

The ProTon Europe 2005 Annual Survey report

Report Draft
April 2007

Executive Summary

The second ProTon Europe Annual Survey (PAS) for the year 2005 captures the profile and level of knowledge transfer (KT) activities carried out by the dedicated Knowledge Transfer Offices (KTO) affiliated to European Public Research Organisations (PRO). The scope of KT in Europe is wider than that described by traditional "technology transfer" (TT). Its form varies across countries and is highly influenced by the different national legal and institutional frameworks. The PAS was constructed with the cooperation and agreement of the European national KTO associations and in some cases national governments. The effort required a consensus on a basic and common questionnaire and collaboration and coordination in terms of the data collection process, which was facilitated by a software tool created by ProTon Europe for this purpose.

Information on KT was collected from 392 European KTOs providing services to 421 PROs across 17 European countries. Although the respondents are not equivalent in their representation, they cover most of the universities in some of the biggest countries in Europe, including France, the UK, Italy and Spain.

The PAS 2005 results show that a consolidated PRO KT process is underway in many European countries. With the exception of those in the UK and Spain, most KTOs were established less than 10 years ago. They engage in a wide range of KT activities from contract and collaborative research to licensing and spin-off creation.

Table 1 displays some basic data from the PAS 2005. The KT output indicators related to the patent protection process (invention disclosures, patent filing, licensing) for European KTOs show poor performance compared to figures for the US based on the AUTM licensing survey.¹ The weakness of the European patent system is the main reason for this underperformance compared to the US.

However, there is a tradition in Europe of business partnering with industry in R&D, demonstrated by 20 years of research and development (R&D) Framework Programmes (FP), and this is the main KT activity in Europe (23% of the KT activity reported by survey respondents) and receives significant support from government at all levels. Contract and collaborative research, consultancy and technical services are

¹www.autm.net

among the means used by European PROs to pump knowledge into industry.

Table 1. PAS 2005 fact-sheet

Overall Figures	FY2004		FY2005		US-AUTM
	Absolute	Absolute	Per KTO	Per M€	Absolute
Survey respondents (#)	172	392			228
Number of PRO served	246	421			228
Invention disclosures (#)	3016	4570	14.8	0.9	27,382
Priority patent applications (#)	1367	2310	6.6	0.3	10,272
Options and licences (#)	680	731	2.8	0.1	4,932
Licence Income (M€)	70	94	0.3	0.04	1,229
Collaborative and contrac. R&D (#)	13,813	63,018	236	42.5	n.a.
Collaborative and contrac. R&D (M€)	734	2,884	10.1	0.2	2,961*
# Spin-off	176	434	1.3	0.1	628
KTO professional staff	7.7	6.07	6.07	0.43	3.7
KTO budget (k€)	612.1	333.3	333.3	0.021	
KTO age (years)	10	8.6			

*Not managed by US-AUTM technology transfer offices

The creation of knowledge based companies in Europe, based on PROs' research results is also a major KTO activity, whose outputs are catching up with the US; However, it is company growth and persistence in the market rather than formal setup that contributes to the success of spinoffs. The PAS does not ask for information on these aspects, but all the indices point to them being one of the main weakness in European spin-off activity.

a deeper level of completeness and reliability to enable more in depth analyses based on its results. As is generally the case with surveys addressing new and changing environments the PAS requires more time to reach cruising speed.

The PAS is designed to become the main source of information on European PROs' KT activity. As it represents a bottom up approach, and involves a variety of different stakeholders in the process, it will be necessary to achieve

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Gate2Growth initiative. This deliverable is the responsibility of the Universidad Politecnica de Valencia (UPV). The members of the survey team are Fernando Conesa from the Technology Transfer Centre of UPV, and Elena Castro and Maria Elena Zárate from the Institute of Innovation and Knowledge Management (INGENIO, CSIC-UPV). The authors want to thank members of the ProTon Europe Survey Committee and Secretariat for their contribution.

I. Introduction

The link between industry and public research has frequently been identified as one of the most important issues for the development of the innovation potential in countries and/or regions. It has been analysed in many research, professional and policy papers. However, sources of data for such analyses are limited, particularly at the European level.² There is a lack of consistent, comprehensive and continuous information on the knowledge and financial flows between PROs and the business sector. It is difficult to obtain these data directly from firms and universities and other public research institutions since knowledge transfer activities are not accounted for at the level required for analysis. In many cases, conclusions are based on rather generalised data, case studies or a few interviews and expert opinions.

The work programmes of the ProTon Europe project, funded by the European Commission's Innovation Programme (FP5), includes the creation and implementation of an annual KT

survey which would be addressed to network members, that is, to the KTOs. These KTOs, which are a relatively recent development for most PROs, are the most appropriate entities to track knowledge links between academics and the business sector, even though some do not come within the PRO structure. In striving to make ProTon a representative network of KTOs, it is hoped that the PAS will provide an accurate picture of KT from public research in Europe.

The objectives of the PAS are twofold. On the one hand it aims to elicit information on the KT situation in European PROs, to provide a basis for more appropriate policies. On the other hand, it aims at self assessment and benchmarking exercises among ProTon Europe members.

The definition and collection of European wide annual data on KT activity is a major challenge. This challenge is related first to the heterogeneity of legal and institutional frameworks across Europe. For example, in some countries it is individual academics who can apply for patents, while in others this is the responsibility of the institution. In some countries academics' mobility to industry is

² Nacional reports:

Spain: http://www.redotriuniversidades.net/index.php?option=com_docman&task=cat_view&gid=18&Itemid=33

UK: http://www.hefce.ac.uk/pubs/hefce/2006/06_25/

Denmark:

http://www.techtrans.dk/viewPage.action?site=da_Forskere&page=patentans

France:

<http://www.cpu.fr/Publications/Publication.asp?Id=453>

handicapped by rigid employment conditions, while in others it is relatively easy to shift between the university and the business sectors. In some countries, the low knowledge absorption capacity of companies leads to relationships based on consultancy and technical support services. These and other conditions mean that KT from public research works differs across Europe. Building a survey that takes into account these situations requires dialogue and consensus between those who are knowledgeable of each country's reality. It also requires time, and iteration and fine tuning over a number of years.

Secondly, the existence of KT professionals in the public research sector is a recent and still scarce phenomenon in most European countries. Their professional backgrounds are still being created. Also key KT concepts have not yet been consolidated due to the ambiguous and conflictive character of the university third mission activities (Molas-Gallart et al., 2006).³ For example, in some countries "collaborative research" is either not differentiated or just included under the "contracted R&D"

category of activities. Some professionals apply the term "spin-off" to any campus company, while others use it to refer to only those companies that are based on PRO intellectual property rights (IPR). So, the collection of KT information is handicapped by different interpretations of the concepts, and there is a need for a clear definition of the terms and a good "translation" and communication of these concepts.

The third challenge for a pan-European KT survey is related to the response rate. Although it is assumed that KT offices are the best possible targets for such a survey and that contact addresses are available, there is no guarantee that the offices will respond. KTOs are often overwhelmed by the number of surveys they receive asking for information that is not easy to retrieve from archives and databases. Therefore, it is essential for them to trust on the surveyors administrators and benefit from accompanying incentives and a relatively straightforward questionnaire.

The strategy adopted by the PAS to overcome these problems has been to collaborate with the national KTO networks, not only in defining the survey, but also in the process of surveying and governance. Thus, a survey committee was established with members

³ Molas-Galart, J; Castro-Martínez, E (2006): Ambiguity and conflict in the development of "third mission" indicators. 9th International Conference on Science and Technology Indicators. September, 7-9. Leuven, Belgium.

representing the national networks. This committee discussed and agreed on a basic common set of survey questions. Additional questions addressing national interests could be included at national level. A coordinated scheme to manage the survey process at the national level was established, which included compilation and integration of survey responses into a single database.

The PAS has been implemented as a web tool that provides a benchmarking service, which allows respondent to see how they are positioned in relation to other respondents, thus providing a direct incentive to respond to the survey questionnaire.

Below we describe the steps involved in administering the PAS 2005 and the results obtained.

II. The Survey Questionnaire

The PAS 2005 questionnaire is the result of discussions and a concertation process involving several national networks within the ProTon Survey Group. It is based on two previous questionnaires produced by this Group and administered in the 2003 and 2004 ProTon surveys. Thus, there has been a genuine effort made to take account of the situations, interests and views of the various countries involved, while, at the same time, enabling comparisons with the KT activities of other continents, and particularly the US, where the AUTM licensing survey has been running for more than a decade. The complexities of the PAS include:

- The diversity in the institutional KTO setup, with some KTOs serving several PROs and other, sometimes specialised KTOs, dedicated to the same PRO.

- The diversity in KT routes, not only focused on patent licensing and spin-off companies, but also involving contract research, consultancy and public-private research partnerships.
- The absence of a single European patent and law system and variations across Europe in the patent framework.

These complexities resulted in a questionnaire for 2005 (see Annex 1), comprising 107 questions, which capture the actual KT situation within PROs in Europe. This is a shorter questionnaire than some previous ones and it is hoped that the Survey FY2006 can be made even shorter.

The second aspect of the Survey concertation was related to coordination between the ProTon

Europe association and the national networks. Some national networks such as RedOTRI (Spain) had been running KT surveys for a few years before the PAS was introduced. In some countries the national networks were interested in surveying their members directly or agreeing to a KT survey with their national authorities. The coordination action implemented by the ProTon Europe Survey Group was the agreement on a common core of questions included in the national surveys, and the facility for national networks to add further questions of specific national interest. It was also agreed that any national network interested in running the survey directly would be welcome to do so and to later provide results to ProTon Europe.

To facilitate this coordination, ProTon Europe implemented a software web tool with functionalities that enabled national surveys to be coordinated with PAS and to import and compile the results from other national surveys.

The questionnaire is structured as follows:

III. The Survey Campaign

As referred to above, ProTon Europe managed the collection of responses to PAS 2005 compiling the responses

1. General KTO setup information. Relationship between KTO and PRO.
2. PRO profile and information.
3. KTO profile and information.
4. IPR protection.
5. Licensing activity.
6. Interaction with Industry (contracted and collaborative research, consultancy, etc.).
7. Support for spin-offs and start-ups.
8. KTO client profiles.

The questionnaire is primarily oriented towards the objectives of ProTon Europe, that is, the monitoring of the KT infrastructure, activity and performance and comparison between KTO members. Different levels of analysis are envisaged. First, the PRO institutional level is tackled by analysing the KT outputs reported by KTOs . It is assumed that KTO reporting can be considered as a proxy of what happens at PRO level, since 90% of KTOs exclusively serve one PRO). Secondly, the analysis is related to the PRO research base and takes account of R&D staff and R&D expenditure. It should be pointed out that many respondents experienced difficulty in answering the questions within these categories. Finally, KTO size is considered, since this is an important aspect for KTO structure design.

collected by national networks that ran the survey and also directly surveying members not included in these national

networks. The national networks that collaborated by directly administering the survey include NetVal in Italy, RedOTRI in Spain and Reseau CURIE in France. Their cooperation widened the respondent target to include all their national network members. NetVal and RedOTRI coordinated their survey campaigns with ProTon Europe and delivered the responses collected to ProTon Europe for compilation. Reseau CURIE did not conduct their survey until the autumn and information was not available until the beginning of the following year; thus, in this case the responses correspond to the previous survey (2004).

The survey run directly by ProTon Europe was implemented using a survey tool. The survey process was initiated at the beginning of June 2006 by sending those ProTon Europe members not included in the surveys run by the national networks, an e-mail containing a KTO-specific link to the PAS web page. The questionnaire was displayed through several screens or sections and the responses were checked and saved before the respondent navigated to another survey screen. The survey could be completed in several sessions and by several different people, if desired. On completion of all the sections a "submit" command validated the consistency of the

responses, thus ensuring quality as far as possible.

Although the first closing date was set at July 31st, this deadline was extended to September 30th in order to accommodate the effects of the summer holiday periods across Europe. Up to three reminders were sent by mail, and ProTon Europe Newsletter. Survey Group members also addressed national network members to encourage them to respond.

During the survey campaign two national networks (the Danish TechTrans network and AURIL from UK & Ireland) signed Partnership Agreements with ProTon Europe. In the Danish case this enabled access to their last national KT survey results (FY2004). In the UK case, by involving Higher Education Funding Council for England (HEFCE) representatives in the ProTon Survey Group, access was gained to the last HEFCE-BEI survey results (FY2003-04). Although in both of these two cases the national questionnaires did not contain all the ProTon Europe questions, the Survey Group decided to compile the responses in order to achieve better European-wide representativeness of the survey results.

The "import" functionality implemented within the survey tool developed by

ProTon Europe made it easy to upload the information from national surveys onto the ProTon Europe Survey Database, which is the basis for the analysis of results described below. This database runs behind the survey tool and was designed to host, in a relational way, the results from different surveys, for different years and different KTO networks. Thus, this database represents a unique source of European-wide KT information, and will undergo refinements to enable future analyses.

IV. Survey Results

1. Response rate

The PAS FY2005 collected responses from 392 KTOs from a total of 505 initially targeted by ProTon Europe and the national partner networks. The number of PROs served by the surveyed KTOs is 421 (in some cases, particularly Germany, there are KTOs that serve several universities in the same region). Although there is not precise information on the total number of KTOs in Europe, it is believed that the number of respondents accounts for more than half of European KTOs working with universities and other public

The ProTon Survey and Self Assessment Tool:

Recognising the benefits of having its own survey system, ProTon Europe developed a web tool to run multinational and multiadministration surveys. It allows for questionnaires to be constructed in different languages and sent to respondents via a specific e-mail service. It manages the data from different national surveys, which are linked to the common PAS core. It also facilitates the definition and calculation of indicators and generation of general or individual reports.

laboratories. The response rate per country was uneven (Table 2), depending on the involvement of national networks in encouraging their members to respond. In some countries, such as the United Kingdom, Spain, Italy, Denmark and France, more than 90% of university KTOs participated. In some cases (UK, Denmark, France) the data correspond to FY2004 (academic year 2003-04 in the case of UK), which was the last survey available when responses were being compiled (October 2006).

Table 2. Response rate by Country

Country		KTO Target	Total valid Responses	%	PROs
United Kingdom	UK	150	146	37.2	146
France	FR	79	73	18.6	73
Spain	SP	64	57	14.5	57
Italy	IT	64	52	13.2	53
Denmark	DK	22	22	5.6	22
Germany	DE	27	8	2	34
Greece	EL	14	7	1.7	7
Portugal	PT	15	7	1.7	8
Austria	AU	7	5	1.2	5
Belgium	BE	14	4	1	4
Poland	PL	11	4	1	5
Finland	FIN	14	2	0.5	2
Czech Republic	CZ	5	1	0.2	1
Estonia	EE	5	1	0.2	1
Hungary	HU	7	1	0.2	1
Netherlands	NL	5	1	0.2	1
Norway	NO	2	1	0.2	2
TOTAL		505	392	100	421

The number of responses to the third version of PAS doubled compared to the previous year. Likewise, the target of surveyed KTOs increased by over 30%. One reason for this increase is that more national KTO networks became partners of ProTon Europe during 2006, which provided access to their survey results. This demonstrates that the process of building a pan-European KT survey requires cooperation from key national actors. The response rate does not mean that all the questions are

answered by respondents. In some cases certain questions do not apply; in other cases, KTOs may not have the precise information being requested. This is related to the fact that the survey is lengthy, but also reflects the fact that KT activity is heterogeneous across Europe and that there is no common reporting practice. The number of valid answers is depicted in the tables and figures below. In Table 3 we present how level of response have been developed from previous years.

Table 3. Evolution of Survey Response

Surveyed year	Target	Total valid respondents	Remarks
2003	285	92	Pilot survey
2004	383	172	ProTon Europe + RedOTRI + NetVal
2005	505	392	ProTon Europe + RedOTRI + NetVal + CURIE (2004) + AURIL-HEFCE(2004) + DK-TT (2004)

2. Main features of the PROs served by the surveyed KTOs

Most of the PROs served by the KTOs that were surveyed are universities (93%), mainly non-specialist institutions profile (Fig. 1). The size of the research base served by the KTOs surveyed is close to 300,000 FTE academics plus researchers, which represents around 70% of the 430,000 FTE HE research force in Europe.⁴ Two features stand out in relation to universities as bases for KT. One relates to the fact that only half of the academic and research staff are linked to the exact and engineering sciences, which use to be the basis for classical KT. Thus, there is an important share of academic personnel that may be far from the KT function, at least in terms of how it is normally understood. The other relates to the balance between teaching and research. Although some of the best-known

universities focus on research, the teaching function clearly dominates. Both of these facts, which could be seen as limitations to the usual KT functions, could also be seen as opportunities for developing KT within the humanities area of knowledge and building KT mechanisms based on the teaching function.

Box 1

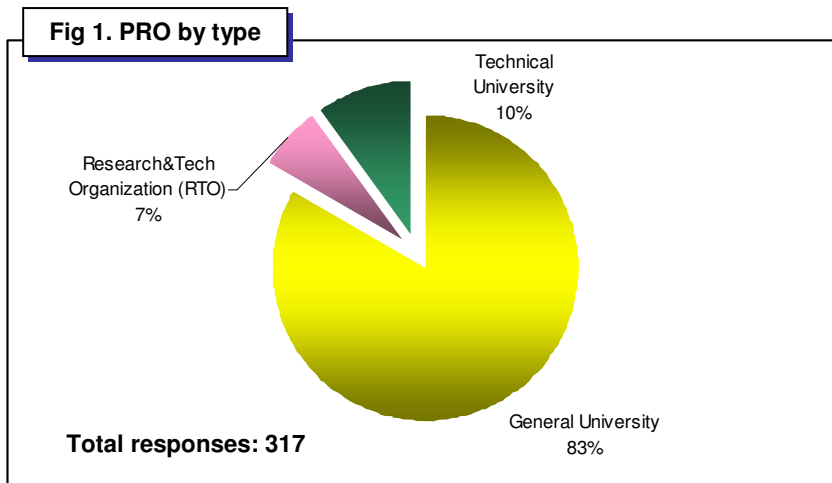
Academic & Research Staff (FTE): **292,363**

R&D expenditure reported: **€5,9 Bn**

Average devoted to exact sciences: **50.4%**

Average R&D Expenditure /
Total expenditure (universities only): **24.6%**

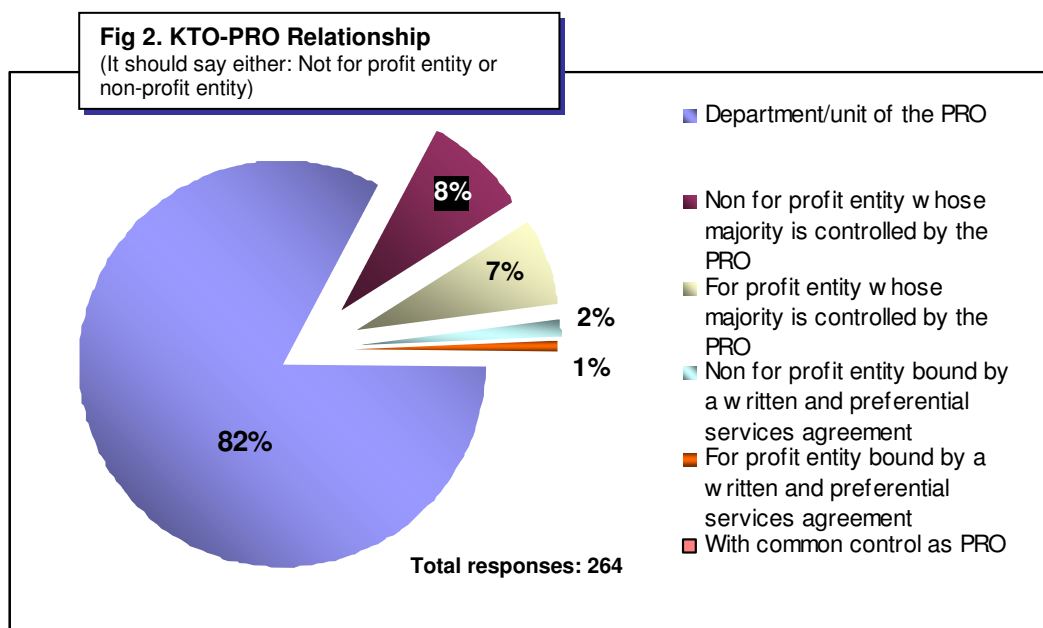
⁴ Source: Eurostat, published in "Towards a European Research Area. Science, Technology and Innovation. Key figures 2005", DG Research.

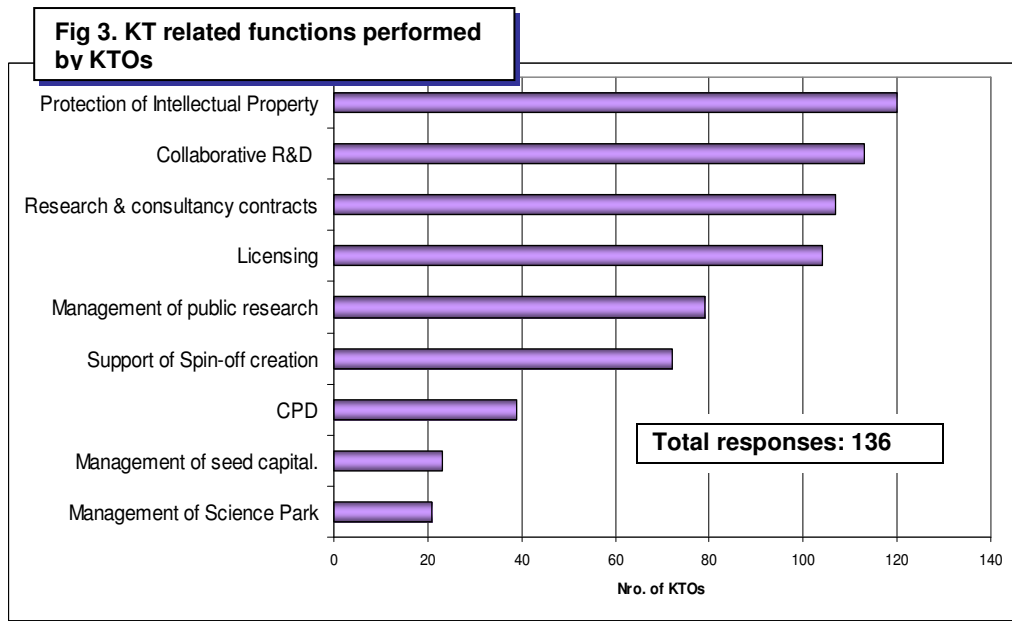


3. The Knowledge Transfer Offices profile

The institutional setup of KTOs is diverse across Europe, both in terms of the configuration of the KTO-PRO relation and in the missions assigned by PROs to KTOs. However, an internal department responsible for a number of KT related

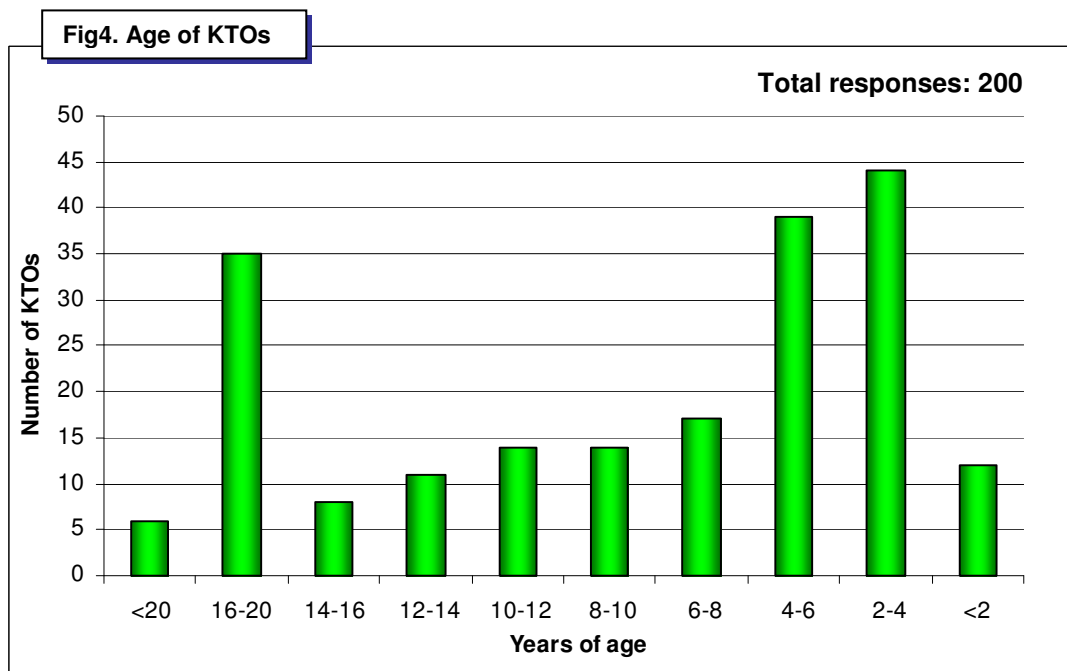
functions (more than 5 functions in over 50% of KTOs) is the most common pattern (Fig. 2). IPR protection and interaction with industry through contract research and consultancy or via collaborative research are the main services provided by the KTOs surveyed (Fig.3).





Thus, unlike US TTOs, a high number of European KTOs not only perform IPR and licensing functions, but also interact with industry (main KTO staff time-consuming activity, according to the survey results) and spin-offs. In a number European KTOs, research management is the major activity.

The KTOs surveyed were established in two waves: at the end of the 1980s (UK, Spain, France) and in the early 2000s (Italy, Germany, Poland). Thus, although the newer KTOs are in the majority, there is a group of experienced European KTOs (Fig. 4).



The size of the average KTO is 6 professional staff (5.5 if referred to as thousands of academics & research staff or 0.43 if referred to M€ R&D expenditure). In financial terms this corresponds to a KTO average budget of 2.1% of R&D expenditure. This is low, particularly if compared to marketing costs in most businesses, and suggests that a small increase in the resources

devoted to commercialisation would lead to a greater discipline specialisation amongst KTO staff and to a significant increase in KT revenues.

The PAS FY2005 also reveals that KTOs' self-funding (overheads on contracts, licence or equity returns) is low (10%); their funding comes mostly from the institutions or grants/subsidies from external agencies.

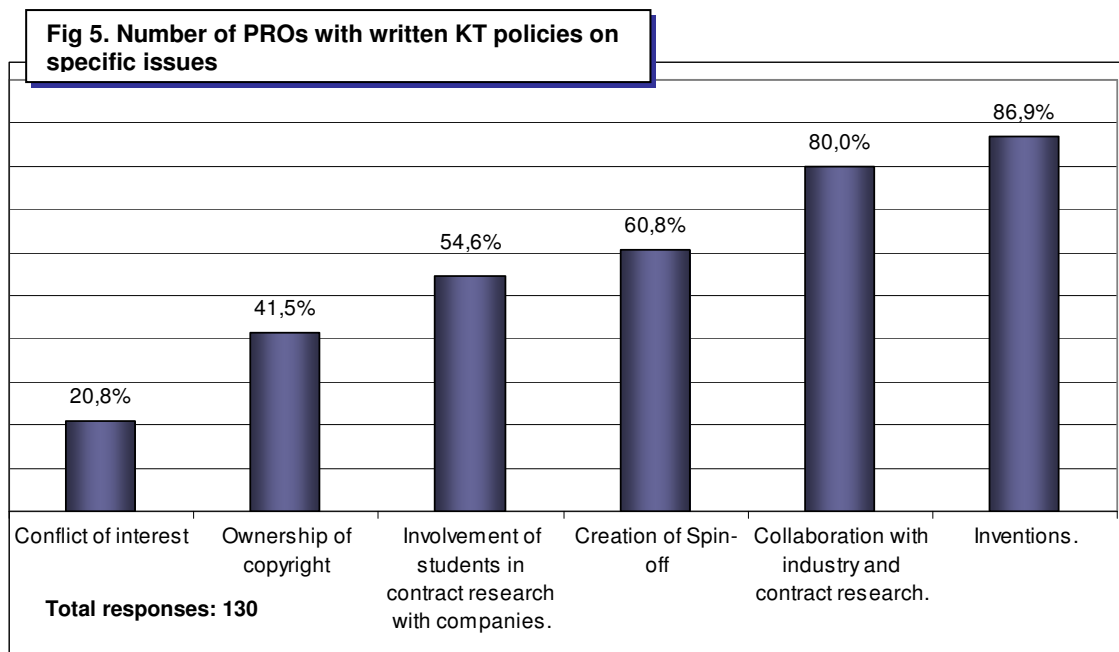
Box 2. Some KTO facts

KTO size:	2.1% of R&D budget (€333k in average)
KTO staff:	6 professional staff in average
	40% of KTO have staff discipline oriented
Main sources of funding:	60% by PRO
	30% by subsidies
	10% by license/overheads/equity returns
Internal Clients:	40 (Research staff per KTO staff)
External Clients:	17 (Clients Companies per KTO staff)

The time of KTO staff is mostly devoted to the management of contracts and searching for public funding. To a lesser extent they are involved in licensing and spin-offs, activities that require significant effort to achieve better results [It is appreciated that the researchers continues demanding from the KTOs the supporting for the establishment and concretion of the collaborations with companies.]

Creating and staffing KTOs represents the main PRO commitment to KT. However, a range of KT policies

implemented by PROs are also key issue. Figure 5 depicts the profile in terms of these KT policies. Most PROs (87%) state that they have written policies concerning inventions. However, this basically relates to patents, since less than 50% have specific policies for copyright. Interaction with industry via research and other technical services is also regulated in most PROs (80%), although only 54% state that they have policies concerning student involvement in this interaction.



The lowest scores were for creation of spin-offs (slightly above 40%) and conflict of interest regulation (20%), which in many cases are related in between. In terms of more advanced KT infrastructures, the PAS shows that less than half of PROs are connected to

4. The Knowledge Transfer outputs.

4.1. Protection of IPR

The identification and protection of IPR are central in the KT process. Patent-related results from the PAS FY2005 reveal a definite weakness in the European patent system compared to the US one. The 4,570 invention disclosures captured by the 2005 PAS (see Table 4) represents a 34.5% increase over the 2004 ProTon Europe survey (3,025), which corresponds to the increased number of respondents. This

Science Parks (45%) or have set up Business Incubators (47%). Thus, in general terms, KT policies are in place, but do not cover the whole range of KT activities and infrastructure.

activity is still far below (4 times lower) the levels for this indicator collected in US-AUTM survey.

The next step in the IPR protection process is patent filing. Again, the PAS 2005 figures (2,310 filings) show an increase on the previous year (1,270 filings), which corresponds to the increase in the number of respondents. It should be noted that a number of KTOs that responded to the question on patent filing question did not respond to the question enquiring about the number of invention disclosures, which

perhaps indicates that the invention disclosure step is not recorded in such detail as the patent application process. Compared to the results of the US-AUTM the number of patent applications from European KTOs surveyed is around 4.5 times lower.

The ratio between patent filing and invention disclosure has increased from 0.42 to 0.5, which might be indicative of more intense protection activity. However, this ratio is again lower than in the US (0.6), where the patent application process is more straightforward.

Table 4. Protection of IPR

	PAS 2005	Top 10	Per KTO	Per 1000 R&D staff	Per 1M€ R&D expenses
Invention disclosures	4,570	31%	14.8	6.8	0.9
(# valid answers to the related question(s))		309		114	162
Priority patent applications	2,310	31%	6.6	4	0.2
(# valid answers to the related question(s))		349		148	168
Patent extensions	455	49%	3.3	1.6	0.08
(# valid answers to the related question(s))		137		113	56

It is common practice, particularly in Europe, that the first application for a patent is made at national level and then extended internationally within the first year, normally via PCT procedure. These patent extensions often involve significant investment; hence, only a small share of national patent applications is applied for internationally. The PAS 2005 captured only 455 PCT extensions, probably due to lack of this information in the data provided by some of countries. In relative terms (per KTO) this figure can be estimated in relation to the number of first patent filings (if referring to the 2005

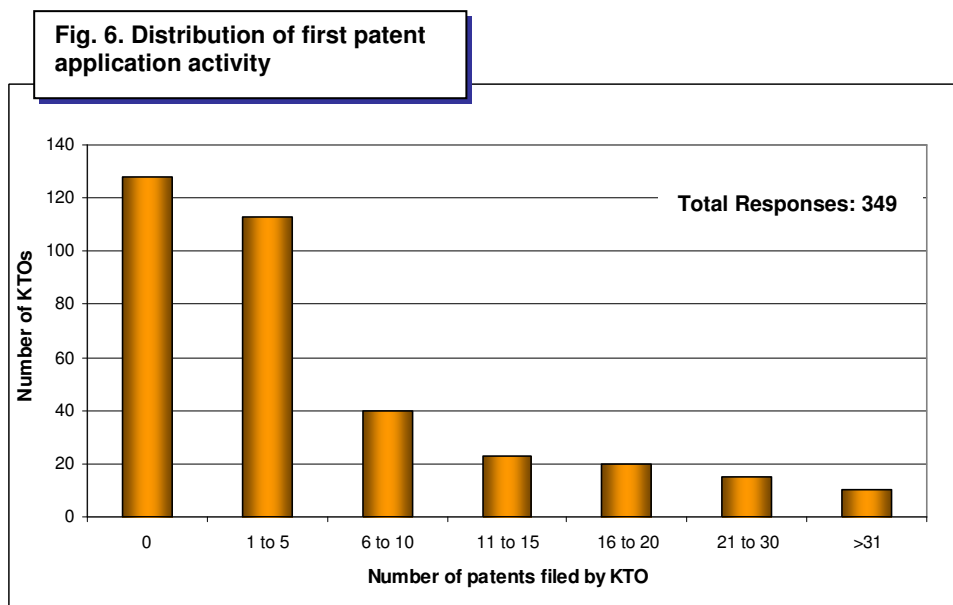
data, this may introduce error, as patent extensions are usually related to patents filed one year earlier). Thus, half of first filings continue to the international extension step.

The research effort (expenditure) needed to produce one patent is significant at €4M for each patent filed and around €11M for extension internationally.

The distribution of the IPR protection activity reveals an important concentration (Fig. 6). Some 31% of patent first filings are made by 3% of the respondents. Around 130 KTOs do not

report any patent filings. In this context the average patent application per KTO statistic does not provide much information, although if compared with the figure from the AUTM (54 patents

filed per office) the difference with ProTon Europe (5 per office) is of the order of magnitude of more than tenfold.



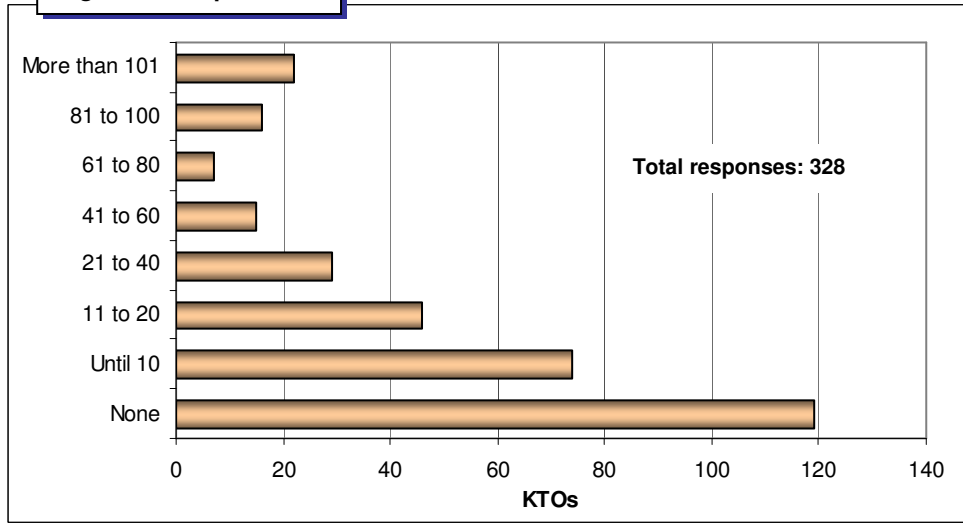
The PAS 2005 identified a total portfolio of 9,382 patent cases (those technically different inventions whose patent costs are borne by the KTO). While this represents an average of 29 patents per KTO the distribution pattern shows that there is a group of KTOs whose patenting activity is fairly stable over several years (Fig. 6). This group also bears most of the 20.7M€ of patent

costs either directly or with subsidies. Less than half of this figure is paid by the licensees. On the other hand, more than 100 KTOs do not have any patents in their portfolios, which means that they are engaged in KT activity that does not depend on patent protection for their IPR.

Box 3. Other IPR related figures

- 175 patents filed in co ownership
- 9,382 patent cases in portfolio, 34 per KTO in average
- 20.7 M€ in patent fees, 56.5% paid by PRO own funds and subsidies
- Average of 2.8 invention disclosures per KTO staff
- Average of 7.2 patent cases per KTO staff

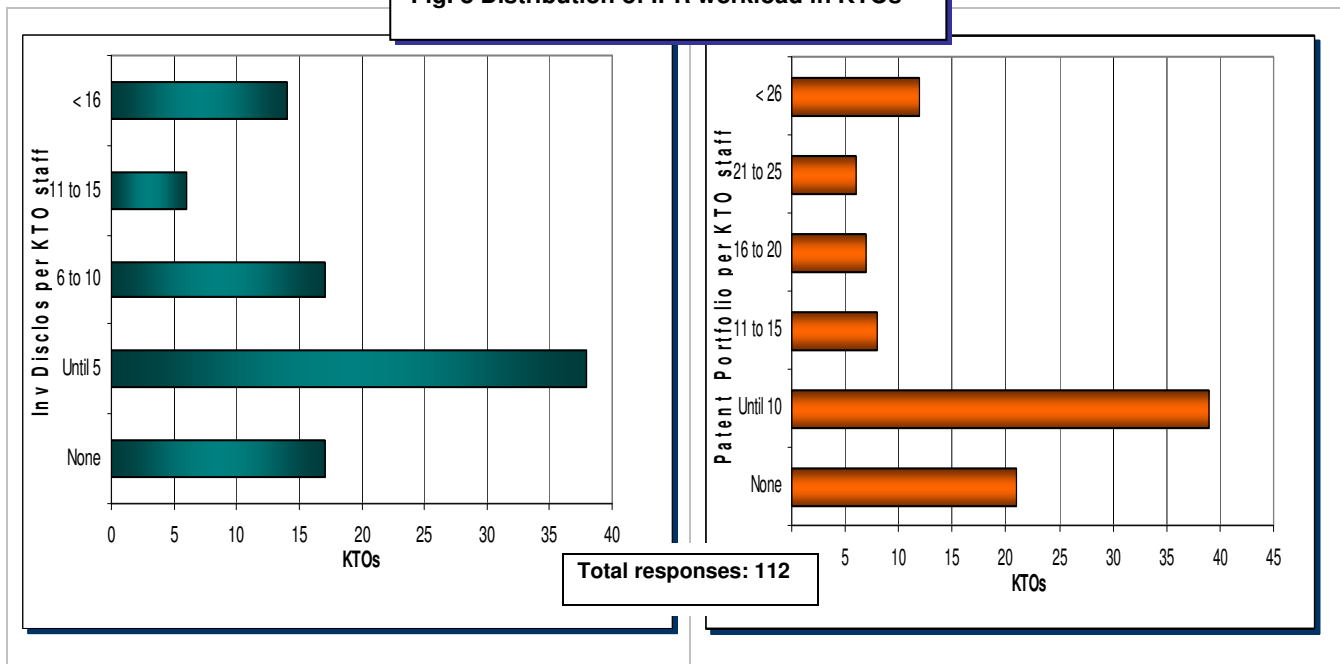
Fig. 7. Patent portfolio



Only 175 patent applications were filed in co-ownership with other partners. This represents 7.5% of all patent applications, which in the EU R&D context, where joint research laboratories and consortia projects are heavily promoted, is an unexpectedly low figure. Other IPR related information requested by the PAS received poor response.

It is interesting to relate IPR activity to KTO resources, as this may describe the workload profile. Fig. 7 shows a clear pattern of minimum IPR activity for a majority of KTOs, but high activity for a small group of KTOs, related to identifying technology opportunities and prosecuting and maintaining intellectual property rights of PROs over time.

Fig. 8 Distribution of IPR workload in KTOs



4.2. Licensing

The number of new licences reported in PAS 2005 is 731, which is an increase over the 566 licenses reported for the previous year, due in part to the higher number of KTOs that responded to this question. This figure for licensing is 6.7 times lower than the figure reported by the 190 respondents to the AUTM 2005 survey.

Although the average number of licences per KTO is 2.8, the distribution of licensing activity is even more concentrated than patenting activity. The top 10 of the 261 respondent KTOs account for 44% of the licences executed in 2005, while 45 KTOs did not report any licensing activity. The resources devoted to licensing are

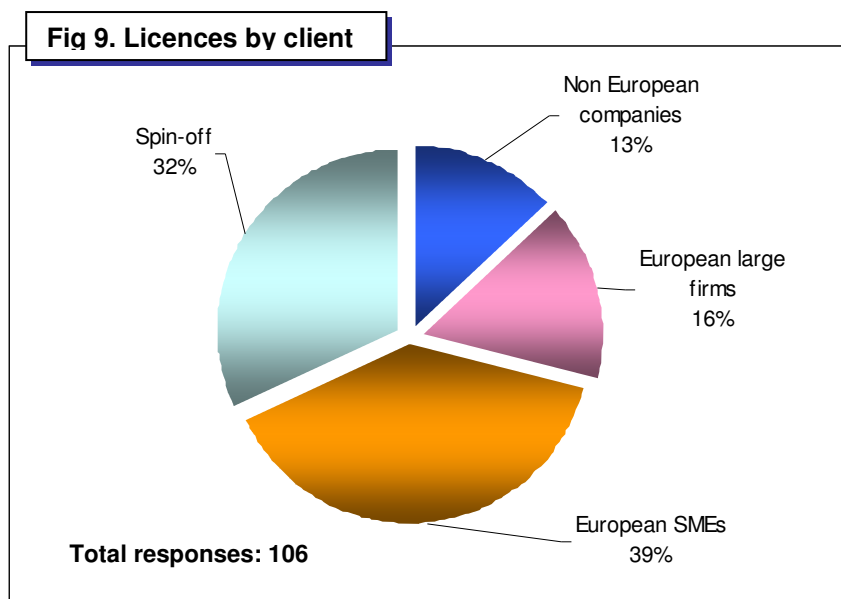
expressed as is 0.4 licences per professional staff.

However, reported licence revenues totalled €93.8M for 2005, a significant increase on the previous year (€26.8M), but only 4% of research contract revenue. Compared to investment in R&D, licensing revenue is only 0.17%, which is barely significant.

These patent licences mostly involve European companies (87%). From the 106 participants that responded to this part of the survey (Fig. 8) 32% of licensees are spin-off companies and 39% of licences involve European small and medium sized enterprises (SMEs). Only 16% of licences are with European big industry.

Table 5. Licensing

	2005	Top 10	Per KTO	Per 1000 R&D staff	Per M€ R&D expenses
Licences executed	731	44%	2.8	0.9	0.1
(# valid answers to the related question(s))		261		95	78
Licensing revenue (M€)	93.8	64%	0.3	0.3	0.04
(# valid answers to the related question(s))		304		111	159



4.3. Interaction with industry

Most PRO KT activity, at least measured in terms of revenue, comes from interaction with industry in different activities. It includes collaborative R&D where the PRO retains some of the rights to the new knowledge whether funded by companies and/or by government economic programmes; Contract Research and Consultancy where the

company receives all the rights to any new knowledge for a fee, which normally covers full costs; and Technical Services where specialised equipment services are used by industry to conduct analysis, tests, etc. The income reported in the survey from these three categories of interaction with industry is 2,884M€ (40%, 47% and 13% respectively).

Table 6. R&D interaction with industry

	2005	Top 10	Per KTO	Per 1000 R&D staff	Per 1M€ R&D expenses
Collaborative and sponsored research and consultancy contracts	6,3018	25.7%	236	93.6	42.5
(# valid answers to the related question(s))		284		121	171
Value of interaction with industry activities (M€)	2,884	28.9%	€10.1M	4.2	0.2
(# valid answers to the related question(s))		266		126	171

Interaction with industry represents the major KT activity, not just in terms of its economic importance, but also in terms of the dedication of KTOs (over 80%, according to the survey). The total number of interactions including collaborative and sponsored research and consultancy is 63,018 for 2006 (not including technical services). An average of 123 research or consultancy contracts and 113 collaborative

research arrangements require different levels of assistance and KT services. Interaction with industry is less concentrated than for other KT activities, but when IPR issues are at the centre of negotiations (collaborative research), then the most active KTOs account for a higher share of the deals and contract revenue (40% of total contracts are executed by top 10 performers).

Box 4. Other figures in interaction with industry

- 34,948 research and consultancy contracts reported by 284 respondents (123 in average); 30% of them by the top 10 performers
- 28,070 collaborative research contracts reported by 265 respondents (113 in average); 40% of them by the top 10 performers
- €374M in technical services, reported by 226 respondents

4.4. Spin-off activity

The total number of new spin-off companies reported in the PAS FY2005 by 337 respondents is 434 (see Table 7), more than double the number for the previous year, due mostly to the increased number of respondents from the UK. In relative terms, this figure represents 1.3 companies per KTO and 1.56 per thousand academic & research staff. The investment in R&D needed to produce a spin-off is €11M.

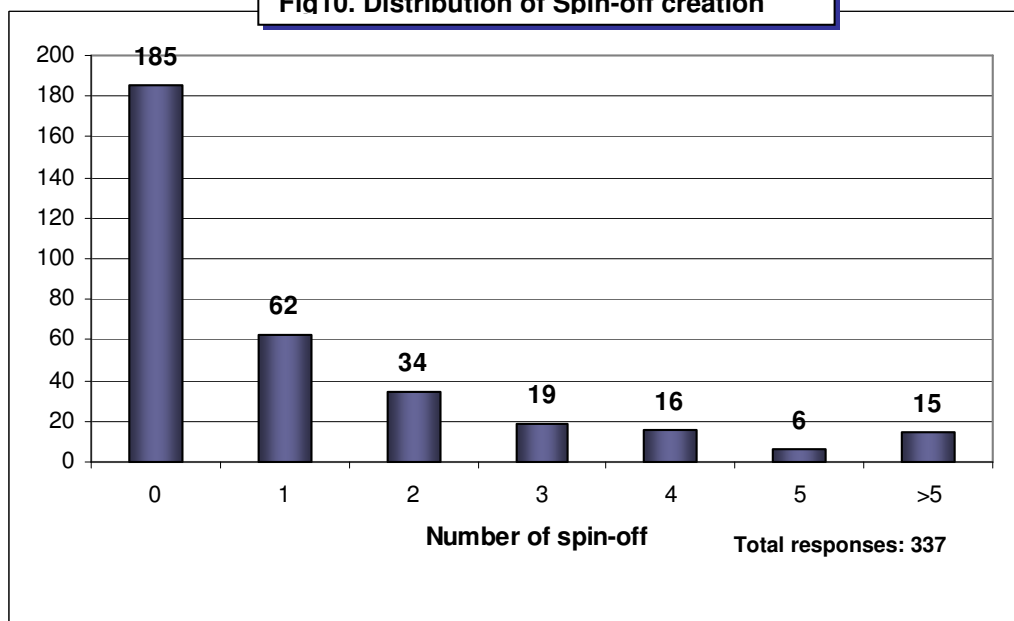
Compared to the US-AUTM survey, the ProTon Europe figure is 30% lower. 55% of respondents declared no new spin-off creation in the year (see Fig. 12). The top 10 performers account for 28% of all newly created companies. As it is the most difficult KT route, spin-off creation is less frequent than other activities. Also, the creation of a new company does not mean a success per se; it is only the beginning of the commercialisation of PRO technology. In 43% of cases, the

PRO takes equity from the spin-off, either directly or indirectly. In only three cases were returns on equity reported.

Table 7. Spin-off creation

	2005	Per KTO	Top 10	Per 1000 R&D staff	Per 1M€ R&D expenses
Spin-off	434	1.3	28%	1.5	0.08
(# valid answers to the related question(s))	337			144	166

Fig10. Distribution of Spin-off creation



VI. Conclusions

The main results from the PAS 2005 are listed below.

1. The PAS 2005 has captured information representative of the European KT situation. As the response rate has increased since the previous survey, no firm conclusions can be drawn about an evolution in KT in European PROs.
2. The European KT activity engaged in by KTOs includes different forms of interaction with industry (collaborative research, contract research, consultancy), IPR

protection, licensing and spin-out creation, although there is a diverse range of KTO patterns in respect of specialisation or mix of KT functions. The US model is very different and is much more focused on patents and licences.

3. European KT outputs related to patents (disclosures, filings, licences) are small compared to the US due to the absence of an efficient and easily accessible patent system in Europe.

4. The main KT effort engaged in by European KTOs is interaction with industry. Most KT deals and revenues in European PROs are related to this type of activity.

5. There is a clear concentration of KT outputs in a small group of KTOs. This concentration increases in line with the degree of IPR protection. There is an urgent need for KTO activities to become more professional.

ANNEX 1

PROTON EUROPE ANNUAL SURVEY QUESTIONNAIRE FY 2005

Section 0: Relation between KTO and PRO.

0.1 Do you agree that the information you will provide on your institution can be made public by ProTon Europe? *

YES NO

0.2 Do you agree that ProTon Europe can internally use the information you will provide in other areas of its work, for example the identification of good practice, analysis of the spin-off activity, etc? *

YES NO

0.3 Does your KTO serve more than one PRO on a permanent and privilege basis? *

YES NO

0.4 Number of PROs by type.

In case your KTO serves only one PRO, please, insert 1 for an affirmative answer and 0 for a negative answer

0.4.1 General University *

0.4.2 Technical University *

0.4.3 Research & Technology Organization (RTO) *

0.5 Number of PROs your KTO perform the following functions for:

In case your KTO serves only one PRO, please, insert 1 for an affirmative answer and 0 for a negative answer

0.5.1 Management of public research (information, support to researchers, administration, etc.)

0.5.2 Collaborative R&D public programmes with industry *

0.5.3 Protection of Intellectual Property. Through patents, models, copyright, designs, trademarks, confidentiality agreements, material transfer agreements, etc. *

0.5.4 Licensing Permission to use, to exploit and to modify under certain conditions a technology or knowledge of the PRO. *

0.5.5 Research and consultancy contracts. Research, development and technical support activities regulated by means of a contract between parties. The contractor usually defines the objectives of the work, finances the total cost of the project and retains the rights over the final results. *

0.5.6 Technical services. Usually analysis, laboratory services, etc. *

0.5.7 Support of Spin-off creation *

0.5.8 Management of Science Park *

0.5.9 Management of seed capital. Funding provided in the early stages of creating a business, including financing for the viability and market studies. *

0.5.10 Continuous Professional Development (CPD). *

0.6 What is the legal relationship between your KTO and the PRO(s)? *

Department/unit of the PRO

Non for profit entity, whose majority is controlled by the PRO

- For profit entity, whose majority is controlled by the PRO
- Non for profit entity, bound by a written and preferential services agreement
- For profit entity, bound by a written and preferential services agreement
- With common control as PRO

0.7 How many PROs have written policies in the following knowledge transfer related issues?:

In case your KTO serves only one PRO, please, insert 1 for an affirmative answer and 0 for a negative answer

0.7.1 Inventions. *

0.7.2 Ownership of copyright *

0.7.3 Involvement of students in contract research with companies. *

0.7.4 Collaboration with industry and contract research. *

0.7.5. Creation of Spin-off *

0.7.6. Conflict of interest. *

0.8 Number of PROs involve in:

0.8.1 Bussines incubator infrastructure. *

0.8.2 Science Park. *

Section 1: PRO profile and Information.

1 Total annual expenses of PRO or PROs (000euros);Excluding extraordinary infrastructure expenses like buildings, facilities, etc. *

2 Number of undergraduate and master students. *

3 Academic Staff. (FTE: Full Time Equivalent).Faculty members with educational and/or research duties *

4 Research Staff (FTE: Full Time Equivalent);Research staff (with contract or scholarship) different from Academic Staff. *

5 Approximate % of academics and permanent research positions in exact sciences. *

6 Total Research expenditure (000euros);R&D expenses carried out by the PRO, including activities with specific public or private funding and expenses funded by the PRO recurrent budget (including R&D share of academic and indirect expenses). This information is usually reported within the official R&D surveys issued by the national statistics offices. *

7. Funding of R&D expenditure by source (000euros).

The sum of answers from Q7.1 to Q7.4 (do not consider Q7.1.a and Q7.2.a) must be equal to the answer in Q6.

7.1 Public funded research, including government and EU. *

7.1.a Of which is related to collaborative R&D with companies. *

7.2 Contract research & consulting and tech services.Including Collaborative R&D. *

7.2.a Of which is collaborative research. Research sponsored by industry partners that is expected to contribute at the same time to new knowledge and to the economic development of the partner. The PRO is expected to retain ownership rights on the results and inventions. *

7.3 Donations. Reasearch activities fundings that are given without any returns. *

7.4 PRO own funds. *

Section 2: KTO profile and information.

8. Staff that work for the KTO. In Full Time Equivalent (FTE).

8.1 Total staff *

8.2 Of which, professional staff *

9 Is the KTO dedicated to specific areas or disciplines of science? *

YES NO

10. Functional orientation of professional staff. Express in Full Time Equivalent (FTE).

The sum of answers from Q10.1 to Q10.6 must be equal to the answer in Q8.2.

10.1 IPR protection. *

10.2 Interaction with industry (includes contract research and consulting) *

10.3 Public funded collaborative research *

10.4 Licensing *

10.5 Spin-off *

10.6 Other duties *

11. Other Staff information

11.1 Number of Professional Staff primarily sector orientated (e.g. ICT, Biotech, etc.) *

11.2 Number of Professional Staff having prior industry experience of at least 5 years. *

12. Please, provide the following financial data for the KTO:

The sum of Q12.3 to 12.7 must be equal to 100.

12.1 Does the KTO have a specific annual budget? *

YES NO

12.2 Annual KTO budget (000euros) *

12.3 % funded by PRO *

12.4 % funded by public subsidies *

12.5 % funded by O/H on contracts *

12.6 % funded by licence revenues *

12.7 % funded by equity returns *

13 Do KTO staff receive financial incentives for their performance? *

YES NO

Section 3: KTO functions: Management of Intellectual Property (IP).

Please only complete this section if you have provided information in question 0.5.3

14 Do you have written procedures for invention disclosures? *

YES NO

15 Number of invention disclosures in the year surveyed. *

16 Number of priority patent applications filed in the year surveyed *

17 From the number of priority patent applications filed in the year surveyed how many are jointly owned with one or several other parties? *

18 Number of priority patent applications extended in the year surveyed (normally PCT but not exclusively) by your KTO. The PCT makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filling an *international* patent application. *

19 How many patents were granted in the year by USPTO? *

20 How many patents were granted in the year by EPO? *

21 Number (cumulative total) of different patents (based on different priority filings) still maintained (not yet abandoned or assigned) by your KTO at the end of the year. Series of patents or patent family deriving from the same priority. A patent family comprises the priority patent application and may comprise PCT, national and regional patent applications and granted patents. *

22 Number of patents abandoned during the year (this means no single patent from that family is still maintained) *

23 External legal fees paid for patent applications, maintenance and prosecution during the year, not including litigation costs. (in 000euros) *

24 Percentage supported by licensees *

25 Percentage paid by either subsidies or own funds. *

26. Know How

26.1 Number of confidential disclosure agreements executed during the year to enable disclosure of PRO know-how. *

26.2 Number of material transfer agreements executed for material originating from your PRO. *

Section 4: KTO functions: Licensing operations. Please only complete this section if you have provided information in question 0.5.4

27 How many licence/options were executed in the year surveyed? *

28. From the licence/options executed in the year surveyed

28.1 How many were based primarily on patents (and related know how) *

28.2 How many were based primarily on software (and related know how). If the licence is just for software use, please consider as 1 licence all those licences for the same software product when they have an individual price below 1000 Euros. *

28.3 How many were based on databases (and related know how). If the licence is just for database use, please consider as 1 licence all those licences for the same database product when they have an individual price below 1000 Euros. *

28.4 How many were based only on know-how *

29. How many of these licence/options executed in the year surveyed have been granted to:

29.1 Spin-offs. New company whose business model and technology is based primarily on knowledge generated by the PRO. *

29.2 European SMEs *

29.3 European Large companies *

29.4 Non European companies *

30 Number of licences yielding revenues in the year surveyed *

31 Licence revenue attributable to the institution(s) you serve (in 000euros); Net of that distributed to

other institutions that are not covered by your KTO. Include the revenue in the surveyed year deriving not only from new licenses but also from previous licences. *

32. From such licence income (express in 000euros):

32.1 How much was distributed to inventors/developers? *

32.2 How much was distributed to research groups? *

33 During the year, how many of your licensed technologies resulted in products to the market?*

Section 5: KTO functions: Collaboration with Industry (research contracts, consulting, services). Please only complete this section if you have provided information in questions 0.5.2; 0.5.5 or 0.5.6

34. R&D contracts

34.1 How many Research and Consultancy contracts (including collaborative research) has your KTO executed for the PRO (s) during the year surveyed? *

34.1.a Of which, how many are Collaborative Research contracts? *

34.2 What revenue was generated by the Research and Consultancy contracts? *

34.2.a Of this, what revenue was generated by Collaborative Research contracts? *

34.3 How many technical services has your KTO executed for the PRO (s) in the year surveyed?. The sale of PRO services for a fee. These may include the use of special infrastructure, performance of tests, etc. *

34.4 What revenue was generated by these services? *

35. Public funding for collaborative research with industry

35.1 How many public collaborative research project proposals have been submitted by the PRO(s), with the assistance of your KTO, in the year surveyed? *

35.2 How many public collaborative research project contracts/grants has your KTO executed for the PRO(s) in the year surveyed? *

35.2.a Of these how many were European Framework projects? *

35.3 What revenue was generated by the PRO(s) from public collaborative research project contracts/grants? *

35.3.a Of this revenue how much was generated by European Framework projects? *

36 How many products have been introduced in the market in the year surveyed derived from previous collaborative research? *

Section 6: Support of Spin-offs and Start-ups. Please only complete this section if you have provided information in question 0.5.7

Spin-offs from one or more of the served PROs

37 How many Spin-offs have been created in the year surveyed with the assistance of your KTO?.*

38. From these, how many:

38.1 Involve researchers transferred from your PRO(s) *

38.2 Maintain a collaborative research agreement with the PRO(s) *

38.3 Use the infrastructure of your PRO(s) *

38.4 Rent space in an incubator in which the PRO(s) is/are involved *

38.5 Are located in a Science Park in which the PRO(s) is/are involved *

38.6 Have signed a licence agreement with the PRO *

39 In how many Spin-offs does your KTO or your PRO(s) hold equity? *

40. For the Spin-offs where your KTO or your PRO(s) hold equity:

40.1 How many have realised a capital increase during the year surveyed? *

40.2 How many have ceased operation? *

41 Capital gain realised in the year surveyed on the sale of equity held by KTO or PROs (in 000euros) *

42 How many Start-ups have been created in the year surveyed with the assistance of your KTO? New company formed by entrepreneurs not depending on PRO knowledge generated by the PRO (it does NOT include Spin-offs as defined earlier). *

Seed Capital

43 Do you manage any seed capital funds?. Funding provided in the early stages of creating a business, including financing for the viability and market studies. Including *university challenge funds* in the UK or similar government funded seed capital funds. *

YES NO

44 Total amount under management (in 000euros). Answer only if you have ticked Yes> in question 43. *

45 Number of investments made in surveyed year. Answer only if you have ticked Yes> in question 43. *

Section 7: KTO clients profile.

46. Internal clients

46.1 Number of academics and research staff that were actual clients of the KTO in the year surveyed (those participating in interaction with industry, patent inventors, Spin-off entrepreneurs?). *

47. Number of external clients

47.1 Number of companies and other entities that are clients/partners of the PRO in knowledge transfer activities serviced by your KTO *

47.1.a Of these, how many are public clients? *

47.1.b Of these, how many are private clients? *

47.1.b.1 Of the private clients, how many are national clients? *

47.1.b.1.1 Of the national private clients, how many are regional clients? *

47.1.b.2 Of the private clients, how many are foreign clients? *

48. Distribution of revenue for the PRO(s) by type of clients (000euros).

48.1 Revenue coming from public clients *

48.2 Revenue coming from private clients *

48.2.a Of the revenue coming from private clients, which are national clients? *

48.2.a.1 Of the revenue coming from national private clients, which are regional clients? *

48.2.b Of the revenue coming from private clients, which are foreign clients? *

Glossary

Academic Staff: Faculty members with education and/or research duties.

Budget: Is the amount of money that is available for, required for, or assigned to a particular purpose in a specific period. This amount includes, in KTO cases, personnel and ordinary expenses; and are out of it, seed funding and protection funding.

Collaborative Research: Research sponsored by industry partners that is expected to contribute at the same time to new knowledge and to the economic development of the partner. The PRO is expected to retain ownership rights on the results and inventions.

Consultancy: The sale for a fee of consulting services based on existing knowledge.

Contract Research: Research and development sponsored by industry partner.

Disclosure: Document that contains all the information which is deemed necessary to evaluate the potential of an invention/result deriving from the research activities so as to be able to decide its legal protection and/or active commercialisation.

Equity: Financial term for the difference between a company's assets and liabilities, that is, the value that accrues to the owners.

Extension: A PCT application or a patent application in another country than that where priority patent has been filed.

FTE (Full Time Equivalents): People working part-time are only included for the fraction that they are employed.

IPR (Intellectual Property Rights): Patents, registered designs, software, etc.

KTO (Knowledge Transfer Organization): Outside organizations or departments units (not physical persons) involved in the transfer of knowledge from PROs, that are entrusted by one or several PROs with a substantial activity in the transfer of knowledge from those PROs, including intellectual property management, licensing, partnering with industry and the creation of new companies.

Licence: Is where the Licensor (e.g. your institution) grants rights to use the technology

under Licence in a defined Field of Use and Territory.

O/H (Overheads): Costs incurred by a business which are not discretely associated with a particular product or service which that business provides for its customers.

Option: Grants the potential licensee a time period during which it may evaluate the technology and negotiate the terms of a licence agreement.

Patent Cases: Series of patents or patent family deriving from the same priority. A patent family comprises the priority patent application and may comprise PCT, national and regional patent applications and granted patents.

Priority filing of a patent application: The first filing under the form of a provisional, national patent application, regional (EP or other) or international (PCT) patent application from which priority date all national patents will derive.

PCT (Patent Cooperation Treaty): The Treaty makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filling an "international" patent application.

PRO (Public Research Organizations): Universities and other research institutions funded primarily by public funds.

Professional Staff: Professional position whose duties include any management task (liaison, marketing, negotiation, evaluation, administration, legal and business counselling, etc) for the support of Knowledge Transfer activities. It doesn't include clerical and administrative staff.

Public Collaborative Research: Public funding for collaborative research (e.g. EU R&D Framework programmes, similar national funding, etc.)

Research and Development expenditures: Total R&D expenditures, including share of academic costs dedicated to research and R&D overheads. Criterion normally used when reporting this figure to the national statistics office if requested.

Research Staff: University graduates involved in research other than academic staff and undergraduates. This includes permanent

research staff, post-docs, researchers on fellowships, etc.

Revenue: Is the amount of money that the PRO receives from its knowledge transfer activities.

Seed Capital: Money that is given to someone to help start a new business.

Spin-off (in relation to a PRO): New company (Start-up) whose business model and

technology is based primarily on knowledge generated by the PRO.

Start-up: New company formed by university entrepreneurs. This survey does NOT include Spin-offs as defined above.

Technical services: The sale of services for a fee. These may include the use of special infrastructure, performance of tests, etc.