INTELLECTUAL PROPERTY WITHIN PUBLIC INTERNATIONAL RESEARCH ORGANIZATIONS. THE EXAMPLE OF THE EUROPEAN SPACE AGENCY.

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The views expressed below are those of the author and do not necessarily represent those of the European Space Agency (ESA).

ABSTRACT

International cooperation, budget cuts and a new geo-political situation are the main factors influencing the development of (public funded) space research and development. Increased critical evaluation of ongoing and proposed research and development projects, protection of developed technology and promotion of the use of the technology seem to be key words when describing the changing attitude of public organisations with respect to the results of government funded space research.

The lack of adequate Intellectual Property (IP) protection can become an obstacle to an efficient international cooperation. The attention given to this problem is also stimulated by the cooperation between (public) research institutions and national industries. Clear rules are needed for protection of the property of the resulting inventions.[1]

This requirement for a clear legal environment leads to the need for a better analysis of the impact of intellectual property protection on space activities in order to determine the need for further actions and policy in this field.

INTRODUCTION

The Intellectual Property relates to protection of creations of the human mind. Intellectual property laws provides, in general, the granting by the State (National Patent Office) of a title (patent, trademark, designs and models... etc.) by virtue of which the holder or other entitled persons (licensees, heirs,etc.) enjoy a set of exclusive rights for exploiting and benefiting from its creation. These titles are limited in scope, duration and geographical extension.

Intellectual Property protection is intended to stimulate the creativity of the human mind for the benefit of the public, by assuring that the advantages derived from the exploitation of

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the creation will, if possible, benefit the creator himself, in order to encourage the creative activity and to allow investors in research and development a fair return or their investments.

Furthermore, Intellectual Property protection encourages the publication, distribution and disclosure of the creation to the public, rather than keeping it secret which at the same time encourages commercial enterprises to select creative works for exploitation[2].

This article aims to analyse the role of Intellectual Property Rights (IPR's) in space activities and in particular those of ESA taking into account the IP policy of some other Research and Development Institutions.

Intellectual Property Rights are playing an important role in all areas of economic activities where research and development are the main thriving factors for the further strengthening of the competitive power of high technology industries on the world market.

Space research and development is a good example of such an activity, since development of new technology can only take place after a relatively long research phase which requires fairly high investments of governments and industries[3].

Space Research and development is also considered to be important for the enhancement of the general technological capabilities of the industry of a country and IPR's are important for protecting and promoting the R&D results.[4]

Another factor which contributes to the importance of controlling technology for space research and development is that most space technologies can be used for dual purposes, namely military and civil[5]. For instance, access to space is dependent on technology that is directly related to the development of ballistic missiles.

Especially with the emerging trend to develop international cooperation in space development projects, for political and economical reasons, access to space technology and securing investments for all partners should be facilitated by well defined rules on sharing jointly developed technologies[6].

The different forms[7] of Intellectual Property (IP) applicable to space activities and examples where these are applied, will be discussed hereunder.

The first type of Intellectual Property is the protection of technical innovations by patents. Patents protect relevant technologies resulting from R&D activities which are of basic importance for private investors; the example of the Williams and Renner patents which will be discussed later on in the paper illustrate the importance of such protection.

The issues that patent protection raise with regard to activities in outer space are discussed in a ECSL study on patent protection for inventive activities and/or utilisation of protected inventions on board the International Space Station[8].
A second relevant Intellectual Property title is the copyright and "droit d'auteur" which play an important role in satellite broadcasts and the protection of remote sensing data.

The last IP title is the protection of a satellite's name (or project) as a trademark which is important for future

commercialisation and for creating a certain image. In particular, trademarks are used to protect the image that is generated by ESA. Space technology, which is tested in one of the toughest environments (outer space) and developed by the best engineers, is then an image which strengthens the quality image of the producer.

The IP policy of the European Space Agency (ESA) is the central theme in this paper and it is hoped that this example will enable readers to have a better understanding of the issues emerging from the increasing international cooperation and the way ESA handles these questions. Of course, ESA is just an example and, therefore, comparisons with other international organisations involved in the management of research and development will be drawn.

I. AREAS OF IP PROTECTION RELATING TO SPACE ACTIVITIES

I.1. Intellectual property and micro-gravity activities

Inventions are new solutions for technical problems. Protection of inventions is provided through the granting of patent titles to the inventors and their successors. A patent confers on its owner the right to exclude others from making, using, selling or importing products or processes incorporating the technology that is covered by the patent. The rights under a patent are limited to the territory under the control of the government which issues the patent, and may be enforced only in that territory.

The planned increase of adequate infrastructures for experimenting in the micro-gravity environment will result in a more significant demand for legal protection of products invented in outer space or patented products used for experimentation and production in outer space. It is in this respect noteworthy that a wide variety of industries will have a potential interest[9] in these activities and that they also represent different kinds of industrial activities.

Most of the micro-gravity activities are expected to be carried out on board space stations (national like the Russian MIR station or international like the international space station) or space platforms[10]. The analysis of the specific problems relating to IPR's arising from the utilization of the future Space Station by the European Partner is an example of the need to harmonize IPR's laws in Europe.

Moreover, the conclusion of the International Governmental Agreement on the Space Station (IGA)[11] leads to questions concerning the impact of Space Station activities on the creation of intellectual property rights in outer space and the consequences for the European partner. It could be asked whether such IPR's should be adapted to the particular characteristics of space activities.

Another aspect of European cooperation through the European Space Agency with regard to space activities is that it poses specific problems as far as the regulatory environment in which these activities are to be carried out, is concerned. Europe's own regulatory complexity may lead to the situation that US legislation[12] will take precedence in joint activities occurring on board the International Space Station.

In practice, the application of the relevant provisions of the IGA

could create a situation where the rights of the patent owners and the use of patented inventions in outer space are governed by the law of the State which recognizes the activity developed on board one of the elements of the Space Station as occurring within its own territory[13]. However, at present, the only applicable national laws appear to be those of Germany and the United States. Notably, for the moment Germany is the only European partner State which ratified the IGA[14] in such a way that the activities which are carried out on board the European Module will be considered, for the purpose of its national patent legislation, as occurring in German territory. Obviously, this situation stresses the lack of harmonization between the European Partner States[15].

ECSL carried out a study[16] on how patent law will be effected on board the International Space Station. Questions like what will happen when a patent is infringed on board the space station, which and whose law will be applied were analysed. For ESA, which in this case represents ten European countries with different patent laws these questions are even more important to solve. The results of the study indicate that harmonisation indeed is needed in Europe and that legislative action is required ensure that national patent laws will be applicable on activities on board the space station.

I.1.a) <u>The Williams and Renner patents: infringement actions and space activities</u>

The William and Renner patents are two examples of unauthorised use of US and European patents by third parties. The William case[17] concerns a law suit started in 1973 by Hughes Aircraft Company against the US Government (USG) for the infringement of the so-called William patent. The William patent has to do with the system for attitude control of spin-stabilised satellites. The two parties in this case are Hughes and the USG. ESA was indirectly involved by assisting the USG with regard to certain satellites which were the result of cooperation agreements. However, Hughes claimed that infringement of this patent also took place when non-US satellites were launched by US launchers and although the satellites were manufactured in countries where this patent was not protected, the launch itself constituted according to Hughes (and this statement was confirmed by the US judge Turner) an infringement act " by" the USG and "for" the USG with its authorization and consent. Hughes sought reasonable and entire compensation from the USG under 28 U.S.C art.1498[18] for this unlicensed use of Hughes' property. On August 16, 1993 a final decision regarding the liability of USG was issued by Judge Turner of the US Court of Federal Claim. The decision on the Accounting phase will take place in the following months.

After a 20 year court struggle, this decision marks a milestone from which several lessons can be learned. Apart from the obvious questions one can have with regard to the length of the procedure and the enormous costs involved due to the U.S. procedural system, the difficulties of running a defence in front of an American Court became painfully clear and leads to the conclusion that particular attention should be given to intellectual property problems when cooperating with other countries in order to avoid the danger of potential law suits.

The Renner patent[19], an ESA invention, relates to a system for

compensating perturbations in a satellite's attitude without the expenditure of on-board fuel which is more economic and more flexible than the known systems. The invention is an important advance in satellite control which allows a significant extension of a satellite's lifetime. ESA discovered in 1991 that Hughes intended to use the invention for a commercial and public satellite order. The use of the Renner technology for the commercial order resulted into direct negotiations between ESA and Hughes in order to agree upon a licence contract, subject to terms and conditions satisfactory for ESA. Discussions proceeded on an intermittent basis, in the course of which Hughes had the choice of taking a licence or switching to alternative non-infringing technology. On september 1991, Hughes advised ESA that it was implementing alternative technology and that it was no longer interested in seeking a licence. The fact that Hughes recognized that it wanted to use ESA technology, and was ready to remove it, can be compared with the effect of an injunction.

The use of Renner Technology by Hughes for the public order, to USG, is a different issue. Hughes has extended all liability for patent infringements to the USG. Therefore, ESA was obliged to file a claim against the USG. Discussions started in order to identify the best solution to avoid starting a "never-ending" infringement action, as in the case of the previous affair which are discussed above. ESA is considering the possibility of offering a licence to USG based on the Renner patent which would either be of the royalty bearing type, or of the non-royalty bearing cross-licence type. In the latter case , no exchange of funds would take place , and ESA could exchange the use of the Renner invention for the licence rights on USG patent(s) and/or technology know-how of interest and value to ESA.

I.2. Intellectual Property and remote sensing activities

Remote sensing activities by European operators raised the question of the legal protection of data obtained from remote sensing satellites. A study carried out on behalf of the European Commission[20] confirmed that the existing legislation in Europe does not adequately cover remote sensing data and there appears to be confusion about which type of law should be applicable. Conflicting schemes for protection are applied in ESA Member States as copyright laws, trade secret law, or just ownership rights which all lead to different rights and obligations for the suppliers and distributors of the data.

In practice, operators in Europe apply copyright protection on their data. The problem is however that copyright law is not ideally suited for these activities (copyright in principle aims at images and not at data) and moreover there is a risk that in some member countries[21] due to the interpretation of national copyright acts, no equal protection will be given to remote sensing data.

Copyright raises another problem with regard to the processing of data and the question whether and to what extent royalties can be demanded by the data provider. Here the question of (ir)reversibility plays a role for making the distinction between the original product and the processed product which then on its own will enjoy copyright protection. However, in remote sensing

processing, different sources of information are often mixed in order to process material and consequently make the irreversibility question irrelevant.

An alternative legal protection could be based on trade secret laws which, however, are also not ideally suited for remote sensing data because part of the data obtained via remote sensing activities can be considered to be information instead of data and require therefore other elements addressing access to (public) information which are not dealt with in trade secret acts which see only the economic dimension of the remote sensing activity.

Another legal question which should be addressed is the access to remote sensing data as formulated in the UNGA 41/65 Resolution and, especially, how the requirement of "non-discriminatory access" should be dealt with in a future regulation.[22]

A sui generis protection for remote sensing data adopted on a European Community level would be the ideal solution for this situation was the conclusion achieved by the ECSL/EEC study on this subject. A sui generis right means that the legislator can "borrow" from comparable regulations principles which are to be applied on protection of satellite remote sensing data. This sui generis right will give legal protection to the investments made in remote sensing activities without dealing with discussions about originality and level of creation. The principle upon which this sui generis right can be created is the same as in the case of the protection of "video-grammes" producers (but disconnected from any copyright) where only the fact of creating a product is sufficient for obtaining legal protection. In the same way, the fact that digitized information is produced will be enough reason to be entitled to such a right.

I.3. Copyright and satellite broadcasting

With regard to satellite broadcasts, it is the European Community who plays an important role by creating an environment where transfrontier broadcasts will not be hampered by legal uncertainties. The European Community Council of Ministers adopted on 27 September 1993, the final version of a Directive on coordinating copyrights and neighbouring rights rules for cable transmissions and satellite broadcasting in the Community. The directive confirms that only the law of the originating country is applied to the act of satellite broadcasting. These rules will take effect in 1995. We will not go here into further details, as the legal problems surrounding these broadcasts justify a separate presentation[23].

I.4. Trademarks

The trade mark is a symbol which distinguishes the products and services of a given manufacturer or retail merchant from those of another. Given the above definition, the question arises why ESA, which has no commercial remit, has chosen to protect names of several of its programmes by means of registered trade marks.

In principle where a programme is conceived and developed with a view to future commercialization by a company that will be created for that purpose (eg., as under the Ariane program), the filing of a name in view of obtaining a trademark protection can be of value.[24] This is the approach of ESA.

ESA protects a number of trademarks for a variety of its programs. The better known are Ariane, Artemis, Esaquest, Earthnet, ERS, Hermes, IRS, and Olympus. These names all refer to programs which at the time of their conception, included the possibility of commercial activities for different goods and services such as launchers, telecommunications, data transmission and elaboration, data bases etc. The choice of the name is in most cases the technical abbreviation of the programme. However, ESA was not always so lucky with the choice of its names as can be illustrated by two examples.

The first example concerns the long negotiation with the Japanese Olympus camera firm on the use of Olympus as a trademark. The Japanese firm contesting potential damage to its image, because of the confusion for the general public caused by the ESA Olympus trademark, withdrew its intention of a law suit for damages only after the signature of an agreement obliging ESA and its Member States to a very limited use of this trademark.

The second example refers to the ERS trademark which led to confusion (in countries in which the trademark will be granted) with the Japanese JERS-1 remote sensing satellite which has been filed after the European ERS trademark. This situation gave ESA the embarrassing right to refuse or grant consent to its Japanese colleagues. This example again emphasises the need for a strong policy for the protection of programmes by trademarks.

We have seen above how IP plays a role in the development and commercialisation of space technology and it is therefore now of interest to see which rules ESA applies with regard to these Intellectual Property rights.

II. THE EUROPEAN SPACE AGENCY'S POLICY ON INTELLECTUAL PROPERTY

ESA's IP policy was laid down in the sixties in the ESRO[25] Convention and was not changed in the ESA Convention. The only significant new policy document since the ESRO Convention was the ESA Council Document on Information and Data adopted in 1989.

The distinguishing feature of ESA lays in its twofold activity. As an R&D organization, it seeks to extend technical knowledge and develop new technologies. It develops facilities for conducting experiments, conducting them itself or making the facilities available to third parties. At the same time, however, it develops facilities for operational use (space applications), improving product quality, diversifying activities, extending expertise, using more modern and complex management methods and improving competitiveness.

As an intergovernmental body, ESA has certain general obligations to fulfil, including protecting the interests of its Member States without discriminating between them.

Article III of the Convention (Information and Data) establishes the principle that Member States and the Agency shall facilitate the exchange of scientific and technical information pertaining to the fields of space research and technology and their space applications. It also stipulates that any scientific results shall be published or otherwise made widely available after prior use by the scientists responsible for

the experiments.

On the basis of principles laid down in its Convention, ESA has drawn up a number of rules governing intellectual property: contract regulations, provisions in the implementing rules of optional programmes, and clauses contained in international agreements.

Given the diversity and abundance of intellectual property provisions, the need to standardize them in a single document, which states the principles of the policy and procedures of the Agency concerning IP rights, soon became apparent.

In 1989 the ESA Council adopted a set of rules on information and data (ESA/C(89)95 rev.1), based on Article III of the Convention.

This document comprises five chapters setting out the basic principles concerning the various sources of information and data, i.e. ESA staff, contractors and experimenters.

ESA adopted the following rules:

- Invention by a staff member where ESA owns any IPR's. Throughout their period of appointment, staff members must declare any invention or creation resulting from employment in the Agency. The same applies to technical or scientific works and inventions effected outside the scope of their duties. Where an invention is concerned, the Director General takes a decision on how to proceed, after consulting the Patents Group, an internal organ, to decide on specific IP protection for inventions.

- Invention by a contractor where the contractor owns the IPR's. The Agency assigns numerous R&D tasks to private or public bodies such as universities, research laboratories and firms specializing in the space field. To that end, it concludes with these partners research contracts under which the contractors are bound to make available to the Agency any resulting inventions or technical data under free, non-exclusive and irrevocable licenses.

- information and data relating to payloads flown on space vehicles for which the Agency provides flight opportunities. It incorporates existing provisions in implementing rules and lays down further principles applicable to ESA "customers". The main difference between the rules applicable to an experimenter as opposed to a customer is that ESA has the right to use inventions and proprietary technical data resulting from the work of an experimenter, whereas the customer, in funding the flight, has exclusive rights over the resulting information and data.

Finally, the document refers to rules governing technology transfer to non Member States from ESA and/or contractors of any technology developed in the ESA framework and to the need to regulate the circulation of information and data within ESA.

It is clear that these rules do not constitute more than guidelines for international cooperation agreements and one can assume that in the near future it will be necessary for ESA to define more precise IP rules in order to defend the interests of the Member States in international cooperation projects and to support the competitiveness of the European space industry.

III. THE IMPORTANCE OF THE

MANAGEMENT OF INTELLECTUAL PROPERTY

III.1 ESA

As we have seen above Intellectual Property is important for protecting space technology and data. But IP can also be an instrument to encourage space and non-space industries to make use of the scientific and technological innovations developed in the ESA basic research framework. In other words, a way to benefit from the substantial investments made by European governments in the ESA framework by the commercial exploitation of these technical innovations. However, many obstacles have to be overcome for the commercial exploitation of basic research and IPR's can play an important role in this process.[26]

Basic research[27] can be very remote from immediate commercial applications and it is not always easy to identify the commercial potential of new discoveries before they are published in public (open) literature[28]. Commercial expertise is then required in order to file for a patent application and to decide where to protect it. Finally, marketing and licensing inventions to companies which might have an interest in exploitation is the last important step to take. However, the costs of protecting and defending IP rights can be high[29] and the commercial expertise is often not available within a public research organization. Moreover there is the wrong perception that intellectual property protection may restrict academic traditions of the open exchange of research information, and that research carried out using public funds should be from the outset freely available to benefit society as a whole. However, the patent system is created to encourage the development and dissemination of new technologies. Unrestricted rights to exploit the invention will discourage the necessary investments which can result in a situation where society cannot derive any benefit from it at all.

There is a lot to be done to improve the IP management and technology transfer activities in research organizations. Effective IP management is needed for this, which requires a strong commitment throughout the whole organization coupled with a clear IP policy which is communicated to all staff. The commercial side of research contracts including the exploitation of IP should be handled by a professionally staffed central office which is accessible to all research staff on demand. But one has to be aware that IP management requires significant initial investments before it can become profitable[30]. Also the costs of protection, and defence, can be high and might only be possible when undertaken in partnership with a commercial company, or unless insurance against litigation costs is obtained. The closer contacts with the business community could also improve the transfer of technological know-how to industries and enhance industrial innovation.

ESA, as a public R&D organisation, also needs to adapt its own practice as there is no policy defining ESA principles for taking a decision on where possible patents have to be protected and which possible patents should be protected. It is clear that, according to the present writer, investments are needed to enable protection in all significant countries where eventual commercialisation can take place. This protection can function as a tool for attracting private

investors but then marketing and licensing expertise is needed within ESA. In some cases the protection of high gain patents can result in costs that are beyond the means of ESA and public-private partnerships are needed with interested industries. Arrangements should then be made to fund possible costs of litigations in case of infringements. At the same time this policy will lead to promotion of innovation as there will be closer contact with private industry and technicians and managers will be better trained to use IPR's as a tool for commercialisation of ESA innovations.

III.2 European Community

Since the adoption of the 1987 Single European Act, the European Community has been involved in the funding and management of Research and Development activities. In 1989 it adopted the so called VALUE programme which is to support the dissemination of publicly available information relating to its R&D programmes and to stimulate the exploitation of the results of these programmes[31]. The European Commission has issued a model contract for participants in its collaborative research programs.(ESPRIT,BRITE,CUBE, etc.) Each contractor (Higher Education Institute (HEI) or company) owns the foreground IP it generates and has the rights to use another contractor's foreground IP for further research and development. Industrial contractors have a non exclusive right to exploit such foreground, on a royalty free basis unless the foreground was generated by an HEI. In case of non exploitation, the licence must be made available on reasonable terms to any Community applicant with a legitimate interest. In this case a specific agreement-called Technology Management Plan (TMP)- is concluded between the participants in the joint research in order to regulate the implementation of the research and the rights and obligations of the participants. With respect to IPR the TMP will normally address inter alia: ownership, protection, user rights for R&D purposes, exploitation and dissemination, including arrangements for joint publication, the rights and obligations of visiting researchers and dispute settlement procedures. The TMP may also address foreground and background information, licensing and deliverables.

III.3 United States

In the US it is now common practice for the Higher Education Institutes (HEI) to retain ownership of the IPR it generates in a sponsored research project, even if the work is done collaboratively with the sponsor. An industrial sponsor is normally expected to bear the cost of any patent applications that they wished to see pursued and would receive a limited duration option to acquire either a royalty-free non exclusive licence or an exclusive royalty-bearing licence. Exclusive licences are often limited in terms of technical field or geographical area leaving the HEI free to licence other companies outside these areas. Safeguards are provided against non-exploitation.

If government funding is involved, the US government retains a royalty free licence to use any invention on its own behalf anywhere in the world. Another condition imposed by government is that licence income from project results should returned to the project.

III.4 Japan

Most sponsored research in Japan by universities is carried out collaboratively with the sponsor. It is common practice that patents are jointly owned by the HEI and the industrial partner. The company has a priority right of exploitation for a set period of not more than 7 years, but a third party is entitled to a licence if there has not been any exploitation after 2 years. Royalty income is usually split roughly equally between the HEI and the industrial partner.

IV. CONCLUSION

The space industry was until now never very active in protecting and exploiting state funded research. Firstly because it did not invest large amounts of company money which should be protected and secondly because the end user was often the government and not the commercial market.

This situation becomes different when commercial exploitation of the IP has to be achieved. This process, transfer of technology to the industries, is a difficult process which in the framework of ESA programmes, with the notable exception of the RADIUS program[32], never attracted a lot of attention.

In general it is clear that an organisation such as ESA lacks the experience and willingness to actively pursue a better IP policy and that this situation can improve only after a change in the attitude of its Member States and of their industries.

For the near future, however, IP management will become more important as ESA has to engage itself in an increasing number of international cooperation projects where access to technology and protection of the Member State's industries will play an important role. Another reason justifying increased attention to the management of IP's is that in times of decreasing space budgets Member States will be more critical to what their industries benefit from ESA programs and thus that transfer of technology to for example non-space industries will become an important goal legitimating the existence of large space R&D programmes.

See next page for notes

1. See report on "*Intellectual Property Protection of Advanced Technology*" prepared for the United Nations University's Institute for New Technologies (INTECH) by Jeroen van Wijk and Gerd Junne, October 1993, to be published

2. Albert Tramposch "Importance of Intellectual Property Rights for Space Activities in general. In particular the protection of invention made and used in relation to Space activities." in *Proceedings of the Workshop on Intellectual Property Rights in Outer Space*, held in Madrid, 26, May 1993, published by ECSL.

3. The average time to develop a satellite after the approval of a programme by the ESA Council is approximately 8-10 years. For example, the ERS-1 preparatory programme was approved in 1978 (*ESA/C/XXVIII/Res.4*), the first Resolution was adopted in 1981 (*ESA/C/L/Res.5*), and the satellite was finally launched in July 1991.

4. "Encouraging space commercialisation would require an increasing public spending in order to allow private investors to overcome existing obstacles and to create large new markets and industries; the increasing of private investment would pay off by reducing the cost of the government of carrying out public space programs." in *Encouraging Private Investment in Space activities*" The Congress of United States, study by Congressional Budget Office, February 1991

"Defi technologique, aventure industrielle, exploit humain, champ scientifique d'investigation, l'espace craque sous le poids des enjeux. La société menacée par la recession, en vient à s'interroger sur l'opportunité des dépenses spatiales. Un débat en perspective, où les retombées économiques et technologiques pourraient devenir une arme. Ni l'ESA ni le Cnes disposent des 600 millions de francs consacrées par la NASA à la valorisation de ses technologies" in Espace retombées en miettes" *Science and technologie*, February 1991, Olivier Languepin and Asdrad Torres On the same subject see Vincent Golito and Yves Arner " Matériaux: interdépendences"in *Science et Technologie*, n°34 Février 1991

5. For example S. Doyle stated at the 44th IAF Symposium in Graz-Austria, that a "fundamental technology is neutral for its application and thus is not confined by its conception to civil or military use", in *Civil Space Systems Creating Confidence Through Cooperation*, S. Doyle, Single Springs, CA, USA, to be published by UNIDIR.

6. A *Task Group Report of the Vice President's Space Policy Advisory Board* - "A post cold war assessment of U.S. space policy" December 1992 recommends "to improve industrial productivity and accelerate transfer of technology and experience among space programs..." "... enhanced international competitiveness of the U.S. private sector through the easing of government restriction on the export of satellite and space technology..." and then states a policy recommendation (n°3) saying " Revitalize, on a urgent basis, a more productive cooperative relationship between the U.S. government and space industry to meet the increased challenge of international cooperation..."

Similarly, another recommendation, in 1992, from the Task Group Report of Vice President's Space Policy Advisory Board on the Future of U.S. Space Industrial Base, states that " to achieve the best leverage in maintaining the U.S. space industrial base, the DoD must be successful in implementing its policy to strongly support research and advanced technology; Nasa should

increase its efforts in space technology and work more closely with industry on technology transfer...".

7. According to Article 2 of the Convention establishing the World Intellectual Property Organisation, done in Stockholm on 14 July 1967, Intellectual Property is understood to be literary and artistic or industrial. Literary and artistic property covers the enjoyment of copyright by writers, artists, composers of music etc. Industrial Property covers patents for inventions, designs, trademarks etc.

8.The International Governmental Agreement among the Government Of United States of America, Governments of the European Space Agency, the Government of Japan and the Government of Canada on cooperation in the detailed design, development, operation and utilisation of the permanently manned civil Space Station, was signed in Washington,D.C. on 29 September 1988; K.H. Bockstiegel and Marietta Benko, *Space Law - Basic Legal Documents* - Vol.2, Martinus Nijhoff Publishers.

9.Microgravity offers many potentialities. The most obvious concerns the synthesis of materials. By eliminating the phenomena associated with convection, sedimentation and hydrostatic pressure , microgravity provides conditions in which it is possible to blend metals or solutions of different densities and obtain alloys or crystals never before produced. In fluid dynamics, a great deal remains to be learnt about the effects of microgravity, but in the very exceptional conditions of weightlessness fundamental experiments can be carried out with great precision when samples are manipulated without physical contact (by the use of acoustic, electromagnetic or electrostatic devices). The physical and thermodynamic characteristics of fluids can therefore be determined with a precision that cannot be equalled on Earth. Finally, in life sciences, the ways in which terrestrial organisms, in whose previous existence gravity has been a permanent influence, react or adjust to microgravity will reveal a great deal about the mechanics of life, from the cell to the whole human being.

10. The MIR manned orbital complex is the Russian Space Station which in its final form will comprise a central control module with up to five further specialist modules docked. Its core was launched in 1986 and the first of the modules in March 1987.

The ESA polar platform is being developed within the framework of the Columbus Programme. Initiated after ESA Council Meeting at Ministerial Level in Rome in January 1985, it was approved for development at the Hague Ministerial Council in November 1987, and confirmed again at the Munich Ministerial Council in November 1991 with a scheduled launch in mid-1998; at the Granada Ministerial Council in 1992 the configuration and responsibilities of the Polar Platform have been transferred to the Earth Observation Programme (*ESA/C-M/CIV/Res.1 Final*)

The European Retrievable Carrier(EUREKA) is a unique, re-usable, user oriented space facility that has been developed to meet the needs of both scientific and application oriented users in the coming years. Eureka was launched successfully aboard Space Shuttle Atlantis on July 1992. Eureka-1 mission carried on 15 facilities for the conduct of over 50 experiments on materials synthesis, life sciences, space enviroment, astronomy, telecomunications and

equipment for satellites of future generations.

11. See Article 21 of the IGA.
For more details see e.g.: G. Lafferranderie, "La Station Spatiale" in *Droit De L'Espace*, ed. by Dutheil de la Rochère, 1988; A. Farand " Legal Framework for the Space Station" *Proceedings of the Workshop on Intellectual Property Rights in Outer Space*, held in Madrid, 26 May 1993; R. Oosterlinck, "The Intergovernmental Space Station Agreement and Intellectual Property Rights" 17 *J. Space Law* 23,29 (1989); J.B. Gantt "Space Station Intellectual Property Rights and U.S. Patent Law" *Proceedings of the Colloquium on Manned Space Stations-Legal Issues*, Paris 7-8 November 1989;
Dieter Stauder," Intellectual Property Regime for Scientific Research" in Boeckstiegel (ed.), *Manned Space Flight*, 1992, 113 to 120; A. Vahrenwald "Intellectual Property on Space Station 'Freedom'" *EIPR*, VOL.15 Issue 9 September 1993; A.M. Balsano " Industrial Property Rights in Outer Space in the International Governmental Agreement(IGA) on the Space Station and the European Partner" *Proceedings of the 35th Colloquium on the Law of Outer Space*, Washington DC,1992.

12. 35 *USC* paragraph 105. Inventions in Outer Space

13. The territory is the one of signatory government States of the IGA, see supra note 8 and 11

14. Article 2 of the law of 13 July 1991 ratifying the IGA.

15.In this respect the situation will become more complex with the possible Russian participation in the International Space Station, as lately envisaged by the actual Partners.

16. This study was taken up in 1992 by ECSL and ESA and a questionnaire was sent out to some 900 addresses in Europe. Interviews were held with a number of respondents representing European interests in microgravity research. The report on this research projet has been presented to the Workshop on Intellectual Property in Outer Space held in Madrid on 26 May 1993. The Proceedings are available at ECSL, c/o ESA, 8-10 rue Mario Nikis, 75015 Paris, France. The World Intellectual Property Organisation (WIPO) is interested in cooperating with ESA in further studies on the subject.

17. The William Patent is a U.S. Patent(n°3798051) owned by Hughes Aircraft Company, which covers an apparatus on a satellite for the orientation of the attitude of a spin-stabilized satellite. There are no foreign patents on the invention. Hughes Aircraft Co. V United States, US Cls Ct, no. 426-73,8 October 1988, see BNA's PTCJ 1988.

18. Section 1498 (a) provide that: "Whenever an invention described in and covered by a patent of United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner's remedy shall be by action against the US Claims Court for the recovery of his reasonable and entire compensation for such use and manufacture.."

19. The Renner patent is a system for controlling the direction of the momentum vector of a geosynchronous satellite. It was filed on February 5,1980 in the United States, and granted on April 13,1982 with the Patent n° 4,325,124.

20. See: Conditions of Access to Remote Sensing data, European Commission (DG XII, Space Policy Unit) Study, 1992 (not published).

21. Regina Doring-Kuschel and Benno Carus v. Schellenberg, Ogilvy and Mather GmbH, not published, on the right to use Meteosat photos covered by ESA copyright. The Court stated that German copyright law protect natural persons only, and a legal person like ESA could not qualify as author according to that law.

22. UN Resolution 41/65 Principles Relating to Remote Sensing of the Earth from Outer Space, Adopted on December 3, 1986

23." *EC Directive on copyright, satellite broadcasting and cable retransmissions of 27 September 1993*" paper prepared by Marie Helen Pichler, for the European Centre for Space Law, Second Practitioner's forum 10 November 1993.

24. The main criteria to have an effective and institutional policy in this field would be:

1) choose a name which is distinctive through its novelty and originality, so that it cannot be contested by a third party owning priority rights in respect of the mark chosen;

2) carefully decide on the countries, classes of products and services for which protection is to be sought, in the light of the programme's potential;

3) conduct regular checks to detect any unauthorized use by third parties, with the possibility of legal proceedings if amicable arrangements are not sufficient to safeguard ESA's interests;

4) work out a list of criteria for use of the mark by third parties to whom ESA wishes to assign that right.

5) formulate arrangements for transferring ownership of the mark to a company which is exploiting the programme commercially.

Such a policy will justify ownership of the marks by ESA, strengthen its public profile and open up a market for companies responsible for exploiting the results of the programme.

25. Dr. H. Kaltenecker " La Politique de l'ESRO en matière de droits de propriété intellectuelle et son cahier des conditions générales des contrats." stated that: " Art.III was the basic legal text for ESRO in the field of exchange of information and data, establishing the following principles:

1) In carrying out its activities the Organisation shall ensure that any scientific results shall be published or otherwise made widely available after prior use by the scientists responsible for the experiments. The resulting reduced data shall be the property of the Agency.

2) Without prejudice to the patent rights, the technical results from the activities of the Organisation will be widely available.

3) Member States shall facilitate the exchange of scientific and technical information, provided that a Member State shall not be required to communicate any information obtained outside the Agency if it considers that such communication would be inconsistent with the interest of its own security or its own agreement with third parties, or the conditions under which such information has been

obtained."

26. For more details see " Intellectual property in the public sector research base" *Report from the UK Office of Science and Technology*, 1992, published in U.K. for HMSO

27. See: Robert D Handscombe, Director Commercial and Industrial Development Bureau University of Sheffield (GB) " New challenges to academic research" in *Proceedings of the first European Congress on Industrial Property Rights and Innovation* ('90).

28. See Antonio Cortes Arroyo Associate Director of the Office of technology Transfer of the Spanish National R&D Plan,
" Technology Marketing by Research Institutes ", in Proceedings of the first European Congress on Industrial Property Rights and Innovation ('90), who states that " The transfer of research results from Universities and public research institutions to industries is not a simple and straightforward process, independent of how attractive and novel these results may appear. In general, a number of steps must be taken before the transfer actually takes place.

1) Collection of the results from partial and final reports.
2) Evaluation of the results through technical and economic feasibility studies.
3) Protection of the promising results by an adequate IP title.
4) Analysis of the potential market for the results to be transferred.
5) Improvements of the results by additional activities of scale-up, building of prototypes, demonstration tests;
6) Actual transfer of the mature and already protected results by selling or licensing contracts, joint venture, etc."

29. See Daniele Archibugi "Patenting as an Indicator of Technological Innovation : A Review " in *Science and Public Policy* vol; 19, n°6,1992 pages 357-368.

30. See the report prepared by Jean-Claude Derian pour le Ministre de l'Industrie et de l'Aménagement du Territoire et le Ministre de la Recherche et de la Technologie "La valorisation de la recherche publique et les possibilitiés de créer en France un nouvel operateur de valorisation et de transfert de technologies" . The following conclusions are made:
- Politiques de valorisation mises en ouevre depuis le début des années 80 afin de valoriser les résultats de la recherche publique et les rendre plus accessibles par l'industrie : Histoire d'un succèss et d'un échec.
Elles ont été un succèss parcequ' elles ont stimulées les industriels à contacter les laboratoires publics pour résoudre leur problèmes et pour développer les technologies dont ils avaient eux-mêmes décidé d'assumer le risque de commercialisation.
Elles ont été un échec quand l'effort de pré-développement ou de développement a été conduit au sein des laboratoires mêmes (technology push), à cause de la mentalité différente qui vise à ne pas favoriser en premier lieu la commercialisation. La politique de l'offre technologique a été poursuivie à travers la commercialisation des brevets et licences directement issus des laboratoires publics, mais avec un success moindre, à cause de la petite taille des services de valorisation, de leur connaissance limitée du marché et de la préférence à exploiter ces resultats dans le cadre des relations directes entre laboratoires et industriels.

La mondialisation des marchés des transferts de technologie, demande une révision et un élargissement de la politique de valorisation à travers des investissements plus importants pour assurer une protection par brevet plus elargie territorialement et le recours aux experts du marché visé.
La recherche de base devient aussi un enjeu stratégique entre Etats et les firmes multinationales, à travers une meilleure protection de celle-ci et par moyen d'un contrôle attentif contre le pillage des industries étrangèrs et la valorisation interne pour une exploitation plus efficace.
Propostion de la création d'un nouvel operateur de valorisation et de transfert de technologies, qui a été crée par la suite en 1992 et s'appelle FIST.

31. B.B. Goodman " Exploitation of R&D Results in Community" les Nouvelles, *Journal of LES*, Vol. XXVIII n°1

32. In 1990, the Space Commercialization Office of ESA convened a Task Force to study the reasons for the lack of industrial participation in micro-gravity activities. The Task Force was asked to give recommendations to identify the best ways to create synergy between the industries and the research groups involved in microgravity activities. The study resulted in the creation of scientific leading groups working in well defined areas of research using the microgravity environment in the framework of the " RADIUS " programme.

Seven of those scientific leading groups were involved in the Study Phase from the end of 1992 to mid 1993, identifying non-space industrial partners ready to cooperate on space experiments. During the next three year phase, i.e. pilot phase, the best groups will be awarded contracts to develop the "Radius Test Structure", promote industrial research, rendering high-quality scientific support to their non-space industrial partners.

ESA funding will be complemented by the contributions from the industrial partners which are already participating in the RADIUS project and any other partner wishing to get involved in this programme.