

RedOTRI Annual Report 2006

Spanish Network of University Knowledge Transfer Offices





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Índice

1. University Knowledge Transfer Offices (KTOs) within the Spanish system for innovation	4
1.1. Aims and objectives	4
1.2. The role of transfer of knowledge and technology	5
1.3. RedOTRI: Network of Spanish offices for the transfer of research results	6
1.4. University OTRIs in 2005	7
2. The RedOTRI network in 2005	11
2.1. Working Groups .	11
2.1.1. The Otri-Escuela working group	11
2.1.2. The Indicator working group	11
2.1.3. The working group on Management of European Projects .	11
2.2. RedOTRI Projects	11
2.2.1. UNIEMPRESIA	11
2.2.2. Red-Valor Project	12
2.3. The RedOTRI Training Plan.	13
2.4. International activities	13
2.5. Events	14
3. Knowledge and technology transfer results during 2005	14
3.1. The RedOTRI Annual Survey	14
3.2. R&D contracted activity with business and other entities	15
3.3. Protection of research results	17
3.4. Licences	19
3.5. New technology-based firms	21
4. Analysis of the role of knowledge transfer from an international scope	22
4.1. Knowledge transfer surveys in other countries	22
4.2. Main outcomes and Spanish position in relation to other countries	24

1.- University Knowledge Transfer Offices (KTOs) within the Spanish system for innovation

1.1. Aims and objectives

In 1988 the General Secretariat for the National Plan for R&D instigated the creation of offices for the transfer of research results (OTRIs) with the intention of strengthening the relationship between the worlds of science and business, thus providing the impulse that the National Plan for R&D required to integrate industry within the dynamics of innovation.

OTRIs were created with the intention of strengthening the relationship between the worlds science and business.

Within this context the OTRIs were entrusted with certain specific objectives:

- To set up a data base containing the knowledge, infrastructure and R&D that their universities could offer.
- To identify the results produced by research groups, assess their potential for promulgation and pass them on to the relevant companies, either directly or jointly with other entities involved at the interface between university and industry.
- To facilitate the transfer of these research results to companies and/or supervise whenever necessary the correct assimilation of outside technology.
- To help and participate in the negotiation of contracts for research, technical assistance, assessment, patents etc. between their research groups and industry.
- To manage R&D contracts in conjunction with the administrative services of their universities.
- To provide assessment on European R&D programmes, offering support in drafting and managing such projects.



Outcomes from university's KTOs in 2005

9,916 R&D Contracts
 339 M€ volume of R&D contracted
 336 national patent applications
 117 international patent applications (PCT)
 116 licence contracts
 88 new technology-based firms

1.2. The role of the transfer of knowledge and technology

The ever closer relationship between Spanish universities and their socio-economic environment includes various activities that have become known as the **university's third mission**, which complements the traditional academic roles of teaching and research, seeking new demands and asking for extra commitments towards this relationship.

The role of transfer covers all those activities aimed at facilitating the benefit from universities research results.

This third mission involves the transfer of knowledge and technology, an activity which is being progressively incorporated into the strategies set out by Spanish universities for the widening of their research and development policies.

OTRIs encourage this promulgation of research results in the following ways:

- 1 Contracts for research and technical support to exploit the scientific and technical skills of university researchers.
- 2 Joint R&D projects and sources of public funding related to obtaining marketable results.
- 3 Strategic alliances with other organisations directed towards the use of scientific skills and the results of university research.
- 4 The protection of research results via patents and other ways of protecting industrial and intellectual property rights belonging to universities.
- 5 Licences deriving from university patents and research results.
- 6 Creating and developing companies based upon knowledge generated by universities.
- 7 Positive acts to promote and relate university researchers with outside companies and other institutions.

In Spain the offices for the transfer of university knowledge and technology are known as OTRIs (Offices for the Transfer of Research Results). In this text all Spanish acronyms will remain faithful to OTRI (i.e. RedOTRI), whilst elsewhere the offices will be referred to as KTOs (Knowledge Transfer Offices).



Sixteen years after the creation of the OTRIs it has become clear that despite their heterogeneity in nature, size and function, their consolidation within the environment of each university has depended to a greater or lesser extent upon the following factors:

- The existence of an institutional framework to integrate the university's research and teaching aims with those of its third mission.
- The involvement of the universities' ruling bodies in the planning, management and follow up of knowledge transfer strategies.
- The joint co-ordination of the OTRIs with the universities' other structures for administration and support of research.
- The provision of both human and material resources to these structures together with operational budgets.

Since the 1990s the universities have also been putting into place another element essential to the generation of knowledge transference: physical space, which, when equipped with advanced infrastructure, allows R&D satellites to be sited around university research groups and centres. This is giving rise to the creation of science and/or technology parks. This new development, over and above the knowledge and technology usually managed by the OTRIs, is widening the scope of knowledge transfer and represents an opportunity for them to reshape their strategy within this new context.

1.3. RedOTRI: Network of Spanish Universities Offices for the Transfer of Research Results

Since their appearance in the innovation system, OTRIs have been conscious of the new demands for professional rigour and the increasing complexity of the instruments involved in the interaction and transfer of knowledge and technology. To all this has been added an increase in the demand for innovation, a reduction in the periods for the applicability of research results and a greater orientation of R&D towards the needs of the university's social and economic surroundings.

Within this context, taking advantage of the actions set in motion at the beginning of the 1990s from the network of offices for the transfer of research and offices for the transfer of technology promoted under the aegis of the National Plan for R&D, in 1997 the Network of Spanish University Offices for the Transfer of Research Results (RedOTRI Universidades) was created. The network was constituted within the CRUE (The Conference of Spanish University Rectors) and since 1999 has adopted the statute of the Permanent Working Group of the Sectorial Commission for R&D. The participation of the KTOs in this network derives from each university's belonging to the CRUE. All KTO staff is considered to be members of the RedOTRI.

The main aim of RedOTRI is to strengthen and promulgate the role of universities as essential elements within the national system for innovation.

The main aim of RedOTRI is to strengthen and promulgate the role of universities as essential elements within the national system for innovation, specifically by:



- strengthening the development of KTOs and encouraging the professional development of their staff;
- encouraging the smooth running of the KTO network via the development of means, actions and services of common interest;
- promoting the presence of universities in European programmes and activities;
- advising the Sectorial Commission for R&D on areas related to the co-ordination of university-company relations;
- contributing to the recognition of the university's capacity to contribute to socio-economic development and the process of industrial modernisation.

Nowadays, RedOTRI is constituted by 60 universities and 7 Public Research Organisations as associated members.

The structure of RedOTRI is that of an association with a Plenary of OTRI directors and managers, which forms the primary authority for representation and debate, and a Permanent Commission made up of seven members who run the work programme of the network for a period of five years. One of the members of this commission assumes the responsibility of network co-ordinator and is its highest institutional representative, and automatically a member of the executive committee of the sectorial commission for R&D and of the CRUE. Since May 2004 RedOTRI has had a supporting Technical Secretariat, which, housed as it is at the seat of the CRUE, acts as a central office and is the base for the recently formed KTO of the CRUE.

Nowadays the activities related to R&D contracted and their protection are completely consolidated in the Spanish knowledge transfer offices.

RedOTRI undertakes a work programme every year that includes both basic and specialised training activities, network events such as conferences and workshops, and working groups composed of professionals from the OTRIs which embark upon projects and initiatives of interest to the whole network.

RedOTRI in 2005

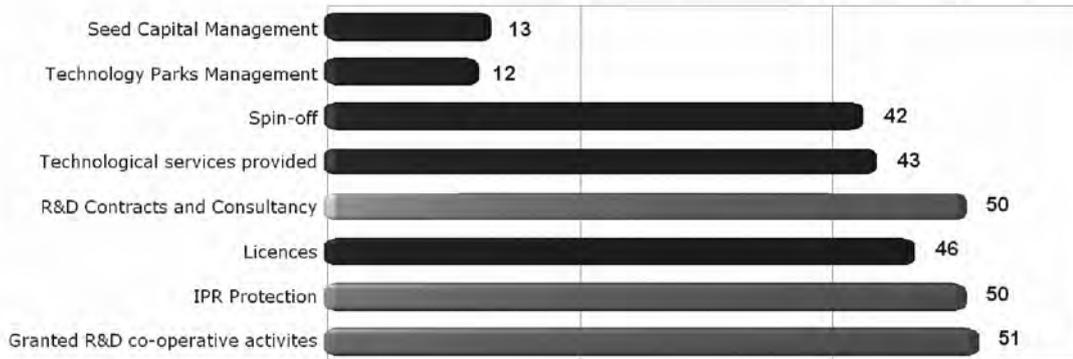
60 universities
434 professionals
7 Associated Public Research Organisations

1.4. University OTRIs in 2005

The 60 university transfer offices that constitute RedOTRI fulfil their role assuming different organised structures despite the variety of units and models that currently exist within each university.



Graph 1 - Activity fields of the Spanish KTOs
Number of offices for each activity field



Data provided by 52 out of 60 universities.
Source: RedOTRI 2005 Survey.

It may be fair to state that there has been a consolidation of the means by which the OTRIs have established their activities towards the encouragement of knowledge and technology transfer since their appearance in the Spanish system for innovation. Among those are R&D and consultancy contracts, IPR protection actions, especially national patents, and the management of public programmes designed to support R&D involving industry collaboration. As shown in **Graph 1**, from RedOTRI 2005 Survey data, these mentioned tasks are practically undertaken by all Spanish OTRIs.

Without any doubt, the work carried out in this area has enriched universities' approach to their industry environments, especially to those geographically closer as it can be seen in this report further on (OTRI clients section).

However, in the last years, assuming "research" as an essential mission entrusted to universities, in the OTRIs themselves have developed considerably towards a more proactive stance. This is based upon the exploitation of less-well-explored means of knowledge and technology transfer such as the setting up of new technology-based firms and licence contracts, which both require important consideration.

Assuming "research" as an essential mission entrusted to universities, in the OTRIs themselves there has been a considerable development towards a more proactive stance, based upon the exploitation of less-well-explored means of knowledge and technology transfer such as the setting up of new technology-based firms and licence contracts, the former acquiring an important consideration.

Moreover, a considerable number of offices carry out tasks belonging to the area which is called Research Services, i.e. those that included responsibility for the management of all types of public programme and offer help for R&D, and not only those involving collaboration with companies and other such entities.



To conclude, up to 12 offices declare involvement in the management of scientific parks in their universities in 2005, 4 more than the past year.

Human resources

According to the information provided by RedOTRI 2005 Survey the number of full-time staff in 2005 was 434 in comparison with 348 registered last year.

The staff-researcher ratio was one of 192 full-time researchers (teaching and research personnel) per staff member.

KTO funding

Graph 2 shows that slightly more than half the funding for running the OTRIs derives from the university itself (57% in 2005, rising 51% from 2004).

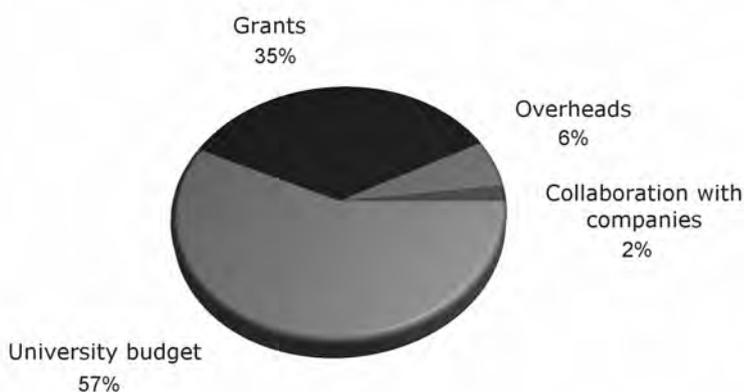
Other important sources of funding are public contributions which come from the central administrations and regional communities.

OTRI clients

As an interface between university and industry, the Spanish KTOs give support primary to “internal clients”. These are mainly composed of researchers that demands the professional services offered by OTRIs. According to the information registered in RedOTRI 2005 Survey, only 24,94% of total academic staff in the Spanish universities takes part in activities related to knowledge transfer, such as contracts with companies, owners of protected inventions, or promoters of technology-based firms.

In relation to the external clients, it is important to mention that the survey asks the number of this type of client. This datum can not be added since there are several companies and entities that are clients of several universities at the same time.

Graph 2 - Sources of KTO funding



Data provided by 48 out of 60 universities.
 Source: RedOTRI 2005 Survey.



Attending the legal status of the OTRI's clients, a characteristic feature is the predominance of the private sector, as it is shown in **Graph 3**.

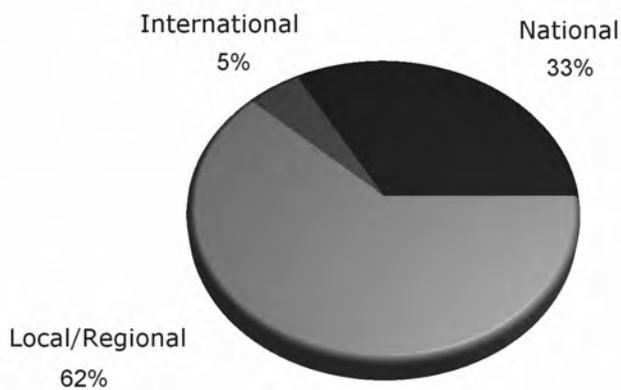
Graph 3 - Type of clients according to their legal status



Source: RedOTRI 2005 Survey.

Once geographical location of the private customers is analysed (see **Graph 4**) it is observed that there is a relevance of clients that come from the same region as the universities. This shows a close link between universities and their nearest business network. However, only 5% of private clients come from abroad.

Graph 4 - Geographical distribution of private clients



Source: RedOTRI 2005 Survey.



2. The RedOTRI network in 2005

2.1. Working Groups

2.1.1. The Otri-Escuela working group

The aim of this group is to provide an adequate response to the demand for specialised training within the network, thus contributing in a decisive way to the greater professional development of office staff in their R&D management and technology transfer tasks.

The main responsibility undertaken by OTRI-Escuela in 2005 is the planning, execution and evaluation of the **RedOTRI Training Plan**.

Furthermore, Otri-Escuela is continuously observing good practises related to training activities in order to adapt them to the Spanish KTO framework.

2.1.2. The Indicator working group

This group's objective is to identify indicators and conduct surveys to measure the level of transfer activity carried out by universities via their OTRIs. The intention of this initiative is to harmonise the various surveys carried out by different organisations at both nationally and internationally in the fields of R&D and innovation.

Within the framework of this working group it co-ordinates the design and content of the Encuesta RedOTRI -**RedOTRI Survey**-, which is included at European level in the *ProTon - Europe Annual Survey*. The information gathered is then used to prepare personalized reports for each of the members of RedOTRI indicating their principal activities.

In addition, this working group developed a report entitled "*Approach to the analysis of the universities environmental impact through the study of Spanish universities KTOs activities*", which was presented in the XI Seminar of Technology Management ALTEC 2005".

2.1.3. The working group on Management of European Projects

This working group aims to improve the support given by the Spanish KTOs to university researchers in a field of great strategic importance as is the Spanish participation in the European Framework Programme. Therefore, within this context, this working group aims to draw jointly upon the expertise of all the professional staff of the Spanish OTRIs to undertake actions to encourage an improvement in the financial management of projects, to promote a larger presence of university representatives in the many decision-making forums, and to foster the participation of SMEs in actions promoted by Spanish universities.

2.2. RedOTRI Projects

2.2.1. UNIEMPRESARIA

Uniempresaria was conceived as an initiative for the promotion of new technology-based firms (NTBFs) within Spanish universities. It was developed within RedOTRI and is a competitive program-



me, open to new applications each year. The project was approved in a plenary meeting of RedOTRI on October 5th 2004 upon the proposal of the Universidade de Santiago de Compostela, who instigated the initiative with three main objectives:

- To support the creation and consolidation of business ideas based upon the knowledge generated in universities, to foster business culture in researcher groups.
- To strengthen the leadership of universities in the management of academic spin-offs.
- To articulate, through OTRIs, systematic methods and common strategies for the management of academic spin-offs as a mean of facilitating the transfer of knowledge.

In its first phase Uniemprendia project was supported by the sponsorships of Grupo Santander, Ministry of Education and Science and The Centre for the Development of Industrial Technology (CDTI).

Some UNIEMPREDIA 2005 outcomes

41 universities and CSIC
66 registered business ideas
25 researchers received business training
7 enterprises were selected in the Venture Capital Forum organized by CDTI

2.2.2. Red-Valor Project

Red-Valor aims to set out a viability plan for the design of a process to assess, from a market point of view, the potential of university inventions.

This system, which will be established with the aid of experts from private enterprises, aims to be a main tool in the Spanish innovation system to increase efficiency in knowledge transfer. The added value of this project, pioneer within the Spanish scope, precisely lies in the implication of stakeholders from business scope and interface units from different environments to that of universities.

The project is coordinated by Universitat de València in collaboration with Universidad Politécnica de Valencia, Universidad Carlos III, Universitat Jaume I, Universidad Miguel Hernández de Elche, and with the aid of two business associations which are especially involved in innovation: the Federación Empresarial de la Industria Química Española (FEIQUE) [The Business Federation of the Spanish Chemical Industry] and the Asociación de Empresas de Electrónica, Tecnologías de la Información y Telecomunicaciones (AETIC) [The Association of Electronics, Information Technology and Telecommunications Industries].



2.3. The RedOTRI Training Plan

The courses that compose the Annual RedOTRI Training Plan are designed and organised according to methods defined by OTRI-Escuela working group, in collaboration with the universities that host the courses.

During 2005, the training actions of the II RedOTRI Training Plan were:

- **“Managing the University-Industry interface” (Barcelona, 13-15 March 2005).**
- **“Consolidation of business ideas, assessment and monitoring of university technology based promoters” (Santiago de Compostela, 21-22 April 2005).**
- **“Financial Management in the VI Framework Programme” (Vigo, 28-29 April 2005).**
- **“A training course for RedOTRI officers” (Zaragoza, 16-20, May 2005).**
- **“A training course in the introduction of patent management” (Castellón, 21-22 June 2005).**
- **“R&D and transfer contracts in the universities” (Torremolinos, 7-8 July 2005).**
- **“Development of directive skills and management team techniques” (Toledo, 20-21 October 2005).**
- **“Innovation agent skills” (26-28 October, 2005).**
- **“Financial and legal aspects of creating new technology-based firms in university environments” (Valladolid, 29-30 November 2005).**
- **“On-line training course in the creation of technology-based firms in universities” (December 2005 - February 2006).**

2.4. International RedOTRI activities

RedOTRI collaborates with the European network of technology transfer offices **ProTon-Europe**, actively taking part with a representative in the management board. According to the collaboration agreement signed between RedOTRI and ProTon, the following acts were carried out during 2005:

- Coordinate the design and content of the RedOTRI 2005 Survey with ProTon-Europe Annual Survey and adjustment of its management tool.
- Collaboration in the course entitled “Managing the University-Industry Interface”, organised by Fundació Bosch i Gimpera from Universitat de Barcelona, framed in the II RedOTRI Training Plan, and collaboration in the Proton Training School.
- Participation in the 3th ProTon Annual Conference entitled “Growing Innovative SMEs” that took part in Berlin (11-13 December 2005).

2.5. Events

Annual Conference RedOTRI 2005, Cartagena (Murcia), 15-17 June 2005.

Flagship event for the meeting of RedOTRI members, brought together more than 120 professionals from university KTOs and associated Public Research Bodies. Entitled "Compromiso con la Innovación" ("Commitment with Innovation"), provided the framework to analyse the new management models of cooperation and knowledge transfer. La Declaración de Cartagena (Cartagena Statement) was approved and addressed RedOTRI position in relation to new challenges that the Spanish universities have to face as innovation producer agents.

Moreover, RedOTRI has organised and promoted the following events during 2005:

- "4º Venture Capital Forum Neotec", Sevilla, 3 November 2005.
Organisers: CDTI, RedOTRI, Agency for Innovation and Development of Andalusia and EOI
- Business School.
- "Presentation of RedValori's results seminar", Leganés (Madrid), 21 February, 2005.
Organiser: Universidad Carlos III de Madrid.
- "Indirect costs in R&D projects seminar", Madrid, 27 April, 2005.
Organiser: RedOTRI. Host university: Universidad Rey Juan Carlos.
- "Audit in European research projects seminar", Toledo, 13 October, 2005.
Organisers: RedOTRI, Servicio Europa I+D and Universidad de Castilla-La Mancha.

3. Knowledge and technology transfer results during 2005

3.1. The RedOTRI Annual Survey

RedOTRI annually launches the ***Transfer of Knowledge and Technology RedOTRI Survey*** with the aim of obtaining first-hand information concerning the relationship between university and industry. After five years since the first edition RedOTRI Survey is nowadays the main source of information available in Spain concerning such matter and a key point of reference in the measurement of the running of knowledge and technology transfer in Spanish universities.

During 2005, RedOTRI has been working on the project promoted by ProTon Europe network, thus contributing to the creation of a Europe-wide means of obtaining valid referents for indicators as complex as those related to knowledge and technology transfer. A representative of the RedOTRI indicator working group has been member of the ProTon-Europe survey working group, being in charge of elaborating a common survey questionnaire to all countries within the European Union. In this context, the 2005 questionnaire is divided into the following seven sections:



- I. General information on the university
- II. General information on the KTO
- III. Management of the protection of intellectual property rights
- IV. Licences
- V. Article 83 contracts and co-operation with businesses
- VI. Creation of spin-offs and start-ups
- VIII. Client profiles

The RedOTRI 2005 Survey was answered by 55 of the 60 universities consulted.

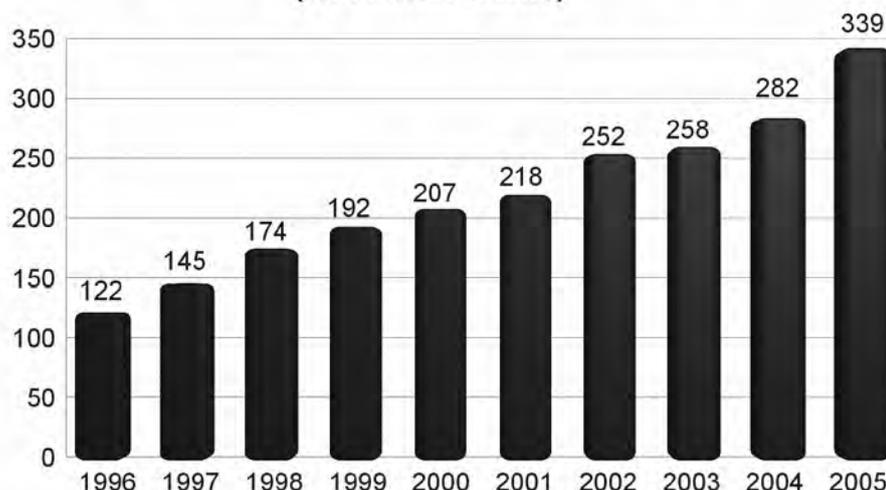
3.2. R&D contracted activity with businesses and other entities

The role that OTRIs play in fomenting relations between the university and other social and economic entities, especially industry, can best be seen in a series of processes which have traditionally been the basic domain of offices. These include all those R&D activities carried out under contract, consultation and technical servicing carried out up to date started and ensured solid ways of collaboration between university and industry.

the basic domain of offices. These include all those R&D activities carried out under contract, consultation and technical servicing such as the analysis of different types of assay, calibration, expert opinion and so on.

With the available data provided since the creation of RedOTRI, it can be seen that the turnover managed in these activities has been constantly increased as is shown in **Graph 5**.

Graph 5 - Evolution in the volume of R&D contracted *
(In Million Euros)



* R&D contracts, services and other activities contracted.
Data provided by 51 out of 60 universities.

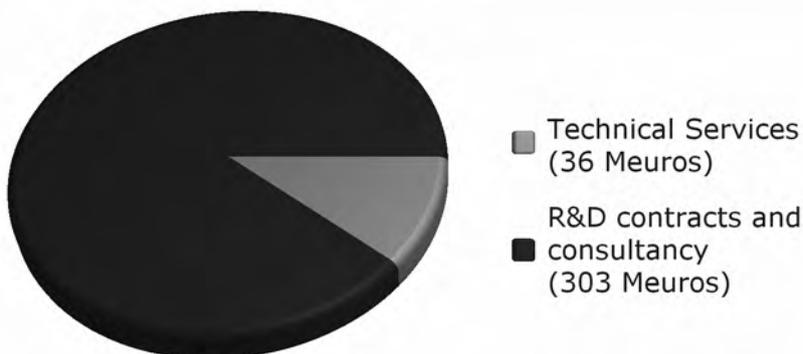
Source: RedOTRI 2005 Survey.



It is important to highlight that the data from 2005 reveal a growth of 20%, with respect to 2004 in real terms in the value of contracts entered into by Spanish universities. This confirms the constant growth of this indicator from 1996. After analysing these data, it can be concluded that this activity, which started and ensured solid ways of collaboration between university and industry, is consolidated.

It can be seen in **Graph 6** that the 339 million euros recorded are unevenly distributed between, on one hand, contracts for R&D and consultancy (the sum of activity contracted during that year) and, on the other, technical services afforded during the same period. The former accounts for 303 million euros, whilst the latter corresponds to 36 million euros of the services provided.

Graph 6 - Type of activity contracted

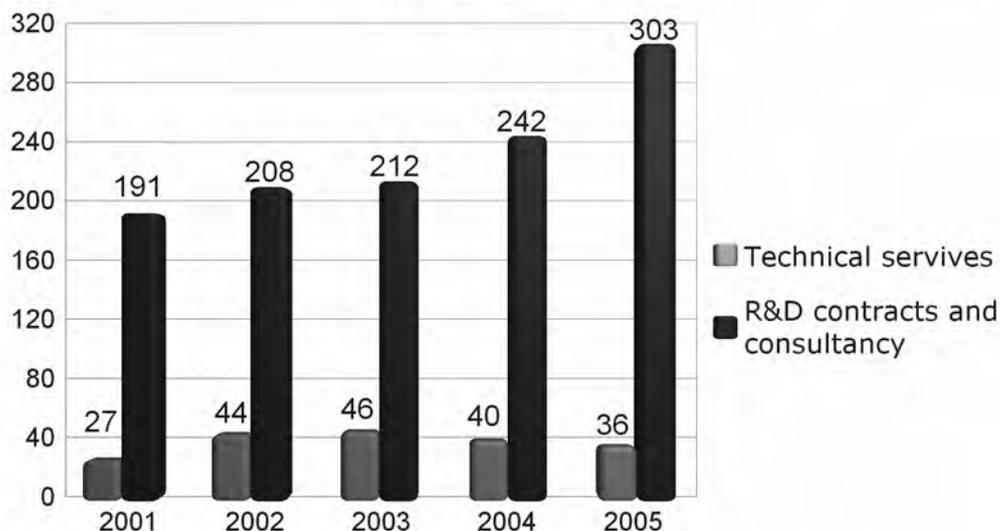


Source: RedOTRI 2005 Survey.

Therefore, while the R&D contracted increased by 25% with respect to 2004, the technical services provided decreased by 10%, giving continuity to a tendency detected during the last years (see **Graph 7**) that shows, in different ways, the Spanish universities as main knowledge suppliers.



Graph 7 - Volume contracted by companies and other entities
(In Million Euros)



Data provided by 51 out of 60 universities.
Source: RedOTRI 2005 Survey.

In 2005 the turnover managed in contracted activities increased to 339 million euros, 303 million euros correspond to contracts for R&D and consultancy whilst 36 million euros correspond to technical services.

This 303 million euros earned from contracted activities was generated by a total of 9,916 R&D and consultancy contracts entered into, which accounts for an average amount of 30,557 euros per contract. This is a considerably different sum from the average 3,854 euros earned for each service provided, the number of which was one of 9,342. These data reveal the secondary nature which the provision of services represents both for the OTRIs and the university R&D groups themselves, very often serving merely as a complement to the activity of research and development that links the clients to the universities.

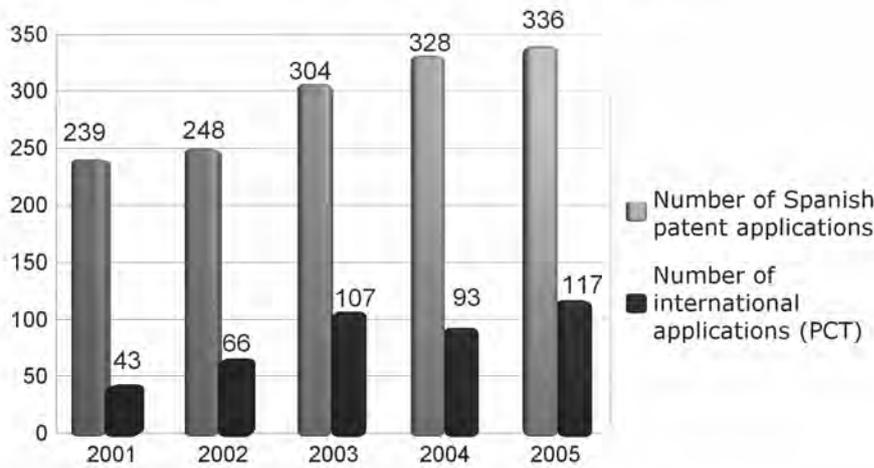
3.3. Protection of research results

In 2005 Spanish universities applied for 336 patents, this is 55% of the invention communications that researchers transferred to OTRIs.

The protection of scientific production is another of the roles that has been traditionally assigned to OTRIs. In 2005 Spanish universities applied for 336 patents, an increase of almost 2.5% on the previous year. As can be seen in **Graph 8** this is 55% of the invention communications that researchers transferred to OTRIs in 2005, which proves that protected results went previously through this filter



Graph 8 - Evolution in IPR protection

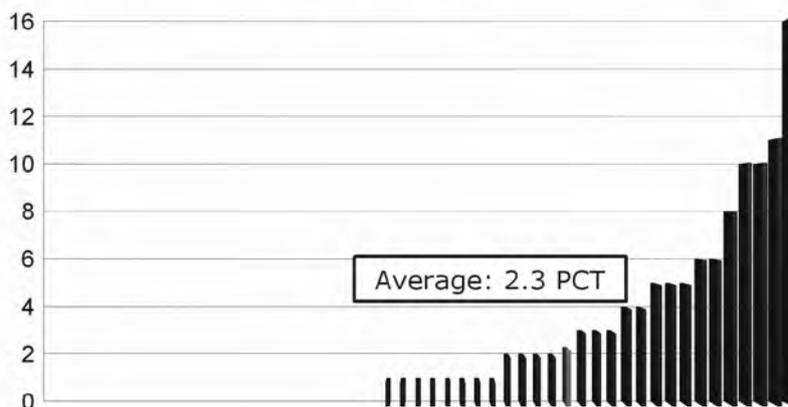


Data provided by 52 out of 60 universities.
 Source: RedOTRI 2005 Survey.

A similar trend is observed at international level. The number of applications at an international level was 117 during 2005, an increase of 26% and 9% on 2004 and 2003 respectively. It is important to mention that a total of 27 universities completed at least one of these 117 international applications. This points out clearly that, despite the effort inverted included protection expenses, protection of research results at international level is an activity field still to be strengthened in our universities. An example that support this statement is shown in **Graph 9** which shows that a small number of universities (10) reach at least 5 patents applied at international level in our country during 2005.

In 2005 the number of patent application at international level increased 26% on 2004, reaching the amount of 117 applications.

Graph 9 - University distribution of the number of international patent applications (PCT)



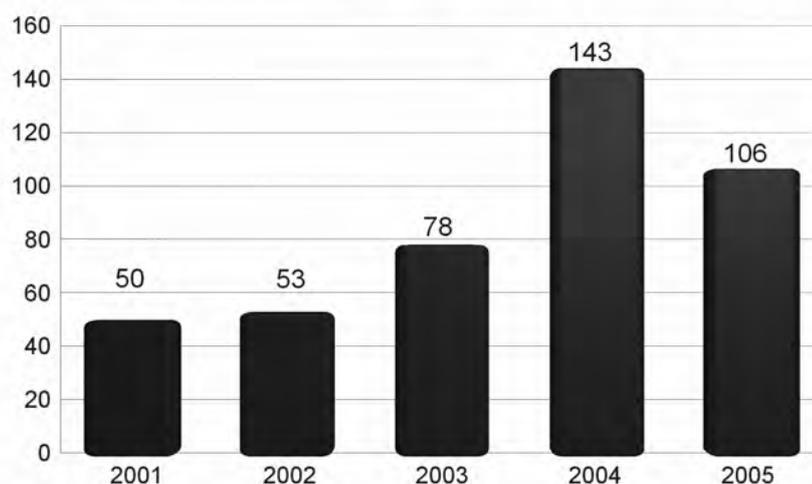
Data provided by 50 out of 60 universities.
 Source: RedOTRI 2005 Survey.



3.4. Licences

Based on the data from RedOTRI 2005 Survey, 106 licence contracts were signed during 2005, 25% less than in 2004, (year where an important increase in this indicator was observed), as is shown in **Graph 10**.

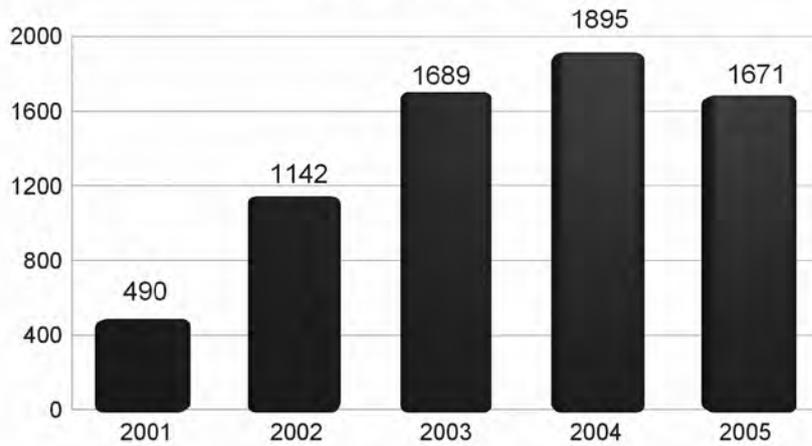
Graph 10 - Evolution of the number of licence contracts



Data provided by 48 out of 60 universities.
Source: RedOTRI Survey 2005.

Outside these fluctuations related to the number of licence contracts signed, it is interesting to observe that the growth in income generated by licences was not as predicted (see **Graph 11**). This points out that this transfer tool is not being developed to its maximum potential. Nevertheless, it is important to take into account that in many sectors, such as those related to life sciences, the income generated by licences takes several years to stabilise due to the long period needed for developing the innovations.

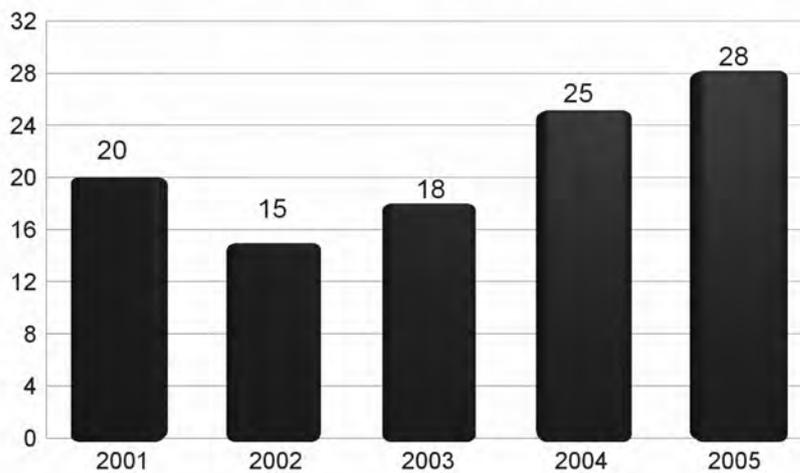
Graph 11 - Evolution of royalties from licences
(Millards Euros)



Data provided by 41 out of 60 universities.
Source: RedOTRI 2004 and 2005 Surveys.

A positive observation from this chapter is the fact that the number of universities that use licence contract to transfer knowledge is increasing year after year. In 2005, a total of 28 universities signed at least one licence contract, following a growing tendency since 2002, shown in **Graph 12**.

Graph 12 - Evolution in the number of universities that have signed licence contracts



Source: RedOTRI 2005 Survey.



However, it can be concluded that it is necessary to draw a higher attention to all aspects related to exploitation of university property rights and their transfer in order to take advantage of the real opportunities that the university research potential is able to generate.

The volume of income generated by licences has not reached a significant level yet.

3.5. New technology-based firms

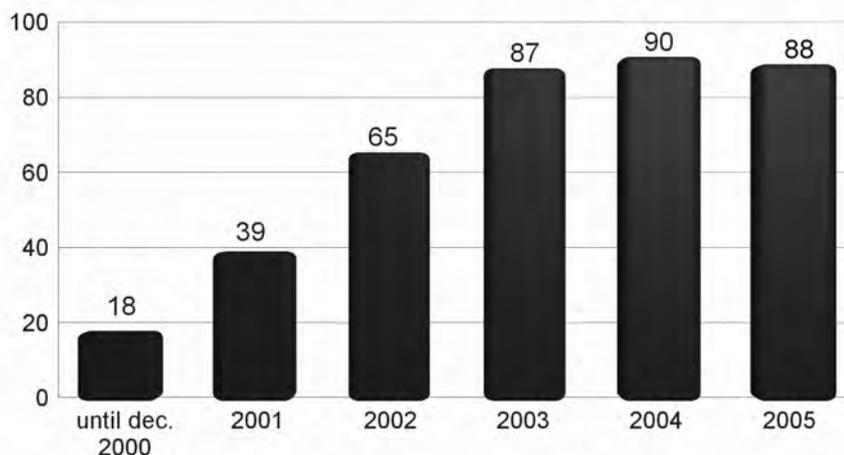
The setting up of new technology-based firms (NTBFs) is a fairly recent concept within the university environment in Spain and is still in a phase of development. However many initiatives have been launched from different views, but always considering the university as a starting or ending point.

The Spanish support to setting up of NTBF is a constant progressive activity with a promising projection. A total of 28 Spanish universities created at least one spin-off during 2005.

Firm incubators, business angels programmes, investor forums, venture capital funds or seed capital, all aim to support spin-offs that are created with the intention of exploiting knowledge generated in the university.

According to RedOTRI 2005 Survey, 88 companies were created based on the university knowledge in 2005. This result is consequent with last year's tendency, as it is shown in **Graph 13**. Overall this means a kind of consolidation of this activity in the university environment in this country.

Graph 13 - Evolution of number of spin-off created in the university environment

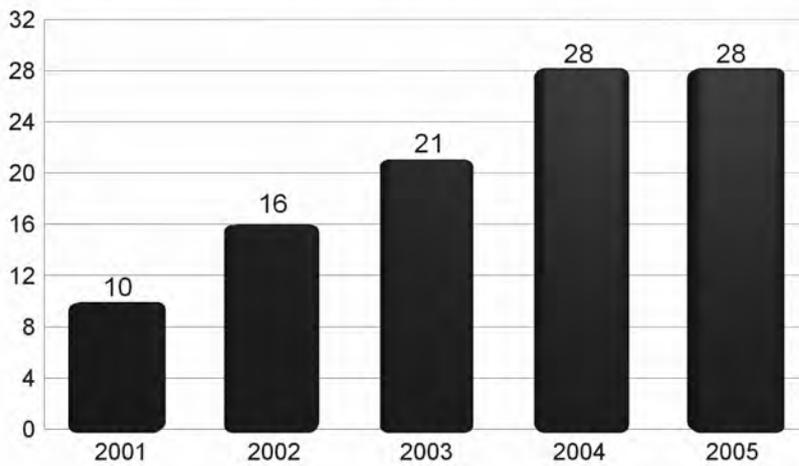


Data provided by 51 out of 60 universities.
Source: RedOTRI 2005 Survey.



A total of 83 researchers, from universities where spin-offs were created, were inserted into the business sector during 2005. Moreover, the number of Spanish universities that created at least one NTBF is another datum that supports the good evolution in this activity. **Graph 14** shows that 28 universities created at least one spin-off in 2004 and in 2005.

Graph 14 - Evolution of the number of spin-offs created in the university environment



Source: RedOTRI 2005 Survey.

4. Analysis of the role of knowledge transfer from an international scope

4.1. Knowledge transfer survey in other countries

Apart from innovation surveys carried out by the national statistic offices, which provide very basic data concerning university-industry relationships, most of the information in this field is obtained from units involved in their management.



It is important to highlight that the wide complexity of the different management models that at present run out in many countries (for instance, units that supply services to more than one university, and in the opposite way, universities where there are several units that manage transfer issues) forces us to consider this analysis as an approximation to the reality rather than a precise image of itself.

Some of the main experiences at an international level within the scope of the survey which have been used to measure the knowledge transfer activity and the relationship between university and industry are the following:

AUTM Licensing Survey

Without any doubt AUTM Licensing Survey is the first reference concerning knowledge transfer surveys. It is led by the Association of University Technology Managers – AUTM –, located in the United States and Canada, with branches in other countries. AUTM members are mainly licence offices from the best north-American universities, a fact reflected in the survey.

The Licensing Survey was first launched 15 years ago, and it has been increasingly improved. It was at the beginning of the previous decade when this survey started to reflect the north-American universities contribution to the innovation and generation of economic wealth.

United Kingdom: HEFC and UNICO

Since 2000, the Higher Education Funding Council of England, -HEFCE-, has launched a survey (Higher Education-business and Community Interaction) that all university's third mission includes. In this case, the data are obtained from the university institutions and not from the transfer units. The data form the basis to calculate the direct funding that British universities receive due to their relations with their socio-economic environment. This is also used to partially cover the expenses generated by the different units related to knowledge transfer.

In addition, the University Companies Association - UNICO - composed by technology transfer entities linked to British universities (with a specialized profile in patent exploitation and new technology based firms) has also run a technology transfer survey during the last two years with the support of the University Nottingham Business School. Its scope is more limited than the HEFCE survey since it follows the north-American Licensing Survey model.

France: BETA study

In France, the Beta study is the result of the collaboration between the Ministry of Higher Education, la Conférence des Présidents d'Université and the association Réseau CURIE, that concerns university KTOs. The implementation of the study has been carried out by Bureau d'Economie Théorique et Appliquée -BETA- from Université Louis Pasteur from Strasburg, which has a long experience of the university-industry relationship.



Italy: NetVal Survey

The Italian network office for the transfer of research results, NetVal, in collaboration with Conferenza dei Rettori delle Università Italiane - CRUI -, has been responsible for collecting the information concerning knowledge transfer to industry amongst their members for the past three years. Academics and researchers involved in the innovator phenomenon are also responsible for the development of the surveys and the analysis of the collected data, as has also occurred in the previous mentioned cases. In Italy this task is entrusted to Scuola Superiore Sant'Anna de Pisa.

Proton-Europe Annual Survey

From a continental European level, the European network of Technology Transfer Offices from universities and other public research organisations - ProTon-Europe - proposed, from its creation in 2002 and in the frame of a European project which supported the creation of the network, to carry out a survey of its members that will reflect the knowledge transfer function of the universities and public research organisations. It will also help to generate interchange processes and training among the offices.

With this proposal, a Survey Group was constituted with representatives from several national networks which coordinated by Instituto de Gestión de la Innovación y el Conocimiento UPV-CSIC from Universidad Politécnica de Valencia, worked on its first pilot survey in 2004. In 2005, after important adjustments in the context, ProTon in collaboration with national networks and with a special contribution from RedOTRI, launched a new annual knowledge transfer survey, the Proton-Europe Annual Survey.

ASTP survey

Similarly, in 2006 the Association of European Science & Technology Transfer Professionals - ASTP -, launched a knowledge transfer survey of its members with the collaboration of Maastricht Economic and social Research and training centre on Innovation and Technology (MERIT) from Maastricht University.

4.2. Main outcomes and Spanish position in relation to other countries

Although the surveys mentioned in the previous sections can not be considered completely homogeneous, it is interesting to venture to analyse some of the conclusions from the results collected during the last campaigns.

Table 1 shows values from different average indicators obtained from these surveys. These average values are referred to by the number of answers given to each question. In most of the cases this is lower than the number of entities who responded to the survey since not all the questions are always responded by them. Nevertheless, the size of the institutions from the countries that answered the surveys is not excessively different from one another.

In Spain, the main knowledge transfer activity is centralised on R&D contracts while IPR activities is relatively poor.



It is equally important to highlight that, due to the wide institutional diversity within each country, KTOs assume different number of functions. For example, there are countries whose main KTO's activity are R&D contracts with industry whereas other transfer offices are more focus in licensing patents or creating spin-offs.

Table 1: Several knowledge-transfer average data from national and transnational networks

Network/ Association (Country/region) N° of answers	RedOTRI (Spain) 55	CURIE (France) 74	UNICO (UK) 103	NETVAL (Italy) 47	ProTon (UE) 172	ASTP (UE) 101	AUTM (EEUU) 194
Survey period	2005	2000/04	2003/04	2004	2004	2005	2004
Invention, Communications	10.5	--	27.9	6.1	30.4	41.1	86.5
Patent Applications	6.5	4.3	8.6	3.8	12.5	17.2	54.8
Granted Patents	4.4	ND	5.5	--	--	4.7	19.2
R&D Contracts Income	6.1M€	2.6M€	--	0.6M€	3.8 M€	--	--
Licence Income	40.1k€	200k€	563k€	92k€	400K€	3.5 M\$	7.1M\$
EBT	1.4	1.9	2.2	3.1	2.7	2.6	2.4

Sources:

RedOTRI 2005 Survey.

Les activités de valorisation dans les établissements universitaires français – Enquête 2005.

UNICO Annual Survey Financial Year 2003.

Terza Indagine Annuale, Network per la Valorizzazione della Ricerca Universitaria, anno 2004.

Proton-Europe Annual Survey 2005.

The 2006 ASTP Survey - Summary Report.

AUTM U.S. Licensing Survey: FY 2004.

The following conclusions concerning Spain's relative position in an international context can be drawn from the data shown in **Table 1**:

- In Spain, the main knowledge transfer activity is centralised on R&D contracts. The income due to this concept is significantly higher than the incomes shown by the rest of surveys, both national and transnational. This result can be explained not only due to minor activity in this field but also due to the fact that the contracted R&D could be managed by other units, or even can be even decentralised in their own research units depending on the case.

- On the contrary, knowledge transfer based on industrial and intellectual property rights is relatively poor and only being overcome by the Italian network in terms of income generated from licences.

The low absorption capacity of technology by enterprises and the current incentive system are the Spanish key weaknesses to transfer knowledge via the exploitation of patents.

This observation has a natural explanation: patents emerge after generating knowledge. Indeed, Spanish universities have started to research massively since the National Plan for R&D was set in motion at the beginning of the 1990s. However, due to the low scientific level of the

Spanish enterprises it was perfectly feasible to first undertake development and contracted research afterwards.

- Therefore, substantial progress is expected in Spain, especially in the field of property rights and exploitation, provided that a high research quality of Spanish patents is assured.

Moreover, the transfer growth via patents is very much determined by the characteristics of the innovation system where it is framed. It is exactly in this point where Spain presents some key weaknesses, such as the low absorption capacity of technology by companies and the current incentive system, which is orientated to consultant activities and R&D projects.

- Concerning the creation of new technology based firms, Spain is remarkably behind in respect to not only the most advanced systems like the US, but also in respect to nearby European countries like Italian, France or the UK. Spanish R&D professionals have to face huge legal and cultural barriers that imply an additional difficulty in the creation of these types of companies.

The legal and cultural barriers that R&D Spanish professionals have to face are the main difficulties for the development of entrepreneurship in Spain.



