

SPACE: A CHALLENGE FOR EUROPE. PRIORITIES

by

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1. Introduction

Western Europe is present and active in space, through a number of national and international programmes, with a mixed record of strenghts and weaknesses. There is no common and coherent European approach to space, but Europe still is the "third" presence in space, after the Usa and the USSR, and could remain so for the future without great problems and pain: only Japan might successfully challenge it's position in the near future, should the existing programmes and their future developments be scrapped or even only delayed.

No intractable difficulties exist for maintaining and improving Europe's performances in space. What is needed can build upon the existing assets. Some courage, coupled with a limited increase of space budgets and a greater awarness of common aims, should suffice. But the time for decision is now: the international competition is growing and the European space industries and scientists need time and money in order to implement the necessary programmes. Different perceptions and priorities, in the various European nations, are part of the problem. Should the required qualitative jump in space activities be made only by some European countries, the others remaining behind, the overall outcome would probably not allow Europe to increase its international competitiveness. These defferencies however should not overshadow the importance and the degree of consensus already in place. The biggest threat to tha future European role in space is coming from its cumbersome and slow system of decision making and from the delays in coordinating and integrating the various European activities.

2. The current status of European priorities

The current status of European priorities may be drawn by the programmes already approved by ESA member states. These are a compromise package of various national and European projects.

The main decisions taken by ESA in 1985 (to be riviewed at the end of 1987), include an increase of 5% per year of the funding for the mandatory scientific programme and an increase of a 3% per year (until 1990) of the

overall ESA funding: it is clear however that these increases will have to be further augmented in the future, should the member states of ESA agree on the fulfillment of all the programmes envisaged. The main aim of these programmes has been officially defined as the will to build "European autonomy" in space.

In practice, ESA programmes are aiming at the development of the Columbus (in cooperation with NASA), a fully independent, manned European space module, carrying facilities for materials- and life-science payloads, with polar orbiting platforms to be serviced from the Space Station or by manned vehicles, with a fully operational data relay system.

In addition ESA is planning the development of a new launcher (Ariane V, with a very large cryogenic engine), and is considering favourably the development of the French-proposed Hermes space shuttle. New earth observation satellites, the study of the second generation of meteorological satellites, and of new space telecommunications satellites are already in an advanced stage of completion. Microgravity experiments, to be carried out through the Columbus/Space Station programme are envisaged. R. & D. on new, fully retrievable, space vehicles, such as the British-proposed Hotel or the German-proposed Sanger II, will be considered.

In space science, four missions are planned by ESA, the so-called "cornerstones". They will require more precise control and positioning of satellites, with new intersatellite communications; new rendez-vous techniques and drilling devices in order to bring back material samples from comets and asteroids; new concepts of multiple telescopes etc.. Improving long-life reliability is the key priority for the applications programmes. The telecommunications programme will be extended. New data-relay satellites will follow the launching (in 1987) of the Olympus satellite. Permanent or semi-permanent orbital systems for earth observation are under consideration.

National programmes, of civilian or military nature, are also contributing to the European presence in Space, such as the French Spot (optical observation) programme, with four satellites, or the new Helios satellite (for optical reconnaissance) under development. The Germans are proposing a new X-ray reconnaissance satellite (that could complement the optical one). The British are cooperating with the USA (and NATO) through their Skynet programme, and have developed a new national programme (Zircon) that, if implemented, should further increase their electronic intelligence capacity. The Italians are considering the possibility of building upon the IRIS programme (a propulsion system designed to operate from the US Shuttle, to put into geo-transfer orbit payloads of about 900 kg.) in order to develop a new space launcher. All major European countries have developed national telecommunication and TV distribution satellites, search and rescue technologies, data collection and localization platforms, ground stations and technologies for acquisition and processing of data coming from space, for civilian and/or military users.

3.a. What are its limitations? b. Is it enough ?

The importance of these programmes cannot be denied. It is not clear however if they will succeed in guaranteeing the future "autonomy" of Europe in space, the continuous competitiveness of European space industries and the maintenance of Europe's role and position as the "third" space power.

3.a.1. External uncertainties

Some uncertainties derive from the past experience of international cooperation between ESA and NASA. European programmes are defined largely in a cooperative framework with the United States: should this cooperation become more difficult, a complete re-examination of the European programmes would be unavoidable. The lessons from the past give ground for future concern.

The negative experience of the Spacelab cooperation with the USA is a case in point and may have contributed towards reducing the perspective of applied science in space. ESA delivered the Spacelab pressurized module to NASA in 1983 and it was intended to be housed in the American shuttle storage room. Its goal: to allow scientists to carry out dozens of experiments in space. Its cost for the Europeans: 1 billion of US dollars. It flew three times. ESA delivered a second module in 1985. Yet this one never got off the ground. In September 1986 NASA announced to the Europeans that there would be only three Spacelab flights over the next 10 years instead of the 15 flights forecast as priority was now to be given to military flights.

Moreover, the status of the future space station, from which the entire Columbus programme is depending, is also posing some problems. The Americans see the station as an extension of their national territory and thus governed by their own laws. For example they consider all inventions that will be found aboard the space stations as American. Similarly they have proposed a rather unequal sharing of the workload: experiments on material in microgravity will be conducted in American modules; the European laboratory is to deal more with life sciences, something which is far less attractive commercially. A request by the U.S. Department of Defense, for the space station to be utilized mainly for military programmes and functions, is also posing a grave political problem to ESA, constrained by its Charter to activities of "peaceful nature".

In general, we can observe that the major space projects have been decided by the major users: and the USA is prominent among them. France, Britain, and now also ESA itself, are trying to increase their cooperation with the USSR, while Japan and China might become interesting future partners, but the USA is, and will remain, the main partner of Europe for many years to come. The US-European experience has been one in which the Europeans could refuse or accept participation in US-defined and US-led projects, and never the other way round. Even good European ideas have sometimes found their implementation as American-led projects, with a later European participation.

3.a.2. Internal European uncertainties

i. space policy

Internal European problems might also have negative repercussions on the overall European space policy. First among them is the problem of funding. ESA member countries have accepted a significant increase of the ESA budget, while at the same time increasing their national space budgets. The new programmes, and their ambitious aims, however, seem to require a far greater financial support. Present calculations of the total cost of such programmes as the Ariane V launcher, the Columbus space station and the Hermes shuttle, have grown from 7.2 to 11.3-12 billion EAU. The annual budget of ESA, for the big programmes only, could increase from a projected 1.7 billion EAU to a 2.3-2.4 billion EAU. The total cost of those big programmes, therefore, is largely comparable with the American space station total cost, estimated at about 12 billion dollars, even if the total civilian space budget of the European states would remain at about 1/3 of the NASA budget. While some issues and priorities might be clarified by the forthcoming ESA ministerial conference, at the end of 1987, no alternative to a significant increase of the total ESA budget (presently projected at 1650 millions EAU by 1990) is likely to be found, unless some of the most expensive (i.e. of the more politically and technologically ambitious) programs would be cut, or their realization would be greatly delayed, allowing the redistribution of costs over more years.

Financial allocations in a time of heavily constrained budgets and strong dependence of space activities on minimal public support increase the tendency towards "national" ventures and "national" perceptions of what should be done in space. Differences between the various national space budgets in absolute terms (relatively high in FRG and France, lower in UK and Italy, still lower in the other European countries), the fragmentation of those budgets between various ministries (the PTT being the most relevant, together with the various research and scientific authorities), the division between military and civilian expenditures, as well as the division between European and national allocations, have to be taken into account as added weaknesses.

Theoretically, the best would be a European single source of space funding, for the entire ESA program. The experience made with the EC budget however, and the difficulty of funding it independently from national policies, suggest a different approach. While a form of self-financing of ESA mandatory program has to be established, voluntary, public and private contributions, program-oriented and based, should continue and be increased. A principle of automatic switching of national funds to ESA could be established, whenever a ESA program is agreed upon, unifying, coordinating or substituting for pre-existing national programs or projects.

ii. time scale

The timing of the European programs however should be carefully considered. It is clear for instance that some of these European projects will become fully operational well into the '90s, while at the same time the US (and possibly Japan or the USSR) will have significantly progressed in competitive

areas, such as space transportation, electronic intelligence and telecommunications, ground stations, cheap expendable space launchers, and so on. While the present programme is designed to increase European "autonomy" in space and to develop European scientific and industrial capacities, more attention should be given to the objective of increasing the overall competitiveness of the European space activities vis-à-vis the other space faring nations (including the poorer ones: presently China is marketing its Long March launcher at half the price of Ariane!).

iii. industrial capacity

iv. technological limitations

A third factor of uncertainty is to be found in the limits of the European industrial capacity of the space sector, and in the technological limitations of some of the European programs. The two things are strictly related. It becomes increasingly apparent the dependency of European space industries from American and Japanese subcomponents, coupled with the relative difference in size between European and American space communities. While the European expenditures for space might be presently put between 1:4 and 1:5 of the global American expenditures, the manpower ratio is estimated to be around 1:7.

The development of technical alternatives to space, especially in the telecommunications field, could decrease the cost-effectiveness of some space operations. While satellites are the easiest way to establish communications with remote areas or over global distances, the evolution of optical fibre technology is challenging their use for television exchanges, high resolution images, transmission of data, etc.. Moreover, while it could be difficult to completely control telecommunications via satellites, cable traffic could be nationally controlled. Protectionist resistances against "deregulation" can easily combine with resistances against a wider use of space technologies. The relative unreliability of space launchers (experienced after the American shuttle disaster) is an additional negative factor weighting against space technologies.

3.b.1. Risk of remaining a junior partner

To sum up, the biggest risk, for Europe, is one of remaining the junior partner of the two existing major space powers (and particularly of the USA), while losing ground with Japan. The objective of attaining the European "autonomy" identified by the ESA Ministerial Council would become impossible, and the European competitiveness would decline.

3.b.2. confronting major problems

In this framework, two challenges seem to be particularly significant, while depending mainly on the autonomous goodwill and independent action of the West European governments. They stem from the fact that Europe is not dealing multilaterally, through common institutions and policies, with two major areas

of space activity, essential for building up a real autonomous European presence in space. We refer to telecommunications and security.

3.b.2.

i. telecommunications

The field of telecommunications is the one where lays the greater economic success of space, and the one that has attracted more "private" users. In Western Europe, however, well entrenched differences between national policies have diminished these commercial and economic returns. Telecommunications fall under the responsibility of the various national PTT ministries and, while they have generated a number of international agreements and organizations (such as Intelsat and Inmarsat) and some European ones (such as Eutelsat), no mature common European telecommunication policy has been established either for the hardware, the software or the operations. This has left the door open for the American (and particularly Californian) industry, which has been able to capture almost the whole of the World market, notwithstanding the existence of important European technological capabilities and of significant ESA and national programs.

Deregulation of the PTT is a central problem in many countries, but particularly in West Germany, where resistance to loosening the Bundespost's telecommunication monopoly runs very deep, even if there is general recognition of the need to provide new services at internationally competitive rates. A special commission, recently appointed by the German federal government, has produced a report comparing West Germany to its major competitors in this field. It says that while the Bundespost's services are technically impressive, tariffs are too high (users of high speed data lines are said to pay up to 15 times more than they would in Britain or America). Protectionist practices (like the "overspecification" of the bidding offers, designed to favour national manufacturers) and preoccupation over the ability of German telecommunication industry to withstand an abrupt "opening" of the competition, are reinforced by other political and social considerations, such as the artificially low cost of local calls or the even coverage of all the national territory.

A greater awareness of the need for a common European approach also in this field, is being felt. This may be helped by the impact of the European Single Act, which has the ambition of building a European common political entity and establishing a true European common market by 1992, thereby integrating industrial and research policies, also for the various public sectors. As far as space is concerned, it is expected that the European Commission will step up its efforts to coordinate the various national telecommunication policies, increasing the "Europeanization" of PTT ministries, the commonality of equipments, the harmonization of technical requirements, etc..

3.b.2.

ii. security

The second challenge is security. The military dimension of the use of space is generally outside the present multilateral European space policy.

European space requirements that are not dealt with nationally, are generally dealt through NATO or in direct cooperation with the USA. Bilateral European projects in this field are generally centered around France (who is outside the NATO framework), but are not at all easy. The failure of a Franco-German cooperation project, over a joint surveillance satellite, is a case in point, even if new concepts are being put forward by private sources, in order to revive the programme, or make it more ambitious (see for instance the Dornier's proposal of the Horas system, based on two surveillance satellites, one optical and one radar-infrared, plus a data relay satellite, or a similar concept for Arms Control verification, called Paxsat, produced under the auspices of the Canadian government). For the time being however, the French have decided to carry on their national project of an optical reconnaissance satellite, called Helios, derived from the experience made with the Spot optical satellites. Italy has joined it with a 15% share of the costs.

There is a growing awareness of the utility of space for defense purposes. While the defense budgets too are heavily constrained, and their priorities should not be forced simply to accommodate the need for more money for space activities, there is an obvious advantage in planning for stronger cooperation between military and civilian ventures, whenever possible. Already today some of Europe's civilian satellites have a built-in capacity reserved for military use. The increasing "need to know", the need for better and more survivable and secure C3I systems, are clearly perceived by the European military establishments.

The utilization of satellite reconnaissance will be crucial for the future of the international and diplomatic role of Europe: without satellites the Europeans will lack a very important element of independent appraisal of the situation and its evolution in many regional theatres, from Libya to Afghanistan. The resolution required for such a purpose is greater than the one offered by commercial optical satellites such as Landsat, but could be smaller than the one required for specific, tactical military requirements.

It may well be that the world enters upon a time in which Arms Control stands a better chance than for some while in the past and where increased attention will be paid to the balance of conventional forces. The Atlantic Alliance will feel an increased need for observation from space, both to verify Arms Control agreement and to make sure that there are no reasons for concern about the military situation.

Presently, Landsat and Spot images have been very useful for assessing the general picture of such facts as Chernobyl, the Iran-Iraqi war, the purported construction of a SAM SA-5 Soviet site in Libya, the under-ice launch test of Soviet SLBMs in the Arctic Ocean, near Wrangel Island, the purported construction of new air and naval Soviet bases in the Kola peninsula, the establishment of an alleged new Soviet base of mobile intermediate-range ballistic missiles (SS-20) near Kirov, the Soviet space shuttle facilities at Tyuratam, the secret Iraqi facility near Samarra, allegedly producing chemical weapons. In January 1986 it was also reported that Landsat imagery was being used to monitor Soviet military activities in the Far East. Another interesting press report in August 1986 suggested that Spot images taken on behalf of a Swedish firm indicated apparent preparation in the Soviet Union for a resumption of underground nuclear testing.

A more secure system, capable of indentifying specific weapon systems and of verifying adequately arms control agreements, should require a resolution greater than the 10-20 metres commercially available, without necessarily going lower than the 1-2 meters, as required for tactical military purposes.

The European NATO allies could contribute to an equitable sharing of burdens within the Alliance by creating an observation capability of their own in space. Such a West European observation system, adapted to the special circumstances of the European continent, would guarantee a desirable degree of redundancy within the Alliance and would also strenghten the strategic consensus between the United States and its European allies.

By choosing the right specifications it can be made clear to both domestic public opinion and to other interested parties that such a West European observation system serves no other purpose than compliance with agreed understanding and support for world stability.

While ESA can not deal with military programs, a case could be made for involving this organization with arms control programs, of a clearly peaceful nature, and for other systems of communication and warning. More specific military programs, directly related with battle management and crisis management, or with electronic and/or Communication Intelligence (but Elint could be useful for arms control purposes too), can be dealt with through other European institutions, such as the WEU, or specific multilateral agreements.

3.b.3. problems to be solved:

i. industrial competitiveness in costs

No long term solution for the future of Europe in space can be found, without a greater competitiveness of the European space industry and of the European space programs. National divisions (such as in the telecommunication case), the comparatively quicker pace of some competitors (such as Japan), the absence of a huge military market (as in the American and Russian cases) or the comparative economic advantage of less developed countries (such as China), represent tremendous challenges. Europe should first of all tackle its internal industrial problems.

Lack of standardization and quantity production are a problem for the entire European space industry, and are felt particularly in the critical field of space launchers. The entire Ariane Program has produced what could be called a very large number of single "prototypes", without really entering the market for launchers, and without allowing for extra-capacity or for unexpected and time constrained launches, "upon request".

The economic and industrial importance of the "ground segment" of space operations should not be underestimated. Especially in commercial terms, the ground stations and utilizations are of great importance (and those where Japanese and American competition is stronger). Unfortunately, up to now, the ground segment of space operations is mainly a national responsibility of the various European countries, poorly coordinated by multilateral agreements, or not coordinated at all. There is no use in developing a space industry, without its related ground segment.

More open public markets, as it has already been underlined, are needed, especially in the PTT field, as well as common European norms and standards.

In specific fields like telecommunications links should be encouraged with other existing high technology European ventures as STAR and RACE.

It should be possible to reconcile "national" and "European" policies, to develop a cost-effective, and competition oriented cooperation. While it would be better to avoid overlaps and duplications, on the other hand it would be wrong for Europe to rely on a single launcher system, single engine building site and single launch site. European needs are not necessarily best served by having monopolistic suppliers of space systems: competing consortia are probably desirable in each main area of application. Many national programmes, moreover, were fully justified by the complete absence of any European alternative (e.g.: Spot, Olympus). The problem is to avoid the persistence of purely nationalistic approaches and of protectionist measures, artificially increasing the user's costs and progressively putting the European industry out of the market. This is not tantamount to deny the existence of national industries and programmes. It is simply a recipe for better cost-effectiveness and restructuring along market lines.

3.b.3.

ii. industrial restructuring

In order to encourage the development of market oriented utilizations of space, it is therefore necessary to think in terms of a global reorganization of the European space industry. One of such restructuring could come about through a better organization of the ground segment. Take for instance the case of remote sensing: its commercial potential has been doomed, until now, by the unpredictability of the market, by the absence of a continuous availability of relevant data, by a poorly organized distribution of data and, more than anything else, by the absence of "value-added outputs", in the form of information routinely extracted from the available raw data. Even more obvious is the case for direct broadcasting, telecommunications etc. The existence of some European consortia, like MASH, STAR and COSMOS, has not yet made the difference.

Those European consortia were originally formed to compete for the contracts awarded under the ESA mandatory program, presently a minor fraction of the total ESA budget. They were co-existing with national industrial structures, built around national "prime contractors", getting all the money awarded by national space programs and by ESA non-mandatory programs (distributed according to the principle of national "fair return"). Moreover, some national industries have started an autonomous process of concentration (as in Germany, between MBB and Arno, or in Britain with the formation of BAE), cutting through the three original European consortia.

Two developments might follow. The first, based on a continuation of the present trends, would see the ad hoc formation of very large "industrial confederations", loosely organized for dealing with especially big projects, formed around the "prime contractor" chosen by the national government contributing the biggest share of the project's funds. This is now the case for

big projects such as Ariane V and Hermes.

No real control over costs would be seriously possible, and no real intra-european competition. The big "prime contractor" would be favoured, increasing the "monopsonic" distortions of this market. National governments will be responsible for choosing their "prime contractor", for guaranteeing the "fair return" of their own contributions and for distributing the money between their national industries. ESA will negotiate with the various national economic ministries a compromise between costs, resources and time-schedule, deriving from it some artificial calculations of cost-efficiency.

The second development would on the contrary see the restructuring of the existing three "multi-functional" European consortia, (and probably their reduction to two), and a fair competition between them, on market basis, for the completion of huge systemic projects, all included. The composition of each consortium could easily accommodate the need of having a representation from at least one of the major space industries of the four larger European countries, allowing them to combine (at least for an intermediary period) the two contradictory principles of "free competition" and "fair national return".

Alternatively, a number of "specialized" European consortia for specific components of the space market, could be envisaged (i.e.: two or more consortia for satellite's bodies; some others for satellite's electronics and software; still others for space propulsion systems etc.).

Some problems (especially in the first case of "multi-functional" consortia) could originate for the smaller countries, where the single existing national space industry could join only one of the competing consortia. Compensations and subcontracts could become a necessity, thus distorting in some way the free interaction of the market. The fact however that those distortions would come about "after" and not "before" the awarding of contracts, would anyway allow a better evaluation of real costs.

It remains obviously important to continue encouraging the organization of disperse technical competences into European companies (ESA has already done it on a limited scale). More ambitious and large projects could help, provided they are genuinely built on European capacities and ambitions.

4. Suggest a framework

It is painfully clear, at this point, how far Europe still is from having a common and coherent space policy, even if all the main elements of such a policy exist, and need only to be put together and structured in a better and more economic and politically significant way.

ESA, the EEC, WEU, are the relevant common European institutions that could strengthen their competencies and widen their fields of intervention, in order to confront the need of a European space policy. What is required however is a preliminary "political" decision, by the European states (or by a significant number of them) to accept the challenge and to work out a number of common criteria, sufficiently clear and far-reaching.

What Europe needs is a conceptual framework, politically shared and institutionally sound, in short, "a space policy", to be carried through multilateral institutions, national space authorities and space industries, with the common ambition of fulfilling Western Europe's objectives in space.

5. Define autonomy and other essential criteria

European governments should be aware of, and accept, the fact that the future role and influence of Western Europe in world politics, in global markets and the cultural life of the next century will be heavily dependent on its capacity and willingness to explore and use space, to develop the necessary technology and to build up the required industrial infrastructure.

At the same time governments and publics need to recognize space as an important instrument for the political (including security), economic and cultural integration of Western Europe, as part of the process of developing a stronger European identity.

These considerations sum up in a single rationale and overall political objective of the European space policy, already identified in the past by an ESA ministerial meeting as the research of European identity and autonomy in space.

Autonomy, as far as space is concerned, needs definition. While many are available, the preferable one would be "that Europe develops a capability to reach, to operate in and to return from space, and to do so, not on sufferance of friend or foe, but according to its own perception of what is to the common good".

Autonomy therefore means the ability to decide independently of others on Europe's future space programme. It means that Europe should have a space transportation system for crews and materials, a space infrastructure consisting of scientific satellites and observatories, space-based remote sensing systems and telecommunications networks, manned or man-tended space platforms as well as a satellite-based capacity for the verification of arms control agreements and the observation of relevant military developments. It would include the necessary ground installations to establish, maintain and use these systems. It means that Europe will have both people and robotics in space, on a complementary base.

There is an important difference, to be underlined, between autonomy and autarky. Europe is not and cannot be autarkic in space, while European autonomy, even if based on a large utilization of foreign components and technologies, is both politically and technically compatible with Europe's technical and industrial capacities and with Europe's relations with the USA and Japan (and with the USSR).

Moreover, Europe has a vested interest in the creation of an open and interdependent space market, in which national dominations will be diminished, and protectionist barriers will be removed. Our objective is to build a competitive and autonomous Europe in space, not to help to segment space into

national boundaries. On the contrary, as it will be clarified later, Europe should have the ambition of contributing to the establishment of an international space order.

The building of an autonomous European identity and presence in space is strongly needed to affirm European competitiveness and to contrast present protectionist and nationalistic policies.

In order to fulfill this objective, any policy to be decided upon will have to conform to some general criteria such as:

- a) the recognition of the great importance of such "imponderable" as the sense of mission and fulfilment of human objectives, of exploring the boundaries of human knowledge and human possibilities;
- b) the awareness that space is a global resource to be at the disposal of mankind as a whole, and therefore the possibility of the utilization of space for a better management of global problems and of specific crises;
- c) the recognition of the importance of space for the security of our countries and of Europe, and therefore also the importance of trying to maintain space as free, secure and peaceful as possible, also for the future, and the need to establish internationally agreed principles and laws protecting the free access to space, the security of operations in space, peaceful relations in space and defense from attacks in and from space;
- d) the best possible utilization of present and future scarce European resources;
- e) the timely investigation and exploitation of the economic and scientific benefits that could be drawn from space activities;
- f) the establishment of a greater competitiveness inside Europe and on a world scale, based upon freer markets, greater circulation of information, progressive dismantlement of protectionist (or para-protectionist) barriers.

The Russian goal is to live and work in space. The Americans are geared towards major projects with the aim of attaining technological leaps. The Europeans should avoid the establishment of European projects for reasons of prestige alone. A general sense of practicality, usefulness and cost-effectiveness has to be retained.

The choice whether to send human crews into space has to be confronted only if and when practical reasons suggest it. While no robot can substitute the versatility of a human being, men cannot be considered as expendable. The cost of making a system "safe" for man, as opposed to making it "secure and reliable", is huge. Europe should aim at an increasing "integration" between robot and man, avoiding to concentrate on men only for the sake of it or for the "image" resulting from it.

6. Policy options - the components of European autonomy - satellites, launchers, space station, ground segment

The first most evident priority lies in the field of launching capabilities (including rockets, launching sites and new space transportation systems, STS). There are important economic and industrial European interests in this field that should be encouraged. The present European dependence on American established costs and timetable, for the completion of important European space projects, suggest the need of a greater European effort.

The development of new launchers with greater lifting capability (Ariane V), and of partially recoverable systems (Hermes), and possibly of new, fully retrievable STS, should increase the competitiveness of European space transportation, especially if a greater degree of "industrialization" in the production and operation of launchers will be established. More satellites and more activity in space will require more and more capable launchers: Ariane V and Hermes are the near future (based on mature, traditional transportation systems). Industrialized launchers, routinely produced and operated, should be developed from them. Fully retrievable, reliable, STS are in the not too distant future, and remain the best hope for a cheaper and wider access to space.

New launching sites are difficult to identify and very costly to establish and operate. The present scale of European space operations does not seem to require new sites, for the immediate future. Should STS be developed the problem would change, but would also probably be simplified (given the fact that STS are conceived to be operated from traditional air bases, with few modifications). The industrialization of traditional launchers could however require at least a new, alternate, European launching site in the near future.

The very evident second priority, for any European space policy, will remain the construction, sending into space and utilization of various kinds of satellites. In this sector European technology is often very competitive. A high degree of European autonomy can be reached without negative consequences. On the contrary, a greater European presence in some fields (like telecommunications, earth observation, etc.) would have the beneficial effect of increasing international competition. Europe is now lagging far behind USA and USSR especially in number, and is vulnerable to growing Japanese competition: a qualitative and quantitative jump is required.

Direct broadcasting satellites, TV distribution satellites, the growth of new services in the field of education and training, the perspective of a global deregulation in the field of telecommunications, are just a few of the elements suggesting a determined European effort in this field. The fact that telecommunications in space have already reached a degree of self financing is a positive element to be underlined.

Dual use of Earth observation satellites for civilian and military use, the importance of reconnaissance for crisis management (both in the security and the civilian and economic fields), the possible growth of a private market for satellite pictures and other information that could be drawn from remote sensing capabilities (including meteorology, environmental protection, etc),

underline the increasing importance of satellites. Similar conclusions can be drawn from developments in the field of communications (especially maritime communications and communications between ground stations and mobile vehicles, aeronautical services etc.), search and rescue, and monitoring (including electronic intelligence, Elint).

A third main priority of the European space policy is for the Space Station. In the near term the perspective is one of participation more than independence. Cooperation with the USA and Japan with the Columbus project of ESA opens up bright prospects. Columbus is a program in which participating states will initially study and later develop elements of the Space Station, including its associated space platforms. The developments of these associate elements will increase Europe's autonomy and identity in space.

A higher degree of European control over costs and operations of the space station, and especially of the European platforms, is an absolute requirement for European participation in the overall project.

Finally, the importance of the "ground segment" of space operations should again be stressed and organized, on a European scale, as we have already said in the previous pages.

the security field

A specific attention has to be directed toward the military and security field. While the WEU could present itself as the logical place where European space cooperation in the security field could be coordinated and agreed upon, the fact is that presently the WEU has no expertise, nor specific competence (either on the technical or on the political side) to deal with it.

The only international Western organization with some experience of space in the security field is NATO. The United Kingdom has separate arrangements and agreements with the USA, enabling it to take advantage of the American space systems related with military operations. France is trying to build its own national systems, possibly with the cooperation of other European partners. A common European approach to the utilization of space for military and security purposes is at present totally absent, but can be encouraged by establishing common requirements, by identifying areas of possible cooperation, by avoiding "double emploi" and increasing commonality and interoperability of space-related equipments.

ESA operations are strictly limited to "peaceful purposes". Some of the countries participating in ESA could not possibly take part in joint Western operations in space, security oriented and managed by the military.

It would be a mistake however to wait for a joint European military and defense authority to be created, before trying to establish a greater cooperation in the security field. The Eurogroup Committees in NATO, the WEU and the IEPG could be usefully employed for such a purpose, at least in the initial phase.

The development of complex and versatile systems, capable of performing both civilian and security oriented operations, could be encouraged, also in the ESA framework. The cases in point are those of reconnaissance, targeting, early warning, secure and resistant communications and electronic intelligence. While the ground segments could be differentiated, the satellites could easily be multi-functional.

Reconnaissance satellites for diplomatic activities and crises monitoring could be related also to the WEU and to non military European institutions, such as the European Political Cooperation of the EC. Secure communications for diplomatic purposes and diplomatic crisis management can be envisaged also on the basis of differentiated use by the various member countries, for dealing with such missions as control and verification of arms control agreements; continuous and reliable channels of communications for dealing with natural disasters, rescue operations, etc.; monitoring of suspicious behaviour and/or military movements in crisis areas, and so on.

The development from scratch of a new European, fully operational, ASAT (anti-satellite) capacity, to deter any attack on European space assets by threatening to reply in kind, would be very expensive, of a dubious military and deterrent value and politically difficult to envisage on a co-operative European basis.

What is required however is the development of more research and of some testing capabilities in the ASAT field, while increasing European pressures and proposals for the establishment of a Space Law Treaty limiting ASAT activities and protecting satellites and other assets, by defining "proprietary keep out zones", or other instruments of protection in space.

The existence of European military satellites and of a European military presence in, or use of, space, would obviously greatly help such a move.

legal presence

One key feature of European autonomy and identity in space will be its capacity to develop a credible and important European role in worldwide space cooperation, both with specific space projects and through its capacity to envisage a new space order.

The problem of establishing a new Space Law, and new legal instruments, besides those already in force (mainly concerning the demilitarization of Outer Space), capable of dealing with the many security and economic problems related with the human presence in, and utilization of, space is becoming urgent. Room should be granted for the recognition and protection of the interests of both producers and users, and for more generalized use from the international community. A greater awareness of the international interests of all mankind in space might be useful to defuse the present Soviet and American tendency of building up a superpower's confrontation in space. Europe should take the lead in trying to establish the new Law of Space.

institutional priority

ESA is not a supranational organization, and is therefore dependent on the decisions taken by the member states, along the lines established by its Convention. In practical terms, ESA lives on the very existence of the various national programmes: for instance it provides satellite and/or platforms for scientific programs, while the various nations provide payloads and/or instruments; in the remote sensing area, ESA capabilities rely on national ground stations; in general, the ground segment of space operations pertains to national initiatives and authorities, etc. Its activities are further complicated by the need to allocate its budget according to a "fair return" of national contributions to each member country.

While being the focus of European space policy, ESA cannot really "originate" policies. It can initiate autonomously the study or the proposal of new programmes, but it still needs the approval of the member states before implementing them, or allocating to them a budget.

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

One important step forward, therefore, would be a greater coordination of space activities and decisions at the national level (through the establishment of a National Space Agency, granted with the necessary authority), overcoming at least some of the problems deriving from infra-governmental and bureaucratic conflicts of competence. While the establishment of national space agencies could strengthen the defense of particular national interests, the advantage of having to deal with a single interlocutor outweighs the disadvantage.

Other institutions, as the European Community and the Western European Union, have actual or potential competences on space policy. ESA has a wider European membership than the EC or the WEU, or even NATO. No real conflict however seems to be emerging, at the moment, between these organizations. On the contrary, at least as far as the EC and WEU are concerned, there is a strong case for putting their political weight behind the general thrust of ESA's programme. The European Parliament, for example, has endorsed the necessity of increasing ESA's budget, as a way of helping Europe towards the goal of autonomy.

We share however the general sense of the debates held in the European Parliament, stressing the importance of democratic scrutiny and control over the huge expenditures needed for space, also considering the important strategic and security dimension of space, its importance for the future of human knowledge, national prestige and international economic development.

It is a fact that presently European space policy decisions are strongly influenced by the demands and interests (and the almost exclusive expertise) of various interest groups (be they the manufacturers, the military, or the bureaucrats and the scientists working in the national space authorities or in ESA). The importance of space is greater than those interests, and the demand for more public money also requires a greater public control over it.

The general goal of an autonomous and strong presence and identity of Europe in space will not be attained without greater public support. A greater degree of democratic control and public awareness over the choices made on European space policies could be helpful, and will on the other hand become a necessity in the future, when the European space policy will have reached a higher degree of importance and maturity.

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