private companies to offer launch services. It protected their markets by ensuring that almost all US government satellites (strategic or not) were obliged to use US launchers. With 80% of a large national market guaranteed, these companies were able to offer very competitive prices to launch US non-governmental or foreign civil satellites.

70. The arrival of China and Russia on the market for civil launches also threatens to upset the delicate balance of the market. The risk is even greater now that space launches are less differentiated. The customers for launch services are interested above all in finding reliability at the lowest possible price, and seek to avoid any constraints that are non-commercial.

This situation could even threaten the European launcher programme, and must be taken fully into consideration in the preparation of future European space policy.

71. European launchers must improve their competitiveness by reducing costs, by increasing launch activity for strategic military satellites, via negotiations to ensure the respect of a minimum competition discipline by competitors, and by Europe showing strong political will to maintain its launch capability.

Community actions aimed at defending and promoting European interests in the field of launch services are given in Section E: External relations.

E. External relations: trade and cooperation issues

72. The globalisation of environmental problems, the changed East-West geopolitical context, and budgetary constraints in space programmes are all creating new needs and opportunities for wider and enhanced cooperation between the main spacefaring nations.

At the same time, the growing commercialisation of some space activities together with increasing international competition make it necessary for the European Community and its Member States to seek to promote and defend their industrial interests, through both multilateral and bilateral arrangements.

These rapid changes in the sector will also make it necessary for Europe to seek scientific, industrial and commercial cooperation with other nations.

In the exercise of its duties under the common commercial policy, the Commission is involved in a number of bilateral and multilateral trade negotiations which will have an immediate effect on the space sector.

Multilateral commercial negotiations

73. In the context of the Uruguay round of the General Agreement on Tariffs and Trade (GATT), three agreements under discussion are likely to have implications for the space activities of the Community, not only for launchers and launch services, but also for satellites and ground equipment: the agreement on services, the agreement on subsidies, and the code on government procurement.

These negotiations have particular implications for Community suppliers of space products and services. There are, for the moment, no international rules on trade in services; the Community has pressed for the coverage of this sector through liberalisation commitments by the major countries concerned. The US (the other major player) is now ready to discuss liberalisation of space launch and satellite services, providing that certain other countries also take on commitments. So far, few other countries have given an indication of readiness to do so.

Space activities depend to a large extent on government support, particularly for R&D programmes. If any multilateral disciplines were to be contemplated, they would therefore have to cover indirect as well as direct support.

Most contracts signed in the space sector are government procurement contracts and therefore are often excluded from international competition. This is particularly important for the US, which reserved 100 percent of government satellite contracts for national launches.

Bilateral relations

74. Until now, Europe has maintained privileged relations with the United States in the field of space. Some Community Member States are also engaged in bilateral cooperation with other countries. Cooperation with the former Soviet Union has been limited for political and military considerations.

75. Following the events which have taken place in the former Soviet Union, Europe needs to adopt rapidly a coherent approach to its relations with the newly independent republics, in the space sector. In the medium and longer term, Russia and other republics could become new partners for Europe. The complementarity of some of their programmes and their advanced (in some cases unique) technological capabilities could allow Europe to counterbalance its relations with the United States in space activities.

In the short term, however, the former Soviet republics, whose space capabilities are under-utilised, are very likely to offer launches, equipment and services at prices well below those of western companies, with the risk of upsetting highly sensitive markets. Russia, which inherits 80% of the space activities of the former Soviet Union, could emerge as a serious competitor for the European space industry.

76. In 1990, the United States Government adopted a national space policy which aims at maintaining its pre-eminence as the only space superpower. This ambition is expressed in the confirmation of its policy of reserving government satellite launches for the US industry, the growth of indirect support granted by NASA and the Department of Defense, and by measures designed to impede new entrants into the commercial space market.

This policy is also confirmed by the signature on 17 June 1992 of a bilateral space agreement with Russia. This new agreement provides a framework for increased cooperation between NASA and the Russian Space Agency, the transfer of new technologies from Russia to the US, the US decision to support the launching of a first commercial western satellite from Russia and the agreement to enter into international negotiations to develop guidelines concerning competition in the international launch market.

77. The case of China needs particular attention because its economic structure does not allow cost and price comparisons to be made with the space activities of countries with a market economy.

78. Several other countries, including Japan, Australia, India and Brazil are trying with various degrees of effort and success to develop a space industry. Japan, in particular, is rapidly building an autonomous satellite system capability on the basis of a strong position in components and equipment. In the medium term, this will have implications for the supply of space equipment and services on the world market.

Scientific and technological cooperation

79. Satellite communications and Earth Observation systems have shown that they can contribute in significant ways to the economic development and the natural resource management problems of developing countries. The recent UNCED "Earth summit" in Rio de Janeiro (June 1992) recognised the importance of space systems for monitoring the environment on a global and regional scale and the need for support from developed countries to help developing countries establish their own capability to manage their resources and contribute to international programmes on global change research.

Community action:

80. In the GATT negotiations on services, the Community should only enter into liberalisation commitments for the space launch services sector if the US and other major partners are prepared to offer comparable commitments. In this context, the Commission will continue to seek the opening of public procurement of satellites and launch services, and the liberalisation of the space-derived services market.

    The Community must ensure that any international discipline governing subsidies in the space sector would apply equally to both direct and indirect support (civilian spin-off from military programmes).

81. In its bilateral relations, the Commission will continue to seek the opening of public markets and the liberalisation of the space-derived services market using all the means at its disposal to create effective, comparable and lasting opportunities in third country markets for European companies.

82. The Commission, in concertation with Member States, will seek to encourage the development of cooperation with those former Soviet republics which have space capabilities.

    The Community should promote contacts and industrial cooperation between organisations and companies in the Community and the former Soviet republics (including the participation of Community companies in privatisation schemes. In return, the Community will insist on the respect of normal market conditions and competition.

    A study will be undertaken in association with ESA and national space agencies to assess the research and industrial potential of those former Soviet Union republics with space capabilities and the opportunities for cooperation.

83. The Community must be attentive to the entire range of direct and indirect aids granted by the US public authorities to the space sector, particularly for the development of a new generation of launchers which would compete directly with Ariane V, and to the various obstacles met by European industry on the US market.

84. The Commission will assess the merits and drawbacks of the US approach towards China (agreement for voluntary restrictions on the launch of satellites incorporating US technologies, agreement on minimum price levels). The Community should aim to ensure the respect by China of a minimum level of discipline, in accordance with international standards, in the space market.

85. The Community will monitor carefully the development of the space sectors in Japan, Australia, India, Brazil and other countries, together with the agreements they conclude with both the US and Russia; and implement scientific and commercial cooperation policies of mutual interest with each of them.

It will also be necessary to ensure that the opening of the public market in Japan will benefit European as well as US companies.

86. In addition to the cooperation actions already defined above, the Commission will encourage and support further the use of space techniques and services in developing countries through its development aid and scientific and technical cooperation programmes (financing of receiving stations, Earth observation data acquisition, processing equipment, training and application projects, etc.).

F. Space science and in-orbit infrastructure

1. Space science

87. European achievements in space science are remarkable by international standards, both in terms of quality and scope. This comes from a balance of efforts between the sustained activities undertaken by ESA, Member States and cooperation at the international level.

While the remit of ESA is to develop and operate the scientific satellites and to make the data available, research support to the scientists for the exploitation of the data is provided only at national level. The Community can support trans-European research cooperation for the utilisation of data from scientific satellites through its Human Capital and Mobility programme within the existing rules and procedures of this programme.

2. In-orbit infrastructure and manned space-flight

88. This Communication focusses mainly on the areas and dimensions of European space activities of direct relevance to Community policies and actions. The Commission therefore does not need to comment on the proposed in-orbit infrastructure and manned space-flight programmes, other than to remark that it is important "to ensure that the cost of developing, operating and maintaining this infrastructure will not cause funding to be denied to, or to be diverted from, Europe's space applications programme."[16]

89. Through its regular contacts with ESA, the Commission will continue to follow these programmes (and possible future programmes relating to the manned exploration of space) with a view to assessing the need for Community action: as a possible direct or indirect user of the in-orbit infrastructure; to support European interests in international cooperation arrangements; and to promote scientific and technological synergy between future space programmes and Community R&TD programmes.

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[16] This view was expressed by an advisory panel in its report to the Commission - "The European Community: Crossroads in Space," 1991 (EUR 14010).

CHAPTER III

THE COMMUNITY ROLE: OBJECTIVES AND IMPLEMENTATION

A. The Community contribution to the European space effort

90. This Communication has reviewed the changing context within which Europe's space effort is undertaken; and has examined the key issues which need to be tackled in the short and medium term, focussing mainly on the issues of direct relevance to Community competences. It has established guidelines for the role of the Community in space, and has specified concrete action lines.

It is clear that the Community has an important contribution to make in helping to ensure the successful development and exploitation of space. Such a contribution will support and complement the role of ESA, Member States and other organisations.

Firstly, it will act as a facilitator by helping to establish the appropriate conditions for the development of space applications markets and a competitive European space industry. Secondly, it will become an important customer of space-derived services (directly for its own needs and as a proxy for other users). This will reinforce the "demand-pull" influence on the development of space applications, especially for environmental research and monitoring. Thirdly, it will use its competences in the fields of trade and its commitment to international cooperation for the benefit of the space sector.

Because of its competences in a number of relevant policy areas, the Community has become a necessary actor in Europe's space effort, and can make an effective contribution both to the definition and implementation of a comprehensive European space policy.

B. Objectives

91. The Commission will make proposals for the implementation of the actions specified in the preceding chapter in pursuit of the following broad objectives:

a) To encourage and support the optimal development and exploitation of Earth observation applications, particularly by initiatives contributing to the establishment of a European operational system for the study and monitoring of the environment; to increase and intensify the use of satellite data within the framework of various Community policies.

b) To ensure the appropriate regulatory conditions allowing the development of new markets for satellite communication services.

c) To develop the complementarity and synergy between Community R&TD programmes and the space programmes of ESA and Member States in order to reach a greater efficiency in European R&TD efforts.

d) To encourage the consolidation and growth of a competitive space industry and to promote its interests at international level, within the framework of Community industrial and commercial policies.

e) To encourage the widening of balanced international cooperation, particularly taking into account the new opportunities for cooperation with the former Soviet republics and the countries of Central and Eastern Europe.

C. Implementation

92. In pursuit of these objectives, the Commission will make use of three types of action:

a) Actions resulting from the exercise of competences derived from Community policies (e.g. promoting European space interests in trade negotiations, the development of Earth observation applications and new sensors within the Community Framework Programme for R&TD, the use of Earth observation data in the implementation of Community policies).

b) Concertation and coordination with Member States and/or other European organisations to promote common strategies, approaches and positions (e.g. an overall European strategy for the development of Earth observation, common positions on data policy); and to ensure that Community and national R&TD policies are mutually consistent (Article 130H of the Treaty).

c) Legislative action to establish the appropriate legal conditions (e.g. liberalisation of satellite communications, protection of intellectual property and other rights for satellite data).

Some of these actions will have financial implications. In its proposals for specific actions, the Commission will give details of the possible financial implications in each case, together with the financial instruments it will use.

93. In order to ensure the consistency and complementarity of Community activities with those of the Member States and other organisations, the Commission will strengthen cooperation with ESA and agree on common objectives commensurate with the issues, and on the best way to join forces to achieve the objectives.

It will develop cooperation with relevant organisations in the Member States, particularly the space agencies, and organisations such as EUMETSAT and EUTELSAT. It will also consult user groups and the various sectors of industry involved in European space activities, as well as relevant organisations in the EFTA countries.

Considering the various dimensions of the Community interest in space, the Commission will establish an *ad hoc* space consultative committee with representatives of the Member States to inform and seek guidance from the Member States during the preparation and implementation of Community actions.

LIST OF ACRONYMS

CORINE	Coordination of Information on the Environment: a programme of the EC
ECS	European Communications Satellite
EFTA	European Free Trade Association
ERS-1	European Remote Sensing Satellite developed by ESA
ESA	European Space Agency
ESA/EARTHNET	ESA programme for handling Earth Observation data
ETSI	European Telecommunications Standards Institute
EUMETSAT	The European meteorological satellite organisation
EURECA	European Retrievable Carrier
EUTELSAT	The European telecommunications satellite service organisation
GATT	General Agreement on Tariffs and Trade
GPS	Global Positioning System
INMARSAT	International Maritime Satellite Organisation
INTELSAT	International Telecommunications Satellite Organisation
JRC	Joint Research Centre
MARS	Monitoring Agriculture by Remote Sensing; an EC project
METEOSAT	European Meteorological satellite
R&TD	Research and technological development
SPOT	Satellite Pour l'Observation de la Terre - developed by France, in association with Belgium and Sweden.
TREES	Tropical Ecosystem Environment Observations by Satellites: a joint project of the CEC and ESA
UNCED	United Nations Conference on Environment and Development
VSAT	Very Small Aperture Terminal
WEU	Western European Union

FINANCIAL STATEMENT

SECTION 1: FINANCIAL IMPLICATIONS

1. Title of operation

Space

2. Budget headings involved

1992 budget: B6-8100, Space and agricultural statistics
1993 PDB: B6-8100, Environment, agriculture and land-use.

3. Legal basis

Resolutions of the European Parliament of 17 June 1987 and 22 October 1991 on European space policy (OJ No C 190, 20.7.1987, p. 78 and OJ No C 305, 25.11.1991, p.26).

Commission communication of 26 July 1988 entitled "The Community and space: a coherent approach" (COM(88) 417 final).

4. Description of operation

4.1 Specific objectives of operation

To implement the action lines set out in the 1988 communication entitled "The Community and space" and described in this communication "The European Community and space: Challenges, opportunities and new actions" to point the way ahead for the Community's activities in the space sector, in which the Community is destined to play a more active role in support of the other organizations involved (space agencies and Eumetsat). A new Space Strategy and Coordination Unit was set up in 1990 to coordinate the work of the various Commission departments concerned with the efforts of the other relevant organizations and to prepare new Community measures and positions.

The new Communication defines the broad objectives of Community actions as follows:

- To encourage and support the optimal development and exploitation of Earth observation applications, particularly by initiatives contributing to the establishment of a European operational system for the study and monitoring of the environment; to increase and intensify the use of satellite data within the framework of various Community policies.

- To ensure the appropriate regulatory conditions allowing the development of new markets for satellite communications services.

- To develop complementarity and synergy between Community R&TD programmes and the space programmes of ESA and Member States in rder to reach a greater efficiency in European R&TD efforts.

- To encourage the consolidation and growth of a competitive space industry and to promote its interests at international level, within the framework of Community industrial and commercial policies.

- To encourage the widening of balanced international cooperation, particularly taking into account the new opportunities for cooperation with the former Soviet republics and the countries of Central and Eastern Europe.

Three types of action are defined:

- Actions resulting from the exercise of competences derived from Community policies (e.g. promoting European space interests in trade negotiations, the development of Earth observation applications and new sensors within the Framework Programme for R&TD, use of Earth observation data in the implementation of Community policies).

- Concertation and coordination with Member States and/or other European organizations to promote common strategies, approaches and positions (e.g. an overall European strategy for the development of Earth observation, common positions on data policy); and to ensure that Community and national R&TD policies are mutually consistent (Article 130h of the Treaty). For this purpose, it is proposed to establish an ad hoc space consultative committee consisting of representatives of the Member States.

- Legislative action to establish the appropriate legal conditions (e.g. liberalization of satellite communications, protection of intellectual property and other rights for satellite data);

Some of these actions will have financial implications. In its proposals for specific actions, the Commission will give details of the possible financial implications in each case, together with the finacial instruments it will use.

4.2 Duration

Ad hoc operation.

4.3 Target population

The various Commission departments concerned with applications of space technology, the space agencies (ESA and national agencies), the space industries and users (telecommunications and Earth observation industries).

5. Classification of expenditure

Non-compulsory expenditure; differentiated appropriations.

6. Type of expenditure

Other. The appropriation covers:

- staff and administrative expenditure; committee meetings;
- studies and consultations necessary for preparing Community measures and positions aimed at strengthening Europe's position in this sector (research, pilot projects, standardization, legislation, etc.);
- preparatory work and pilot projects on the development of applications of Earth observation.

7. Financial impact

7.1 Method of calculating total cost of operation

	1992	1993
Space	2 400 000	2 400 000
Agricultural statistics	1 000 000	1 000 000
TREES and EARSEC	3 200 000	3 200 000
	6 600 000	6 600 000

7.2 Proportion of mini-budget in total cost of operation

The mini-budget will cover 10% of the total cost of the operation.

7.3 Indicative schedule of commitment and payment appropriations

Not applicable (ad hoc operation).

8. What anti-fraud measures are planned in the proposal for the operation?

Directorate-General's audit programme plus inspections by the officials responsible for the technical side of the operation.

SECTION 2: ADMINISTRATIVE EXPENDITURE

1. The proposed operation does not involve an increase in the number of Commission staff.

2. Expenditure involved in the proposed operation:

   - administrative expenditure: ECU 700 000;
   - staff expenditure: 2A + 1C

   This expenditure has been provided for in the 1992 budget and cover has been requested under the 1993 budget procedure.

SECTION 3: ELEMENTS OF COST-EFFECTIVENESS ANALYSIS

1. **Objectives and coherence with financial programming**

   Advisory, coordination and consultation activities in close cooperation with other organizations active in the space field (space agencies, Eumetsat, etc.) and with the various Commission departments concerned.

   a) Critical analysis of developments in the European space industry: political, technological, economic and industrial aspects, strengths and weaknesses, and definition of Community measures to back up the action taken by other space organizations. In particular, definition of measures to help to create the conditions required for the development of markets for applications of space technology in the socio-economic fabric of the Community

   b) Operations to encourage the development of applications for Earth observation, particularly applications of interest to other Community policies and offering technological synergies between the space industry and other sectors.

2. Grounds for the operation

   The Community is destined to play a more active role in support of the space agencies. Europe's space activities are having an increasing impact on other Community policies and vice versa.

The proposed operation should help:

- to develop complementarity and synergy between Community R&TD programmes and the space programmes of the ESA and Member States in order to increase the effectiveness of European R&TD efforts;

- to encourage the consolidation and growth of a competitive space industry;

- to encourage the widening of balanced international cooperation, particularly taking into account the new opportunities for cooperation with the former Soviet republics and the countries of Central and Eastern Europe;

- to create the regulatory conditions allowing the development of new markets for satellite communications services.

3. Monitoring and evaluation of the operation

Performance indicators selected:

- number of pilot projects funded

- number of studies and workshops

- number and quality of publications and communications.

Details and frequency of planned evaluation:

- steering committee for each study

- periodic seminars with independent experts to validate the work of the contractors

- cooperation meetings with the representatives of the Member States.

IMPLICATIONS FOR SMALL AND MEDIUM-SIZED ENTERPRISES

The implementation of the actions proposed in this Communication will have a positive impact on small and medium-sized enterprises in the space industry, particularly those providing value-added services based on space-derived data.