

TECHNOLOGY TRANSFERS AND PUBLIC INTERNATIONAL RESEARCH ORGANISATIONS. 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 is one of the central principles that guide states in their space activities, which becoming more internationally oriented and increasingly, with the new geopolitical situation, carried out through international cooperation projects, notably the international space station. One of the issues raised by these projects is the transfer and sharing of technology. The transfer of technology within the ESA framework has been well regulated but problems occur when cooperating with third parties. The international legal environment for transferring technologies is becoming more harmonised with the adoption of the TRIPs. However, ESA is paying increasingly close attention to the needs of developing countries, and it may have to establish new provisions, clearly regulating the basis on which technology is to be shared or transferred when cooperating with partners that do not have the same level of technological development. It is suggested that ESA will cooperate closely with other

(international) organisations for implementing the Ministerial Council Resolution adopted in Granada calling for increased efforts by ESA in favour to developing countries. An obvious partner for ESA in this area would be the European Union.

I. Introduction : transfer of technologies in space activities

Since Neil Armstrong took his first step on the moon in 1969, space activities have been transformed in terms of their goals and the methods used to achieve them. Soon, the emphasis was no longer on large "prestigious" projects like putting people on the moon, but more on what space could bring to mankind. Increased access to outer space therefore brought the beginning of an era which can be characterised by a wish to test in practice technical capabilities and scientific objectives which existed only on paper. Consequently, one of the main aims of the spacefaring nations was to meet the needs of scientific experimenters in outer space and at a later stage, when operational

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services were developed, those of (potential) users of space technologies.

The space adventure which at first was largely a competition for prestige between a few powerful nations is now gradually becoming a more ordinary routine activity. A successful space shuttle mission, a long-duration stay by cosmonauts on board MIR, or a launch by Ariane is not front page news any more.

Due to decreasing budgets for space activities there is a growing need to share costs, and consequently results, and technology more widely. Increased international cooperation is the vehicle for this cost-sharing¹, as illustrated for example by the Intergovernmental agreement between USA, Russia, Europe, Japan and Canada, to design and build the International Space Station.

Moreover, the growing concern over the changes in the Earth's environment is being reflected in cooperation and coordination of the activities pursued by different nations, for example through the Committee for Earth Observation Satellites (CEOS)².

These developments indicate a new chapter in space history : the transformation from competition between a few powerful nations to a period of cooperation between spacefaring and non-space faring nations, albeit limited to certain areas of space activities. Also part of the same trend, initiatives such as the World Space Organisation have been proposed, until now with only limited success.

Space projects, since their early beginnings, have brought progress in human knowledge in various fields, producing many scientific and technological results, which have given rise to a wide range of technology transfer processes both within the space industry between its space and non-space sector (spin-offs).

A transfer of technology is not a simple act of transfer but can be described as "... le transfert des connaissances systématiques nécessaires à la fabrication d'un produit, à l'application d'un procédé ou à la prestation d'un service, et ne s'étend pas aux transactions comportant la simple vente ou le louage de biens"³.

Technology transfer is a multi-faceted notion which comprises situations that can differ considerably. The creation of technological knowledge can be the result of a research activity or the natural consequence of industrial use. The technology can be "imported or exported" by and from its "creator/owner" under different contractual forms, such as licensing, granting of rights, transfer of a given technology etc..

It can be protected under two main legal forms, patents and "know-how". These are of a different nature; in fact "know-how" is frequently defined as non-patentable technology, but both legal forms are suitable instruments for establishing an originator's ownership of technology.

The concepts of technology transfers described above are very clear for private entities in a market economy. Their meaning becomes blurred in an international research and development environment. In this context the presence of large and varying numbers of operators, each with their own characteristics (private sector firms and public or mixed public/private institutions), which are involved in the origination of a technology can accentuate the difficulties of applying the "normal scenario" for transfers of technologies⁴.

The international space research and technology development work of the European Space Agency (ESA) is a clear example of the above. Here the formation of a group of operators is facilitated by the intergovernmental organisation (ESA) in order to create a common technology in the

field of space research and applications.

The ESA's various optional programmes: telecommunications, Earth observation, orbiting laboratories and launchers, simultaneously incorporate basic research and applications in a multiplicity of forms. Here the group of operators is formed by the (member) States, which decide how cooperation should be developed between the Member States and non-Member States, the basis of relations between companies and/or private operators which "manufacture" the technologies, and who is to furnish the technology needed and on what conditions, which represents, in other words the policy decisions.⁵

This complex of relations in the context of research and development of space technologies is a complicated and interesting scenario in which technologies can be developed and transferred; analysis of this "scenario" for technology transfer both among the ESA Member States and with third parties is the purpose of this article.

II. Transfer of Technology among Member States within the ESA Framework

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

Article III (Information and Data) of the ESA Convention establishes the principle that Member States and the Agency 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 MUST be published or otherwise made widely available after prior use by the scientists responsible for the experiments.

Given the diversity and abundance of intellectual property provisions, the need to standardise them in a single document soon became apparent and in 1989 the ESA Council adopted a set of rules on information and data⁶, based on Article III of the Convention. The document comprises five chapters setting out the basic principles concerning the various sources of information and data, i.e. ESA staff, contractors and experimenters.

1) A number of intellectual inventions or creations exploited or used by the Agency and its Member States stem from work done by ESA staff members. Chapter I of the Council document on Information and data rules summarises the various provisions already contained in the ESA Staff Regulations which lay down rules on the ownership of intellectual property rights, the status of the inventor or creator, and the treatment of inventions or works produced within the Agency.

1a) Before being appointed by the Agency, staff members must declare any intellectual property rights to inventions or creations acquired within the scope of their previous duties. The Director General determines whether the holding and exploitation of those rights are compatible with future employment in the Agency. The exercise of such rights by future staff members must be compatible with ESA activities and their duty of loyalty to the Agency, which bars them from having - without the Director General's permission - any paid occupation outside the Agency, and from directly or indirectly holding such interests in commercial firms as could, by their nature, compromise their independence in the discharge of their duties in the Agency.

1b) 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. An ad hoc internal group, the Patents Group, is mandated by the Director General to decide whether the innovation is of interest to ESA and what type of legal protection is suitable and where this should be filed.

1c) After termination of appointment, a staff member wishing to use or exploit the intellectual property rights stemming from inventions or creations produced in the course of his activities in the Agency must notify the Director General, who may require those rights to be transferred to the Agency or authorise concurrent exploitation by the Agency and the staff member. This obligation continues to apply for three years after departure from the Agency.

2) ESA assigns numerous R&D tasks to private or public bodies such as universities, research laboratories and companies specialising in space. To that end, it concludes with these partners research contracts under which the contractors - which are the owners of the rights over inventions and technical data developed under ESA contracts - are bound to make available to the Agency and Member States for their own requirements in the field of research, technology and space applications, any resulting inventions or technical data under free, non-exclusive and irrevocable licences.

The intellectual property clauses contained in such contracts are based on Chapter II of the Rules concerning Information and Data and the special conditions applicable to intellectual property rights and other related rights applicable to study, research and development contracts⁷.

These contracts bind the parties in the

following ways:

2a) Before the research contract is concluded, the contractor must declare to the Agency any intellectual property rights held in respect of previous inventions and related technical data. The Agency may then disclose them for its own purposes provided it obtains the prior agreement of the contractor/owner, and provided the information and inventions are legally protected;

2b) Once the contract has been concluded, inventions or technical data resulting from the research work are owned by the contractor, who may or may not protect them by registered patent, or legal title affording similar protection, and exploit them. In exchange, the Agency and ESA Member States may use the inventions or information under free, irrevocable and non-exclusive licences. The Agency reserves the right of reproduction, i.e. the right to manufacture or have others manufacture the products or inventions resulting from the research work;

2c) Throughout the duration of the contract, the contractor must inform the Agency of any further technical data and inventions in the space sector resulting from execution of the contract.

3) Information and data relating to instruments flown on board a space vehicle, are regulated by Chapter III of the ESA Council document on Information and Data rules.

Different regimes are established for an experimenter to which ESA offers a flight opportunity free of charge and for an experimenter who pays for the cost of the flight.

In the first case ESA is the owner of all data resulting from the payload and grant in exchange to the experimenter an exclusive right of prior access to those data (for a

period from 6 to 12 months). The experimenter is the owner of any innovation based on analysis of the data, about which he must inform ESA; ESA is entitled to a free of charge, non-exclusive, irrevocable licence to use the analysed data.

In the second case the experimenter is treated as a customer and consequently owns the rights in the data resulting from the payload.

4) The exercise of these rights - owned by ESA or by the contractors - outside the Member States or for non-space applications is monitored by the Transfer Technology Committee, which is composed of representatives of ESA Member States, in accordance with the provisions described in Chapter IV of the Council document on information and data rules. This Committee has not been established to compete with national and European systems for monitoring the transfer of technology to non-member states but to achieve a uniform procedure enabling the Agency and Member states to control the circulation of information and data to third countries in order to guarantee consistency with its own objectives. It thus plays a useful support of the Agency's pursuit of its mission in accordance with Article VII.1(b) of the Convention, which states, that it is part of the Agency's industrial policy " encourage the rationalisation and development of an industrial structure appropriate to market requirements".

The transfer application is notified confidentially to the members of the above-mentioned Committee via a standard document, completed by the Agency and the contractor, indicating the use and destination of the property to be transferred, the programme under which it was developed, and the remuneration required in return. The Committee is given a six weeks-period for analysing the application and its implications and eight weeks in total to convey a meeting at which decisions on controversial cases should be taken. It is of interest to point out

that the Committee's power of veto is confined to transfer requests by the Agency - here the Committee plays the role of the national control entity for technology export in relation to an intergovernmental organisation which should respect all the laws of its Member States. The Agency, however, is not legally bound by any of those national laws. In the case of an application submitted by a contractor, the Committee can only render an opinion, negative or positive, which can be transmitted, as an indication, to the national authority competent to give the export authorisation. In the latter case the role of the Committee can be seen as a "fail-safe mechanism" to be applied in special circumstances, and as a good tool to assess the world wide impact of exports of European space technology.⁸

III. Transfer of technology provisions in ESA International Cooperation Agreements

When Europe started its space programmes through ESRO and ELDO, it was dependent on cooperation with the USA for gaining access to outer space and for carrying out micro-gravity experiments and manned space flights⁹. Cooperation with the USA was based on minimum transfer of technology confined to specific projects. Basically, it was the USA that provided the launch capability and at a later stage, space infrastructure facilities, where ESA or individual European countries could provide instruments, astronauts, experiments or in the case of a launch facility, the spacecraft (examples are Geos-1 and 2, ISEE-1-2 and 3, Spacelab).

International cooperation is addressed in the ESA Convention in two Articles, namely Article II¹⁰ and Article XIV.

Art.II provides for cooperation among European States and "concerting the policies of the Member States with respect to other

national and international organisations and institutions".

Cooperation with other international organisations, institutions, governments, organisations and institutions of non-member States is provided for in Article XIV of the Convention.

Three forms of international cooperation conforming with Art. XIV can be distinguished:

- 1) a general cooperation agreement as described in paragraph one of Article XIV¹¹;
- 2) participation by non-member States or international organisations in one of the optional programmes of ESA;
- 3) an Association Agreement with a non-member State, which can be the first step to full membership of ESA (eg Finland); the Associate State will also contribute to the mandatory activities conducted by the Agency under Art V.I(a) of the Convention.

ESA has concluded more than 150 agreements with third parties¹², on matters ranging from general cooperation on space research to a specific project or mission or, for example, reception of ERS-1 data.

For the purposes of this article we will concentrate on the general cooperation agreements, which can be divided into two main groups:

The first group consists of general cooperation agreements with third countries, or institutions. This kind of agreement sets out the mutual interest of the parties in the exchange of scientific information and data, and the exchange of researchers, and establishes the framework for developing other possible projects or programmes. Examples are the ESA agreements with Poland, Hungary¹³, Romania, Russia, and

Greece.

Typical clauses in these agreements provide for the exchange by each Party of scientific and technical information and literature published without restriction as to its use on scientific programmes and projects, as well as exchange of assets, including equipments, where appropriate. For specific projects, implementing arrangements are established to define the use of intellectual property rights over inventions, data and assets. In general the exchange of information and data must be in accordance with international law and the laws of the parties¹⁴.

The second group of agreements relate to specific projects, with one party permitting the other to participate in one or more (application) projects. This kind of agreement has been concluded with the European Commission for the Apollo project¹⁵, and with other international organisations.

Typical clauses here require the parties to make available to each other on a need to know basis and with due respect to any intellectual property rights, all technical data necessary for the execution of the agreement¹⁶, and the results of the experiments obtained by either party in the course of execution of the agreement to be made freely available to the other party, which will be entitled to use it for its own purposes and to communicate it to its Member States¹⁷.

Specific international projects normally include cooperation involving exchanges of proprietary data in order to study opportunities for joint development of a specific mission or cooperation on joint development of a specific payload or technique.

Here we have to make a distinction between the principles relating to the exchange of

technical information for the manufacture or use of an instrument and the clauses that relate to the information and data resulting from actual use of the instrument.

With respect to information on the instrument itself, all data should be exchanged. However, proprietary information must be kept confidential and cannot be used for any purposes other than those described in the Agreement. This proprietary information will be marked as such by the furnishing party.

With respect to data gathered by the instrument, we can distinguish two cases. In the first, the mission and data are to be considered purely scientific and the rules in Chapter III of the ESA Rules on Information and Data are applied, which implies the widest distribution of the results to the scientific community after having given prior access to the principal investigator. For other missions, sharing of data and ownership over jointly developed inventions are dealt with on a case-by-case basis depending on the object of the agreement and the investments of the parties.

IV. The Changing Environment for Technology Transfer

Since the entry into force of the North American Free Trade Agreement (NAFTA) and the signature of the Agreement on Trade-Related aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods (TRIPS Agreement), there have been important changes with regard to ownership itself and the effects of ownership of intellectual property rights. "In the post-Uruguay Round period, intellectual property rights protection is deemed to constitute an important component of an environment conducive to international transfer of technology, including FDI (Foreign Direct Investments). Further studies and technical assistance, in collaboration with the WTO and the WIPO,

may be needed in order to elucidate the relation between intellectual property rights and transfer of technology...."¹⁸.

This recommendation in the draft UNCTAD code of conduct indicates that with the improved protection of IP on a worldwide basis, developed countries will have better legal safeguards when transferring technologies to developing countries.

An important improvement in protection of IP has been made through the TRIPs as briefly described below¹⁹.

The Paris Convention for Protection of Industrial Property²⁰ gives no definition of patentable subject matter. Article 27(1) of the GATT Agreement does so as follows : "any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.."

The exemption allowed in Article 27 (2) in order to protect public order or morality, to protect human, animal or plant life or health or to avoid serious damage to the environment cannot be resorted to on the sole ground that exploitation of a given IP is prohibited by domestic laws.

The impact of this new, more harmonised environment for the protection of IPRs cannot be assessed at this stage, not least because the GATT Agreement has not yet been ratified by the major countries. However, one preliminary observation that may be made is that the TRIPs will certainly make it easier for developed countries to cooperate with or transfer technology to developing countries. The GATT Agreement provides for an International Dispute Settlement Body (DSB) and, with the establishment of a permanent World Trade Organisation (WTO), creates a far more stable legal environment for international trade.

V. ESA Increased Commitment to International Cooperation

At the ESA Council meeting at ministerial level in Munich, a resolution on the European long-term space plan and programmes was adopted on 20 November 1991²¹. This resolution reaffirmed the need to intensify international cooperation, taking into account the changing geopolitical context. At the next meeting held in Granada, this resolution was recalled and it was decided that more emphasis should be laid on international cooperation. The Granada Resolution adopted by the Ministers²² "invites the Director General to seek, together with those responsible for cooperation in the Member States concerned and with the appropriate international bodies, ways of making available to the developing countries, on mutually acceptable terms, appropriate data obtained through the Agency's programmes that can be of use to them, in accordance with the provisions of the Agency's Rules on information and data..". The Director General was invited to "prepare a report on the aforementioned cooperation with developing countries so as to enable Council to discuss the Agency's policy in that area"²³.

Currently, an ad hoc working group of ESA's International Relations Committee is studying the possibilities of extending the benefits of space applications to developing countries. The results will be discussed later this year by the Agency's delegations.

ESA cooperates with the United Nations, WMO, FAO, the European Union and other institutions in organising training and workshops and establishing ground infrastructure to access and use data derived from its space missions, especially ERS-1 data.

In general, the world community (UN) is paying closer attention to environmental, ecological and other issues, especially since

the Rio Conference, with new emphasis on the possible uses of space technologies to enhance information-gathering on a regular basis worldwide. However, there is a general lack of technical capabilities and data in the developing world, and this provides further incentive for increased efforts to stimulate transfers of technology by ESA, among others. However, ESA has until now had little involvement in the transfer of technology to developing countries and has not established any special provisions or policy on the subject. The consequence is that most of ESA's activities in the field of data can at best be described as ad hoc, without any specific policy for the longer term. This is not surprising, as ESA is not a development aid organisation and its top priority is cooperation with its Member States institutions and industries. It is therefore to be expected that in seeking to contribute to cooperation with developing countries, ESA will develop close relationships with organisations that are better suited to that kind of role.

ESA is currently establishing "exploratory contacts" with the European Commission to seek a basis for a framework agreement between the two international organisations which would make for improved coordination of their respective research and development programmes and policy for space-related activities²⁴. It therefore seems logical that international cooperation should be one of the subjects addressed in such a framework agreement.

VI. Conclusions

We have seen that international cooperation and technology transfer within the ESA framework is well established and that no legal flaws can be identified in the arrangements for technology transfers between the Member States. In cooperation with non-member States, ESA adopts a minimum technology transfer approach, only

transferring information and data necessary for carrying out a particular project. At the same time ESA concludes more general cooperation agreements which provide for general exchange of scientific and technical information, exchange of researchers and even exchange of personnel. Cooperation arrangements naturally differ from country to country and also reflects the political interests of the Member States. But the changes taking place in the international environment make it likely that ESA will extend its cooperation to more states including developing countries. It is clear that in that case the minimum technology transfer approach will have to be adapted as it makes no sense to cooperate on a quid pro quo basis with countries which do not have the minimum technology needed to derive benefit from ESA's space technology. The enhanced protection of IP through the TRIPs and a well defined policy on transfer of technology will then be beneficial to both ESA and its partners. The legal framework for such cooperation is still to be established and must reflect the outcome of the discussions among the ESA Member States on how to implement the political will expressed at the Granada conference.

ENDNOTES

1. See for example van Reeth & Madders, Reflections on the quest for international cooperation, in Space Policy, August 1992. The authors go even further and state that "...the reason why international space cooperation has acquired such topicality is that most spacefaring nations are facing severe domestic spending constraints, which reduce the freedom to conduct a wide range of science and technology programmes.
2. CEOS was established at the Economic Summit of the Group of Seven in Washington 1984.
3. Draft Code for Transfer of Technologies UN/TD/Code ToT/20 as quoted by J.H. Gaudin, Guide Pratique de L'ingénierie des Licences et de coopérations industrielles, p.3, Editions Litec, 1993.
4. These items were largely addressed during the workshop organised by ESA and ECSL the 5 and 6 December 1994, entitled "Intellectual property rights and space activities : a worldwide perspective".
5. Joseph Jehl " Le commerce international de la technologie; approche juridique" Librairies Techniques de Paris, 1985.
6. (ESA/C(89)95 rev.1)
7. Clauses 36 to 42 of the General Clauses and Conditions for ESA Contracts, ESA C/290 rev.5.
8. A.M. Balsano "Intellectual property rights and Space activities " ESA Bulletin n. 79.
9. ESA's only partner in the first thirty years of activities was the United States. See J. Arets, The Changes within ESA and Prospects for Increased International Cooperation with EC and CIS, in New Opportunities for Cooperation in European Space Activities, Proceedings of the Second ECSL/ Dutch NPOC Workshop, ESTEC, March 26, 1993.
10. Article II of the ESA Convention stated that the purpose of the Agency is "to provide for and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems". One of the means is : " a) by elaborating and implementing a long-term European space policy, by recommending space objectives to the Member States, and by concerting the

policies of the Member States with respect to other national and international organisations and institutions".

11. Article XIV (1) provides that "The Agency may....., cooperate with other international organisations and institutions and with Governments, organisations and institutions of non-member States, and conclude agreements with them to this effect".

12. These Cooperation Agreements can be found in the ESA LEG series administrated by the Legal Affairs Division.

13. Agreement between the European Space Agency and the Government of Hungary concerning cooperation in the field of the exploration and use of outer space for peaceful purposes, signed on 10.4.91, ESA/LEG 129. This cooperation is based on Article II of the Convention; Cooperation among European States.

14. Agreement with the USSR concerning cooperation in the field of the exploration and use of outer space for peaceful purposes, ESA/LEG/123, 18.5.1990.

15. ESA/LEG/77, 20.9.85 Agreement with the EEC on cooperation in the framework of the Apollo activities.

16. *idem*, Article 7 (1)

17. *idem*

18. United Nations Conference on Trade and Development (UNCTAD), March 1994, as quoted in *Les Nouvelles*, September 1994, p.162-164; Draft Final Report of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer Paragraph 27.

19. The description is partly based upon the analysis made by Christopher Kent, "NAFTA, TRIPs affect Intellectual Property Protection", in *Les Nouvelles*, December 1993.

20. This Convention was concluded on March 20, 1883 and revised at Stockholm on July 14, 1967, 828 U.N.T.S. 305

21. ESA/C-M/XCVII/Res. 1 (Final)

22. ESA/C-M/CIV/Res. 2 (Final), 10 November 1992

23. *idem*

24. See G. Lafferranderie & P.H. Tuinder, The role of ESA in the Evolution of Space Law, in *Journal of Space Law*, Vol. 22, No 1&2, 1994.