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Knowledge Transfer Study 2010-2012

Final Report

Research and Innovation

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Knowledge Transfer Study 2010 – 2012

Final Report

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EXECUTIVE SUMMARY

State of Recommendation implementation: policy survey (WP1)

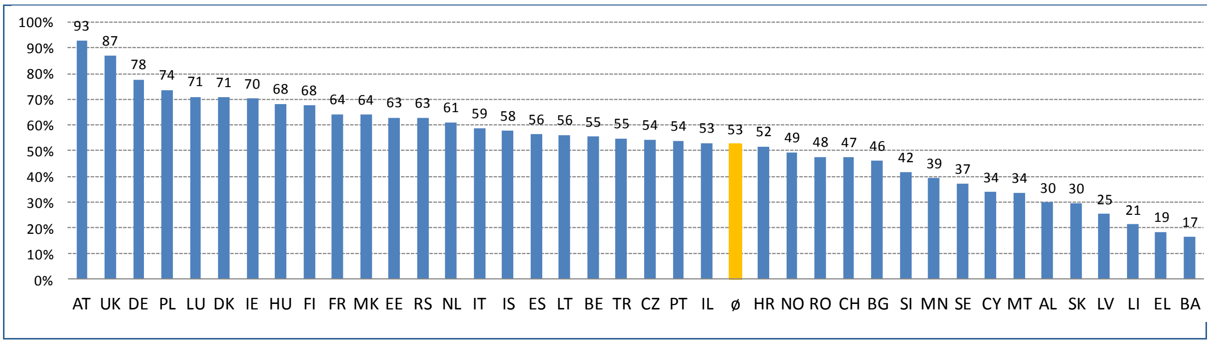
Survey background, objectives and methodology

The objective of the European KT Policy Surveys in 2010 and 2012 was monitoring the status of implementation of the European Commission's "Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations" from 2008. Responding to the survey fulfilled the Recommendation's requirement that Member States should "inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact". Associated States were also kindly requested to fill in the questionnaire. The following findings are based on answers from the countries, mostly by representatives of the European Research Area Committee's working group on knowledge transfer. For four countries – Bosnia-Herzegovina, Italy, Liechtenstein and Turkey – other sources were taken instead.

Overall implementation of the Recommendation

Taking all countries, all Recommendation themes and all related survey questions together, and considering also plans for future KT policies, the overall **level of implementation in 2012 was found to be on average 53%**. This means that the Recommendation's targets are currently reached approximately by half. "Implementation level" refers to fulfilling the Recommendation's single items, the "facilitating practices" mentioned in the Recommendation's annex, and a few further questions added by the study team.

Exhibit A: Implementation of the KT Recommendation in European countries in 2012



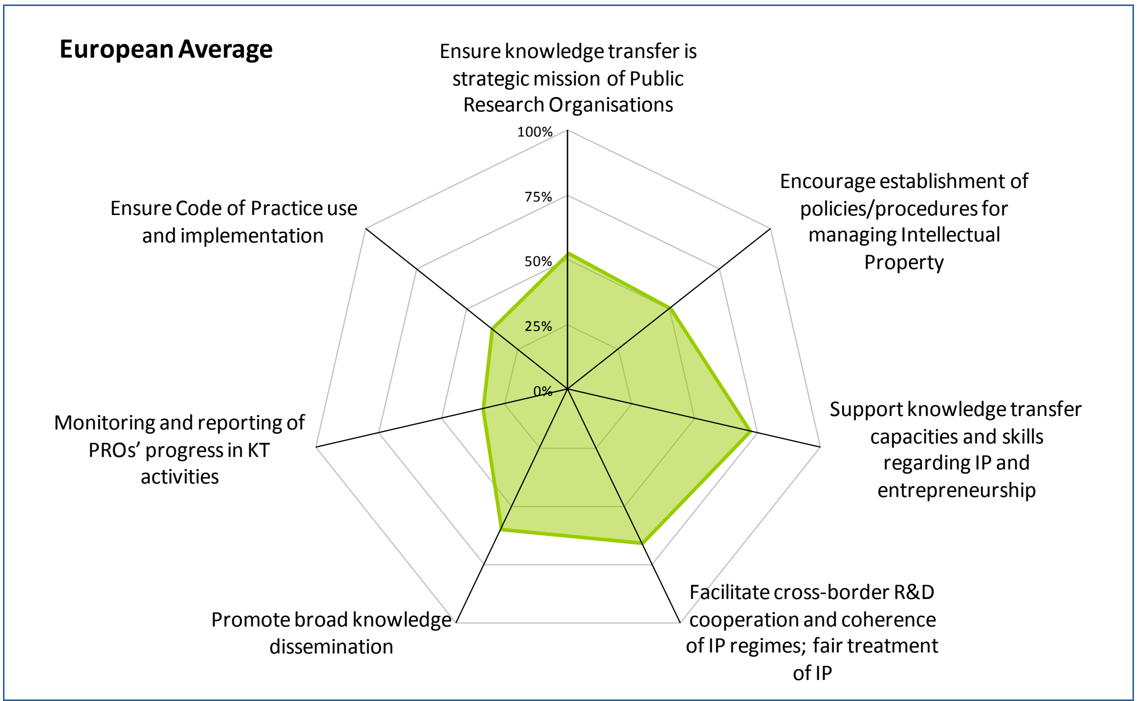
There are **strong differences between European countries** not only in the overall level of implementing the Recommendation – see Exhibit A – but also in implementing the Recommendation's themes and items. Each country has its own implementation profile and its own KT policy profile. In their KT policies, apparently European countries put stronger emphasis on capacities and skills development, while there is less effort on supporting the development of KT strategies and IP management procedures – see Exhibit B. Hence one might tentatively argue that, at least against the questions posed in the survey, many European countries take the third step before the first and the second. EU support for developing strategies and IP management procedures might be advisable.

Country groups and clusters

Comprehensive KT policies appear to be correlated with national wealth. Eight of the ten countries with the most intense KT policy activity have a GDP per capita above the EU average, and most of them also belong to the countries that formed the European

Community already in the 1970s. Exceptions from the rule include Switzerland, Norway, Sweden and Liechtenstein which are wealthy countries with less comprehensive KT policies. The low position of Switzerland, Norway and Liechtenstein might to some extent be related to the fact that they are no EU Member States so that they are not formally required to fulfil the Recommendation. The low position of Sweden might partly be explainable by the fast that it is beside Italy the only EU Member State where the professor's privilege is still in place.

Exhibit B: Implementation of Recommendation themes: European average 2012



Secondly, comprehensive KT policies were found mainly in larger countries: Germany, France, UK, Italy, Spain and Poland are all above average. On the other hand, while some of the laggards are among the smallest European countries, notably Malta, Cyprus and Latvia, there are several very small countries with more comprehensive KT policies: Iceland, Estonia, Luxembourg, and FYR Macedonia. Different from what one might expect Nordic countries are not represented in the leaders, while Denmark and Finland are among the followers. East European countries are represented in all groups except the leaders.

Key results about KT policy themes and measures

KT policy is generally accepted as an important issue in Europe: The vast majority of countries (90%) said that national and regional governments promote policies and procedures for the management of IP resulting from public funding. Within the policy measures for fostering KT strategy development asked about in the survey, non-legal measures were found to be widespread. Legal measures to support KT strategy development were found to be less prevalent.

Almost all countries (92%) said that national and regional governments support the development of KT capacity and skills in universities and other PROs. The lowest score for this theme was found for "model contracts for KT activities". 38% of the countries said that model contracts as well as related decision-making tools are available. Further 15% of countries plan to introduce model contracts.

As regards international RDI cooperation, 67% of the respondents said that their country cooperates with other countries to improve the coherence of IP ownership regimes. This share may be considered as remarkably low – one might have expected that all or almost all countries in the European Research Area co-operate in improving the coherence of ownership regimes.

Results of regression analysis and correlation with national characteristics

No noteworthy correlation was found between KT policy intensity and any of the seven KT performance indicators considered here: invention disclosures, patent applications, patent grants, licence agreements, licensing income, number of spin-offs, and number of research agreements. The indicators were put in relation to public R&D investment in the country concerned in order to make data comparable across countries. Furthermore, no correlation was found between total KT performance and KT policies (correlation coefficient -0.14).

Correlating KT policy activity with selected national characteristics, high KT policy intensity was found to tend to go together with high national innovativeness (as measured by the European Innovation Scoreboard) and competitiveness (as measured by the Global Competitive Index). Apparently there is also a slightly positive correlation with GDP per capita, but only when excluding the wealthy non-EU Member States of Norway, Switzerland and Liechtenstein as well as Luxembourg. Furthermore, KT policy intensity appears to be slightly positively correlated with population size of a country – the larger a country, the more likely is it to have a strong KT policy.

KT indicators: performance of PROs and universities (WP2)

Methodological approach

Chapter 3 of this report presents the result of a UNU-MERIT survey on the technology transfer activities of Public Research Organisations (PROs, comprising universities and other public research organisations) in the European Union and twelve Associated States. The objective of the survey was to obtain internationally comparable indicators of knowledge transfer activities by leading European public research organisations. In 2010 valid replies were available for 430 PROs, in 2011 for 498 PROs.

KTO characteristics

Most European Knowledge Transfer Offices (KTOs) are young, with more than half, established after 2000. Furthermore, more than half have fewer than five employees. These results suggest that most KTOs in Europe are still developing experience and capabilities with managing the IP produced by their affiliated university or research institute. Furthermore the regression results in this report have shown that the size of the KTO measured by its employees has a significant and positive impact on the number of invention disclosures, license agreements, license income and start-ups. Many KTOs could therefore be struggling with a lack of sufficient and experienced staff in catching up with the performance of their peers in the US.

Performance related to research expenditures

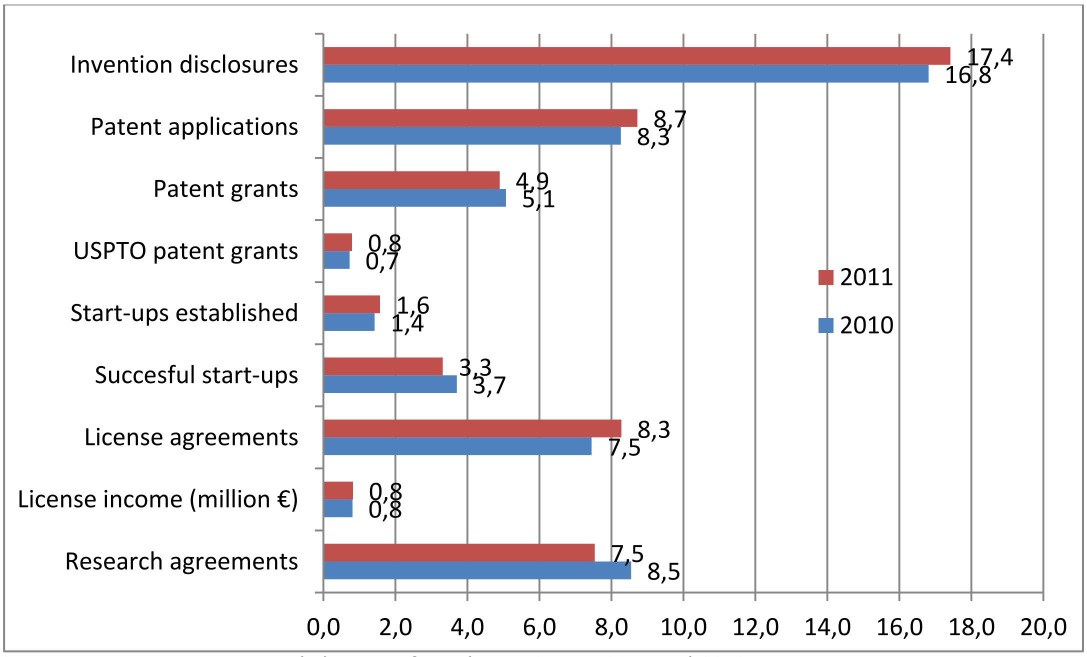
Exhibit C gives standardised performance measures for the combined data set by research expenditures and also provides comparable results from the AUTM (US) survey. For example, the performance in terms of economic efficiency or the estimated cost in million Euros to produce each output. For example, it costs universities in Europe on average €3.2 million of research expenditures to produce 1 invention disclosure. With the exception of license income, universities outperform other research organisations when research expenditures are used to standardise the results. This should not be surprising, since government and non-profit research institutes have a substantially larger research budget per staff member and are likely to perform more applied research than universities.

Exhibit C: Performance by research expenditures (million Euros to produce 1 output), EKTIS 2011 and 2012 results combined

	Universities	*Valid responses[1]*	**Other research organisations**	*Valid responses*	**Total**	*Valid responses*	**US[3]**	**Ratio[4] (EU/US)**
Invention disclosures	3.2	*350*	3.8	*63*	3.3	*413*	2.1	1.6
Patent applications	6.3	*355*	8.8	*63*	6.6	*418*	2.3	2.9
Patent grants	9.9	*325*	13.4	*57*	10.4	*382*	9.7	1.1
USPTO patent grants[2]	42.0	*238*	75.6	*53*	47.1	*291*		
Start-ups established	27.2	*324*	61.3	*61*	30.4	*385*	68.0	**0.4**
Successful start-ups	14.4	*262*	34.0	*51*	16.4	*313*		
License agreements	6.9	*316*	11.7	*61*	7.5	*377*	7.5	**1.0**
License income (million €)	113.5	*287*	33.3	*54*	81.1	*341*	24.4	3.3
Research agreements	0.6	*271*	1.1	*48*	0.6	*319*		
Total reported research expenditures (million €)[5]	34,470		6,602		41,072		45,631	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures).
2: Data from HE-BCI (HEFCE) survey does not include this indicator. To compare patent grants, with the US the number for USPTO patents grants from the US is placed in the row patent grants.
3: US data stems from the AUTM results for the fiscal year 2011.
4: **Bold**: EU performance exceeds that of US.
5: Total number of PROs: Universities, n=503, other research organisations, n=99, total EU, n=602, US, n=183.
6: Based on answers for EKTIS 2011 and 2012 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit D: Performance per 1,000 research staff, panel data 2010 and 2011



Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: total, n=320.
4: Based on answers for EKTIS 2011 and 2012 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

A comparison of European performance with American PROs shows that the latter are more efficient producers of invention disclosures, patent applications and license income. While European universities spend €113.5 million to generate €1 million in license income, American public research institutes only spend €24.4 million to generate €1 million in license income. This shows that European PROs are not that effective yet as American PROs when it comes to commercialising research results. Conversely, European performance exceeds that of the US for the number of start-ups and the number of license agreements.

KTO performance related to research staff

Out of the 430 respondents that replied to the EKTIS 2011, 320 responded as well to the EKTIS 2012. Exhibit D gives standardised performance measures for the panel data set per 1,000 research staff. The results show that European PROs, who responded to both the EKTIS 2010 and EKTIS 2012, performed better in 2011 on invention disclosures, patent application, USPTO patent grants, start-ups established and license agreements.

Code of Practice implementation and impact (WP3)

Objectives

This part of the report documents the work conducted by FHNW (University of Applied Sciences and Arts Northwestern Switzerland, School of Business) within the Knowledge Transfer Study 2010-12 and answers to the Commission's requests to analyse the implementation and impact of the Code of Practice.

Degree of use of the principles of the Code of Practice in the surveyed PROs

Summarising the results of the surveys of 322 universities and public research organisations on the implementation of the Code of Practice a few general issues appear:

(1) Three of the principles are seemingly not widespread let alone generally accepted among PROs: the creation of coherent IP portfolios and patent/IP pools (CoP 5), the existence and publication of a licensing policy (CoP 11), and the publication of start-up policies (CoP 12). The other 15 principles are at least partially accepted and in the majority of surveyed institutions implemented. Universities, universities with hospitals and non-university institutions have specific transfer patterns. A general backlog in regard to the implementation of the CoP principles appears for small PROs and PROs with small transfer offices.

(2) Publishing policy documents (on IP, publication/dissemination, licensing, and start-up policies) is not common practice at the surveyed PROs. Along the same lines, while PROs monitor internally their IP protection and knowledge transfer activities and achievements (CoP 14), they neglect, to some extent, the publication and dissemination side and consequently might fail to raise their visibility to the private sector.

(3) PROs provide incentives to mobilise their employees for IP issues and KTT and they let them participate in the resulting revenues in one way or the other (CoP 4, 13). Monetary incentives are, however, a lot more frequent than other incentives, above all among PROs from countries with established R&D systems (medium to high R&D-density, measured as the R&D personnel per 1000 employees in the country). Using incentives which are more strongly related to the academic culture, such as taking IP/KTT issues into account in career decisions, is current practice in only 30% of the surveyed PROs (and another 10% have begun to consider it).

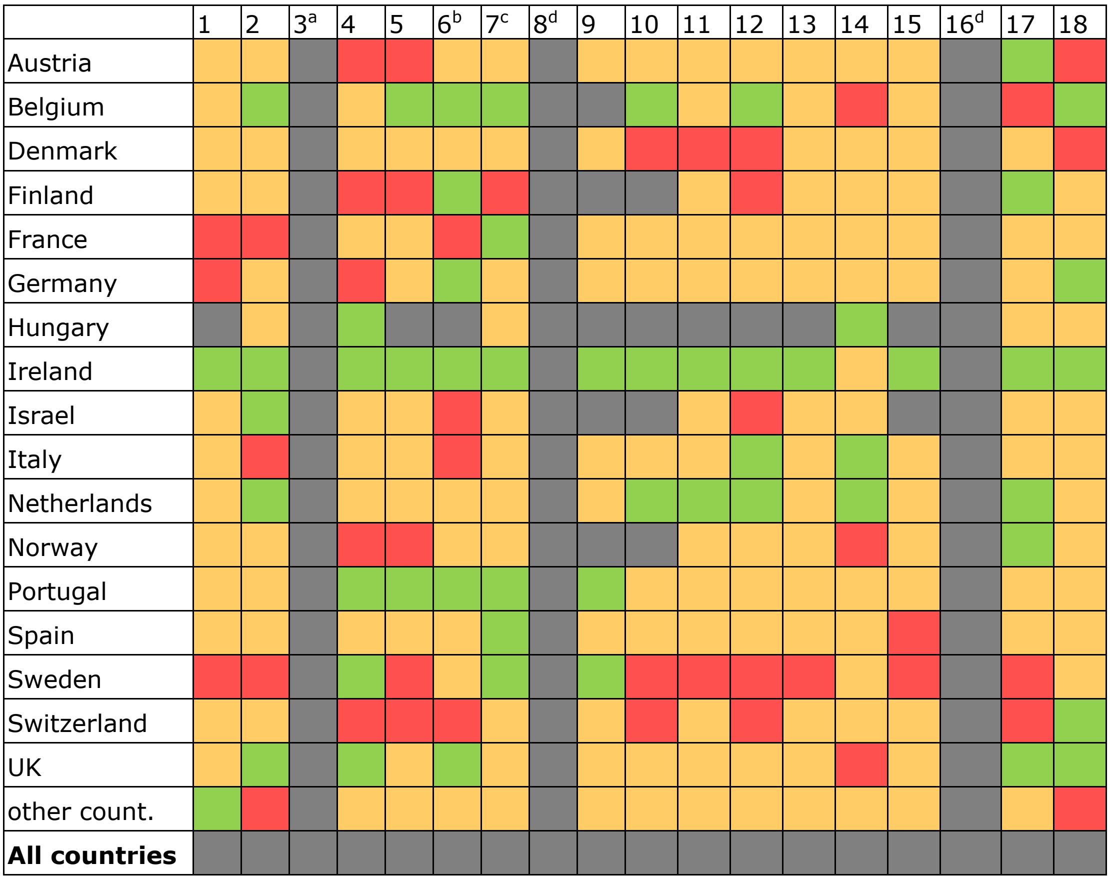
(4) Access to and provision of professional KTT services is generally widespread and most KTOs have some staff with a technical background and formal qualification in science or engineering (CoP 10). This applies less to small PROs and PROs with small KTOs, where personnel with management degrees is often common.

Training actions are more common for students and less for staff (CoP 6) and they are more popular among the larger institutions and transfer offices.

(5) Licences are the most frequent mechanism and existing companies the most frequent partners in the exploitation of IP generated in universities and other public research organisations (CoP 8). Start-ups come third in most institutions; in smaller PROs and PROs with small KTOs IP assignments are more important. The most important objectives of IP and exploitation policies are the diffusion of scientific knowledge and technology and generating possibilities for collaboration (CoP 9). The financial revenues possibly resulting from transfer activities are less often considered as important.

(6) The type of research (collaborative or contract and the funding arrangements that come with either one) and the type of IP (foreground or background) influence the negotiation of ownership and access rights in the conclusion of research contracts (CoP 17, 18). Common practice is to define this before a project starts, though expressly the sharing of revenues might be agreed upon later in the project or when it becomes clear that such revenues might accrue (CoP 16).

Exhibit E: Regulations and practices in regard to the CoP principles by country



Colour coding:	Practice not according to CoP	Practice somewhat according to CoP	Practice very much according to CoP	No data

a See principle 7.
b Referring only to training; on skills see principle 10.
c Referring to use of open access publications and commonness of publication delays to facilitate IP protection.
d Survey results do not permit a country comparison.

Cross-country differences in the Code of Practice implementation by PROs

A comparison of regulations and practices in PROs with the European Commission's 2008 Code of Practice was done for 17 countries (where at least 5 PROs had replied to the online surveys) and 15 of its 18 principles. In Exhibit E green fields stand for very good alignment of PRO practice with the CoP; yellow fields point to average alignment; red fields signal a contrast between practice in the surveyed PROs of the particular country and grey fields the absence of sufficient data. The main results are:

- The practice of PROs in Ireland follows the CoP nearly perfectly.
- For PROs from the Netherlands and from Portugal we also get only green and yellow fields indicating general alignment with several CoP principles. In Belgium and the UK green and yellow fields clearly dominate over a few red fields indicating non-alignment of PRO practice and the CoP.
- Red fields indicating a deviating national practice dominate in Sweden (9 out of 15 principles). They appear often in Switzerland (6 principles), Denmark and Finland (4 principles each), though in these countries we also find that practice follows the CoP with regard to several issues.

Relationship between institutional policies and performance

In order to analyse the relationship between institutional policies and practices and knowledge transfer performance, the policy variables were regressed on a set of six performance measures (invention disclosures, patent applications, licence agreements and revenues, start-ups, R&D agreements with companies). We found:

1. Universities and other PROs having policies on Intellectual Property, licensing and start-ups also are more successful in the different areas of KTT. In particular, if these policies are in written form they can contribute to a consistent management of different projects. Publishing the content of these policies as well as the available patents, license offers, or new start-ups is not linked to a better performance; to the opposite, institutions with a lower KTT performance tend to publish more, presumably with the intention to raise awareness and improve their performance in the future. Whether this is successful cannot be answered with the available cross-sectional data.

2. While the European Commission's Code of Practice puts forth in principle 4 that institutional incentives to faculty in order to raise awareness and involvement in IP and transfer issues should not only be monetary, our regressions clearly show that non-monetary incentives are rather ineffective. In institutions where inventors are entitled to a share of the revenues and/or they receive higher salaries the transfer performance measures are significantly higher. However, the percentage given to inventors is **not** related to performance, contrary to studies using the US AUTM dataset. We explain this with the still rather heterogeneous IP ownership situation for university faculty in Europe and a lower degree of IPR law enforcement than in the US.

3. Knowledge transfer services can either be provided internally, i.e. by the KTO or other offices of the PRO, or externally by service providers on a contract basis. We evaluated whether either form of service provision is related to any of the performance measures. Two findings are remarkable:

- Drafting patent applications is the only service that is predominantly provided externally, in roughly 70% of all PROs. However, institutions (also) providing it internally do not only have significantly higher patent applications, but also higher licence revenues. The ability to draft a patent application requires considerable technical and legal understanding, the existence of which is obviously also conducive to commercialization.
- Serving as a broker between faculty and companies is done mostly internally – by 60% of the PROs – and only by one out of six PROs externally. For raising licence revenues it is beneficial if the service is provided externally and not by the KTO itself; however, for closing R&D agreements the opposite is the case and the KTO is in an advantageous position helping companies to overcome entry barriers.

Supporting start-ups with preferential IP access, infrastructure, management and capacity-building services (training, coaching etc.) is correlated with the number of start-ups. Providing scientific, technological or financial support and having an incubator are insignificant.

4. Among the different marketing channels, personal channels, such as open days, business roundtables, or personal contacts are rather ineffective for marketing IP and closing licence agreements. Print and electronic channels and in particular the World Wide Web, on the other hand, correlate positively with performance measures.

Drivers and barriers to more effective and efficient knowledge transfers in the view of universities and other public research organisations

A few points of key importance for being successful in the area of knowledge and technology transfer resulted from the interviews conducted with 100 universities and other PROs. They are briefly summarised in this section.

1. Relationship between KTO funding and staff is crucial. KTO funding was repeatedly mentioned in the interviews as a barrier to more transfer success. A general lack or little stability of resources can have many negative effects:

- KTOs need to look and apply for resources, e.g. in the form of project grants, which takes away time from their main tasks;
- KTOs will limit their activities and focus on the early steps of the KTT value chain, the identification and protection of institutional IP, neglecting later steps, in particular technology marketing and scouting in industry.
- Most importantly, funding problems reduce the attractiveness of KTOs as employers, as remuneration and possibilities for career advancement will be rather low.

At the same time, KTO employees need to bring many different competencies and qualifications to their jobs: they need to have a good technical understanding of their fields of activity, and corresponding training and degrees (in engineering, biomedicine etc.) – as also mentioned in the CoP – are essential; as brokers KTO staff need to be able to understand the interests of scholars and faculty as well as the needs of managers and engineers and know the industry in order to be effective in assessing the commercial potential and value of an invention, helping to find users/customers for their technologies, negotiating and concluding contracts and the like; in the best case they also know the stumbling blocks of start-ups and are able to understand and support entrepreneurial faculty and students. Therefore it is logical that industry experience has been found as an important asset of transfer staff (Conti & Gaulé, 2008).

2. Formal collaboration between PROs in the area of IP/KTT is still in an early stage of development. Virtually all PROs collaborate informally on IP/KTT issues and exchange information, share good practice, lobby towards their political decision-makers, or hold joint workshops and seminars; many KTOs collaborate with or subcontract to external service providers. However, formal, contract-based collaboration among PROs is still rather an exception: few interviewees pointed to it, and more advanced collaboration types as IP/patent pools are rarely found. Cross-institutional collaboration could have several advantages: PROs could specialize on certain activities, realise scale economies and reach critical mass; they would increase their reach and create links to partners in industry (and academia) outside their existing networks. It would contribute to the professionalization of the trade and a more varied institutional landscape, which is currently very much dominated by the small internal office of the university board or administration (85% of all PROs are internal and two thirds had 8 or fewer full-time equivalents of staff). Of course, collaboration also creates some costs, entails a loss of control and self-sustainability and eventually places additional distance to the internal audience of scientists and faculty. But still, in the light of the survey finding that small

KTOs are less versatile in regard to their KTT principles and practices it would make a lot of sense for them to further explore the possibilities of collaboration.

3. Having a written and published licensing policy has advantages as well as disadvantages. The EC Code of practice states in its principle 10 that PROs should "[d]evelop and publicize a licensing policy, in order to harmonise practices within the public research organisation and ensure fairness in all deals." Only a few PROs have done this, as established by the conducted online surveys. In the interviews, the KTOs pointed out that the main reason was that without a licensing policy they were more flexible and negotiations could be conducted on a case-by-case basis. In addition, communicating the principles of their licensing practice also to their partners in industry would weaken their position in negotiations. Another important reason was that a meaningful licensing policy would need to be quite detailed and complex to accommodate the large variety of possible issues which in turn decreases the main advantage of having it, namely transparency towards the stakeholders involved in KTT.

4. Using model contracts, collecting experiences and developing trust can speed-up contract negotiations. The frequent complaint from the company interviews in 2011 that contract negotiations with PROs have become longer and more complex over the years was followed up in the PRO interviews. The majority of PROs agreed with this opinion as well. They suggested three main roads to speed up negotiations:

- Developing and using model contracts which are backed by PROs and the private sector/industry associations;
- building up negotiation experiences and using staff with such experience and good knowledge of the constraints and needs of the private sector in negotiations;
- developing trust among the involved parties and reducing the importance of the legal perspective in favour of a technology- and competence-related perspective.

The latter is not a plea for being naïve about the importance of contract clauses and contractual arrangements, but more the insight gained by our interview partners that in R&D and innovation projects some developments and pathways cannot be foreseen and taken into account in the contracts. However, if trust prevails and the parties accept that eventualities will be dealt with in a cooperative and mutually supportive manner, then lengthy haggling about possible minor contract clauses would not be necessary.

5. KTOs role in transfers not based on IP/patents is a difficult one. In an institutional IP ownership regime KTOs are the guardians of this IP. However, their role in other transfer channels is limited: R&D collaborations, contract research, and consultancy services are fully within the responsibility of faculty and staff and KTOs can do little to support them, except for influencing the framework conditions (as outlined in the CoP principles 15-18). With regard to start-ups, KTOs have few tools and means to influence as well: first of all, fostering entrepreneurial spirit and generating an entrepreneurial culture are institutional, regional or even national tasks and heavily influenced by other systems outside higher education and public research. Incubators and other supportive infrastructure are of little use without a steady flow of academic entrepreneurs. Second, as parts of the university administration, KTOs are not really close to the business sector themselves (which many try to remedy by outsourcing their start-up support activities). Third, for one of the most pressing problems of start-ups and academic entrepreneurship, the provision of seed and venture capital, PROs usually lack instruments and resources.

Drivers and barriers to more effective and efficient knowledge transfers and impressions on the impact of the Code of Practice in the view of companies from research-intensive sectors

In this task we interviewed 49 companies from the industries Biotechnology and Pharmaceuticals, Technology Hardware and Equipment, Software and Computer Services, Automobiles and Parts plus another 11 from the remaining sectors of the European Industrial R&D Investment Scoreboard. On average in 2009, the 60 interviewed companies had a large ratio of R&D expenditure to total sales (R&D-intensity of 12.1% compared to 3.6% for the population of companies in the Industrial R&D Investment Scoreboard) and they invested 83 mEUR in R&D. Roughly half of the companies had internal R&D activities at global level, i.e. in Europe and at least two further world regions.

All but one company cooperated with PROs in their home countries, 80% with partners in other European countries and nearly 60% with partners in North America. Companies used both, formal and informal mechanisms. Communication in personal networks, at conferences etc., the recruitment of academics and graduates and the reading and evaluation of scientific publications were the most common *informal* mechanisms. Collaborative and contract R&D were the most common *formal* mechanisms: only three companies (all in the software industry) were not engaged in one or the other. The use of several formal mechanisms is closely related to company size.

We differentiated between nine types of incentives for and barriers to KTT: competence-related, technical, informational, financial, organizational, legal, sociocultural, spatial and other. Competence-related incentives are by far the most important driver to take part in KTT (mentioned by 9 out of 10 companies). Organizational and sociocultural are the most frequently mentioned barriers across the board. In regard to academic patents technical incentives/barriers related to the outcome of research; the quality and the relevance of the technology were also stressed. Distinct incentives and barriers were mentioned for Europe, the US and Asian countries. Furthermore, incentives and barriers are related to certain characteristics of the companies, above all their size, R&D-intensity, the geographical extension of their internal R&D and the degree of central R&D coordination. We note in particular, that not only SMEs with less than 250 employees, but also medium-sized companies with up to 1000 employees encounter financial barriers.

For different reasons it is a challenging task to evaluate the impact of the European Commission's Code of Practice: 1) the code was issued only three years ago and we would not expect an immediate effect; 2) there are other, not necessarily fully consistent initiatives and policies on IP management and KTT at national or regional levels; 3) the collected data refers only to the current situation and comparable data from the period before the publication of the CoP is not available. Still, we compared the interviewees' experiences with IP management and KTT practices in PROs with the CoP (predominantly principles 8-18 which address KT policies and collaborative and contract research) and looked at the trends and changes to get an understanding of the likely significance of the CoP for KTT. The results can be summarised in three key points:

1. *Limited contribution of PROs to innovation.* Though universities and other public research organisations may undertake considerable efforts to turn their research into socio-economic benefits and use a broad set of exploitation mechanisms and partners, the perception of the interviewed companies is overshadowed by problems of setting-up, executing efficiently and concluding successfully joint projects. All in all, the contribution of PROs to innovation is seen as limited.

2. *The current rules, practices and incentives don't serve the purpose of converting knowledge into socio-economic benefits very well.* First and foremost, many interview partners strongly opposed the view that giving PROs strong ownership positions for the IP generated with their involvement, focussing then on exploitation via licensing activities, and establishing an incentive scheme in which PROs and their scientists give the monetary returns for research results/IP first priority is really beneficial to better converting knowledge into socio-economic benefits. According to their opinion this can cause in the worst case:

- False conceptions of the importance of PROs in innovation and bureaucratic behaviour in university administrations and KTOs, leading to long lasting contract negotiations, unrealistic price expectations for patents or licences, stalled project proposals and, in the end, less joint research and less valorisation of scientific knowledge and creation of socio-economic benefits.
- A reduced willingness of scientists to engage in an open and uncensored informal exchange of information with private enterprises and waste of time in internal discussions and negotiations with their administrations.
- Less interest of private enterprises in cooperating with European scientists, increased search for expertise and technology from other sources or world areas, strategies to bypass IP regulations and university bylaws.

3. No "one-size-fits-all" approach and collecting experiences are important. Thanks to the continued and intensified cooperation, PROs – both administrations/KTOs and scientists – and companies have developed a better mutual understanding of needs, constraints, regulations and requirements. This would constitute a good basis for intensifying the cooperation. Negotiations and haggling over IP ownership, access rights, and licence fees repeatedly constitute a burden and stumbling block.

In a number of cases the interviewees from different industries lamented the fact that regulations, practice and KTO staff are biased to considerable extent by the extraordinary conditions and opportunities in the biotechnology and pharmaceuticals industry. They are unfamiliar with the situation in other industries and unable to adjust their approaches to exploitation and interaction with industry. This lengthens negotiations and complicates or even impedes commercialisation projects.

Current and emerging KT issues: workshop results (WP4)

Overview of workshops conducted

The objective of the KTS workshops was monitoring the implementation of the EC's KT Recommendation in European countries, finding out about current and emerging issues in KT in the countries, and providing a forum for discussion about current KT issues in the countries. Considering the information gathered, the workshops can be considered as a method of collecting qualitative data on current KT practices and issues in the countries involved. The KTS conducted 15 workshops in 2011, 2012 and 2013, covering 38 European countries.

Workshop issues

Numerous KT issues were discussed in the workshops, which can be subdivided by issues of strategy, operations, organisation, measurement, and funding. In the following, some of the most important issues are summarised.

Strategy-related issues:

- *Level of strategy development*: Even in countries that are further advanced in KT and IP management practice, there seems to be considerable room for further development of related strategies at universities and PROs.
- *KT programmes*: National support programmes can have positive effects on KT performance, but sustainability may be difficult to achieve. National KT programmes may have positive effects on KT strategy and capacities development, but after the end of the programme PROs may reduce their KT activities again.
- *Prevention of IP loss*: The prevention of IP loss to industry and countries outside Europe without adequate compensation was only discussed in-depth at the German

workshop. One could interpret this in different ways: It might indicate a lack of awareness but it might also indicate that this issue is not very important for Europe.

- *KT standardisation*: Currently there are several parallel initiatives for KT professional certification in Europe which might need to co-operate and align their activities.
- *Easy access to PRO's IP*: The University of Glasgow's "Easy Access IP" approach attracted much attention in Europe, but it is fairly young and still gathering experience and it is being critically discussed.
- *KT governance*: The development of good KT governance was found to be an issue in many South-Eastern European countries. A deeper understanding of strategy development for KT and IP management needs to be developed, including e.g. issues to be covered and acknowledgement of the complexity of KT. The European Commission may need to consider this in its future KT policies.

Operations-related issues:

- *Model contracts* were mentioned as an issue in many workshops. They were mainly assessed as positive, while it was often stressed that they provide not more and not less than guidelines for concrete negotiations.
- *Commercialisation support services* were presented and discussed mainly with regard to the Commercial Edge, an initiative from the UK which is about to spread to a larger number of universities. Such services may be promising, but their proliferation requires high-profile service providers with in-depth deal-making expertise.
- *PRO's IP capacity and skills* were found to be an issue in practically all European countries. The strength and sustainability of KT office services is often questioned, for example when the KTOs deal primarily with research contract issues rather than valorisation or when there is relatively few KTO staff compared with the amount of tasks to be accomplished. Even more basic, in the South-East of Europe there is also a need to strengthen the R&D base from which opportunities for KT may arise.
- *Firm's IP capacity and skills* may also be limited, and responsibilities may be unclear, which hampers interaction about IP between PROs and business.
- Developing KT and IP awareness among researchers are apparently an issue even in more advanced countries like the Nordic states; it was found to be an even stronger issue in less advanced countries, particularly in Eastern Europe.

Organisation-related issues:

- *(De-)centralisation of KT* was discussed in several workshops. It may be important to allow different types of universities to pursue different types of KT strategies and activities, and it may be important to decide about centralisation or decentralisation of KT services with respect to how researchers' needs can best be fulfilled.
- *S*mall countries in particular may benefit from central KT functions carried out by an organisation serving several PROs – or, vice versa, it is neither efficient nor effective for every PRO to try to build up an own KTO. KTOs should in any case be able to focus on directly communicating with the researchers at their PROs, which is their essential task.
- *New KT models*: In a related session at the Nordic workshop, it was mentioned that enterprises are increasingly asking for "strong IP" in the form of IP portfolios and "patent families" because single IP may not carry sufficient commercial value. However, cases of actually combining IP and creating patent families were found to be rare. The bottom line for strong IP may be the quality of research.

- The importance of *KT through people*, in contrast to KT by patenting, licensing and spin-offs, was mentioned as an issue particularly in the workshops where countries with less advanced IP management capacities were involved (e.g. Baltic, Polish).

Measurement-related issues:

- Several similar surveys on KT indicators are conducted regularly in Europe, putting strain on the TTOs requested to answer them and probably reducing the response rates (unless the surveys are obligatory). Furthermore, since there are no standardised definitions, TTOs may be unsure how to properly answer the questions.
- The importance of good KT indicators for assessing KT practice and for designing good policies was substantiated, but currently there may be too much focus on patents. Counting the number of patents does not reveal the success of academic research or of knowledge transfer. It may be desirable to have impact measures.

Funding-related issues:

- An apparent lack of proof-of-concept funding was mentioned in many workshops but not discussed more in-depth; this lack would hamper KT because promising inventions often cannot be developed to a commercialisable stage.
- State aid rules' ambiguity was mentioned in many workshops but hardly ever discussed more deeply; the current revision of these rules by the EC was welcomed.

Conclusions

Supporting PROs' KT strategy, policy and procedure development:

The EC should support the development of Green and White Papers on KT and IP management to start a Europe-wide consultation process among different stakeholders in governments, universities and other PROs, business associations and companies and mobilise considerable resources and discussion on KT regulations and activities of public research organisations.

Exploring and supporting the development of non-monetary knowledge transfer incentives as well as formal KTO collaboration could also be beneficial.

Improving knowledge transfer capacities and skills

There is a need for "more KT about KT", to be filled for example in the form of workshops on more specific KT issues, a KT good practice manual and a KT Europe Network. The benefits and possible downsides of the following issues should be further explored and subsequently supported in adequate ways: KT standardisation and certification; internships and expert visit programmes for KTOs; deal making support through intermediaries; and SME requirements in KT and their capacities to interact with PROs.

Promoting broad dissemination of knowledge while protecting IP

An analysis of the publication activities should explore the benefits and risks of publishing KT strategies and policies. It should find out what content should be published in what media to achieve the best possible visibility for the outcomes of academic research and development.

Facilitating cross-border research and KT

The globalisation of research collaboration and knowledge transfer requires further research on its consequences and the conditions under which, for instance, knowledge generated at European PROs will or will not be made available to non-European companies.

Introducing or adapting national guidelines and legislation

As regards improving legal framework conditions for KT, it is crucial to evaluate closely the existing IP ownership and access regulations in Europe and their consequences for the commercialisation of knowledge. As regards de-bureaucratisation of KT processes, a constant review of existing funding and project regulations in Europe, creating the possibility for “fast track” applications and evaluations under certain conditions, could be considered.

Improved monitoring of policy measures and KT performance

While there is a European questionnaire template for KTO surveys, there are three problems of current European KTO surveys: they do not cover all leading European KTOs, they are not being combined into one data set, and answering to several surveys distracts KTOs from their usual business. Options for improving the data include encouraging cooperation between the different professional organisations so that data can be pooled, funding national statistical offices to conduct national surveys, and funding professional associations to survey KTOs that are not part of their membership.

1 OBJECTIVES AND CONTENTS OF THE FINAL REPORT

This document is the Final Report of the Knowledge Transfer Study 2010-2012, as required in section 3.2.4 (p. 12) of the Study's Tender Specifications. It constitutes Deliverable 5 of the Knowledge Transfer Study. The Tender Specifications (TS) of the Knowledge Transfer Study 2010-2012 provide the following specifications for the Final Report:

"The final report (200-250 pages without annexes) will present the results of the study, including its objectives, the methodology, the results and reasoned conclusions in a readable and well presented form. The report shall include:

- An executive summary – a short description (5-10 pages) of the objectives of the study, tasks and methods, and a synthesis of the main results of data and information collection and analysis;
- Main study report describing the work undertaken and the results of the data and information collection and analysis;
- Relevant annexes (including the raw data, questionnaires, records of interviews etc.)."

As required, the lay-out of the final report takes into account the requirements of Office for Official Publications of the European Communities (OPOCE) for its publications.

This Report takes the following approach to fulfilling these tasks.

Recommendation implementation: KT policies (WP1)

An analysis of the European Knowledge Transfer Policy Surveys in 2010 and 2012, indicating developments in recent years and including a regression analysis about possible linkages between national KT policies and KT performance.

KT indicators: performance of PROs and universities (WP2)

An analysis of the European Knowledge Transfer Indicators Surveys in 2011 and 2012, indicating developments between the two years.

Code of Practice implementation and impact (WP3)

An analysis of two online KTO surveys in 2011 and 2012, indicating developments from one year to the other, as well as an analysis of the company interviews in 2011 and the KTO interviews in 2012.

KT problems and emerging issues: workshop results (WP4)

An analysis of the 14 workshops conducted in the framework of the Knowledge Transfer Study in 2010 and 2011. Results of the final workshop will be included in the revised Final Report.

Conclusions

A set of conclusions from the findings of all WPs, indicating policy recommendations.

2 STATUS OF IMPLEMENTING THE KT RECOMMENDATION (WP1)

2.1 Objectives and background of the KT policy surveys

The objective of the European KT Policy Surveys in 2010 and 2012 was monitoring the status of implementation of the European Commission's "Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations" from 2008.

Responding to this survey fulfilled the Recommendation's requirement that Member States should "inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact", as stipulated in item 11 of the Recommendation. Associated States were also kindly requested to fill in the questionnaire. The 2012 survey was a follow-up exercise after an initial survey conducted by the European Commission itself in 2010. In the 2010 survey, responses from 26 countries were received.

2.2 Methodology of the European KT Policy Surveys

Methodological approach

Timeline: empirica Communication and Technology Research (Bonn, Germany) launched the survey on behalf of the European Commission at the beginning of May 2012, asking the countries to respond by mid-July 2012. The survey was concluded after six months at the end of October 2012. The survey in 2012 was a follow-on activity after an initial survey launched by the European Commission itself in 2010.

Target group: In 2012, representatives from 39 European countries – EU Member States and Associate Countries in the European Research Area – received the questionnaire. Most of the representatives are official members of the European Research Area Committee working group on knowledge transfer.[1] In countries with no or no active member in this group, empirica involved KT experts who represented their country in the KTS workshops (WP4).

Response rate: By 31 October 2012, empirica had received complete answers from 35 countries, which is a response rate of 90%. The missing countries were Bosnia-Herzegovina, Italy, Liechtenstein, and Turkey. For Italy, a reply was received from the Ministry of Economic Development, while most of the questions needed to be answered by the Ministry of Education, Universities and Research. Empirica completed the questionnaires for these four countries, using information from the ERAWATCH country pages website,[2] information from the 2010 survey (available for Italy and Turkey), and KTS workshop presentations (available for Bosnia-Herzegovina, Italy and Liechtenstein). In the 2010 survey, questionnaires had been returned from 28 countries.

Survey themes and questions: For the survey in 2012, the study team rearranged the eleven items of the Recommendation to seven themes in order to facilitate responses and analysis. For each theme, the countries were asked, firstly, to report about KT policy developments since 2010 and, secondly, to tick boxes for specific policy measures,

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[1] Since Belgium has one representative each for the Flemish and the Wallonian part of the country, both received the questionnaire.

[2] See http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages.

indicating whether the measures exist, do not exist or are planned in their countries. The countries were also offered the opportunity to add explanatory statements if deemed useful. The measures asked about are the items of the Recommendation and the related "facilitating practices". For the first two themes, a "yes" or "no" answer to the general question whether the country ensures strategy development or encourages the establishment of policies and procedures for IP management would not have brought sufficient insights. More detailed questions were necessary. In the course of research the study team identified national practices related to strategy development and IP policy development beyond the items and facilitating practices mentioned in the Recommendation. Thus, for these two themes – KT strategies and IP policies – the questionnaire also included questions about legal and non-legal measures which are not specified in the Recommendation.[3] Altogether the questionnaire included 40 single questions.

Data evaluation: The tickbox approach with answers of "yes", "no" and "planned" allows for a tentative quantitative analysis of national KT policies. An answer of "yes" was assigned the value of 1 (or "one point"), "planned" 0.5, and "no" 0. This assessment takes a favourable view on plans, assuming that "planned is half implemented". Occasionally, the value of 0.5 was also assigned when certain measures apply for some regions of the country.[4] For calculating the countries' level of implementation, the maximum number of points was considered as 100%. Thus, if a country had fulfilled all measures asked about in the questionnaire, its level of implementation would be 100%; if it had not implemented or planned any measure it would be 0. An overall value for all countries and all items together was calculated in the same way. In the following, data are largely assessed by describing the percentages to which indicators were found to be fulfilled or planned and by pointing to specificities of certain countries. Occasionally, the assessments are supplemented by individual statements from the countries and by findings from the Knowledge Transfer Study workshops. Thus, the assessment is based on the information provided by the countries. A more detailed investigation about the quality and extent of the measures taken would have been beyond the scope of the study.

Limitations: A simple approach was chosen in order to facilitate answers and to receive a high response rate. There are however limitations of the approach. Above all, an answer of "yes" may refer to many different levels of fulfilling a measure – measures may exist, but their scope or depth may be very high or low; they may be very well designed and very effective or badly designed and not effective. Similarly, plans to introduce a measure may be well advanced or just an idea. Speculatively, some assessments might have a tendency to show the country's policies more positive than they actually are. This may in particular apply to planned measures.

Outlook: Future surveys of a similar kind might have a more detailed questionnaire – at some risk of a lower response rate – or be supplemented by more detailed assessments from third party sources.[5] Selected items of the Code of Practice might be included explicitly, for example the issue of "open innovation" as an exemplary approach for KT

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[3] See the annex for WP1 for the standard version of the questionnaire.

[4] Belgium was a special case with one questionnaire returned for Flanders and one for Wallonia and the Brussels capital region. When one part of the country indicated "yes" and the other one(s) "no", a score of 0.5 was attributed; when one part indicated "planned" and the other one(s) "no", the attributed score was 0.25. When one part indicated "yes" and the other one(s) provided no answer, which was the case for 14 of 40 single questions, a score of 1 was attributed; Belgium's overall KT policy performance might thus be overestimated.

[5] The annex for WP1 also includes notes about how specific questions could be improved in possible future surveys.

strategy which is currently high on the European Commission's agenda.[6] The theme about KT monitoring and reporting could be supplemented by a question about KT policy evaluation, which would be important from a policy effectiveness and efficiency point of view. Furthermore, the questionnaire could also be answered for reference countries outside Europe, e.g. the US, Japan, and South Korea.

2.3 Overview of Recommendation implementation in European countries

2.3.1 Recommendation implementation in 2012

General assessment of Recommendation implementation

Taking all countries, all Recommendation items and all related questions of the European Knowledge Transfer Policy Survey 2012 together, the **level of implementation is on average 53%**. Considering only policy measures that are actually implemented, i.e. not only planned, the level of implementation was found to be 49%. This means that the Recommendation's targets are currently reached approximately by half. "Implementation level" refers to fulfilling the Recommendation's single items, the "facilitating practices" mentioned in the Recommendation's annex, and a few further questions added by the study team in order to operationalise Recommendation items.

There are **strong differences between European countries** not only in the overall level of implementing the Recommendation but also in implementing the Recommendation's seven themes. Each country has its profile of KT policies, i.e. its own profile of implementing the KT Recommendation.

Overall implementation of the Recommendation: European average

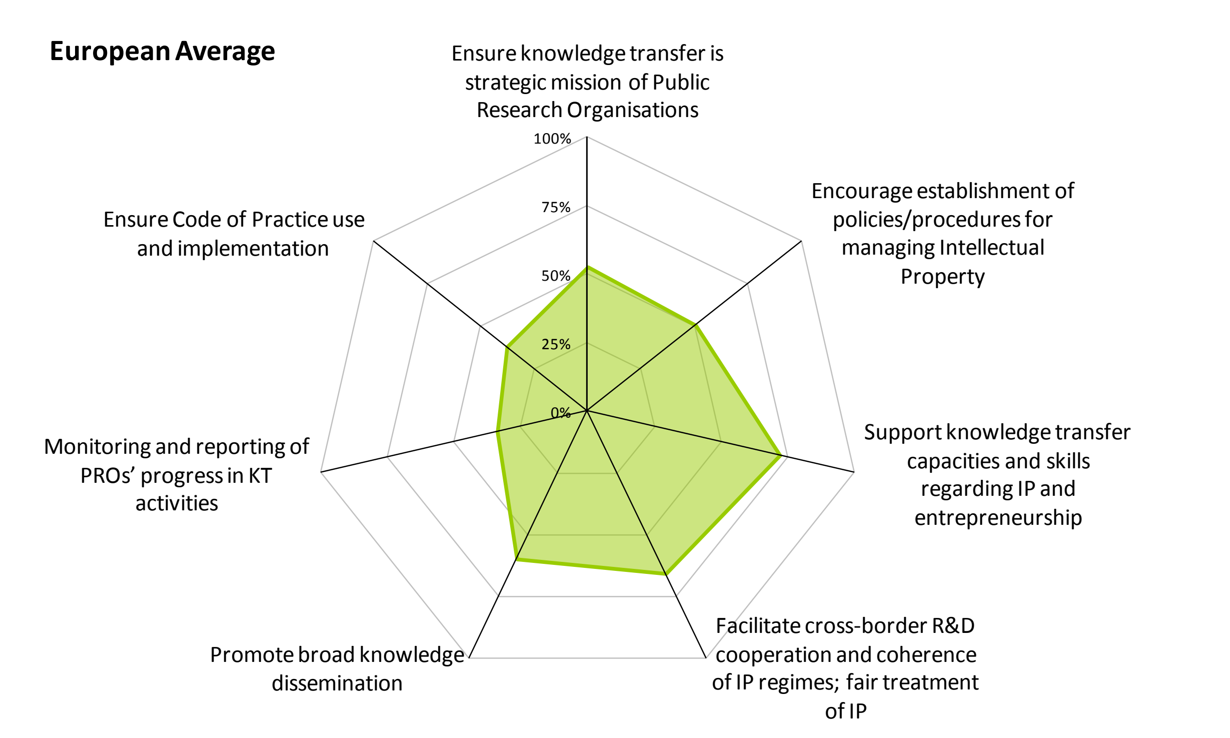
Implementation was found to be highest for "support KT capacities and skills" (74%), followed by "facilitate cross-border KT cooperation" (68%), "promote broad knowledge dissemination" (60%), "ensure KT is strategic mission of PROs" (55%) and "encouragement of policies/procedures for managing IP" (51%).

Two items are implemented below 50% on average: "ensure Code of Practice use and implementation" (34%) and "monitoring and reporting KT policy measures and impact" (35%).

Exhibits 2-1 and 2-2 show the European average of implementing the KT Recommendation. Exhibit 2-1 shows unweighted values, i.e. each country has the same weight. This means that the largest countries – Germany, France, Italy, the UK, Spain, and Poland – have the same weight as the smallest – Liechtenstein, Malta and Iceland. Therefore, an alternative presentation in Exhibit 2-2 shows the values weighted by population. Measuring KT policy performance with the weight of population of the countries concerned indicates the share of the European population – including researchers – that benefit from comprehensive KT policies. The picture is similar but with data weighted by population, performance is for all Recommendation themes better than without weighting because some of the largest European countries – notably the UK, Germany, France, and Poland – have more comprehensive KT policies than many of the smaller countries.

[6] See the European Commission's Communication about the European Research Area in European Commission (2012).

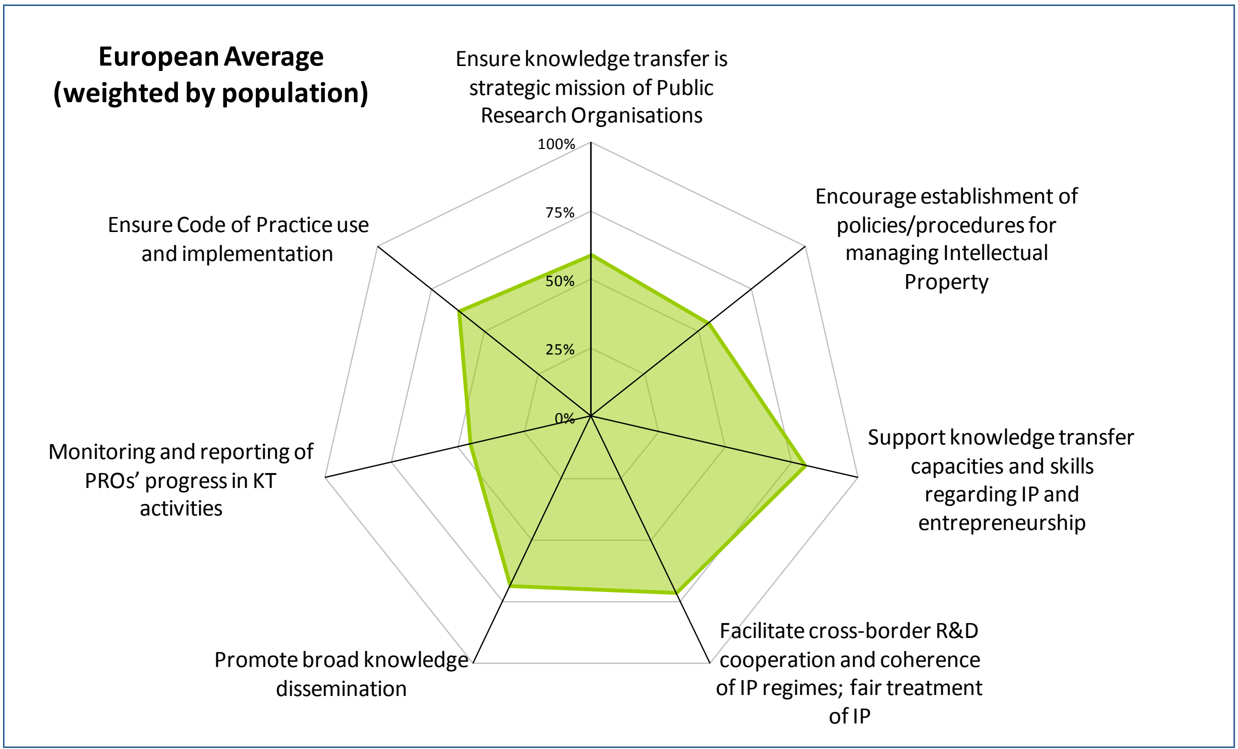
Exhibit 2-1: Overall implementation of the Recommendation: European average 2012 (unweighted, i.e. each country has the same weight)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-2: Overall implementation of the Recommendation: European average 2012 (weighted by population, i.e. each country is represented by the size of its population)



n = 39.

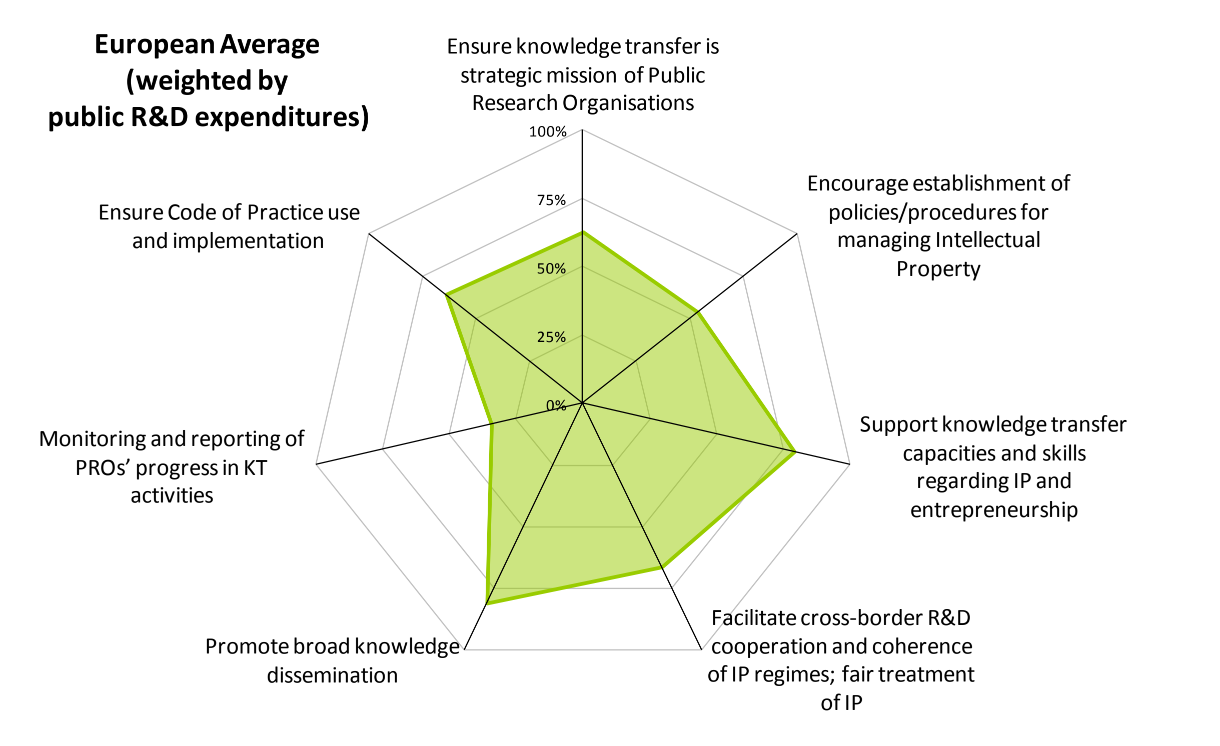
Source: empirica, European Knowledge Transfer Policy Survey 2012

Apparently European countries put strongest emphasis on capacities and skills development, while there is less effort on supporting the development of KT strategies and IP management procedures. Hence one might argue that European countries take the third step before the first and the second. Similarly, one could question whether it is good policy practice to focus capacities and skills while rather neglecting policy monitoring and Code of Practice implementation. Tentatively, resources for KT capacities and skills development might be more effectively and more efficiently used when KT strategies, IP policies, monitoring practices and a Code of Practice are in place.

Exhibit 2-3 shows average European KT policy performance in the seven themes of the Recommendation weighted by national public R&D expenditure. Such expenditure includes governmental expenditure in R&D (GovERD) and R&D expenditure by higher education institutions (HERD).[7] The diagram excludes the five Balkan states of Albania, Bosnia-Herzegovina, FYR Macedonia, Montenegro and Serbia as well as Liechtenstein for which no data on R&D expenditure is available.

Measuring KT policy performance with the weight of public R&D expenditure of the countries concerned indicates the share of European R&D activities that are accompanied by comprehensive KT policies and that benefit from such policies. The picture is similar as weighted by population. The slight difference is that weighted by public R&D expenditure, performance for "broad knowledge dissemination" is somewhat stronger and performance for "monitoring and reporting of PROs' KT activities" is somewhat weaker than weighted by population. This picture is not considerably influenced by the six missing countries.

Exhibit 2-3: Overall implementation of the Recommendation: European average 2012 (weighted by public R&D expenditure, i.e. each country is represented by the level of its public investment into R&D)



n = 33. Missing countries: Albania, Bosnia-Herzegovina, FYR Macedonia, Montenegro, Liechtenstein, Serbia

Source: empirica, European Knowledge Transfer Policy Survey 2012

[7] The figures thus exclude business investment into R&D. All three categories together – i.e. governmental, higher education and business expenditures on R&D – add up to a country's gross expenditure on research and development (GERD).

Overall implementation of Recommendation items by country

Positioning: The survey found that the three countries with the most comprehensive KT policies fulfilled more than three quarters of the policy measures. Austria is the country with the most comprehensive KT policies, found to fulfil 93% of the policy measures. The UK (87%) and Germany (78%) follow.

A broad group 21 countries were found to fulfil KT policy measures above the European average, i.e. between 53% and 75%: Poland (74%), Luxembourg (71%), Denmark (71%), Ireland (70%), Hungary and Finland (68%), France (64%), Macedonia (64%), Estonia (63%), Serbia (63%), Netherlands (61%), Italy (59%), Iceland (58%), Spain and Lithuania (56%), Belgium and Turkey (55%) as well as the Czech Republic and Portugal (54%).

Furthermore, 14 countries were found to have implemented 26-53% of the measures: Israel (53%), Croatia (52%), Romania (48%), Switzerland (47%), Norway (47%), Bulgaria (46%), Slovenia (42%), Montenegro (39%), Sweden (36%), Cyprus (34%), Malta (34%), Albania (30%), Slovakia (30%), and Latvia (25%).

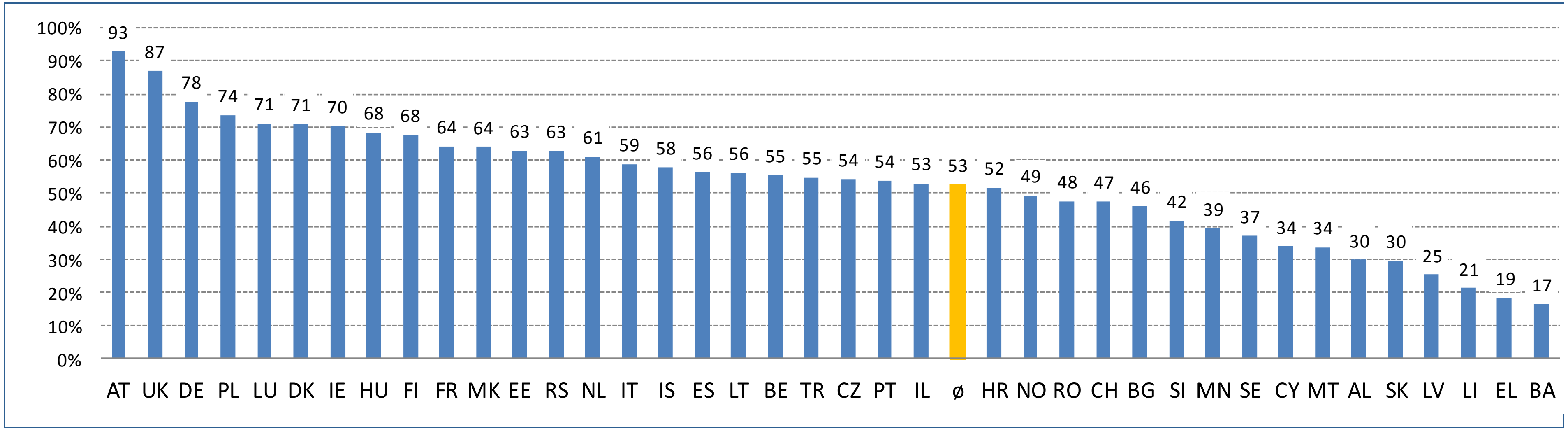
Finally, four countries were found to fulfil less than 25% of the measures. This group included Liechtenstein (21%), Greece (19%) and Bosnia-Herzegovina (17%).

Country clusters: The positioning reveals some particular clustering of countries, but not only the type one would expect. Two cluster groups stand out. First, comprehensive KT policies appear to be correlated with wealth. Seven of the top nine countries have a GDP per capita above the EU average, and they also belong to the countries that formed the European Community already in the 1970s. The "top ten" countries are all from the geographic middle of Europe. However, there are exceptions from the rule, notably Switzerland, Norway, Sweden and Liechtenstein which are wealthy countries with less comprehensive KT policies. The low position of Switzerland, Norway and Liechtenstein might to some extent be related to the fact that they are no EU Member States so that they are not formally required to fulfil the Recommendation. The low position of Sweden might partly be explainable by the fast that it is beside Italy the only EU Member State where the professor's privilege is still in place, which limits the role of KTOs and diminishes the necessity for policies to strengthen KTOs. Secondly, comprehensive KT policies were found mainly in larger countries: Germany, UK, France, Spain and Poland are all above average (data from Italy is still missing). On the other hand, while some of the laggards and followers are among the smallest European countries, notably Malta, Cyprus and Latvia, there are several very small countries with more comprehensive KT policies: Iceland, Estonia, Luxembourg, and FYR Macedonia. Different from what one might expect Nordic countries are represented in all groups but not among the leaders, while Denmark and Finland are among the followers. Balkan countries and East European countries are also represented in all groups except the leaders.[8]

Exhibit 2-4 shows the position of European countries by their level of having implemented the KT Recommendation, including plans. Exhibit 2-5 visualises to which of the four groups the countries belong with regard to KT policy measures.

[8] See also section 2.5 for a correlation of countries with various national characteristics.

*Exhibit 2-4: Positioning of overall implementation of the knowledge transfer Recommendation in European countries – **also including policy plans***

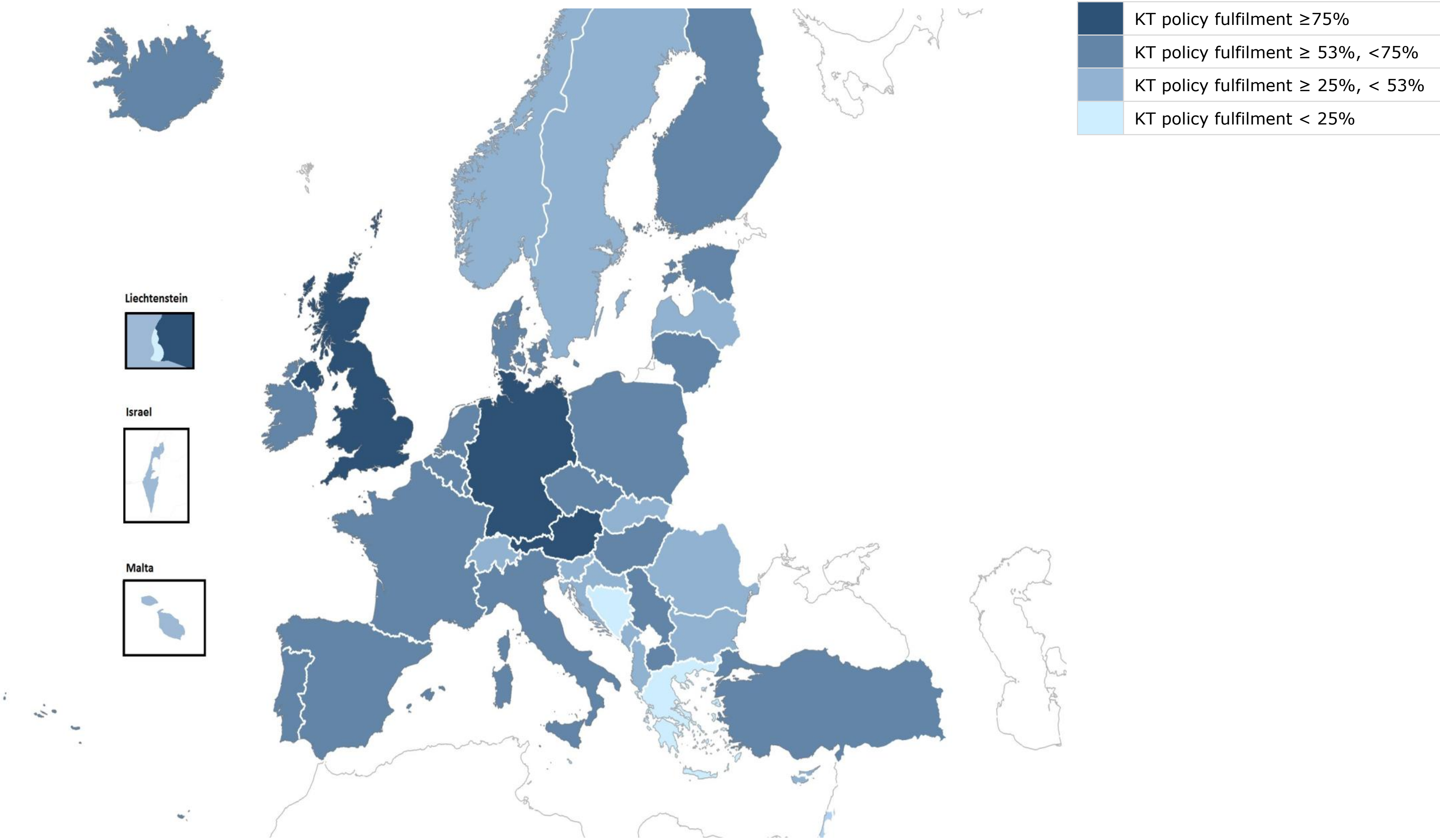


n = 39

Source: empirica, European Knowledge Transfer Policy Survey 2012

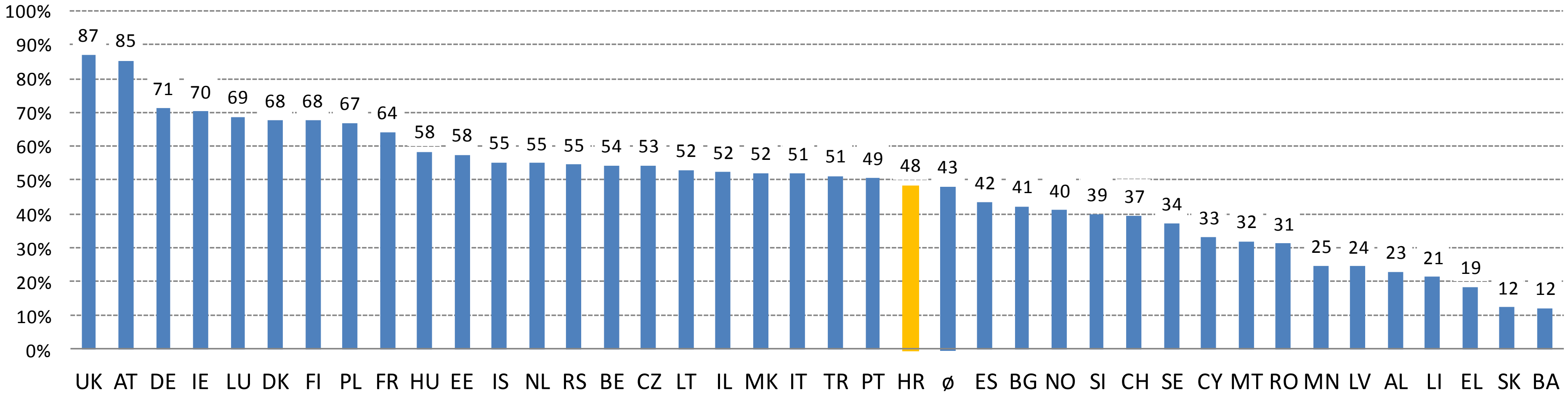
AL = Albania	AT = Austria	BE = Belgium	BA = Bosnia-Herzegovina	BG = Bulgaria	HR = Croatia
CY = Cyprus	CZ = Czech Republic	DK = Denmark	EE = Estonia	FI = Finland	FR = France
DE = Germany	EL = Greece	HU = Hungary	IS = Iceland	IE = Ireland	IL = Israel
IT = Italy	LV = Latvia	LI = Liechtenstein	LT = Lithuania	LU = Luxembourg	MK = FYR Macedonia
MT = Malta	MN = Montenegro	NL = Netherlands	NO = Norway	PL = Poland	PT = Portugal
ES = Spain	RO = Romania	RS = Republic of Serbia	SK = Slovakia	SI = Slovenia	SE = Sweden
CH = Switzerland	TR =Turkey	UK = United Kingdom			

Exhibit 2-5: Landscape of implementing the European Commission's knowledge transfer Recommendation from 2008 in European countries (incl. plans)



Source: empirica, European Knowledge Transfer Policy Survey 2012. Presentation by StepMap.

*Exhibit 2-6: Landscape of implementing the European Commission's knowledge transfer Recommendation from 2008 in European countries **– actually implemented policy measures only***



n = 39

Source: empirica, European Knowledge Transfer Policy Survey 2012

AL = Albania	AT = Austria	BE = Belgium	BA = Bosnia-Herzegovina	BG = Bulgaria	HR = Croatia
CY = Cyprus	CZ = Czech Republic	DK = Denmark	EE = Estonia	FI = Finland	FR = France
DE = Germany	EL = Greece	HU = Hungary	IS = Iceland	IE = Ireland	IL = Israel
IT = Italy	LV = Latvia	LI = Liechtenstein	LT = Lithuania	LU = Luxembourg	MK = FYR Macedonia
MT = Malta	MN = Montenegro	NL = Netherlands	NO = Norway	PL = Poland	PT = Portugal
ES = Spain	RO = Romania	RS = Republic of Serbia	SK = Slovakia	SI = Slovenia	SE = Sweden
CH = Switzerland	TR =Turkey	UK = United Kingdom			

Exhibit 2-6 presents the positioning of European countries when considering only policy measures which are actually implemented, no plans. The picture then changes slightly. In particular, the average drops to 48%, Austria and the UK swap places at the top and remain the only KT policy leaders, and several countries score considerable lower: Slovakia (-17%), Romania (-16%), Montenegro (-15%), Spain (-13%), FYR Macedonia (-12%), and Hungary (-10%).

2.3.2 KT policy developments from 2010 to 2012

The European KT Policy Survey in 2012 was a follow-on activity after an initial survey of similar kind in 2010, at that time carried out by the European Commission itself. In 2010, answers from 28 countries were received. Exhibit 2-6 indicates in which of the themes the countries launched new policy measures according to their statements in 2012.

For each policy theme, the 28 countries who had replied to the previous survey in 2010 were asked whether they introduced new measures since then. Considering the responses from these 28 countries, there were apparently lively KT policy developments from 2010 to 2012. **All 28 countries reported new KT policy measures** since 2010 in at least one of the seven themes or at least on a general level.[9] However, the responses in the questionnaires do not always tell clearly whether a certain measure was introduced since 2010 or whether it existed already before. The analysis in this section might thus overestimate the level of really new measures somewhat.

Austria, Spain, Germany, Ireland and the UK were found to be particularly active. These countries indicated policy developments in all or six of the themes. Except Spain, these countries already belong to the top ten KT policy implementers. It appears that those countries with strong KT policies maintain their strong activities. This means that the top group might maintain or even increase their lead in the next years. Six countries indicated policy initiatives in five themes: Belgium, the Czech Republic, Estonia, Lithuania, Malta, and Poland. Notably, Lithuania and Malta are currently among the "moderate KT policy implementers". These countries appear to be strongly improving their KT policy and might move up the ladder in the years to come.

Many countries used the first question about "KT as a strategic mission" to report about general KT related policies such as national research and innovation plans. For the table in Exhibit 2-7, such general measures were separated from specific measures related to KT strategy development.

Most countries (15) indicated new policy measures in the field of "KT capacities and skills" and "knowledge dissemination", followed by "monitoring KT progress" (14 countries) and "IP policies and procedures" (12 countries). Eleven countries reported measures related to developing PROs' KT strategies. A smaller number of countries indicated policy activities in the themes of trans-national co-operation and Code of Practice implementation (eight countries each). As regards the high number of countries indicating recent policy initiatives in the field of KT capacities and skills, this supplements the survey finding that KT policies in European countries are strongest in this field.

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9 Norway did not report new measures in the questionnaires but in the Nordic workshop of the Knowledge Transfer Study on 1 June 2011 in Gothenburg.

Exhibit 2-7: Countries indicating new KT policy measures since 2010

		Policy theme related to the KT Recommendation from 2008						
Country	**General KT-related policies**	**A) KT as a strategic mission of PROs**	**B) IP policies and proce-dures**	**C) KT capacities and skills**	**D) Trans-national co-operation**	**E) Know-ledge dissemi-nation**	**F) Monito-ring KT progress**	**G) Code of Practice implem-entation**
Albania	X		X			(X)		
Austria		(X)	X	X	X	X	(X)	(X)
Belgium		X		X	X	X	X	
Cyprus			X					
Czech Rep.	(X)		X	X		(X)	X	
Denmark	X			X		X	X	
Estonia	X				(X)	X	X	X
Spain	X	X	X	X	X	X	(X)	X
Finland	X			X			X	
France	X	X	X	X		X		
Germany	X		X	X	X		X	X
Hungary						X		
Ireland		(X)	X	X		X	X	X
Israel		X						
Italy *	X							
Latvia	X							
Lithuania	X			X	(X)	X		X
Luxemburg	X							
Malta	X		X	X		X	X	X
Netherlands		X		X			X	
Norway	X							
Poland	X	X	X	X	X		X	
Romania		X						
Slovenia	X	X				X		
Sweden						X	X	
Switzerland			X	X				
Turkey *	X							
United Kingdom	X	X	X	X	(X)	X	X	X

n = 28 countries that responded to the KT policy surveys in 2010 and 2012. Crosses in brackets (x) indicate policy plans that were introduced since 2010 or general policy documents demanding activities in the related theme or policy measures that might have been implemented already before 2010.

* No official reply in 2012; information taken from KTS workshops and ERAWATCH.

Source: empirica, European Knowledge Transfer Policy Survey 2012

2.4 Findings by Recommendation theme

2.4.1 Knowledge transfer as a strategic mission of Public Research Organisations

Background

This theme relates to point 1 of the Recommendation that Member States should "e*nsure that all public research organisations define knowledge transfer as a strategic mission*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

1. *"Knowledge transfer between universities and industry is made a permanent political and operational priority for all public research funding bodies within a Member State, at both national and regional level.*
2. *The subject clearly falls within the responsibility of a ministry, which is charged with coordinating knowledge transfer promotion initiatives with other ministries.*
3. *Each ministry and regional government body that carries out knowledge transfer activities designates an official responsible for monitoring their impact. They meet regularly in order to exchange information and discuss ways to improve knowledge transfer."*

Policy measures for fostering KT strategy development at PROs

Within the policy measures for fostering KT strategy development asked about in the survey, **non-legal measures were found to be widespread** (see Exhibit 2-8). The largest percentage (85%) was found for "encouraging universities and other PROs to develop KT strategies". In 77% of European countries that responded to the survey, KT is "a permanent political and operational priority for public research funding bodies", and in 64% "national and regional governments support universities and other PROs in developing KT strategies".

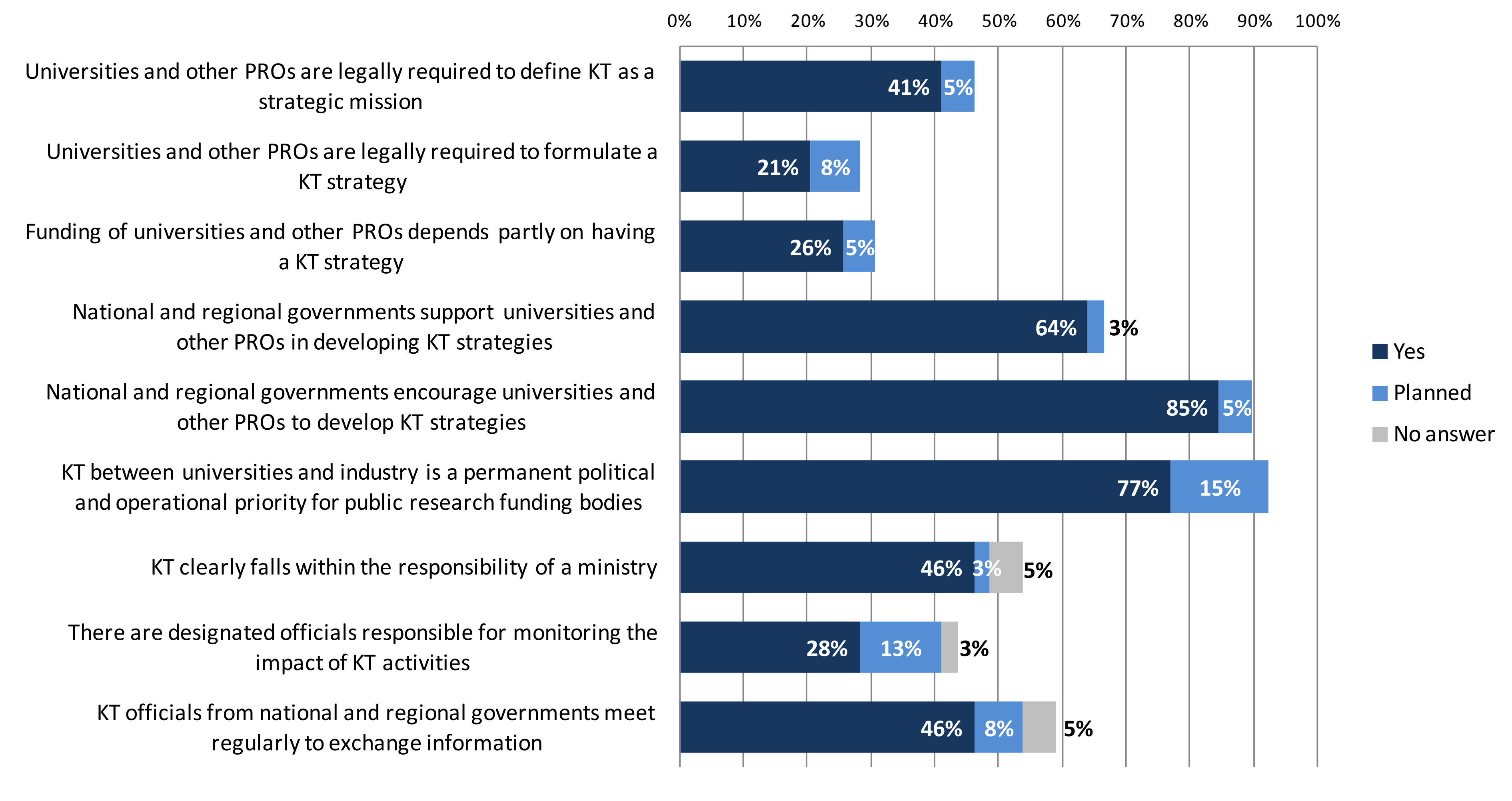
Legal measures to support KT strategy development were found to be less prevalent. While a larger share of the countries (41%) reported that "universities and other PROs are legally required to define KT as a strategic mission", only one fifth (21%) said that "universities and other PROs are legally required to formulate a KT strategy". A quarter (26%) stated that "funding of universities and other PROs depends partly on having a KT strategy".

The level of applying the facilitating practices mentioned in the KT Recommendation varies. 46% of the countries said that "KT officials from national and regional governments meet regularly to exchange information" about KT, which further indicates that the majority of countries takes KT serious. Only 46% reported that "KT clearly falls within the responsibility of a ministry". This may indicate the natural character of KT of taking place between PROs and industry – when there are different ministries for research and for the economy, both may be assigned responsibilities for KT. Finally, designated officials responsible for monitoring the impact of KT activities were found in a little more than a quarter (28%) of the countries.

Policies fostering KT strategy development in PROs in European countries

Most advanced policies for KT strategy development were found in Austria (100% fulfilment), France and Poland (89%) as well as Estonia, Romania, Switzerland and the UK (78%) – see Exhibit 2-9. The high position of Switzerland in this category is remarkable because this country does not score that high in most other categories.

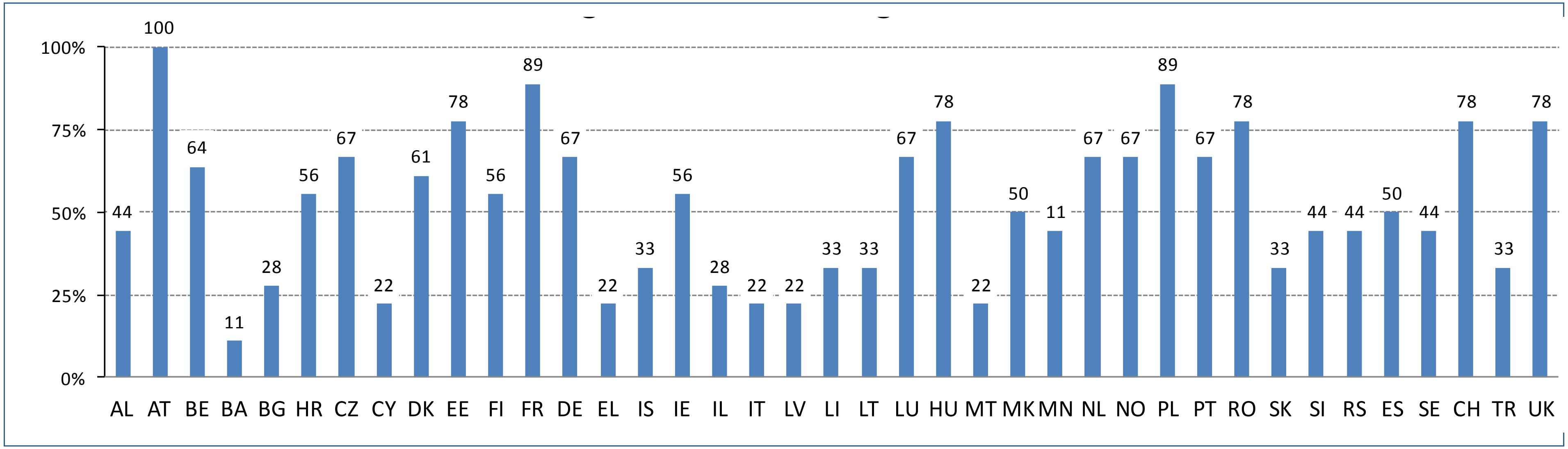
Exhibit 2-8: Policy measures fostering knowledge transfer as a strategic mission of PROs (% of countries in which the measure is implemented)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-9: Policies fostering knowledge transfer as a strategic mission of PROs: overview about implementation in European countries



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

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2.4.2 Policies for managing intellectual property

Background

This theme relates to point 2 of the Recommendation that Member States should "*encourage public research organisations to establish and publicise policies and procedures for the management of intellectual property in line with the Code of Practice set out in Annex I*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

4. *"The proper management of intellectual property resulting from public funding is promoted, requiring that it be carried out according to established principles taking into account the legitimate interests of industry (e.g. temporary confidentiality constraints).*
5. *Research policy promotes reliance on the private sector to help identify technological needs and to foster private investment in research and encourage the exploitation of publicly-funded research results."*

Policy measures for encouraging IP management at PROs

The vast majority of countries **(90%) said that national and regional governments promote the management of IP resulting from public funding** – see Exhibit 2-10. Further 5% (i.e. two more countries, Bosnia-Herzegovina and Estonia) said they plan to introduce such promotion. Only Slovenia answered "no"; one country (Denmark) provided no answer. This means that almost all governments were found to be aware that IP management at PROs is an issue that needs to be fostered.

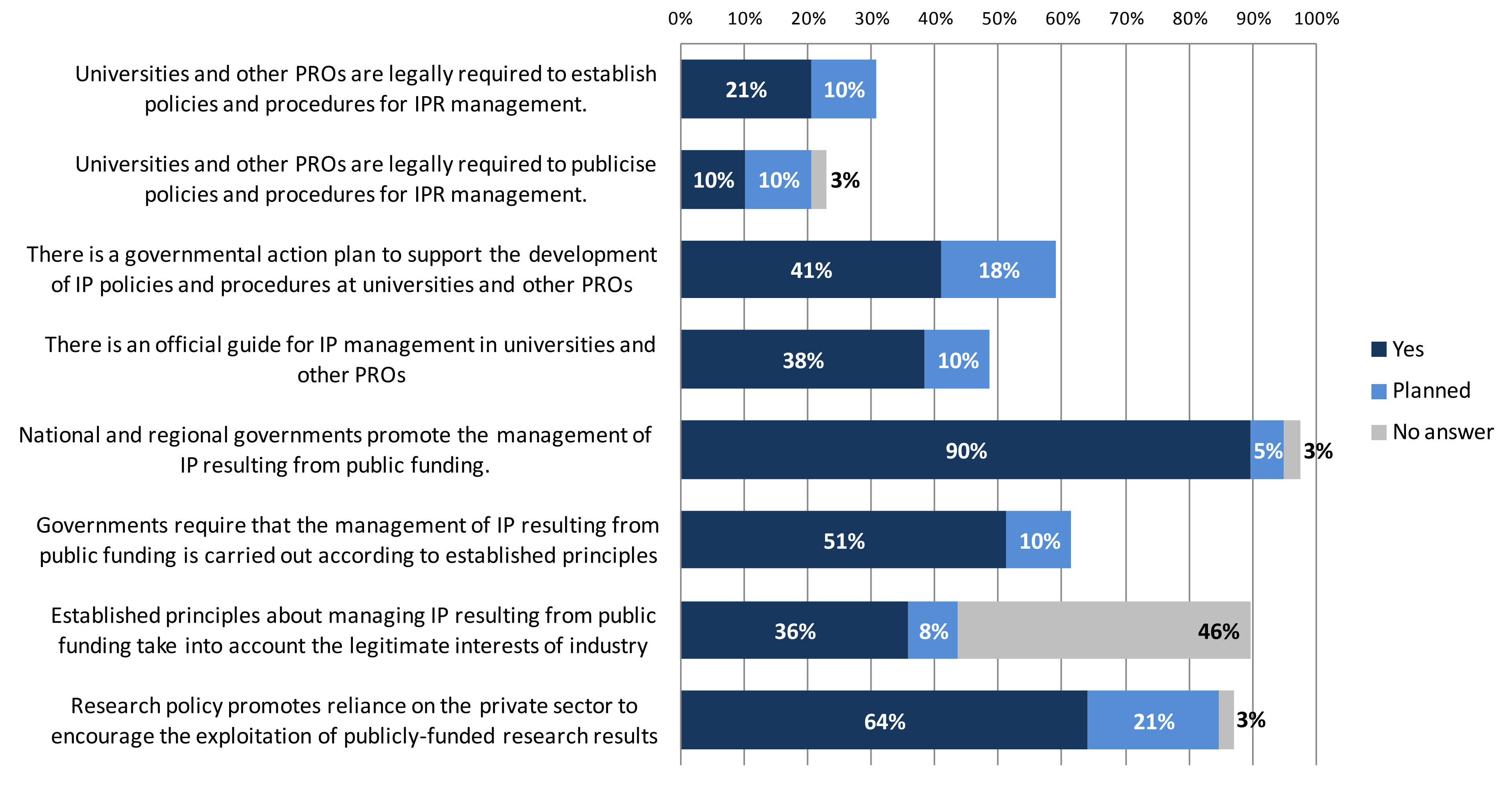
Other measures were found to be much less prevalent. The majority of countries reported that research policy promotes reliance on the private sector to encourage the exploitation of publicly-funded research results (64%); further 21% said they plan to introduce this. Slightly more than half of the countries (51%) said that governments require that the management of IP resulting from public funding is carried out according to established principles. Where there are such principles, they usually "take into account the legitimate interests of industry" (36% of all countries). In slightly less than half of the countries (44%) there is a governmental action plan to support the development of IP policies and procedures at universities and other PROs. 38% of the countries said they have an official guide for IP management.

Legal requirements to establish policies and procedures for IPR management were reported from less than a quarter of the countries (23%), and in only 10% of the countries there is a legal requirement to publish such policies.

Policies for encouraging IP management at PROs in European countries

As Exhibit 2-11 shows, most comprehensive policies for encouraging IP management at PROs were reported from Poland (100%), Austria (94%) and Hungary (86%). The level of such policies was also found to be high in Ireland, Macedonia and the Netherlands (75%) as well as Germany (72%).

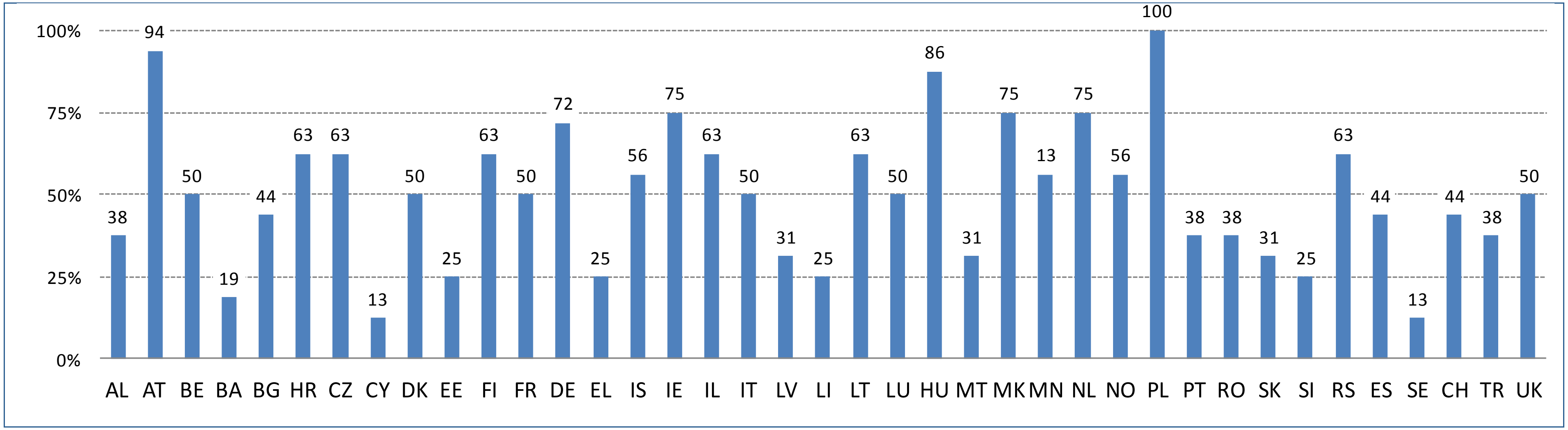
Exhibit 2-10: Policies measures for encouraging the establishment of policies and procedures for IP management in PROs (% of countries which implemented the measure)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-11: Policies encouraging the establishment of policies and procedures for IP management in PROs: overview about implementation in European countries



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

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2.4.3 Knowledge transfer capacities and skills regarding IP and entrepreneurship

Background

This theme relates to point 3 of the Recommendation that Member States should "*support the development of knowledge transfer capacity and skills in public research organisations, as well as measures to raise the awareness and skills of students – in particular in the area of science and technology – regarding intellectual property, knowledge transfer and entrepreneurship*".

The list of related **facilitating practices** in Annex II of the Recommendation includes the following:

6. *"Sufficient resources and incentives are available to public research organisations and their staff to engage in knowledge transfer activities.*
7. *Measures are taken to ensure the availability and facilitate the recruitment of trained staff (such as technology transfer officers) by public research organisations.*
8. *A set of model contracts is made available, as well as a decision-making tool helping the most appropriate model contract to be selected, depending on a number of parameters.*
9. *Before establishing new mechanisms to promote knowledge transfer (such as mobility or funding schemes), relevant stakeholder groups, including SMEs and large industry as well as public research organisations, are consulted.*
10. *The pooling of resources between public research organisations at local or regional level is promoted where these do not have the critical mass of research spending to justify having their own knowledge transfer office or intellectual property manager.*
11. *Programmes supporting research spin-offs are launched, incorporating entrepreneurship training and featuring strong interaction of public research organisations with local incubators, financiers, business support agencies, etc.*
12. *Government funding is made available to support knowledge transfer and business engagement at public research organisations, including through hiring experts."*

Policy measures for KT capacities and skills regarding IP and entrepreneurship

Almost all countries (92%) said that national and regional governments support the development of KT capacity and skills in universities and other PROs. This is shown in Exhibit 2-12. Further 5% were found to plan to do this. The only country not assumed to support KT capacity and skills development or to plan such support was Bosnia-Herzegovina, for which, however, the study team received no questionnaire.

Support is apparently also high for raising awareness and skills of students regarding IP, KT and entrepreneurship; 82% of the countries reported related measures, and 16% said they plan such measures.

A very high share of countries (82%) reported to support spin-off companies from universities and other PROs with governmental programmes. This issue has seen a remarkable rise in importance in recent years; 15 years ago the importance of spin-offs was rarely addressed with governmental programmes in European countries.

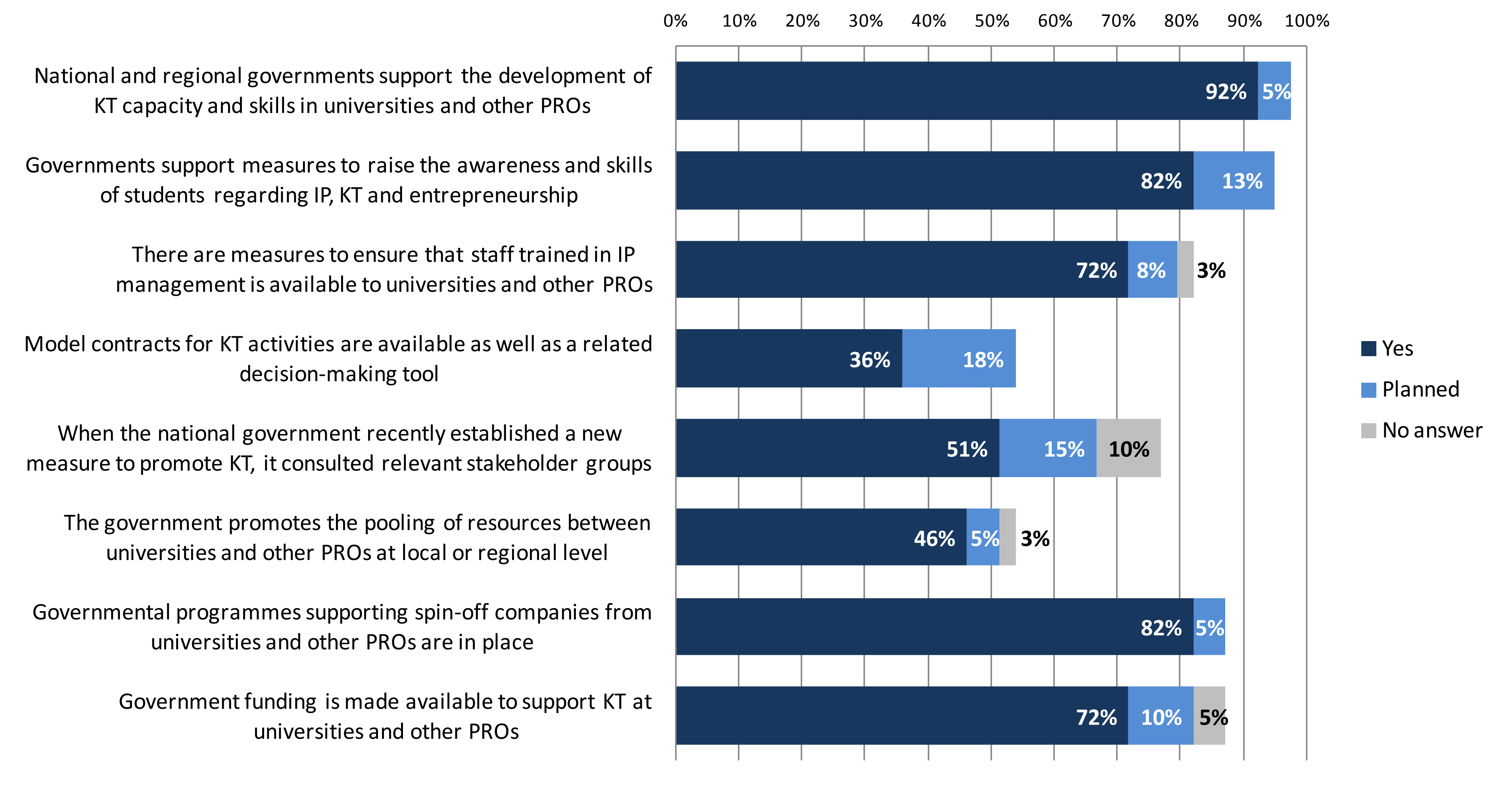
The lowest score among measures for KT capacities and skills was found for "model contracts for KT activities". 36% of the countries said that model contracts as well as related decision-making tools are available. Further 18% of countries plan to introduce model contracts.

Relatively low scores were furthermore found for governmental promotion of pooling resources between universities and other PROs at local or regional level (46%). Estonia may soon provide an example of pooling KT resources: Two of the largest universities in the country are planning to join forces in KT. The score was also relatively low for "when the government recently established a new measure to promote KT, it consulted relevant stakeholder groups" (51%).

Policies for KT capacities and skills regarding IP and entrepreneurship in European countries

Policies for KT capacities and skills were found to be comprehensive in many countries – see Exhibit 2-13. Four countries reported to fulfil all measures (100%): Austria, Germany, and the UK. Almost all measures for KT capacities and skills (94%) were found to be fulfilled in Belgium and the Netherlands. A very high level (88%) was also found in Croatia, the Czech Republic, Denmark, Ireland, Lithuania, Luxembourg, Serbia, Spain and Switzerland. Remarkably low scores (50%) were reported from France, while France is overall among the more advanced countries in terms of KT policies.

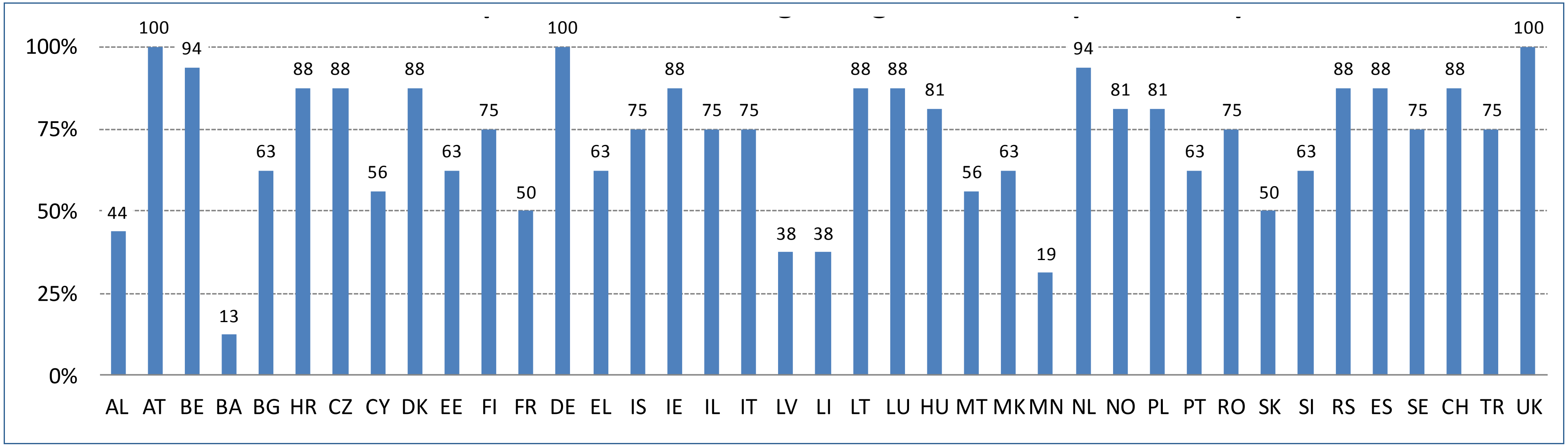
Exhibit 2-12: Policies measures for KT capacities and skills regarding IP and entrepreneurship (% of countries which implemented the measure)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-13: Policies for KT capacities and skills regarding IP and entrepreneurship: overview about implementation in European countries



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

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2.4.4 Trans-national cooperation

Background

This theme relates to point 5 of the Recommendation that Member States should "*cooperate and take steps to improve the coherence of their respective ownership regimes as regards intellectual property rights in such a way as to facilitate cross-border collaborations and knowledge transfer in the field of research and development*"; and to point 8 that they should "*ensure equitable and fair treatment of participants from Member States and third countries in international research projects regarding the ownership of and access to intellectual property rights, to the mutual benefit of all partners involved*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

13. *"In order to promote transnational knowledge transfer and facilitate cooperation with parties from other countries, the owner of intellectual property from publicly-funded research is defined by clear rules and this information, together with any funding conditions which may affect the transfer of knowledge, is made easily available. Institutional ownership – as opposed to the "professor's privilege" regime – is considered the default legal regime for intellectual property ownership at public research organisations in most EU Member States.*

14. *When signing international research cooperation agreements, the terms and conditions relating to projects funded under both countries' schemes provide all participants with similar rights, especially as regards access to intellectual property rights and related use restrictions."*

Policy measures for cross-border research and knowledge transfer co-operation

Four of the five questions that were asked in this theme were answered with "yes" by the majority of countries – see Exhibit 2-14: 74% said that the owner of IP from publicly funded research is defined by clear and easily available rules. 69% said there are legal provisions ensuring equitable and fair treatment of participants in international research projects regarding the ownership of and access to IP. 67% said that the country cooperates with other countries to improve the coherence of IP ownership regimes. This share may be considered as remarkably low – one might have expected that all or almost all countries in the European Research Area co-operate in improving the coherence of ownership regimes. 64% reported that in international research projects, the terms and conditions in the country's research schemes aim at providing participants from all countries with similar IPRs.

A minority of 31% of the countries were found to have "governmental programmes to strengthen KTOs in universities and other PROs through trans-national collaboration", which was the lowest share of all questions about cross-border research and KT co-operation. Some examples of international KTO cooperation include France, where there is cooperation with KTOs in the US and Canada (Quebec),[10] and the Portuguese UTEN programme which cooperates with KTOs in the USA (especially the University of Austin, Texas).[11]

Policies for cross-border research and KT co-operation in European countries

Six countries reported to fulfil all policy measures related to cross-border research and KT cooperation: Estonia, Israel, Iceland, Poland and Serbia. Very high levels (90%) were also found in Croatia and Macedonia. It may be striking that the majority of these countries is small, making it meaningful to be strongly oriented towards international cooperation.

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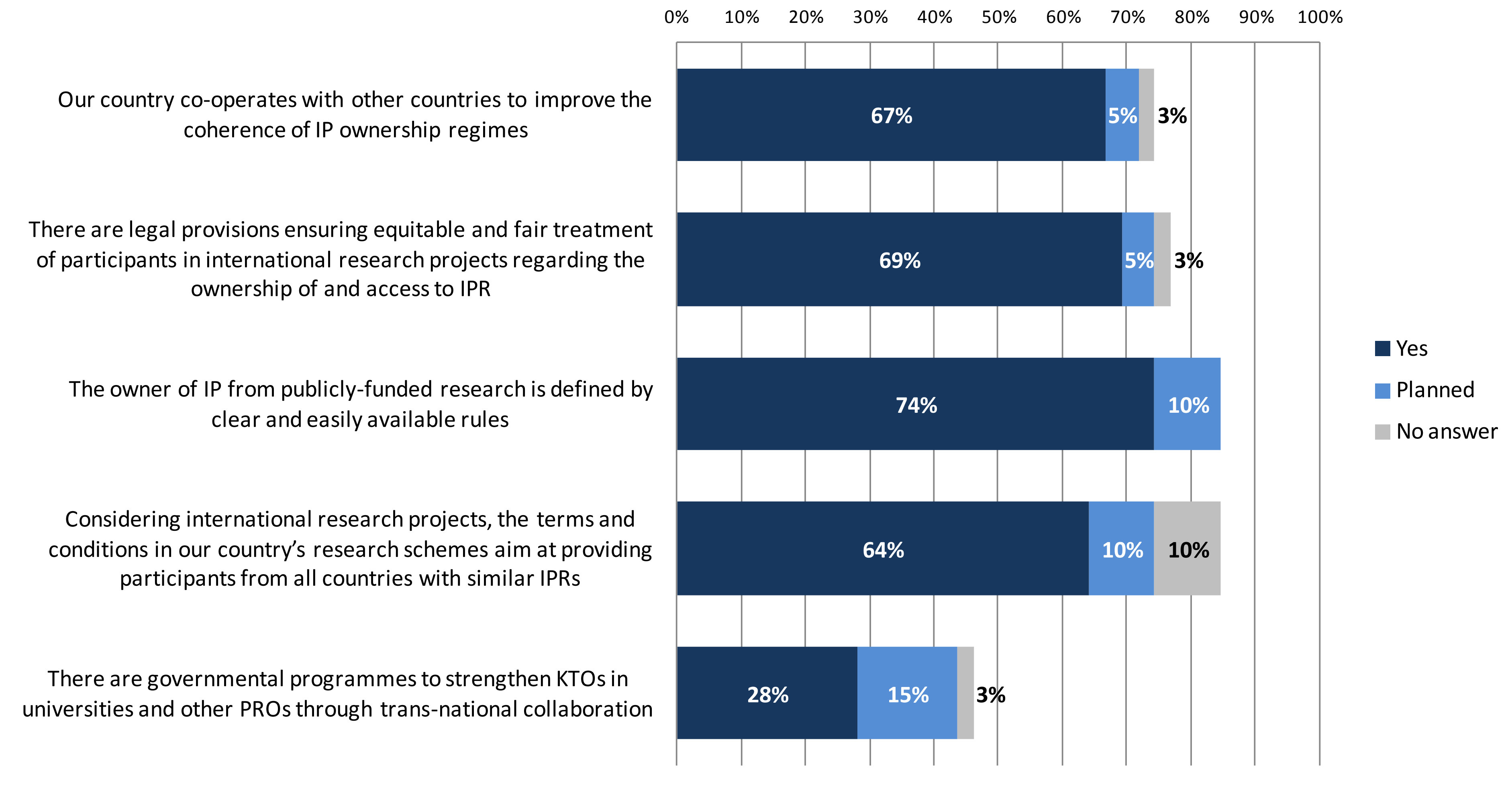
[10] Information from the French representative to the ERAC WG-KT at meeting on 18/10/2012.

[11] See the summary of the Iberian workshop of the KTS at http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Iberian/KTS_WS_Iberian_2011-11-14_Summary_v1.3.pdf.

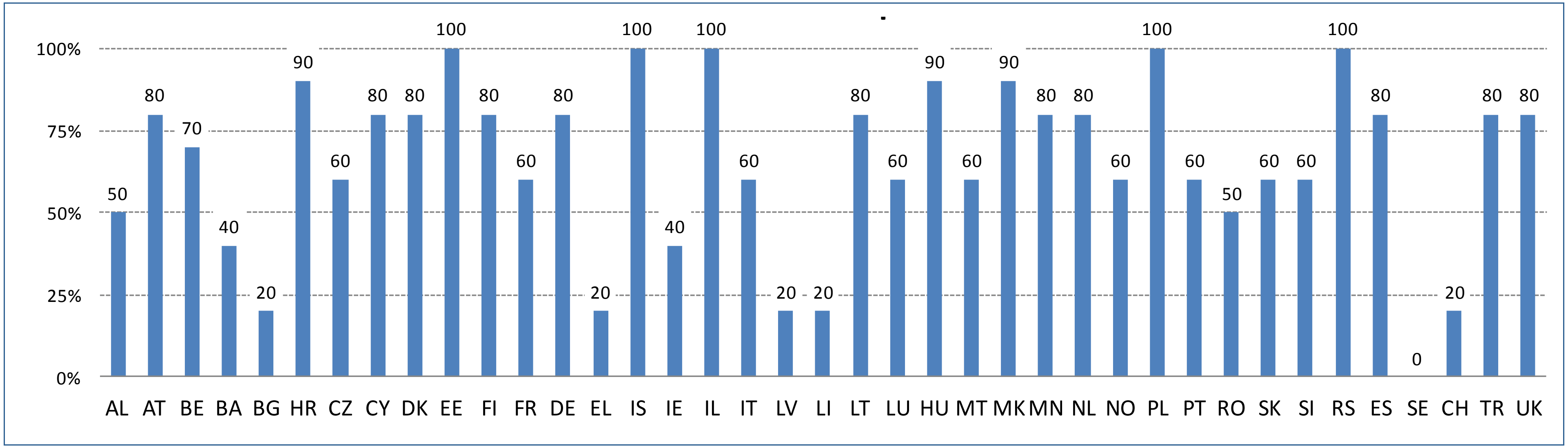
Exhibit 2-14: Policies measures for cross-border research and knowledge transfer co-operation (% of countries which implemented the measure)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-15: Policies for cross-border research and knowledge transfer co-operation: overview about implementation in European countries



n = 39.

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2.4.5 Knowledge dissemination

Background

This theme relates to point 4 of the Recommendation that Member States should "*promote the broad dissemination of knowledge created with public funds, by taking steps to encourage open access to research results, while enabling, where appropriate, the related intellectual property to be protected*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

15. "Open access is implemented by public research funding bodies with regard to peer-reviewed scientific publications resulting from publicly-funded research.

16. Open access to research data is promoted, in line with the OECD Principles and Guidelines for Access to Research Data from Public Funding, taking into account restrictions linked to commercial exploitation.

17. Archival facilities for research results (such as internet-based repositories) are developed with public funding in connection with open access policies."

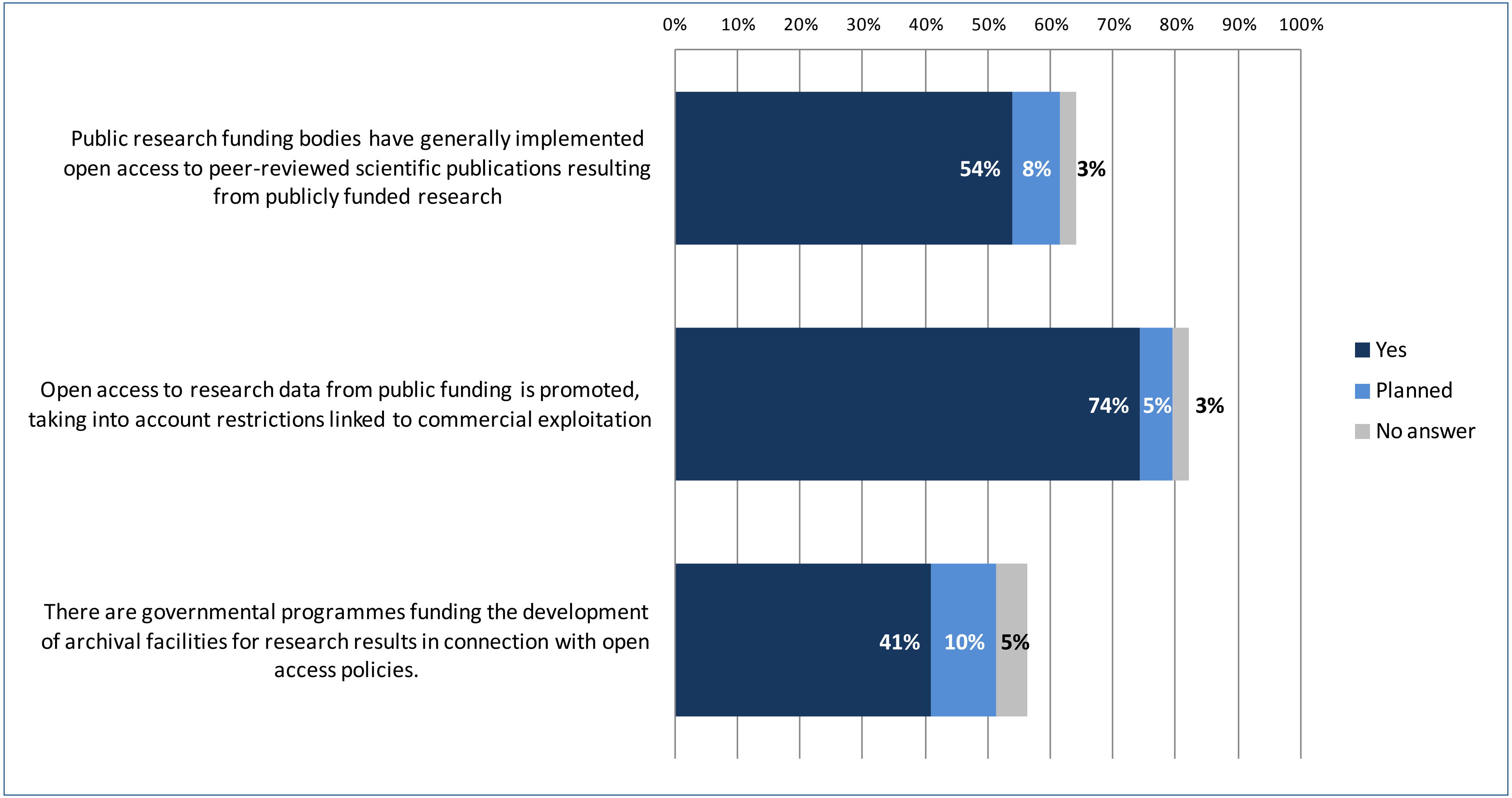
Policy measures for knowledge dissemination

As Exhibit 2-16 shows, the knowledge dissemination measure found most prevalent was "open access to research data from public funding is promoted, taking into account restrictions linked to commercial exploitation". 74% of the countries reported this measure. 54% said that "public funding bodies have generally implemented open access to peer-reviewed scientific publications resulting from publicly funded research". Slightly less than half of the countries (41%) said that there are governmental programmes funding the development of archival facilities for research results in connection with open access policies.

Policies for knowledge dissemination in European countries

Exhibit 2-17 shows that almost one third of the countries that responded to the survey, ten countries, reported to fulfil all three measures for knowledge dissemination: Austria, Estonia, France, Germany, Iceland, Lithuania, Macedonia, Serbia, Sweden and the UK.

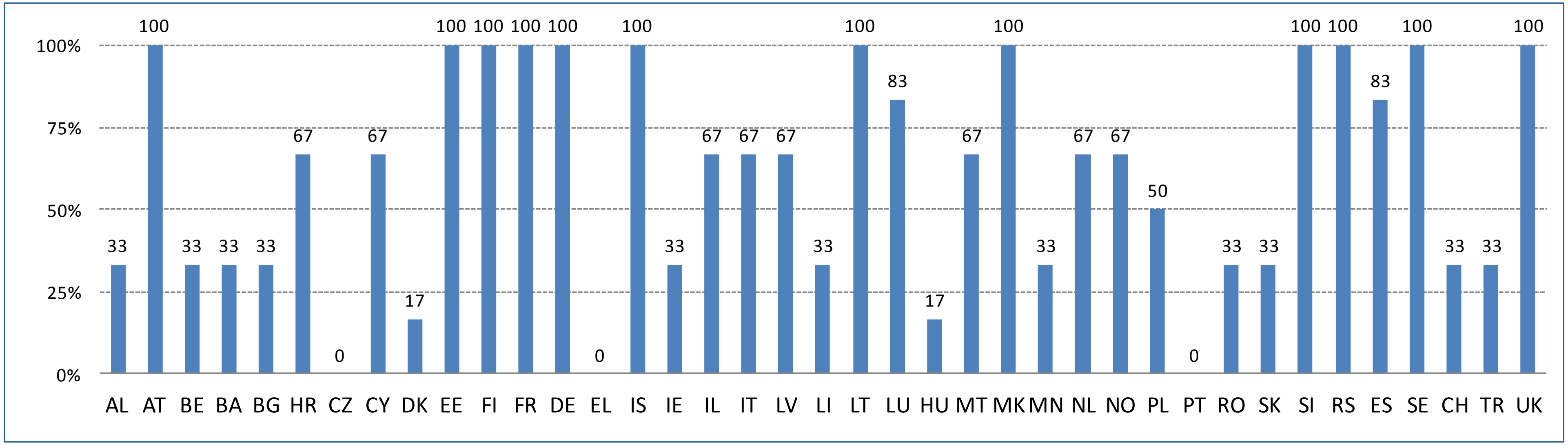
Exhibit 2-16: Policies measures for knowledge dissemination (% of countries which implemented the measure)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-17: Policies for knowledge dissemination: overview about implementation in European countries



n = 39.

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2.4.6 Monitoring and reporting on measures taken on basis of the Recommendation

Background

This question relates to point 11 of the Recommendation that Member States should "*inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

18. "The necessary mechanisms are put in place to monitor and review progress made by national public research organisations in knowledge transfer activities, e.g. through annual reports of the individual public research organisations. This information, together with best practices, is also made available to other Member States."

Measures for KT policy monitoring

The questionnaire asked about the "facilitating practices" of the Recommendation. Monitoring and reviewing KT progress in universities and other PROs can be considered as important to design and implement KT policies. Such monitoring and reviewing activities were found to have the weakest fulfilment of the seven KT policy themes. As Exhibit 2-18 shows, only slightly more than a quarter (28%) of the countries reported that there is a national scheme to monitor and review KT activities of universities and other PROs. Further 18% said that such a scheme is planned.

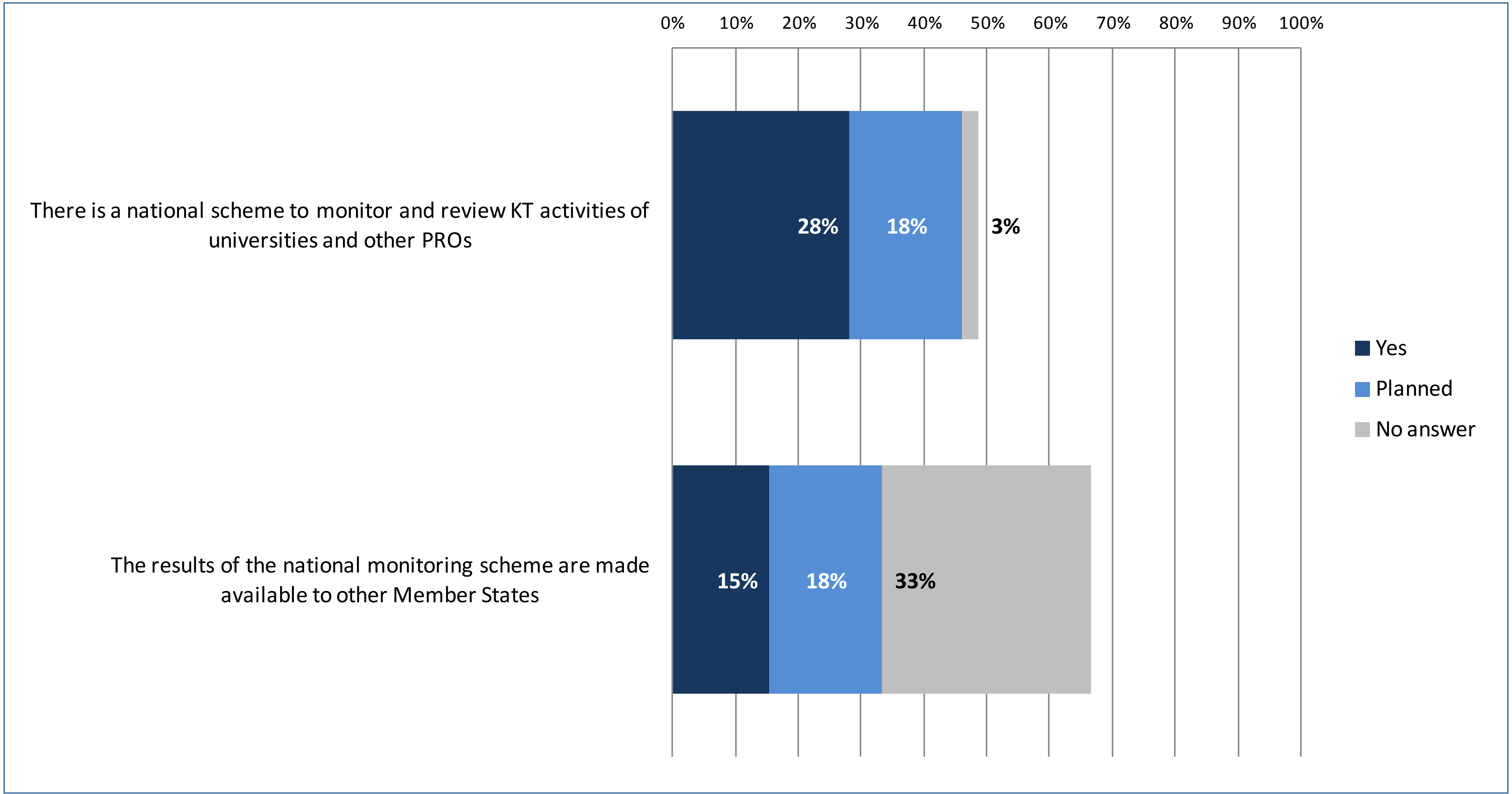
Moreover, 15% of all countries said that the results of the national monitoring scheme are made available to other Member States, and 18% plan to make it available.

However, the fact that 35 of the 39 countries responded to the KT policy survey in 2012 is a sign that the countries take their KT policy monitoring tasks very serious versus the European Commission – even among non-Member States.

KT policy monitoring in European countries

Six countries reported that there is a national scheme to monitor and review KT activities of universities and other PROs and that the results of this monitoring scheme are made available to other Member States: Bulgaria, the Czech Republic, Denmark, Ireland, Portugal and the UK. A monitoring scheme – without making it available to others – was found to be implemented in further three countries: Estonia, Luxembourg, and Poland. A scheme covering parts of the country was reported from Belgium. Plans to implement a monitoring scheme were reported from Hungary, the Netherlands, Romania, Serbia, Spain, Switzerland and Turkey. Related findings are shown in Exhibit 2-19.

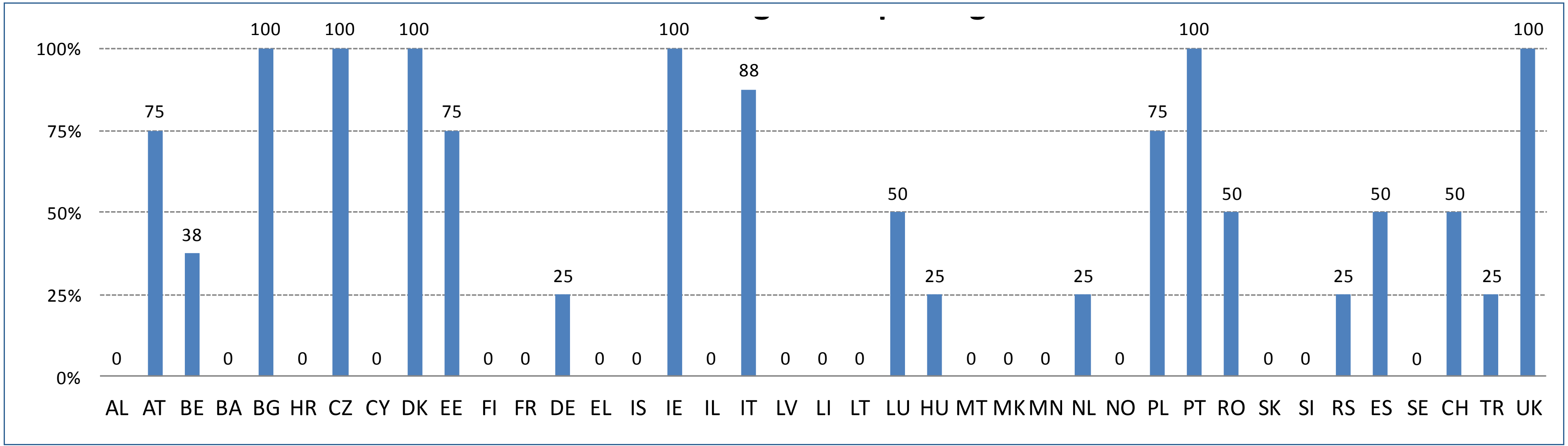
Exhibit 2-18: Measures for KT policy monitoring (% of countries which implemented the measure)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-19: KT policy monitoring: overview about implementation in European countries



n = 39.

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2.4.7 Code of Practice use and implementation

Background

This theme relates to point 7 of the Recommendation that Member States should "*take steps to ensure the widest possible implementation of the Code of Practice, whether directly or through the rules laid down by national and regional research funding bodies*".

The Code of Practice is attached to the Commission Recommendation (see also annex to this questionnaire). It includes provisions for professionalising intellectual property management in public research organisations and universities as well as collaborative and contract research.

Policy measures for implementing the Code of Practice

As Exhibit 2-20 shows, 44% of the responding countries said that "national guidelines for managing IP in KT activities existed before the European Commission's Code of Practice was issued in 2008".[12] 13% said that the government revised existing national guidelines for IP management in KT activities in the light of the Code of Practice. 41% said that existing guidelines for KT, IP management as well as collaborative and contract research generally comply with the Code of Practice.

6% of the countries – effectively two countries: Germany and Poland – reported that the government adopted the Code of Practice as its official guideline for managing IP in KT.

33% of the countries reported that the national government actively sought to make the Code of Practice or existing guidelines known to key stakeholders.

Policies for implementing the Code of Practice in European countries

Ten countries said that they implemented the Code of Practice or made existing codes comply with the Code of Practice suggested in the KT Recommendations, and they also made the code known to stakeholders, so that they were allocated a score of 100% (see Exhibit 2-21). These ten countries are Austria, Denmark, Finland, France, Germany, Hungary, Ireland, Luxembourg, the UK, and Turkey.

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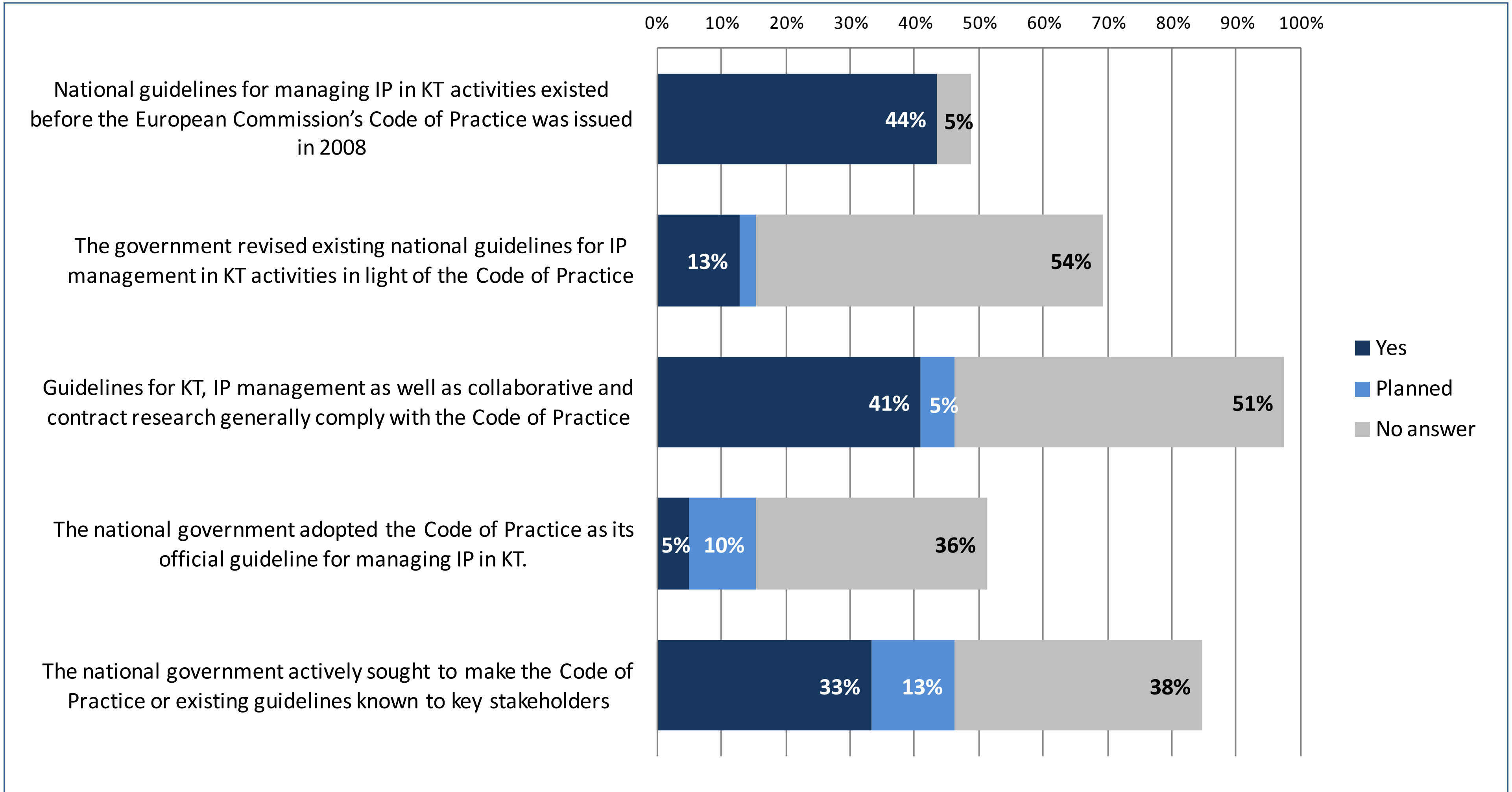
[12] A methodological note: For this theme, the countries fulfilling 100% of KT policy measures needed to be calculated in a special manner – not just as a sum of all items – because there were several filter questions. Minimum requirements for countries to score 100% were that (a) guidelines for IP management existed before the Recommendation was issued, (b) that these guidelines were broadly in line with the CoP or were revised accordingly, and that (c) the CoP or existing guidelines were actively sought to be made known to stakeholders. Thus, to reach a score of 100%, countries did not necessarily need to adopt the Code of Practice as their national guidelines.

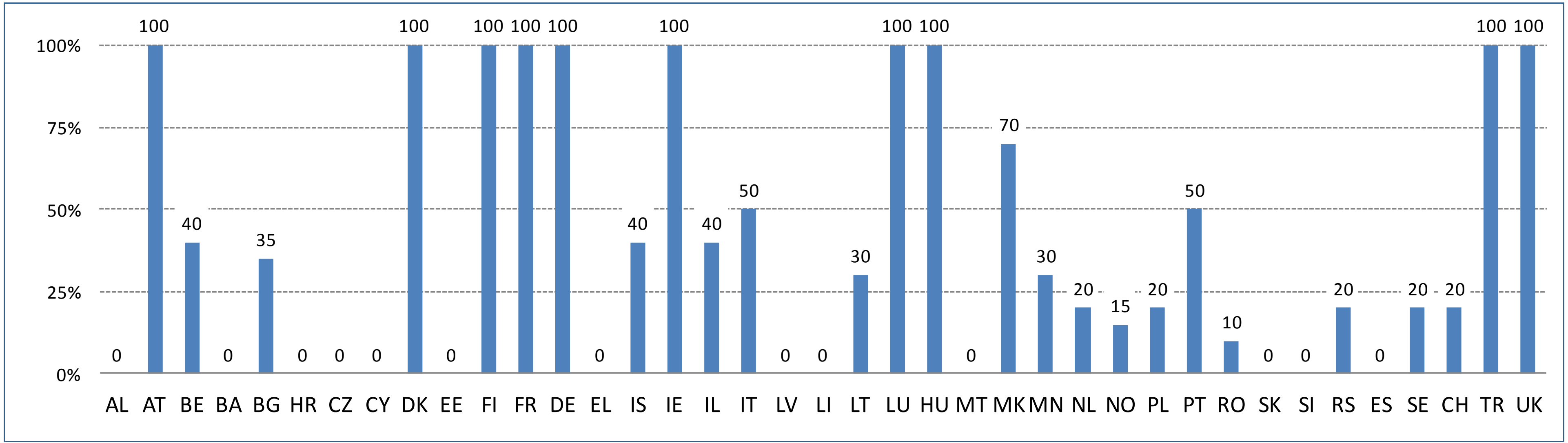
Exhibit 2-20: Measures for Code of Practice use and implementation (% of countries which implemented the measure)



n = 39.

Source: empirica, European Knowledge Transfer Policy Survey 2012

Exhibit 2-21: Policies for Code of Practice use and implementation: overview about implementation in European countries



n = 39.

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2.5 National KT policies and national KT performance: a tentative regression analysis

Methodological approach

Considering the increasingly comprehensive KT policy activities in European countries, the question arises whether there is any link between national KT policies and national KT performance. Data collected in the Knowledge Transfer Study offers the opportunity to correlate both: Data from the European Knowledge Transfer Office Survey (WP2) offers information about national KT performance; data from the European Knowledge Transfer Policy Survey (WP1) provides data about national KT policies. The study team conducted a related **linear regression analysis**. The correlation coefficient may take values between -1 (strong negative correlation, i.e. KT policies' intensity would be strongly negatively correlated with KT performance) and +1 (i.e. KT policies would be strongly positively correlated with KT performance). A value below -0.5 and above +0.5 can be considered of being notable. The correlation coefficient describes a statistical correlation; there is not necessarily also a causal relationship.[13] Furthermore, the coefficient of determination (R^2) indicates what percentage of variation in one variable can be explained by the variation of the other variable. It can take values between 0% and 100%. 100% would indicate a perfectly linear correlation.

For **national KT policies**, answers for the following themes were considered: A) Policies fostering knowledge transfer as a strategic mission of PROs. B) Policies encouraging the establishment of policies and procedures for IP management in PROs. C) Policies for KT capacities and skills regarding IP and entrepreneurship. D) Policies for cross-border research and knowledge transfer co-operation. G) Policies for Code of Practice use and implementation. These themes were considered as relevant for possibly having an impact of national KT performance. Policy themes A-C were double-weighted because they comprise eight or nine questions, while policy themes D and G only comprise four or five questions. The two remaining themes, policies for knowledge dissemination and KT policy monitoring, were considered as not having any impact on national KT performance. Policy plans were not considered in the analysis because plans may not yet have impacted on performance. The percentages for KT policy intensity are thus slightly different from those in the analyses in sections 2.3 and 2.4.

For **national KT performance**, the whole set of items surveyed in WP2 was taken, comprising six indicators: (1) invention disclosures, (2) patent applications, (3) patent grants, (4) number of spin-offs, (5) license agreements, (6) licensing income and (7) research agreements. In order to make results comparable across countries, all these items were related to the amount of underlying research funds. Low costs, i.e. a small value for euro invested into research divided by the value for the respective indicator, imply KT efficiency and thus a good KT performance.

The following analysis is based on findings from the combined KTO surveys in 2011 and 2012. Related results were available for **15 countries**: Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), Finland (FI), France (FR), Germany (DE), Ireland (IE), Italy (IT), the Netherlands (NL), Norway (NO), Spain (ES), Sweden (SE), Switzerland (CH), and the United Kingdom (UK).

In addition to the overall limitations of the two surveys considered – as explained in sections 2.2 and 3.2 –, the regression analysis has the following **limitations**:

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[13] See also the strong positive correlation between chocolate consumption per capita and Nobel laureates per population found by Messerli (2012).

- Due to the quite small amount of countries for which performance data was available, the correlations do not necessarily generate reliable results for Europe.
- There is not necessarily a direct link between national KT policies and performance; there are many intervening variables – such as strength of national industrial base, business sector composition, companies' innovativeness, and companies' readiness to adopt research findings from PROs – that may distort the findings.
- Assuming that KT policies actually have an influence on KT performance, there may normally be a time lag. However, there was only data from 2012 available, which includes policy measures that were just recently introduced.

One might come to the conclusion that, given the problems with the indicators, calculating correlations between KT policies and KT performance is too tentative. However, such a correlation analysis may be considered as descriptive and explorative, forcing to find explanations for the position of particular countries in the data room, which in any case provides a better understanding of the context.

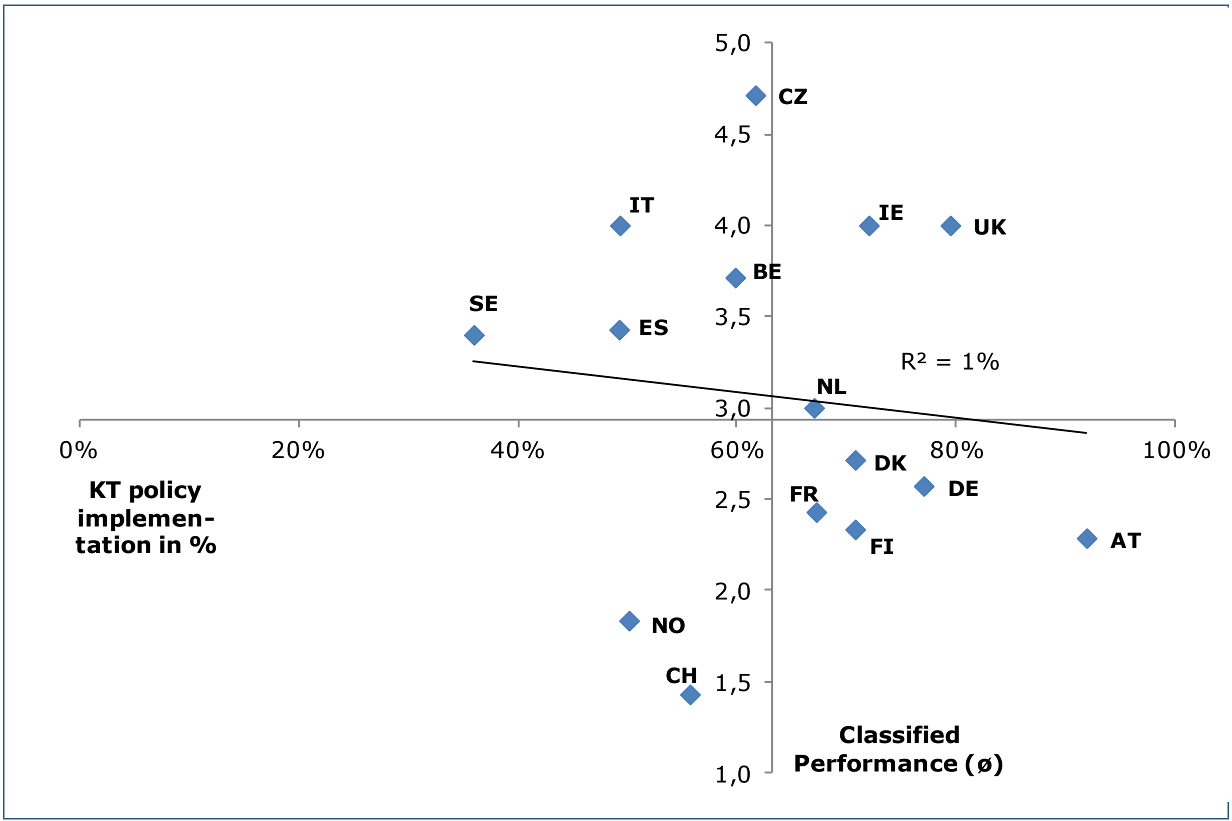
Overall results

No noteworthy correlation was found for any of the seven single performance indicators. The results for the single indicators are presented in the following.

KT policies correlated with KT performance total

For conducting a regression analysis for the performance total, results for the seven performance indicators were classified into five groups: "1" for a very bad performance, i.e. a low ratio between output indicator and public R&D investment, and "5" for a very good performance, i.e. a high ratio between output indicators and public R&D investment.

Exhibit 2-22: KT policies correlated with KT performance total



Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

No correlation was found between total KT performance and KT policies (correlation coefficient -0.18).

For a graphical representation of results, the axes were arranged as a cross with averages of both indicators as point of intersection. The average KT policy implementation intensity of the countries in this sample (62%, excluding plans) is higher than the average for all countries in the survey (48%).

As Exhibit 2-22 shows, two countries stand out with having strong KT policies and good KT performance (upper right quadrangle): Ireland and the UK.

On the other hand, Austria in particular but also Germany, Denmark, Finland and France have relatively strong KT policies but are apparently rather inefficient in their KT performance. The Netherlands, placed at the bottom of the upper right quadrangle, are close to this group, having an average performance and also an almost average KT policy intensity.

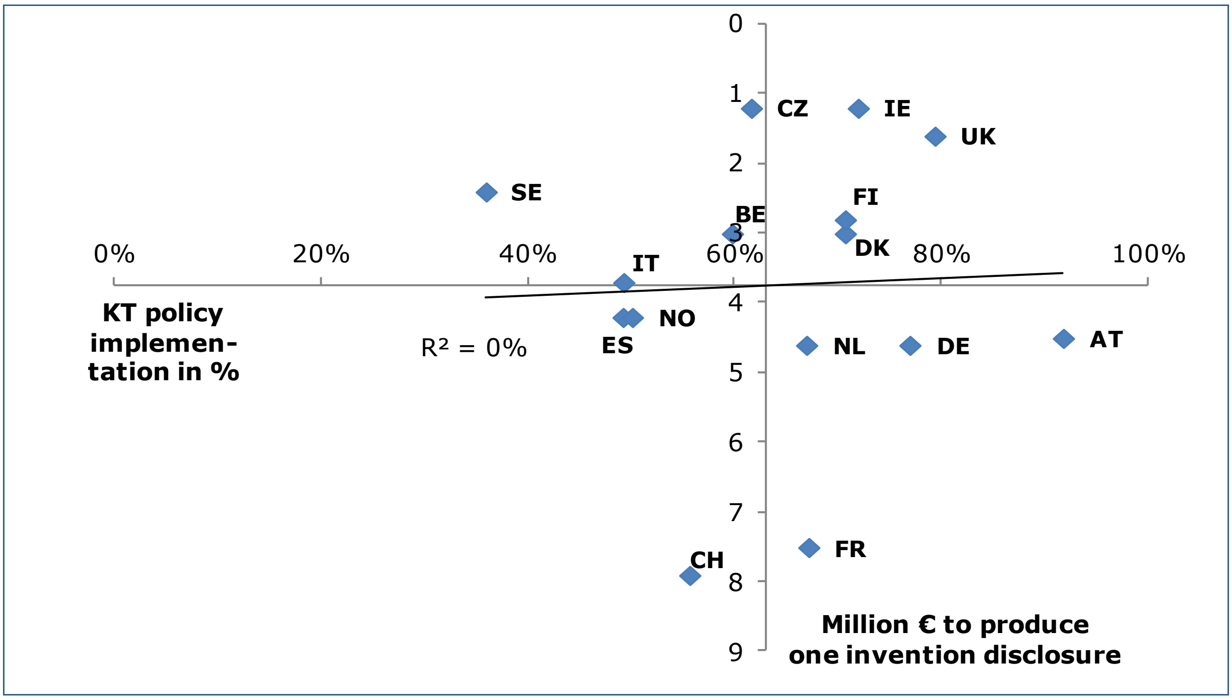
Switzerland and Norway were found to have relatively weak KT policy activities and at the same time rather low output per cost.

Finally, five countries were found to have fairly weak KT policy intensity but relatively good performance in terms of output per cost: the Czech Republic in particular, but also Italy, Belgium, Spain and Sweden.

KT policies correlated with number of invention disclosures

No correlation was found between KT policies and invention disclosures – the regression line is almost even (correlation coefficient 0.05).[14]

Exhibit 2-23: KT policies correlated with invention disclosures



Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

[14] Note that the correlation coefficient is positive, equaling the straight line in the graphic which has a positive slope – because increasing policy intensity accompanied by lower output per R&D expenditure was considered a positive relation. This may be counterintuitive from the perspective that the values of the y-axis increase downwards.

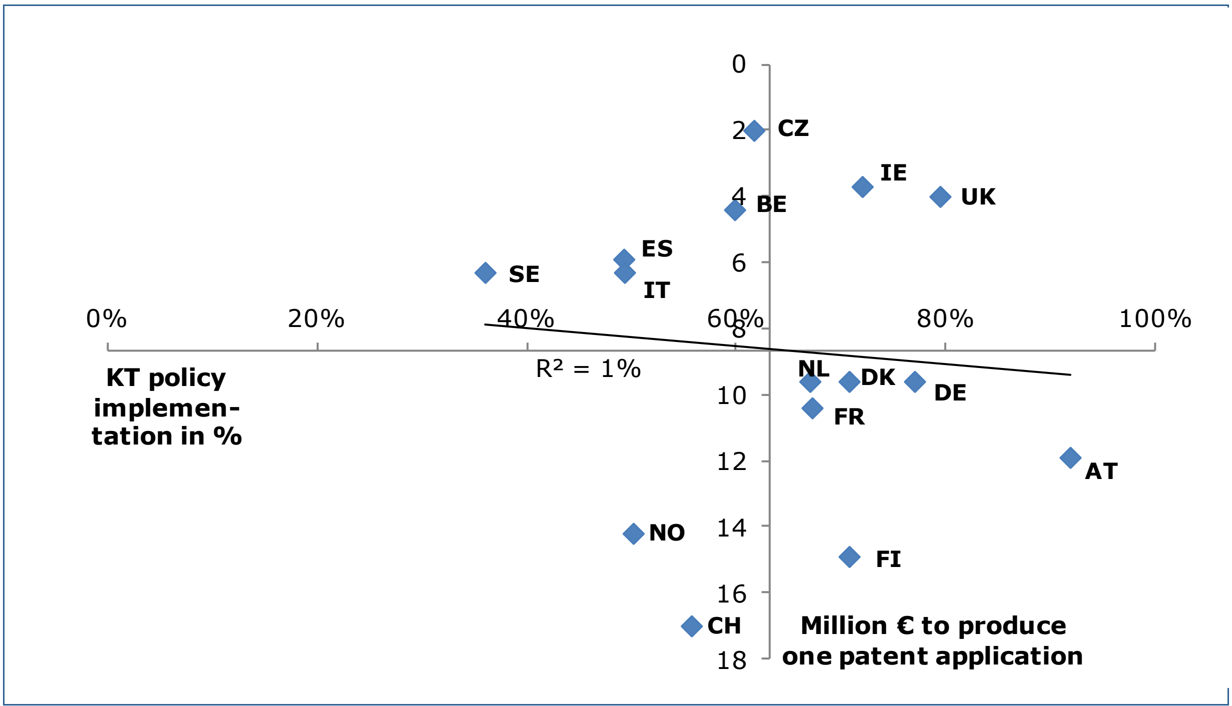
As Exhibit 2-23 shows, the distribution of countries across the four fields remains similar to the overall graphic, while Denmark and Finland as well as Norway have a somewhat better ratio of output per cost. On the other hand, France has a rather bad ratio.

KT policies correlated with number of patent applications

No correlation was found between KT policies and patent applications – the correlation coefficient is slightly negative (-0.09). Related results are shown in Exhibit 2-24.

The distribution of countries across the four fields is similar to the overall picture.

Exhibit 2-24: KT policies correlated with patent applications



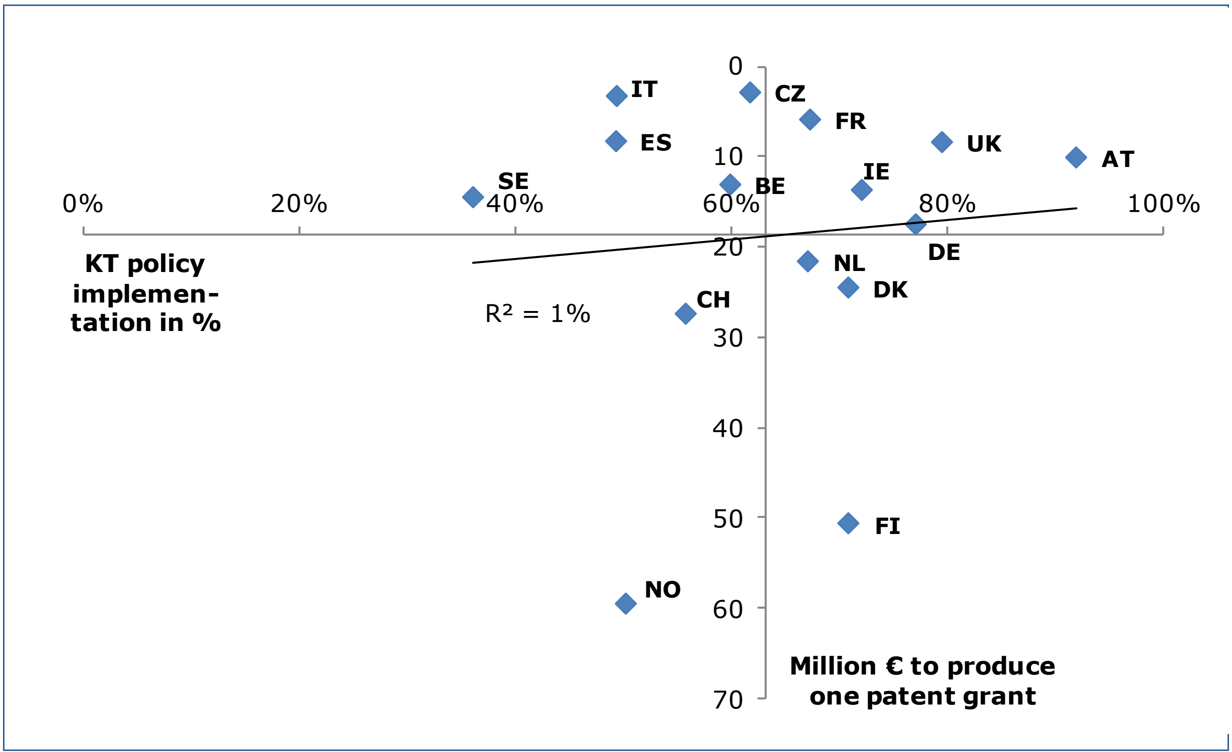
Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

KT policies correlated with number of patent grants

No correlation was found between KT policies and number of patent grants (correlation coefficient 0.09).

The distribution of countries across the four fields is a broadly similar to the overall picture, with a few differentiations: France and Austria move up into the quadrangle with a relatively good output-cost ratio; Norway and Finland were found to have by far the least favourable ratios.

Exhibit 2-25: KT policies correlated with patent grants



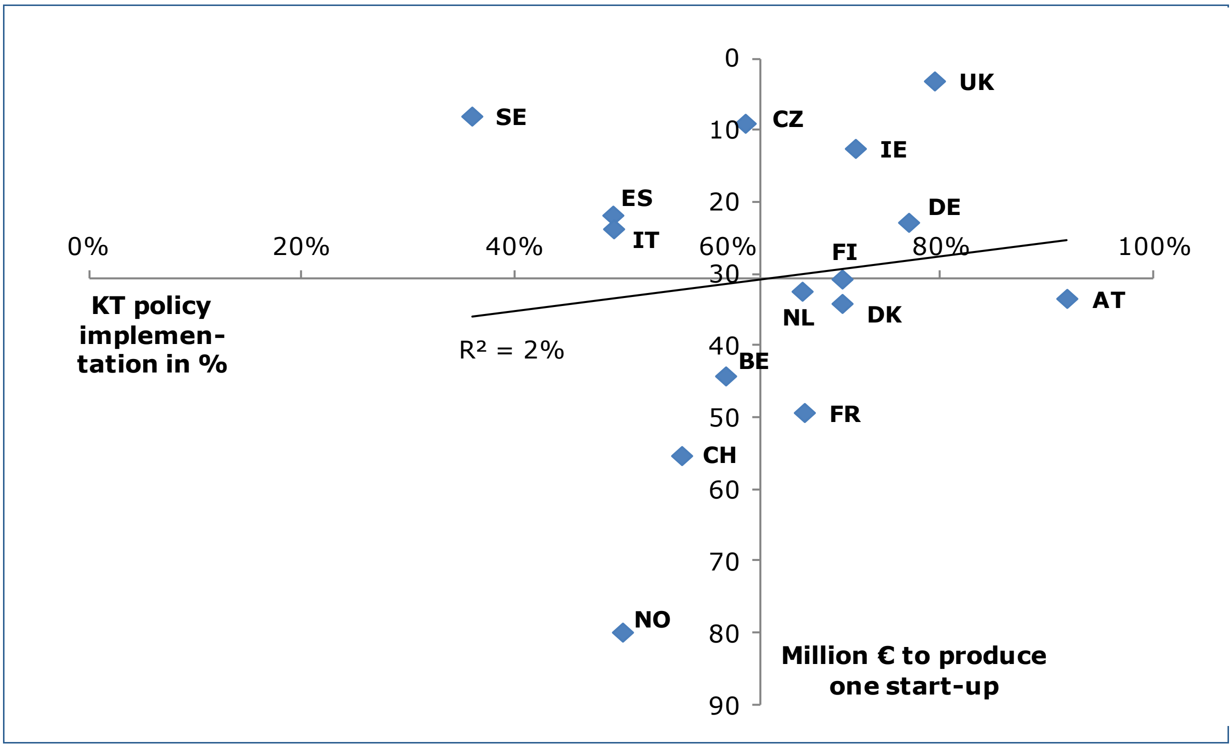
Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

KT policies correlated with number of start-ups

No correlation was found between KT policies and the number of start-ups from PROs. The correlation coefficient is slightly positive (0.13).

The distribution of countries across the four quadrangles is broadly the same as in the overall picture, while Germany and Sweden move up and Belgium down.

Exhibit 2-26: KT policies correlated with start-ups



Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

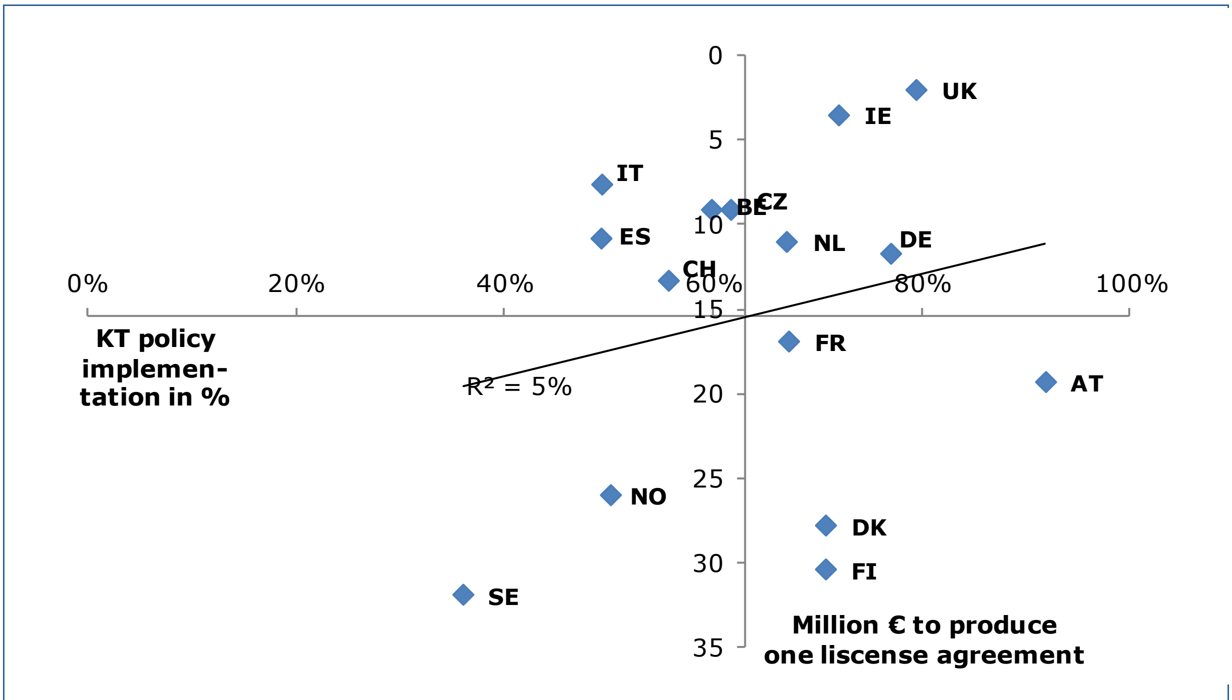
KT policies correlated with number of licence agreements

No correlation was found for KT policies and license agreements (correlation efficient 0.22).

The distribution of countries in the field is somewhat different from the overall picture: Sweden has the least beneficial ratio between output and cost, and Denmark and Finland also move downwards. Remarkably, together with Norway, the four Nordic countries perform worst in this respect, distinctly worse from countries in other European regions.

The correlation with licence agreements is the only indicator where Switzerland was found to be above average in performance.

Exhibit 2-27: KT policies correlated with license agreements



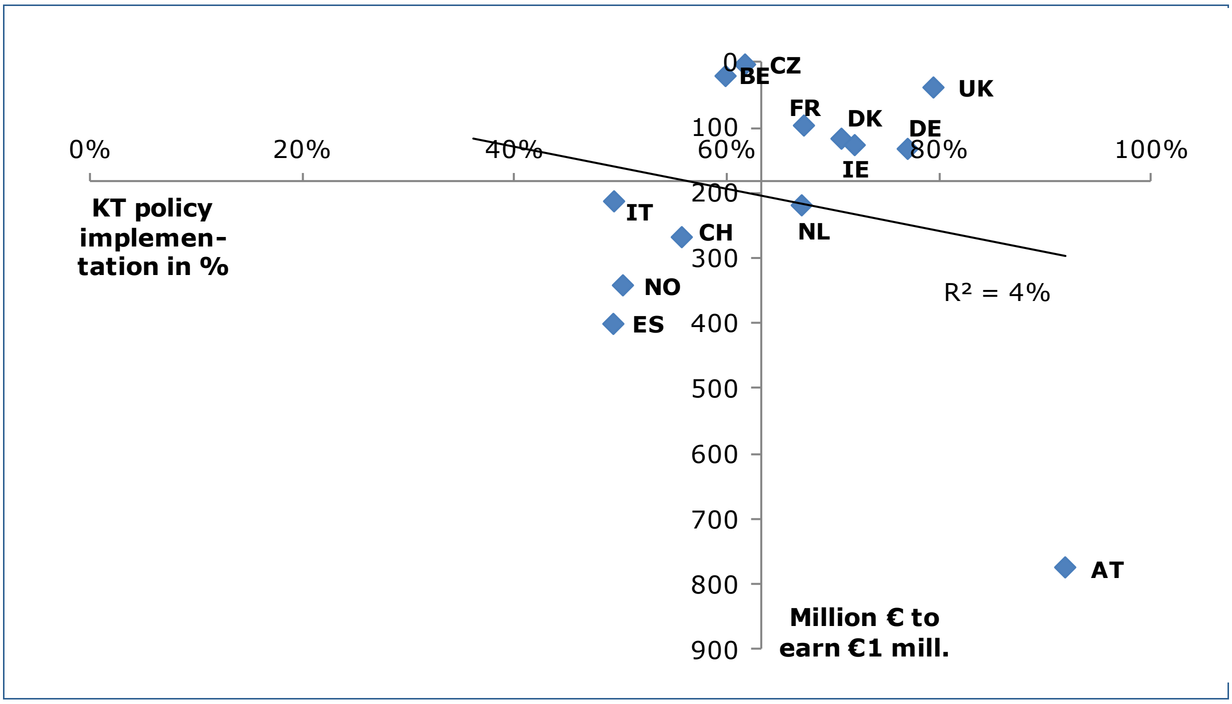
Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

KT policies correlated with licensing income

No correlation was found between KT policies and licensing income. The absolute value of the correlation coefficient was the largest of all indicators, but still not noteworthy high (-0.2).

The country distribution across the four fields finds Austria in the lowest position, see Exhibit 2-28. No data is available for Sweden for this indicator.

Exhibit 2-28: KT policies correlated with license income



Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

KT policies correlated with number of research agreements

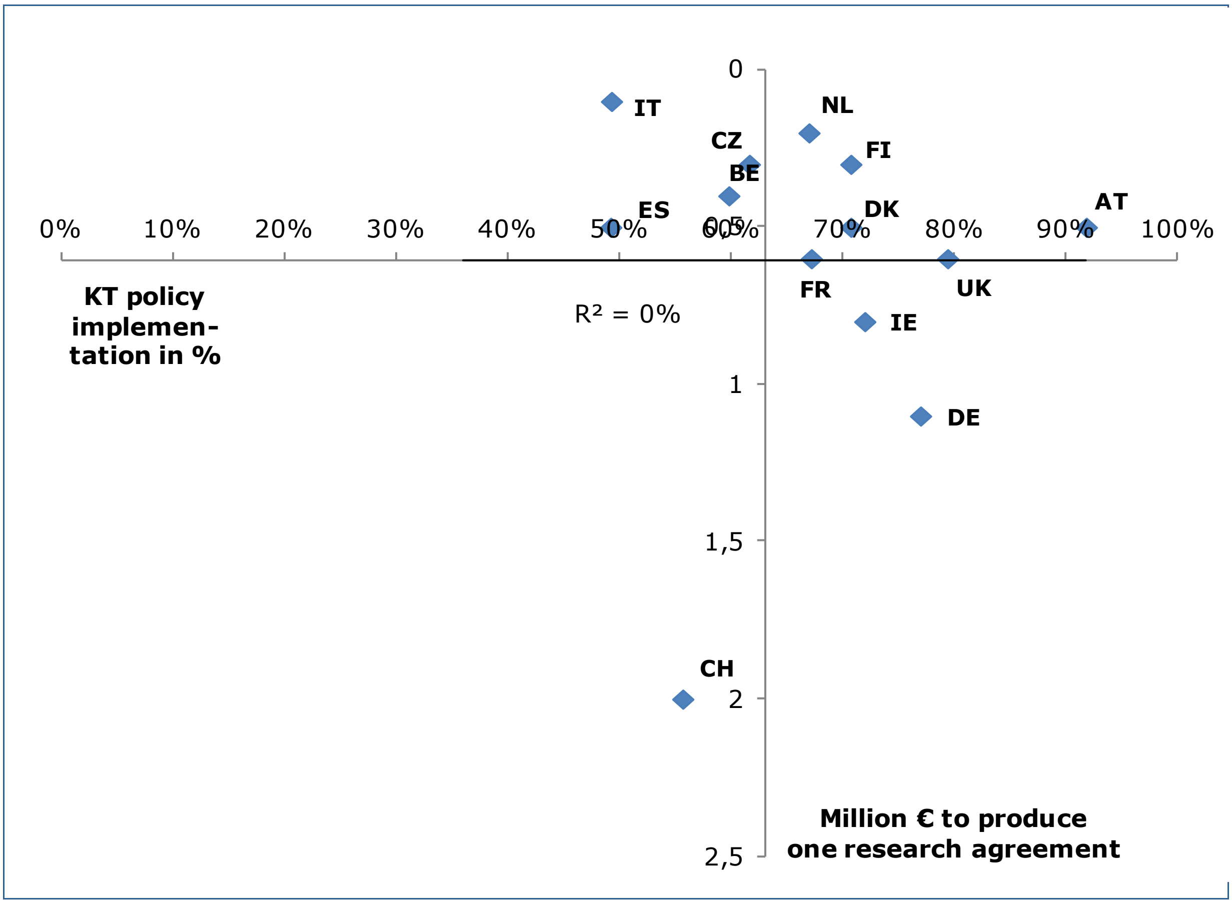
No correlation was found between KT policy intensity and number of research agreements. The regression line is almost even (correlation coefficient: -0.002).

As Exhibit 2-29 shows, Italy and the Netherlands found to have the best output per cost ratio; the UK was found to be only average and Ireland even below average in this respect.

Switzerland was found to have the single least beneficial ratio of output per cost.

No data was available for Norway and Sweden.

Exhibit 2-29: KT policies correlated with research agreements



Source: European Knowledge Transfer Policy Survey 2012 (for KT policy), European Knowledge Transfer Office Survey 2011 (for KT performance)

2.6 Linking KT policy intensity with national characteristics

Overview about the approach and general findings

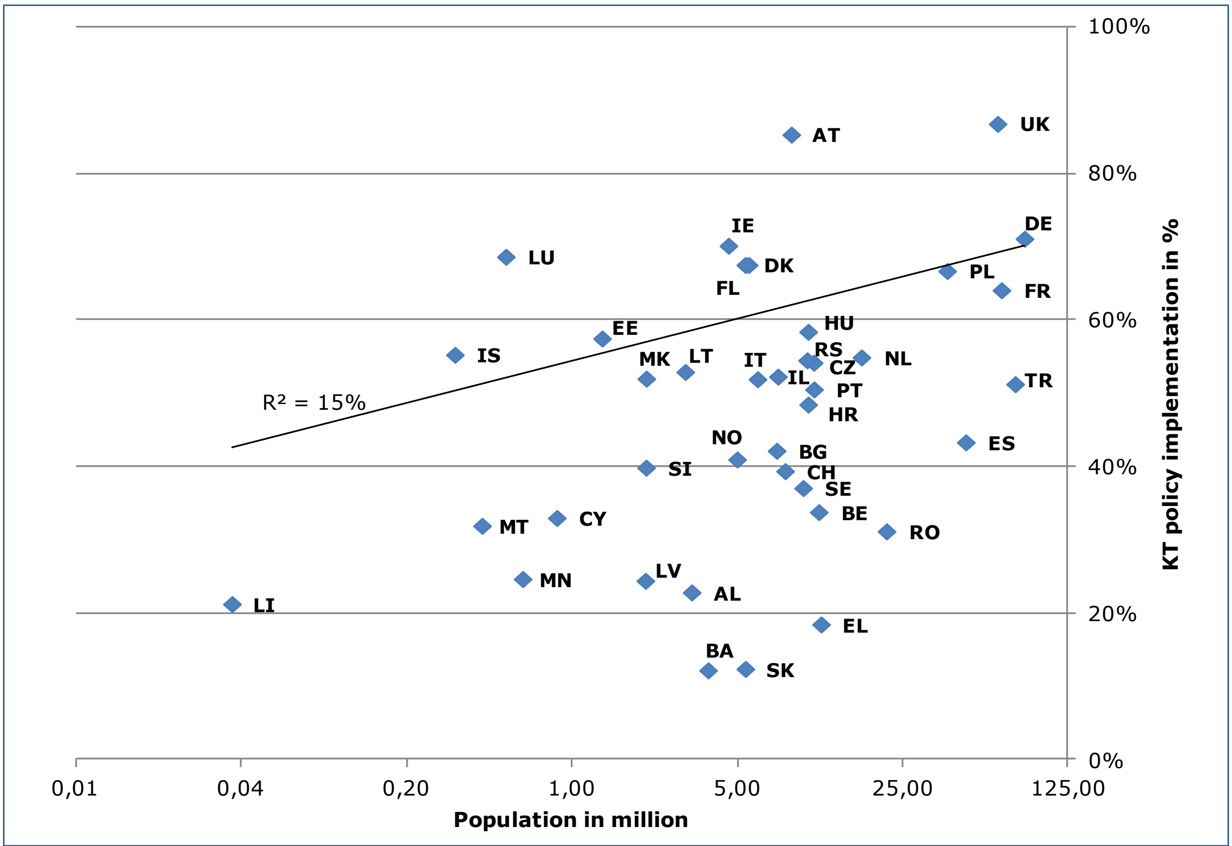
There may potentially be relationships between the intensity of national KT policies and other national characteristics – and there may be groups of countries with a particular level of KT policy intensity and particular other national characteristics. In statistical terms, while the previous section analysed whether KT policy can in any way be considered an independent variable for KT performance (i.e. have an influence on KT performance), the question now is whether there is any correlation between KT policy and national characteristics, potentially even that KT policy can be considered as a dependent variable in any way (i.e. be the result of another variable). In the following, the level of national KT policies will be related to selected indicators: gross domestic product (GDP), population, innovation performance, and competitiveness. For these issues, data for all 39 countries considered is available. The graphical presentations and the position of certain countries or groups of countries may provide further information about national KT policy profiles. For these linkages, all policy themes were considered.

The overall finding was that **high KT policy intensity tends to go together with innovativeness, and competitiveness**. Apparently there is also a positive correlation with GDP per capita, but only when excluding the wealthy non-EU Member States of Norway, Switzerland and Liechtenstein as well as Luxembourg. A very weak correlation was found with population.

Linking national KT policies with population

KT policy intensity appears to be slightly positively correlated with population size of a country (correlation coefficient 0.4) - see Exhibit 2-32 for related results.

Exhibit 2-30: KT policies linked with population



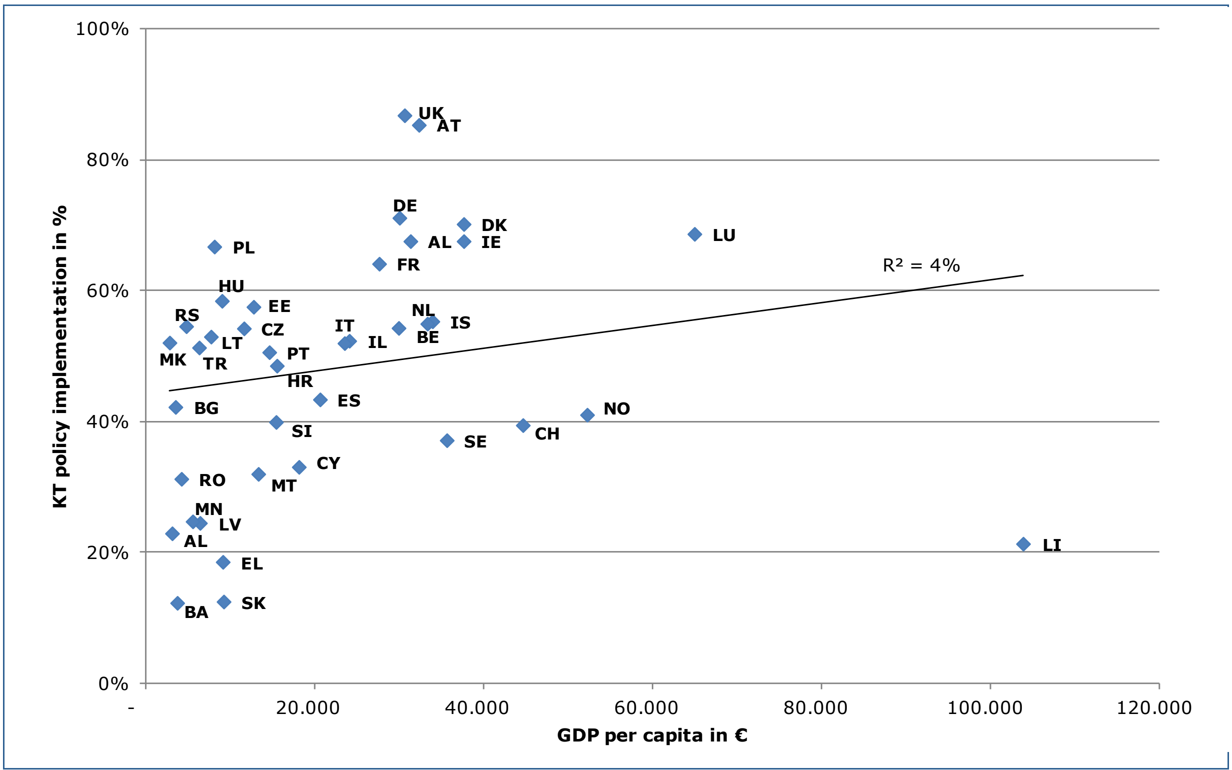
Source: European Knowledge Transfer Policy Survey 2012 (for policies); Eurostat for population

The larger a country, the more likely is it to have a strong KT policy. A possible explanation may be that in larger countries there is a larger need to formalise KT operations and to establish national structures for them.

Linking national KT policies with GDP per capita

At first sight the Gross Development Product per capita does not appear to be strongly correlated with the intensity of KT policy measures (correlation coefficient 0.2) – see Exhibit 2-30.

Exhibit 2-31: KT policies linked with Gross Domestic Product per capita

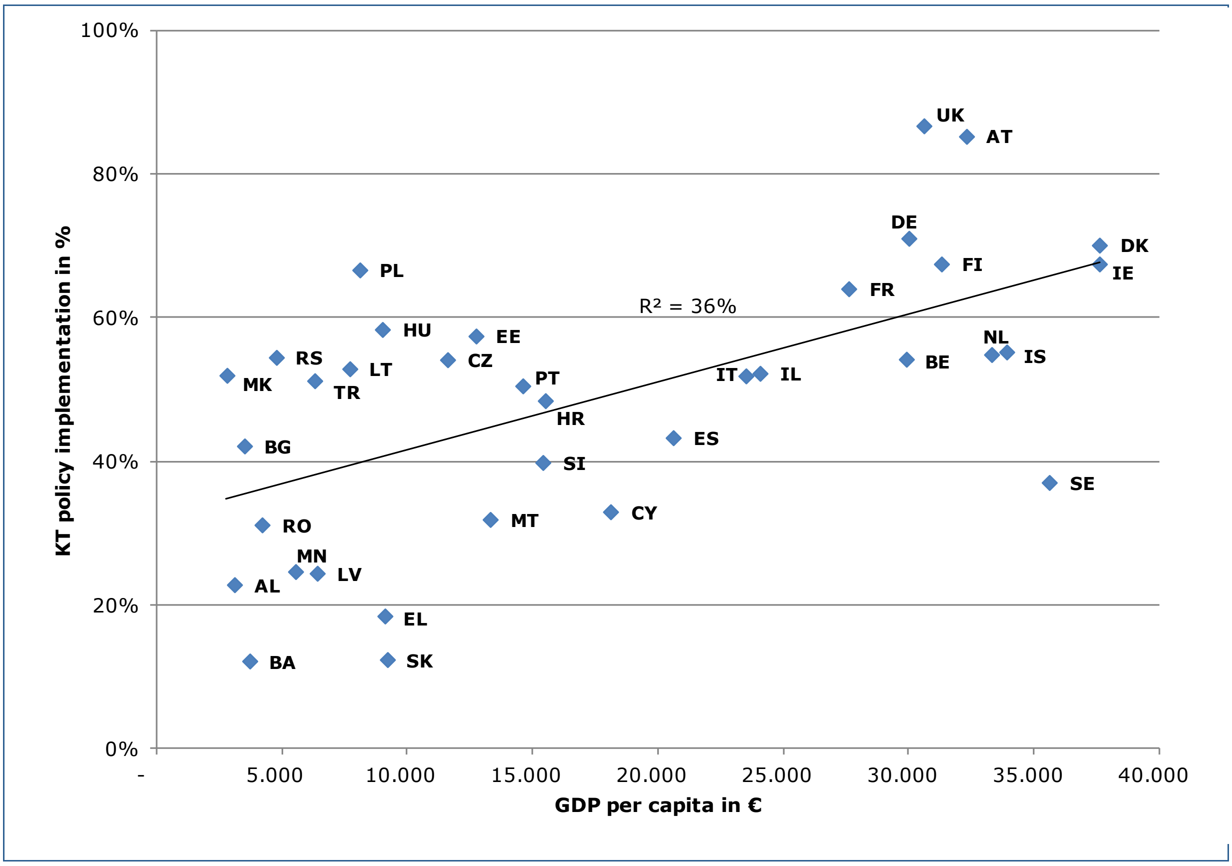


Source: European Knowledge Transfer Policy Survey 2012 (for policies); World Bank and Eurostat (for GDP per capita)

However, the situation becomes different when Luxembourg, Norway, Switzerland and Lichtenstein are excluded. These are the four countries with the highest GDP per capita in Europe, but for different reasons Liechtenstein, Norway and Switzerland do not have strong KT policies. Excluding these four countries, a relatively strong correlation between GDP per capita and KT policy intensity turns out (0.6).

As Exhibit 2-31 shows, countries with a high GDP like the UK or Austria and also Denmark, Ireland tend to have strong KT policies. Bosnia Herzegovina, Slovakia and Greece have a low GDP and weak KT policies. Strong KT policies appear to be a characteristic of economically wealthier countries.

Exhibit 2-32: KT policies linked with Gross Domestic Product per capita without LI, LU, NO, CH



Source: European Knowledge Transfer Policy Survey 2012 (for policies); World Bank and Eurostat (for GDP per capita)

Linking national KT policies with the Innovation Union Scoreboard

Using data from the Innovation Union Scoreboard 2011, a relatively strong correlation between innovation performance and KT policy intensity was found (correlation coefficient 0.4). This means that countries with a strong innovation performance also tend to have strong KT policies – and vice versa.

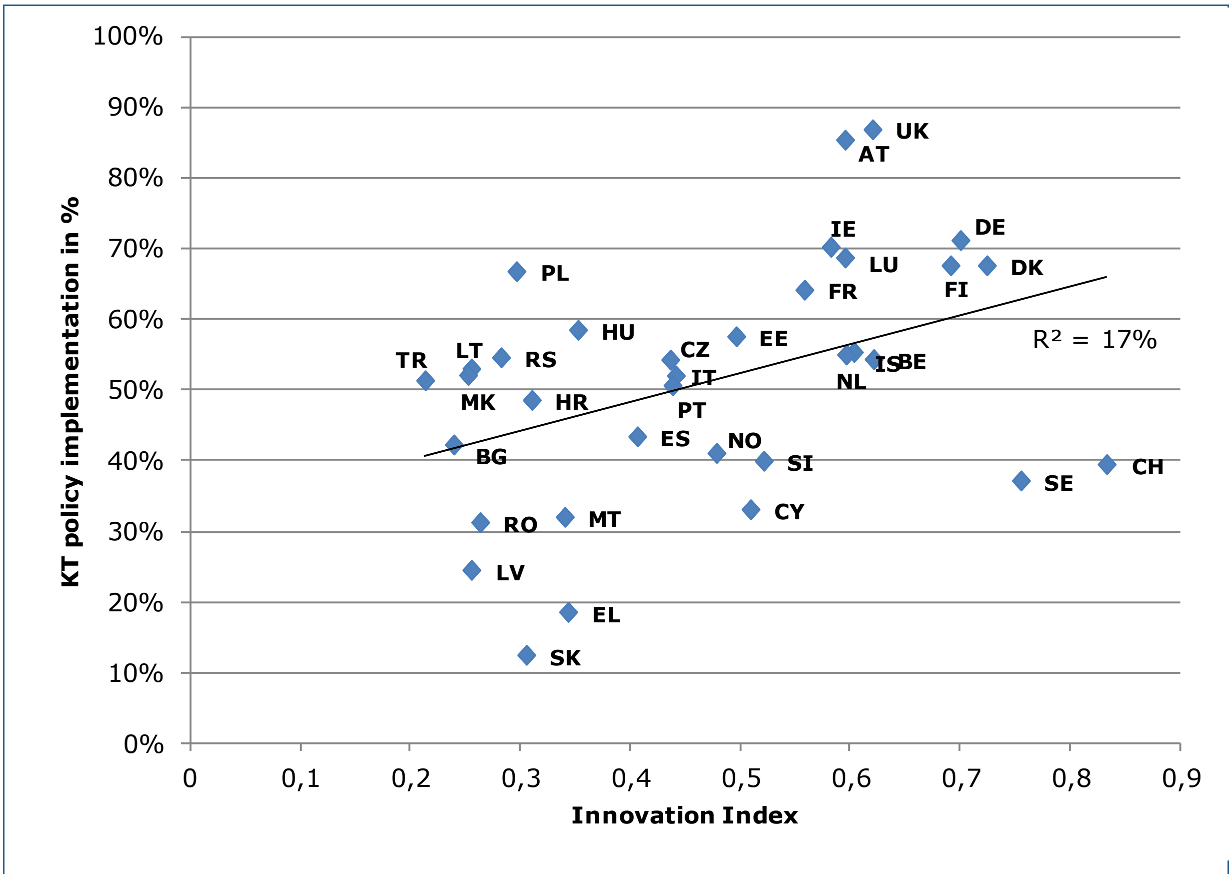
The first group comprises highly innovative countries with strong KT policies. This is the upper right quadrangle which includes eleven countries: the UK, Austria, Germany, Belgium, Ireland, Luxembourg, Finland, Denmark, France, the Netherlands and Iceland. All countries in this group are from the central and Northern parts of Europe.

The second group is highly innovative countries with weak KT policies, the lower right quadrangle, including Switzerland and Sweden. These are notably the two most innovative countries in the sample. Apparently they do not see a need for strong KT policies but they still do very well in terms of innovation.

The third group comprises countries with a low level of innovation and weak KT policies. It includes Slovakia, Greece, Croatia, Spain, Norway, Slovenia, Bulgaria, Montenegro, Cyprus, Latvia and Rumania. All countries in this group are from the South-Eastern and also Southern and Eastern parts of Europe, with the exception of Norway.

The fourth group includes countries with a strong KT policy but a weak innovation level: Poland, Hungary, Italy, Estonia, Czech Republic, Portugal, Serbia, Lithuania, Macedonia and Turkey. These countries may be trying to improve their innovation performance by political measures, including KT policy measures. Most countries in this group are from Eastern Europe, complemented by two countries from South Europe (Italy and Portugal).

Exhibit 2-33: KT policies linked with the innovation Union Scoreboard



Source: European Knowledge Transfer Policy Survey 2012 (for policies); European Innovation Index 2012

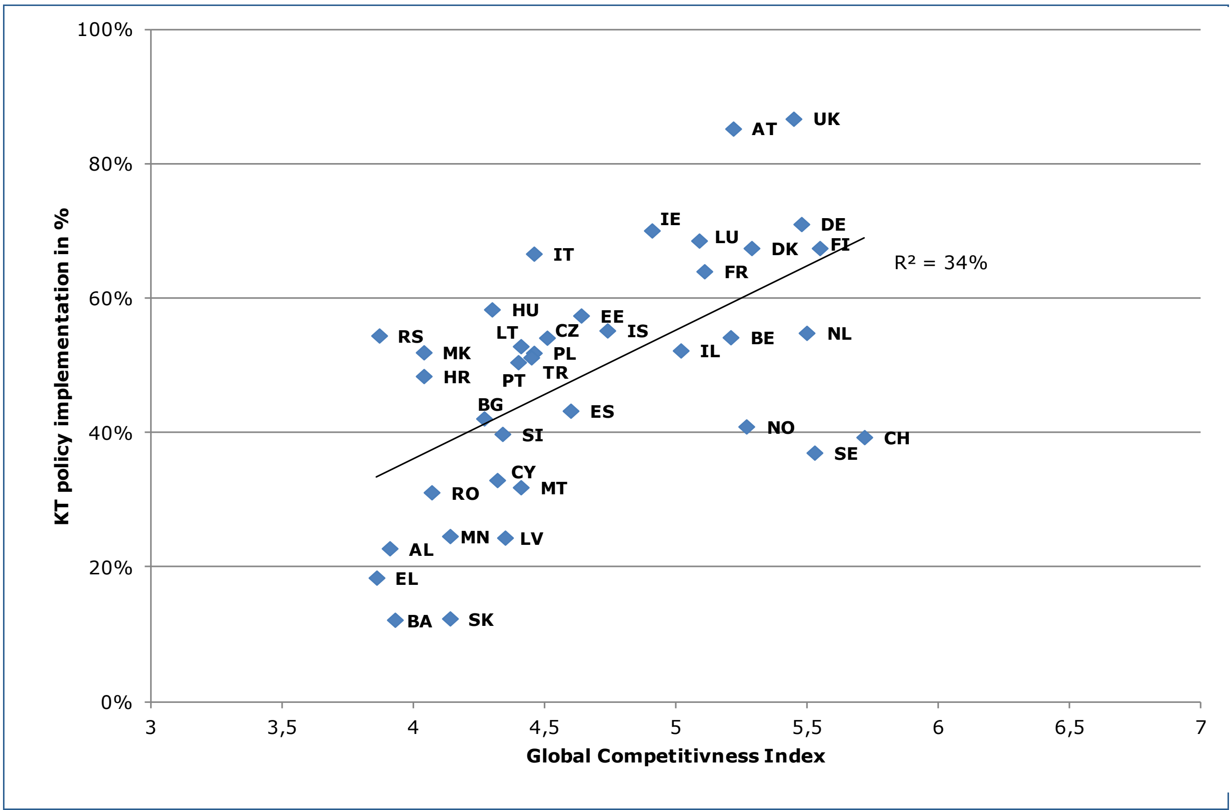
Linking national KT policies with the Global Competitiveness Index

The Global Competitiveness Index (GCI) is part of the annual Global Competitiveness Report published by the World Economic Forum. The report assesses the ability of countries to provide high levels of prosperity to their citizens. This in turn depends in how productively a country uses available resources. Therefore, the GCI measures the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity. It is made up of 110 variables, which are subdivided into twelve pillars: (1) Institutions, (2) Infrastructure, (3) Macroeconomic environment, (4) Health and primary education, (5) Higher education and training, (6) Goods market efficiency, (7) Labour market efficiency, (8) Financial market development, (9) Technological readiness, (10) Market size, (11) Business sophistication and (12) Innovation.

Competitiveness of a national economy appears to be positively correlated with the intensity of KT policy measures (correlation coefficient 0.6) – the more competitive a country, the stronger its KT policy. One might speculate whether there is a connection in the way round that strong KT policy leads to strong competitiveness, but competitiveness is determined by many different aspects and KT policy and its desired outcomes is just one tiny aspect of it.

Among some of the "odd cases" are again the highly competitive countries of Switzerland and Sweden and also Norway which have relatively weak KT policies.

Exhibit 2-34: KT policies linked with the Global Competitiveness Index



Source: European Knowledge Transfer Policy Survey 2012 (for policies); Global Competitiveness Index 2012

2.7 Summary of the current status of implementing the KT Recommendation

Survey background, objectives and methodology

The preceding chapter (Chapter 2) presented the results of the European KT Policy Survey 2012. The objective of this survey was monitoring the status of implementation of the European Commission's "Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations" from 2008. Responding to the survey fulfilled the Recommendation's requirement that Member States should "inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact". Twelve Associated States were also kindly requested to fill in the questionnaire. The findings are based on answers from the countries, mostly by representatives of the European Research Area Committee's working group on knowledge transfer. For four countries – Bosnia-Herzegovina, Italy, Liechtenstein and Turkey – other sources had to be taken instead. (See methodological notes about the survey in section 2.2.)

Overall implementation of the Recommendation

Taking all countries, all Recommendation themes and all related survey questions together, the level of implementation was found to be on average 53%. This means that the Recommendation's targets are currently reached approximately by half. There are strong differences between European countries not only in the overall level of implementing the Recommendation but also in implementing the Recommendation's themes. Each country has its own implementation profile and its own KT policy profile. In their KT policies, apparently European countries put stronger emphasis on capacities and skills development, while there is less effort on supporting the development of KT strategies and IP management procedures. Hence one might argue that, at least against the questions posed in the survey, many European countries take the third step before the first and the second. EU support for developing strategies and IP management procedures might be advisable.

Country groups and clusters

The countries can be subdivided into the following four groups by their level of implementing the Recommendation.

- Austria is the country with the most comprehensive KT policies in Europe, found to fulfil 93% of the policy measures. The UK (87%) and Germany (78%) follow.
- The group of countries fulfilling KT policy measures above the European average, i.e. between 53% and (below) 75%, comprises a broad group of 21 countries: Poland (74%), Luxembourg (71%), Denmark (71%), Ireland (70%), Hungary and Finland (68%), France (64%), Macedonia (64%), Estonia (63%), Serbia (63%), Netherlands (61%), Italy (59%), Iceland (58%), Spain and Lithuania (56%), Belgium and Turkey (55%) as well as the Czech Republic and Portugal (54%).
- The group of countries which implemented 25-53% of the measures includes 14 countries: Israel (53%), Croatia (52%), Romania (48%), Switzerland (47%), Norway (47%), Bulgaria (46%), Slovenia (42%), Montenegro (39%), Sweden (36%), Cyprus (34%), Malta (34%), Albania (30%), Slovakia (30%), and Latvia (25%).
- Three countries fulfilled less than 25% of the measures. This group includes Liechtenstein (21%), Greece (19%) and Bosnia-Herzegovina (17%).

Comprehensive KT policies appear to be correlated with national wealth. Eight of the top ten countries have a GDP per capita above the EU average, and most of them also belong to the countries that formed the European Community already in the 1970s. Exceptions from the rule include Switzerland, Norway, Sweden and Liechtenstein which are wealthy countries with less comprehensive KT policies. The low position of Switzerland, Norway and Liechtenstein might to some extent be related to the fact that they are no EU Member States so that they are not formally required to fulfil the Recommendation. The low position of Sweden might partly be explainable by the fast that it is beside Italy the only EU Member State where the professor's privilege is still in place. Secondly, comprehensive KT policies were found mainly in larger countries: Germany, France, UK, Italy, Spain and Poland are all above average. On the other hand, while some of the laggards are among the smallest European countries, notably Malta, Cyprus and Latvia, there are several very small countries with more comprehensive KT policies: Iceland, Estonia, Luxembourg, and FYR Macedonia. Different from what one might expect Nordic countries are not represented in the leaders, while Denmark and Finland are among the followers. East European countries are represented in all groups except the leaders.

Key results about KT policy themes

KT policy is generally accepted as an important issue in Europe: The vast majority of countries (90%) said that national and regional governments promote policies and procedures for the management of IP resulting from public funding. Within the policy measures for fostering KT strategy development asked about in the survey, non-legal measures were found to be widespread. Legal measures to support KT strategy development were found to be less prevalent.

Almost all countries (92%) said that national and regional governments support the development of KT capacity and skills in universities and other PROs. The lowest score for this theme was found for "model contracts for KT activities". 38% of the countries said that model contracts as well as related decision-making tools are available. Further 15% of countries plan to introduce model contracts.

As regards international RDI cooperation, 67% of the respondents said that their country cooperates with other countries to improve the coherence of IP ownership regimes. This share may be considered as remarkably low – one might have expected that all or almost all countries in the European Research Area co-operate in improving the coherence of ownership regimes.

Monitoring and reporting of the progress made by universities and other PROs in KT was not found to be widely implemented in European countries. Furthermore, implementation of the Code of Practice of the KT Recommendation was also found to be relatively weak.

For more detailed results about implementation of KT policy themes in European countries, see section 2.4 of this report.

Results of regression analysis and correlation with national characteristics

No noteworthy correlation was found between KT policy intensity and any of the seven KT performance indicators considered here: invention disclosures, patent applications, patent grants, licence agreements, licensing income, number of spin-offs, and number of research agreements. The indicators were put in relation to public R&D investment in the country concerned in order to make data comparable across countries. Furthermore, no correlation was found between total KT performance and KT policies (correlation coefficient -0.14). (See section 2.5 for more detailed results.)

Correlating KT policy intensity with selected national characteristics, it was found that high KT policy intensity tends to go together with high innovativeness, and competitiveness. Using data from the Innovation Union Scoreboard 2011, a relatively strong correlation between innovation performance and KT policy intensity was found, and using data from the Global Competitiveness Index (GCI) by the World Economic Forum, competitiveness of a national economy appears to be positively correlated with the intensity of KT policy measures. Apparently there is also a slightly positive correlation with GDP per capita, but only when excluding the wealthy non-EU Member States of Norway, Switzerland and Liechtenstein – which have a low KT policy intensity – as well as Luxembourg. Furthermore, KT policy intensity appears to be weakly positively correlated with population size of a country – the larger a country, the more likely is it to have a strong KT policy. (See section 2.6 for more detailed results.)

3 KT INDICATORS: PERFORMANCE OF UNIVERSITIES AND OTHER PROS (WP2)

3.1 WP2 background and objectives

R&D is a vitally important input for innovation in both the business and public sectors, while innovation in turn is essential for improving productivity and the quality of life. In most developed countries, the business sector accounts for the majority of investments in R&D, but the public sector also accounts for a significant share of all R&D investments. In 2009 in the EU-27 countries, the public sector accounted for 37.6% of total R&D expenditures while the business sector accounted for 61.3%. The remaining 1.1% was due to the private non-profit sector[15].

Almost all R&D in the public sector is conducted either by government research institutes or by universities. Together, these are defined in this report as public research institutes, or PROs. Although a significant share of the R&D performed by PROs is either basic research or humanities research with few short-term commercial applications, a substantial (although unknown) share of public research has immediate or potential commercial value. This includes research of value to a wide range of commercial applications, including aerospace, health applications, computerization, energy, and new materials.

For several decades, the goal of many Governments, both within Europe and abroad, has been to improve the transfer of commercially useful knowledge from the public research sector to private firms. The transfer of knowledge can occur through many channels, including informal contacts between the staff of PROs and firms, from PRO staff making results publicly available at conferences or in published journals, through firms obtaining the expertise of PROs through contracting out research, by firms hiring trained students after the completion of their degrees, via new start-up firms that use know-how created by PROs, or through the licensing activities of PROs. In general, the amount and quality of knowledge that is transferred through many of these mechanisms is difficult to measure. This is particularly true for informal channels or for methods that leave few traces, such as hiring or the use of publicly available knowledge by researchers in firms. In contrast, it is easier to measure formal transfer methods that leave traces in legal documents, such as licenses, patents and research agreements, although it is still difficult to determine if the transferred knowledge has resulted in commercially viable goods and services.

In order to encourage and support knowledge transfer activities, particularly those that require legal and technical expertise, many European PROs have established Knowledge Transfer Offices (KTOs) that can provide professional advice to assess the patentability of inventions, interact with firms, and provide licensing expertise. Although some PROs have had KTOs for decades, the majority of European KTOs have been established since 1990. In the study reported here, 81.5% of KTOs were established after 1990 and 62.2% after 2000. These KTOs collect data that can be used to construct indicators for the knowledge transfer activities of the PROs that they serve. This information is of value not only for the KTOs themselves, but also for policy to support knowledge transfer. Both groups can use this information to benchmark knowledge transfer activities and to track progress, for instance in response to KTO actions to improve the efficiency of their staff or policy actions to encourage knowledge transfer.

The recognition of the value of the data collected by KTOs has led to efforts by associations of technology managers, such as ASTP and ProTon in Europe and AUTM

15 Data from Eurostat based on purchasing power standards (PPS).

(Association of University and Technology Managers) in the United States, to survey their members to collect relevant data. The AUTM survey established the gold standard for such surveys because it was the first comprehensive annual survey. The AUTM studies also pointed to an interesting aspect of research in the public sector: it is highly concentrated, in the same way that business expenditures on R&D are concentrated in a small percentage of all firms. In the United States, approximately 100 leading universities, out of a total of over 2,500 tertiary education establishments, accounted for 90% of all Federal Government funding of research by the tertiary education sector. Most of these leading universities were also regular participants in the annual AUTM surveys.

Unfortunately, none of the European surveys were able to replicate the AUTM success in obtaining responses from the leading research-intensive universities in Europe. There are several reasons for this. First, the European surveys have been focused on their members, with none of the associations providing good coverage of the leading PROs in all of Europe. Second, Europe has lagged the United States in the share of PROs with a KTO. As noted above, the majority of KTOs were not established until after 2000 and 38% were not established until after 2005. Third, Europe lacks a complete list of an estimated 3,500 European tertiary education institutes that also includes information on the types of activities performed by these institutes. Therefore, membership associations that wished to extend their membership and their survey to new institutes faced a difficult task, particularly in the new member states. In particular, the cost of identifying KTOs in universities that were not part of their membership was often prohibitively high for a member-funded organisation.

The goal of this study has been to address these problems and to produce a comprehensive set of indicators for Europe’s leading research universities, using two surveys of KTOs: one in 2011 that covers knowledge transfer activities in 2010 and a second survey in 2012 to cover knowledge transfer activities in 2011.

This report presents the results of the European Knowledge Transfer Indicators Survey (EKTIS) for 2011 and 2012 with data collected for respectively 2010 and 2011.

The EKTIS surveys in 2011 and 2012 created both in their respective years the largest available dataset of the knowledge transfer activities of European PROs. The full dataset for 2010 consists of 430 PROs and the full data set for 2011 consists of 498 PROs.The EKTIS surveys in 2011 and 2012 had both the broadest coverage of any survey to date, with responses from 27 of the 27 EU member states and from 9 out of 12 Associated States.

Six key EKTIS indicators and three supplementary indicators for European PROs are compared over time between the two surveys. For this a panel data set is constructed with 320 PROs that have responded to both surveys.

3.2 WP2 methodology

3.2.1 Sample selection

The European public research sector includes the Higher Education (HE) Research sector and the Government Research sector (GR). The former includes research universities, other universities, and other tertiary research institutions. The latter includes publicly funded government research institutes and some government departments. The distribution of public expenditures by each of these two sectors also varies by country. For example, in 2006, 72% of the combined R&D by the HE and GR sectors in the United Kingdom was performed by higher education institutes, while in France the GR sector performed a much larger role, with higher education institutes responsible for only 51% of total expenditures.[16] Consequently, obtaining internationally comparable results for the public research sector requires data from both the HE and GR sectors. At the same time, results are required for both sectors separately, due to large differences in the type of research conducted by these two sectors.[17]

There are an estimated 918 universities within the 27 member states of the European Union, 1,850 other tertiary institutions (ERAWATCH, 2008) and an unknown number of government research institutes, but possibly up to several hundred, although many of these could be small, specialised institutes. The 12 Associate Countries are mostly small, but could contribute an additional 200 PROs. This suggests that there are approximately 3,500 PROs within the countries of interest. Many of these PROs are unlikely to meet the eligibility criteria for inclusion in this study. These criteria are as follows:

1. Research must be a core function of the PRO (many European PROs, as in the United States, could primarily focus on teaching).
2. The PRO must have a KTO or dedicated personnel who provide support for knowledge transfer activities. In some cases, the KTO function can be provided by an external, independent contractor.
3. The PRO must be one of the leading research institutes in the country.
4. The sample should cover both the leading PROs in Europe and the leading PROs in each target country, with a minimum of one PRO per country.

The fourth requirement is designed to ensure that the survey is relevant to all target countries. Without this requirement, the sample of leading European PROs could be dominated by a small number of countries, particularly the UK, Germany and France, with a small number of additional PROs from Scandinavia and the Netherlands. These criteria result in a five-step process for identifying PROs to include in the sample.

The first step is to draw a minimum of one PRO from each of the 27 EU member states and the 12 Associate Countries. The selected institution should be the top research performing institution in the country, either in terms of research expenditures or research personnel. For the smallest countries such as Malta, this could be the only PRO in the country. The problem for other countries is that it is not always possible to identify the leading PRO (see step three below). As a result, several PROs in each country were sampled.

In the second step, the remaining sample of 461 institutes is based on a weighted sample, with the weights based on the share of each country out of total research expenditures by PROs, which equals the sum of GOVERD (government intramural

[16] Based on an analysis of the OECD MSTI data (OECD, 2008).

[17] Compared to higher education institutes, Government research institutes in Europe conduct more applied research that is closer to the market (Arudel and Bordoy, 2008; OECD, 2003).

expenditures on R&D) and HERD (higher education expenditures on R&D). Exhibit 3-1 provides the distribution of research expenditures and the sample size by country.

Exhibit 3-1: Distribution of R&D expenditures and number of PROs to be sampled

Country	Government expenditures on R&D (GOVERD)[2]		Higher education expenditures on R&D (HERD)[3]		GOVERD & HERD		Desired Sample share	Desired Sample share + 1[5]
	Million $	% of total GOVERD	Million $	% of total HERD	Million $	%of total GOVERD & HERD		
Albania	-		-		-		4	1
Austria	358	1.14%	1,627	2.83%	1,985	2.23%	10	11
Belgium	501	1.59%	1,334	2.32%	1,835	2.07%	10	11
Bosnia-Herzegovina	-		-		-		4	1
Bulgaria[1]	210	0.67%	38	0.07%	248	0.28%	1	2
Croatia[1]	137	0.44%	178	0.31%	315	0.35%	2	3
Cyprus[1]	19	0.06%	31	0.05%	50	0.06%	4	1
Czech Republic	619	1.97%	511	0.89%	1,131	1.27%	6	7
Denmark	189	0.60%	1,207	2.10%	1,396	1.57%	7	8
Estonia	28	0.09%	105	0.18%	132	0.15%	1	2
Finland	522	1.66%	1,090	1.90%	1,612	1.81%	8	9
France	6,008	19.11%	7,121	12.40%	13,128	14.78%	68	69
Germany	8,386	26.68%	9,854	17.16%	18,240	20.53%	95	96
Greece	312	0.99%	728	1.27%	1,040	1.17%	5	6
Hungary	374	1.19%	359	0.62%	732	0.82%	4	5
Iceland	59	0.19%	71	0.12%	130	0.15%	1	2
Ireland	129	0.41%	582	1.01%	712	0.80%	4	5
Israel	378	1.20%	1,043	1.82%	1,421	1.60%	7	8
Italy	2,690	8.56%	5,577	9.71%	8,267	9.30%	43	44
Latvia[1]	40	0.13%	75	0.13%	115	0.13%	1	2
Liechtenstein	-		-		-		4	1
Lithuania[1]	89	0.28%	201	0.35%	290	0.33%	2	3
Luxembourg	69	0.22%	22	0.04%	90	0.10%	4	1
Macedonia	-		-		-		4	1
Malta[1]	2	0.01%	14	0.02%	16	0.02%	4	1
Montenegro	-		-		-		4	1
Netherlands	1,189	3.78%	3,488	6.08%	4,678	5.26%	24	25
Norway	513	1.63%	1,036	1.81%	1,549	1.74%	8	9
Poland	1,118	3.56%	1,060	1.85%	2,178	2.45%	11	12
Portugal	219	0.70%	790	1.38%	1,009	1.14%	5	6
Romania	332	1.06%	212	0.37%	544	0.61%	3	4
Serbia	-		-		-		4	1
Slovak Republic	137	0.44%	99	0.17%	236	0.27%	1	2
Slovenia	166	0.53%	108	0.19%	274	0.31%	1	2
Spain	2,413	7.68%	3,682	6.41%	6,095	6.86%	32	33
Sweden	493	1.57%	2,347	4.09%	2,840	3.20%	15	16
Switzerland	60	0.19%	1,794	3.12%	1,854	2.09%	10	11
Turkey	645	2.05%	2,679	4.67%	3,324	3.74%	17	18
United Kingdom	3,028	9.63%	8,355	14.55%	11,383	12.81%	59	60
Total	**31,432**	**100.00%**	**57,417**	**100.00%**	**88,849**	**100.0%**	**461**	**500**

Source: Main Science and Technology Indicators (OECD)
Notes:
1: Source Eurostat.
2: Average annual government intramural expenditures on R&D (GOVERD) 2005-2010 - (million 2000 dollars -- constant prices and PPP).
3: Average annual higher education expenditures on R&D (HERD) 2005-2010 - (million 2000 dollars -- constant prices and PPP).
4: Would not be included in sample based on percentage in total or due to no data availability.
5: Sample share plus the minimum of one institution from each of the 27 EU member states and the 12 Associate Countries.

Research expenditures are averaged over the five year period of 2005 to 2010 to reduce the effect of annual variability. The average annual total research expenditures (GOVERD + HERD) are given for each country, plus the country share of total European GOVERD + HERD research expenditures. For example, the average for Germany is $18,240 million (in purchasing parity dollars), which is equivalent to 20.53% of the total GOVERD + HERD research expenditures of €88,849 million for all the target countries combined. Based on Germany's share or research expenditures, the desired sample size for Germany is 95 PROs out of a total of 461 PROs, as shown in the next column. The final column gives the desired sample size after including the minimum of 1 PRO per country.

Of note, the desired sample size for each country is only approximate, since the actual sample depends on the concentration of research activities among PROs. This issue is dealt with in the third step, which selects PROs from each country in descending order of research-intensiveness. For example, if the goal is to sample 15 PROs in country *x*, these 15 PROs should be the leading PROs in the country in terms of the number of research personnel or research expenditures. This step presents a difficult challenge because for most target countries there are no publicly-available data that rank the research efforts of their PROs. As a result, we use a range of public sources (see Annex A) to identify eligible PROs. Since these data sources are not complete, we also oversample PROs in each country in order to be able to identify the leading PROs *ex post* from the survey results.

The fourth and most time-consuming step is to obtain contact information for the KTO that serves each PRO. This was done through using both data from professional associations and from telephoning the central administration offices of PROs and asking for this information.

The fifth step was to obtain data *post-survey* for missing PROs from other sources that also survey and collect data on knowledge transfer activities in the target countries. For example, HEFCE, a government organisation in the UK, conducts a survey of British PROs that collects similar data to this study. Data for an additional 60 PROs in the UK was obtained from HEFCE for the 2010 survey and an additional 68 PROs for the 2011 survey. The HEFCE results are for fiscal years instead of for calendar years, but they should be roughly similar to the EKTIS results.[18] Similarly additional data for 4 PROs in Denmark was obtained from the Danish Agency for Science, Technology and Innovation (DASTI) for the EKTIS 2012.[19]

Before (and during) the start of the EKTIS 2012 several collaboration possibilities were explored with ProTon, ASTP and other national institutes to collect additional data on the knowledge transfer activities of PROs.

The country representatives of ProTon were contacted during the fall of 2011 by the European Commission to request 2010 individual level data for their members in Belgium, France, Italy and Spain. They were furthermore asked about the possibility of running the next survey jointly with UNU-MERIT in order to decrease the burden of KTOs.

UNU-MERIT was only able to obtain additional data for 39 PROs for Spain from RedOTRI for the year 2010. RedOTRI was contacted again in the preparations for the second survey to obtain data from their national survey on KT activities for 2011. At first RedOTRI agreed to share their data. Because of this UNU-MERIT decided to create a

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18 OECD publication series such as *STI indicators* or the *Biotechnology Compendium* regularly publish indicator data for countries for different years. This recognizes that there is often no alternative source of data for the same year. Furthermore, data for adjacent years (or even over a two or three year gap) are often similar enough to be useful.

19 Public Research Commercialisation Survey Denmark 2011 http://en.fi.dk/publications/2012/public-research-commercialisation-survey-denmark-2011/

shortened questionnaire for Spain that mainly asked qualitative information that was not asked in the RedOTRI survey, expecting that RedOTRI would contribute the quantitative data. Unfortunately, at a later stage RedOTRI decided to ask for financial compensation for their data. Efforts were made to construct a deal with RedOTRI to share data from the EKTIS survey in order to obtain the Spanish results, but RedOTRI did not respond to these efforts.

Since 2003 ProTon Europe has been carrying out a survey on the activities of KTOs in European universities and other public research institutions. Their most recent report covers the knowledge transfer activities of five countries for the fiscal year 2011[20]. ProTon collaborated with national Technology Transfer associations to collect data. The data for the fiscal year 2011 was obtained from HEFCE (UK), NetVal (IT), RedOTRI (ES), DASTI (DK), and ITTIG (IR). The data source for the UK and Denmark is identical to the individual level data used by UNU-MERIT for this report. Data presented by ProTon in the report for Italy, Spain and Ireland are aggregate data and could therefore not be included in the data sample for this report. This aggregate data is obtained from the same sample of PROs and, if used, would lead to counting the results for certain PROs twice. Furthermore the data obtained for these countries through the EKTIS 2011 and EKTIS 2012 is a good representation of the leading PROs in these countries (see Exhibit 3-29).

In the spring of 2012 an agreement was made with ASTP to conduct the ASTP survey on their behalf, with the condition that all the questions asked in the EKTIS 2012 were to be included in the ASTP survey. Additional address information has been provided by ASTP which was used to increase the sample size for the EKTIS survey and to make sure that all the leading PROs were asked to participate. The benefit for the study was 65 additional valid responses received trough the ASTP cooperation.

Another agreement was established in the spring of 2012 with the Portuguese national network for KTOs (UTEN) to conduct their national survey jointly. The agreement was made in order to decrease the response burden of Portuguese KTOs. The EKTIS survey and UTEN survey were merged so that one integrated survey was sent out to all public research institutes in Portugal. Additional data for 33 PROs in Portugal was obtained from UTEN.

An additional agreement was made with the French national network for KTOs, RESEAU C.U.R.I.E to obtain data for French PROs for the years 2010 and 2011. However the national French survey, which collects data for the period 2008-2011, is postponed, and closes on July 10, 2013. This implies that the expected additional cases for France are not included in this report.

3.2.2 Response rates

Steps one to four identified 705 KTOs for inclusion in the EKTIS 2011 and 805 KTOs for inclusion in the EKTIS 2012. Responses to the EKTIS 2011 were obtained from 402 KTOs for a response rate of 57.0% and from 442 KTOs for the EKTIS 2012 for a response rate of 55.9%. These response rates are comparable to the 2010 AUTM survey, which obtained a response rate of 59.6%. Every effort was made to maximise response rates, including three separate mail-outs of the questionnaire, a reminder letter with the second and third mail-outs, translated questionnaires and reminder letters in French, Spanish, German and Italian and up to three follow-up telephone calls.

[20] Piccaluga, A., Balderi, C., and Daniele, C. (2012) The ProTon Europe Ninth Annual Survey Report (fiscal year 2011), ProTon, December 2012.

Exhibit 3-2: Response rates by country 2010 and 2011

Country	Number of mailed questionnaires	Number of responses	Response rate	Number of mailed questionnaires	Number of responses	Response rate
		2010			**2011**	
Albania	1	0	0.0%	1	0	0.0%
Austria	18	10	55.6%	20	14	70.0%
Belgium	19	12	63.2%	17	11	64.7%
Bosnia-Herzegovina	3	2	66.7%	3	1	33.3%
Bulgaria	4	3	75.0%	4	3	75.0%
Croatia	3	3	100.0%	3	1	33.3%
Cyprus	1	1	100.0%	3	3	100.0%
Czech Republic	12	9	75.0%	12	7	58.3%
Denmark	16	14	87.5%	15	8	53.3%
Estonia	1	1	100.0%	3	2	66.7%
Finland	12	6	50.0%	13	8	61.5%
France	47	19	40.4%	117	51	43.6%
Germany	123	87	70.7%	127	85	66.9%
Greece	9	6	66.7%	9	5	55.6%
Hungary	8	5	62.5%	8	4	50.0%
Iceland	2	1	50.0%	2	2	100.0%
Ireland	14	9	64.3%	15	8	53.3%
Israel	15	7	46.7%	15	9	60.0%
Italy	58	31	53.4%	57	34	59.6%
Latvia	3	2	66.7%	3	2	66.7%
Liechtenstein	1	1	100.0%	1	1	100.0%
Lithuania	1	1	100.0%	1	1	100.0%
Luxembourg	2	1	50.0%	2	2	100.0%
Macedonia	1	0	0.0%	1	1	100.0%
Malta	1	1	100.0%	1	1	100.0%
Montenegro	1	0	0.0%	1	0	0.0%
Netherlands	24	20	83.3%	25	21	84.0%
Norway	16	9	56.3%	13	9	69.2%
Poland	17	9	52.9%	15	9	60.0%
Portugal	15	7	46.7%	2	2	100.0%
Romania	5	2	40.0%	5	3	60.0%
Serbia	1	1	100.0%	1	0	0.0%
Slovak Republic	1	1	100.0%	1	1	100.0%
Slovenia	1	1	100.0%	4	4	100.0%
Spain	51	29	56.9%	77	52	67.5%
Sweden	28	17	60.7%	25	11	44.0%
Switzerland	31	20	64.5%	29	23	79.3%
Turkey	25	7	28.0%	27	5	18.5%
United Kingdom	114	47	41.2%	113	38	33.6%
Total	**705**	**402**	**57.0%**	**791**	**442**	**55.9%**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: The total number of mailed questionnaires is smaller than the 805 identified PROs because 14 Portuguese PROs were not contacted by MERIT but by UTEN Portugal.

Compared to the EKTIS 2011, 128 new PROs were identified for the EKTIS 2012 and 71 PROs were dropped from the sample compared to 2010. The EKTIS 2012 obtained 63 responses from PROs that did not reply to the EKTIS 2011.

Exhibit 3-3: Number of new PROs in 2011 compared to 2010, by country

Country	New PROs in 2011	Country	New PROs in 2011
Austria	2	Italy	1
Bulgaria	2	Luxembourg	1
Cyprus	2	Netherlands	6
Czech Republic	1	Norway	2
Estonia	2	Portugal	1
Finland	2	Slovenia	3
France	77	Spain	4
Germany	12	Sweden	1
Greece	1	Switzerland	1
Iceland	1	Turkey	2
		Total	**128**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Exhibit 3-4: Number of PROs excluded in 2011 compared to 2010, by country

Country	Number of PROs excluded in 2011	Country	Number of PROs excluded in 2011
Belgium	3	Italy	4
Bosnia-Herzegovina	2	Liechtenstein	1
Bulgaria	3	Luxembourg	1
Czech Republic	1	Netherlands	9
Denmark	1	Norway	1
Finland	1	Poland	5
France	4	Sweden	6
Germany	9	Switzerland	2
Greece	2	Turkey	1
Israel	3	United Kingdom	12
		Total	**71**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Exhibit 3-5: Number of new respondents in 2011 compared to 2010, by country

Country	New respondents in 2011	Country	New respondents in 2011
Austria	2	Ireland	1
Bulgaria	1	Italy	1
Cyprus	1	Luxembourg	1
Estonia	1	Netherlands	2
Finland	2	Norway	2
France	31	Portugal	1
Germany	8	Slovenia	3
Greece	1	Spain	3
Iceland	1	United Kingdom	1
		Total	**63**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Not all responses were valid. For the EKTIS 2011, 64 respondents reported no knowledge transfer activities and a further 7 PROs had fewer than 25 researchers and were therefore not representative of 'leading' research institutes in their respective countries. This left 331 eligible responding KTOs for analysis. After including the additional responses from HEFCE for the UK and from RedOTRI for Spain, the full dataset consists of 430 PROs for 2010.

For the EKTIS 2012, 49 respondents reported no knowledge transfer activities to date. This left 393 eligible responding KTOs for analysis. After including the additional 68 responses from HEFCE for the UK, 4 for Denmark and 33 for Portugal the full dataset consists of 498 PROs for 2011.

Exhibit 3-6: Valid responses per country 2010 and 2011

Country	Desired responses	Valid responses	Valid/ Desired (%)	Valid responses	Valid/ Desired (%)
		2010		2011	
Albania	1	0	0.0%	0	0.0%
Austria	11	10	90.9%	14	127.3%
Belgium	11	9	81.8%	11	100.0%
Bosnia-Herzegovina	1	0	0.0%	0	0.0%
Bulgaria	2	0	0.0%	3	150.0%
Croatia	3	3	100.0%	1	33.3%
Cyprus	1	1	100.0%	2	200.0%
Czech Republic	7	8	114.3%	6	85.7%
Denmark	8	13	162.5%	10	125.0%
Estonia	2	1	50.0%	2	100.0%
Finland	9	5	55.6%	8	88.9%
France	69	15	21.7%	43	62.3%
Germany	96	78	81.3%	79	82.3%
Greece	6	4	66.7%	3	50.0%
Hungary	5	5	100.0%	3	60.0%
Iceland	2	1	50.0%	2	100.0%
Ireland	5	9	180.0%	8	160.0%
Israel	8	4	50.0%	8	100.0%
Italy	44	27	61.4%	32	72.7%
Latvia	2	2	100.0%	2	100.0%
Liechtenstein	1	0	0.0%	0	0.0%
Lithuania	3	1	33.3%	1	33.3%
Luxembourg	1	0	0.0%	2	200.0%
Macedonia	1	0	0.0%	1	100.0%
Malta	1	1	100.0%	1	100.0%
Montenegro	1	0	0.0%	0	0.0%
Netherlands	25	11	44.0%	16	64.0%
Norway	9	8	88.9%	9	100.0%
Poland	12	4	33.3%	8	66.7%
Portugal	6	7	116.7%	35	583.3%
Romania	4	2	50.0%	3	75.0%
Serbia	1	1	100.0%	0	0.0%
Slovak Republic	2	1	50.0%	1	50.0%
Slovenia	2	1	50.0%	4	200.0%

Country	Desired responses	Valid responses	Valid/ Desired (%)	Valid responses	Valid/ Desired (%)
Spain	33	68	206.1%	49	148.5%
Sweden	16	11	68.8%	10	62.5%
Switzerland	11	18	163.6%	17	154.5%
Turkey	18	6	33.3%	4	22.2%
United Kingdom	60	95	158.3%	100	166.7%
Total	**500**	**430**	**86.0%**	**498**	**99.6%**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

In addition to the survey response rate, an important factor affecting the results is the item non-response rates. These are the percent of respondents that replied to each specific question (Annex B gives the item non-response rates for each question for both the EKTIS 2011 and 2012 surveys). On average, item non-response rates are low for nominal (yes or no) questions, with non-response rates below 5%. Non-response rates are of particular concern for the questions used to construct the key indicators, particularly the denominator question on research expenditures, where the item non-response rate is 30.8% in 2010 and 20.3%. In contrast, there is considerably more data for the denominator question on the number of researchers, where data are missing for only 4.9% of respondents in 2010 and 2.4% in 2011. This is partly because this information could be found from the websites or annual reports of PROs.

3.2.3 Panel dataset

Out of the 430 respondents that replied to the EKTIS 2011, 320 responded as well to the EKTIS 2012. This implies that 110 PROs replied to the EKTIS 2011 but not to the EKTIS 2012.

Exhibit 3-7: Panel dataset: number of PROs that responded to both the EKTIS surveys, by country

Country	Number	Country	Number
Austria	7	Latvia	1
Belgium	8	Lithuania	1
Croatia	1	Malta	1
Cyprus	1	Netherlands	11
Czech Republic	4	Norway	7
Denmark	10	Poland	5
Estonia	1	Portugal	5
Finland	3	Romania	2
France	8	Slovak Republic	1
Germany	55	Slovenia	1
Greece	2	Spain	44
Hungary	2	Sweden	7
Iceland	1	Switzerland	13
Ireland	5	Turkey	2
Israel	3	United Kingdom	90
Italy	18		
		Total	**320**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: The following countries are not represented in the panel data set, Albania, Bosnia-Herzegovina, Bulgaria, Liechtenstein, Luxembourg, Macedonia, Montenegro and Serbia.

Exhibit 3-8: Number of PROs that responded to the EKTIS 2011 but not to the EKTIS 2012, by country

Country	Number	Country	Number
Austria	3	Israel	1
Belgium	1	Italy	9
Croatia	2	Latvia	1
Czech Republic	4	Norway	1
Denmark	3	Portugal	2
Finland	2	Serbia	1
France	7	Spain	23
Germany	23	Sweden	4
Greece	2	Switzerland	5
Hungary	3	Turkey	4
Ireland	4	United Kingdom	5
		Total	**110**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

3.2.4 Questionnaire

The survey questionnaire for both years was designed to obtain six key indicators plus three supplementary indicators for knowledge transfer activities. Each relevant question was designed to provide results that are comparable to other surveys, such as the AUTM, ASTP and ProTon surveys. The key and supplementary indicators are as follows:

Key indicators

1. Number of invention disclosures
2. Number of priority patent applications
3. Number of technically unique patent grants
4. The number of start-ups
5. The number of licenses or option agreements with companies
6. The amount of license income earned

Supplementary indicators

7. The number of R&D agreements between the affiliated institutions and companies
8. Number of USPTO patent grants
9. The number of successful start ups (the start up developed a product/process that is sold in the market)

The questionnaires were broadly similar between the two years with only minor differences. In addition to the above mentioned key and supplementary indicators both questionnaires collected data on, the fields of activity based on patent applications, if the KTO was aware of cases where start-ups were able to introduce products or processes onto the market, the size of licensees, share of license revenues by area of application, and whether or not licensed technology results in commercial uses. Some of these questions have been used in other questionnaires, but they are not part of a core set of questions used in almost all KTO surveys. Consequently, these questions underwent extensive cognitive testing to ensure that each question was correctly understood and answerable by respondents.

The full questionnaires are attached as Annex C.

3.3 Combined datasets for 2010 and 2011

Combining the two datasets for 2010 and 2011 leads to a larger dataset of 602 unique PROs. Data for adjacent years are similar enough to be useful to analyse the performance of KTOs in the period 2010-2011. Out of the 602 PROs, there are 498 cases from the EKTIS 2012 and 104 from the EKTIS 2011. Combining the datasets for 2010 and 2011 furthermore allows a more complete cross-country performance analysis. As there is no data available on the number of research staff for the US, this chapter provides standardised performance indicators by research expenditures for cross-country comparisons in paragraph 3.3.5.

3.3.1 Characteristics of the PROs

This section gives results on the characteristics of each PRO. The results are given for the EKTIS 2011 and 2012 conducted by UNU-MERIT. Data obtained from the ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) surveys is added to results if they were available. A note below the exhibits clarifies if results from additional resources are included.

Type of responding PRO

Out of the full EKTIS survey dataset, 503 PROs are universities. Of these, 61 are universities with a hospital. An additional 99 PROs are other research organisations.

Exhibit 3-9: Type of public research organisation, EKTIS 2011 and 2012 results combined

	Number	Percentage
Universities	503	83.6%
Universities without a hospital	*442*	*73.4%*
Universities with a hospital	*61*	*10.1%*
Other research organisations	99	16.5%
Total	602	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for question 1, percent non-response 0% in both surveys. Results provided for EKTIS 2011 and 2012 combined, including UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Knowledge transfer office establishment year

On average, the KTOs at universities are 14 years old while the ones at other research organisations are 19 years old. Most of the KTOs were established after the year 2000. Exhibit 3-10 shows the distribution of the year of establishment for 496 KTOs.

Exhibit 3-10: Distribution of the year of establishment of the KTO EKTIS 2011 and 2012 results combined

	Universities		Other research organisations		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Before 1990	71	17.5%	11	12.2%	82	16.5%
1990-1999	90	22.2%	23	25.6%	113	22.8%
2000-2004	86	21.2%	24	26.7%	110	22.2%
2005 or later	159	39.2%	32	35.6%	191	38.5%
Total	406	100.0%	90	100.0%	496	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for question 4.1. Results provided for EKTIS 2011 and 2012 combined, including UTEN (PT) and RedOTRI (ES) respondents.

Knowledge transfer office staff

The total number of KTO staff reported was 6,799 FTE, 5,932 FTE of these were employed at universities and 868 FTE at other research organisations. The average KTO at universities had 12 FTE staff members and the average KTO at other research organisations had 9 FTE staff members. The median at universities is 5 FTE and at other research organisations 6 FTE. The average staff member is highly skewed, this can be explained by the large average staff number of 31 FTE at KTOs in the UK. Exhibit 3-11 shows the distribution of the number of office staff for 589 KTOs.

Exhibit 3-11: Distribution of the number of office staff, EKTIS 2011 and 2012 results combined

	Universities		Other research organisations		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
up to 2	114	23.1%	24	25.0%	138	23.4%
2.1 to 5	145	29.4%	24	25.0%	169	28.7%
5.1 to 10	98	19.9%	24	25.0%	122	20.7%
More than 10	136	27.6%	24	25.0%	160	27.2%
Total	493	100.0%	96	100.0%	589	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for question 4.2. Results provided for EKTIS 2011 and 2012 combined, including ASTP, UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Ownership of intellectual property

At most PROs the ownership of intellectual property is in the hands of the institution itself exclusively (23.5%) or in some kind of combination between the institution and other parties (51.4%). Although the question leaves room for multiple answers, Exhibit 3-12 below gives a good idea of who has the first right to the intellectual property in different countries.

Exhibit 3-12: Ownership of intellectual property, EKTIS 2011 and 2012 results combined

	The institution	Companies	The inventor	Other
Universities	50.9%	21.9%	22.8%	4.4%
Other research organisations	53.6%	20.3%	21.6%	4.6%
Total	51.4%	21.6%	22.6%	4.4%
Total (exclusively)	23.5%	2.4%	2.9%	1.7%
Country	**The institution**	**Companies**	**The inventor**	**Other**
Austria	46.7%	43.3%	6.7%	3.3%
Belgium	52.2%	26.1%	21.7%	
Croatia	100.0%			
Cyprus		50.0%		50.0%
Czech Republic	60.0%	33.3%	6.7%	
Denmark	57.1%	21.4%	14.3%	7.1%
Estonia	100.0%			
Finland	38.5%	34.6%	26.9%	
France	52.9%	16.1%	23.0%	8.0%
Germany	63.2%	19.4%	12.9%	4.5%
Greece	28.6%	14.3%	28.6%	28.6%
Hungary	54.5%	27.3%	18.2%	
Iceland	33.3%	33.3%	33.3%	

	The institution	Companies	The inventor	Other
Ireland	55.0%	15.0%	25.0%	5.0%
Israel	66.7%	25.0%	8.3%	
Italy	36.4%	31.2%	28.6%	3.9%
Latvia	37.5%	37.5%	25.0%	
Lithuania	100.0%			
Malta	33.3%	33.3%	33.3%	
Netherlands	75.0%	15.0%	10.0%	
Norway	57.1%	28.6%	14.3%	
Poland	61.5%	23.1%	15.4%	
Portugal	70.7%	4.9%	22.0%	2.4%
Romania	75.0%		25.0%	
Slovakia	50.0%		50.0%	
Slovenia	42.9%	28.6%	14.3%	14.3%
Spain	42.9%	15.4%	34.1%	7.7%
Sweden	4.3%	43.5%	47.8%	4.3%
Switzerland	59.4%	15.6%	21.9%	3.1%
Turkey	33.3%	33.3%	33.3%	
United Kingdom	49.3%	17.9%	29.9%	3.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 5 and EKTIS 2012, question 6. Results include ASTP and UTEN (PT) respondents.

Research personnel

The total number of research personnel covered by the combined data set is 1,021,731 full-time equivalents (FTEs). Out of this total, 872,915 researchers are working at universities and the remaining 148,816 researchers at other research organisations. Exhibit 3-13 below shows the distribution of research personnel among 574 PROs. Average research personnel at universities was 1,804 FTE and 1,654 FTE at other research organisations.

Exhibit 3-13: Distribution of research personnel, EKTIS 2011 and 2012 results combined

	Universities		Other research organisations		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Up to 499	107	22.1%	21	23.3%	128	22.3%
500-1249	148	30.6%	27	30.0%	175	30.5%
1250-2499	121	25.0%	18	20.0%	139	24.2%
2500 or more	108	22.3%	24	26.7%	132	23.0%
Total	484	100.0%	90	100.0%	574	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 12.2 and EKTIS 2012, question 13.2. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Research expenditures

Total reported research expenditures among the responding PROs amounted to approximately €41.6 billion. Out of the total amount, €34.9 billion was spent on research by universities and €6.7 billion by other research organisations. Average research expenditures were €94.4 million at universities and €98.1 million at other research organisations. Exhibit 3-14 below shows the distribution of research expenditures as reported by 438 PROs.

Exhibit 3-14: Distribution of research expenditures, EKTIS 2011 and 2012 results combined

	Universities		Other research organisations		Total	
	Number	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
up to 5 m	60	16.2%	6	8.8%	66	15.1%
5 m - 14 m	74	20.0%	8	11.8%	82	18.7%
15 m-39 m	67	18.1%	15	22.1%	82	18.7%
40 m-79 m	70	18.9%	14	20.6%	84	19.2%
80 m -159 m	49	13.2%	16	23.5%	65	14.8%
160 m or more	50	13.5%	9	13.2%	59	13.5%
Total	370	100.0%	68	100.0%	438	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 12.3 and EKTIS 2012, question 13.3. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

3.3.2 Performance measures

Summary for all performance measures

The EKTIS survey collected count data for several knowledge transfer activities in 2010 and 2011:

Key indicators

1. Number of invention disclosures
2. Number of priority patent applications
3. Number of technically unique patent grants
4. The number of start-ups
5. The number of licenses or option agreements with companies
6. The amount of license income earned

Supplementary indicators

7. The number of R&D agreements between the affiliated institutions and companies
8. Number of USPTO patent grants
9. The number of successful start ups (developed a product/process that is sold in the market)

Exhibit 3-15 summarises the results for these indicators for both universities as well as other research organisations. The mean number of each type of outcome is however not a performance measure, since the mean will vary depending on the number of researchers or research expenditures at each PRO. Standardised performance measures accounting for size differences are given in Section 3.3.3. The percent zero column in Exhibit 3-15 gives the percent of PROs that report none of each of the indicators. For example, 62.0% of universities in the sample report zero patent grants at the USPTO. Almost all PROs report at least one invention disclosure and research agreement.

Exhibit 3-15: Summary of key and supplementary indicators for universities and other public research institutes, EKTIS 2011 and 2012 results combined

	Universities				Other research organisations			
	Valid responses[1]	Mean	Total reported	Percent zero[2]	Valid responses[1]	Mean	Total reported	Percent zero[2]
Invention disclosures	456	28.8	13,122	8.6%	84	32.2	2,707	8.3%
Patent applications	460	14.3	6,581	16.5%	84	20.1	1,691	8.3%
Patent grants	408	7.4	3,034	29.9%	75	17.5	1,315	14.7%
USPTO patent grants	320	1.6	502	61.9%	69	4.6	316	44.9%
Start-ups established	421	3.0	1,244	38.5%	83	2.0	165	33.7%
Successful start-ups	335	4.8	1,606	28.4%	67	3.1	210	29.9%
Licenses executed	395	11.9	4,713	26.6%	82	11.3	929	14.6%
License income[3]	346	741	256,484	30.9%	71	2,535	180,045	22.5%
R&D agreements	323	139.7	45,110	5.3%	64	130.9	8,378	4.7%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Number of KTOs reporting results for each performance measure (including zero outcomes).
2: Percent of respondents reporting 'zero' for each outcome. For example, 8.6% of 456 universities reported zero invention disclosures in 2010 and/or 2011.
3: License income given in thousand Euros.
4: Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Other research organisations, on average, outperform universities for all input indicators of potential commercialisation such as invention disclosures, patent applications and patent grants. Other research organisations have also earned on average 3.4 more license income than universities. Universities on average perform better than other research on start-ups, successful start-up and research agreements.

Licensing

In addition to data on the number of licenses executed and license income, the survey collected data on the share of licenses that were granted to start-ups, to firms with less than 250 employees, and to firms with more than 250 employees; and license income by subject area.

License income

Total license income amounted to €436.5 million. Out of the total, approximately €256.5 million was earned by universities and approximately €180 million by other research organisations. Average license income was €741,285 at universities and €2,535,857 million at other research organisations. Exhibit 3-16 below shows the distribution of license income for 417 PROs.

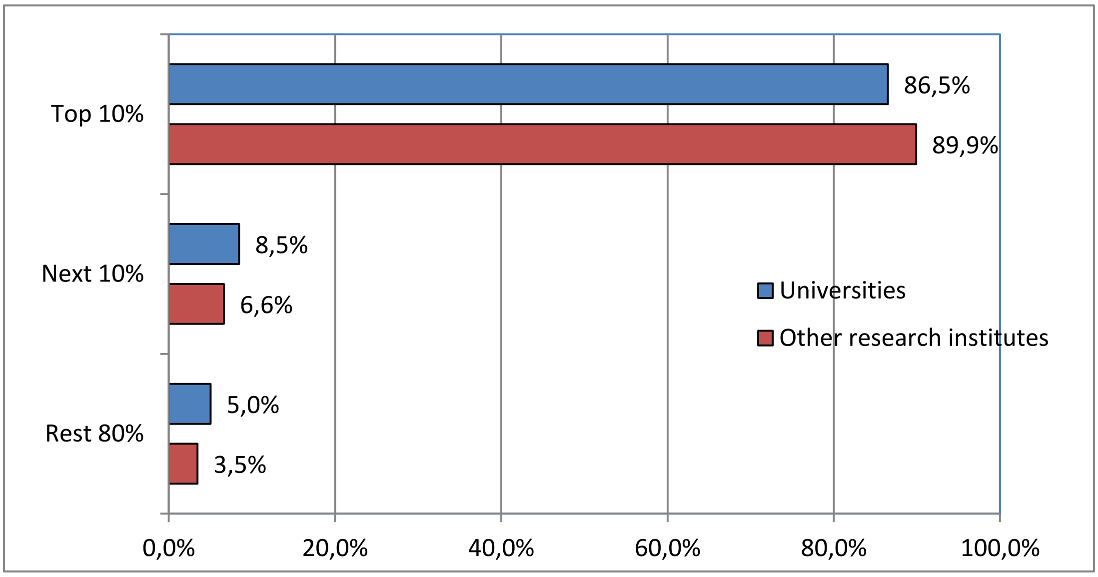
Exhibit 3-16: Distribution of license income, EKTIS 2011 and 2012 results combined

	Universities		**Other research organisations**		**Total**	
	Number	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Zero	107	30.9%	16	22.5%	123	29.5%
€1 - € 19,999	54	15.6%	7	9.9%	61	14.6%
€20,000 - €99,999	68	19.7%	13	18.3%	81	19.4%
€100,000 - €249,999	34	9.8%	11	15.5%	45	10.8%
€250,000 - €499,999	25	7.2%	7	9.9%	32	7.7%
€500,000-€1,999,999	40	11.6%	9	12.7%	49	11.8%
€2,000,000 or more	18	5.2%	8	11.3%	26	6.2%
Total	346	100.0%	71	100.0%	417	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 9.3 and EKTIS 2012, question 10.3. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

As shown above, license income is highly skewed. For all PROs, 29.5% reported zero license income and 63.5% in total reported less than €100,000 license income. Other research organisations perform better than universities. The percentage of all other research organisations that report zero license income is 22.5% compared to 30.9% at universities. And 50% of all other research organisations report more than €100,000 license income compared to 34% at universities.

Exhibit 3-17: Percentage outcomes of license income earned by top performers, EKTIS 2011 and 2012 results combined



Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011 question 9.3 and EKTIS 2012, question 10.3. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents. Total reported license income earned at universities was €251 million and €160 million by other research organisations.

Most of the license income is earned by a small percentage of PROs. As shown in Exhibit 3-17, the top 10% respondents at universities (35 PROs) earn 86.5% of the total license income earned by all universities in the sample. The top 10% of respondents at other research organisations (7 PROs) earn 89.9% of the total license income earned by other research organisations. Total license income only accounted for 0.9% of research expenditures by universities, 3.0% of research expenditures by other research organisations, and 1.2% of all research expenditures by PROs.

Distribution of licenses by type of licensee

The distribution of licenses is of interest as many national policies encourage licensing to either start-ups or to small firms with less than 250 employees. Exhibit 3-18 below gives the results for the distribution of licenses by the type of licensee. The percentages sum across the columns.

Exhibit 3-18: Distribution of licenses by type of licensee, EKTIS 2011 and 2012 results combined

	Start-up companies		**Other firms with <250 employees**		**Firms with >250 employees**		**Total**	
	licenses	%	licenses	%	licenses	%	licenses	%
Universities	331	22.2%	611	41.0%	547	36.7%	1489	100.0%
Other research organisations	63	12.5%	245	48.6%	196	38.9%	504	100.0%
Total	394	19.8%	856	43.0%	743	37.3%	1993	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported licenses and have answered in which category the license belongs. Based on answers for EKTIS 2011, question 9.2 and EKTIS 2012, question 10.2. Results include ASTP and UTEN (PT) respondents.

For both universities and other research organisations the smallest share of their licenses are issued to start ups: 22.2% at universities and 12.5% at other research organisations.

The largest share of licenses at universities are issued to small firms (41.0%) and 36.7% are issued to large firms. A similar distribution is found at other research organisations, where the largest share, 48.6% of licenses, are issued to small firms and 38.9% to large firms.

Share of license revenue by subject area

Respondents are asked to estimate the distribution of all license income across five subject areas, as shown in Exhibit 3-19. Excluding the 'other' subject area, the highest share of license income at both universities (34.9%) and other research organisations (40.8%) is from biomedical knowledge, followed by ICT. Very little licensing is for low and zero carbon energy technologies (3.2% for all PROs).

Exhibit 3-19: Share of license revenue by subject area, EKTIS 2011 and 2012 results combined

	Universities	**Other research organisations**	**Total**
Biomedical	34.9%	40.8%	36.1%
Computers, communication equipment and software (ICT)	16.8%	12.7%	16.0%
Nanotechnology and new materials	7.7%	6.4%	7.4%
Low/zero carbon energy technologies	3.6%	1.9%	3.2%
Other subject areas not listed above	37.0%	38.3%	37.3%
Total	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 10 and EKTIS 2012, question 11. Results include ASTP and UTEN (PT) respondents.

License revenue by subject area

Combining the results from Exhibit 3-19 and data on license income, shows that the largest part of all license income earned is from biomedical knowledge. Out of the total license income earned at universities, 81.6% is from biomedical knowledge. At other research organisations 93.7% of all the license income earned is from biomedical knowledge.

Exhibit 3-20: License revenue by subject area, EKTIS 2011 and 2012 results combined

	Universities	**Other research organisations**	**Total**
Biomedical	81.6%	93.7%	87.0%
Computers, communication equipment and software (ICT)	5.9%	1.4%	3.9%
Nanotechnology and new materials	1.4%	0.2%	0.9%
Low/zero carbon energy technologies	4.0%	0.1%	2.3%
Other subject areas not listed above	7.1%	4.6%	6.0%
Total	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 9.3 and 10 and EKTIS 2012, question 10.3 and 11. Results include ASTP and UTEN (PT) respondents.

3.3.3 Standardised performance outcomes

This section gives the results for standardised indicators for the combined data set. The maximum number of possible responses is 602, but due to missing data (either for the numerator or denominator), no indicators are available for all possible respondents. The most complete coverage is for the number of patent applications per 1,000 researchers (see Exhibit 3-20), with results for 532 PROs.

Performance for the full sample

Performance per 1,000 research staff

Exhibit 3-21 below gives standardised performance measures for the combined data set per 1,000 research personnel. For example, universities produced on average 15.0 invention disclosures per 1,000 FTE research staff. For license income, universities earned on average €400,000 per 1,000 researchers, or approximately €400 per research staff.

Exhibit 3-21: Performance per 1,000 research staff, EKTIS 2011 and 2012 results combined

	Universities	*Valid responses[1]*	**Other research organisations**	*Valid responses[1]*	**Total**	*Valid responses[1]*
Invention disclosures	15.6	*447*	21.9	*79*	16.4	*526*
Patent applications	7.9	*452*	12.3	*80*	8.5	*532*
Patent grants	4.5	*403*	9.8	*71*	5.3	*474*
USPTO patent grants[2]	1.0	*316*	2.5	*67*	1.3	*383*
Start-ups established	1.7	*410*	1.2	*80*	1.6	*490*
Successful start-ups	2.9	*330*	1.9	*67*	2.7	*397*
License agreements	6.5	*386*	6.8	*78*	6.6	*464*
License income (million €)	0.4	*340*	1.5	*67*	0.6	*407*
Research agreements	82.8	*316*	73.8	*59*	81.3	*375*
Total number of reported research staff[3]	872,915		148,817		1,021,731	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff).
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: Universities, n=503, other research organisations, n=99, total, n=602.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Universities outperform other research organisations on the number of start-ups, successful start ups and research agreements. Other research organisations, however, have 1.4 more invention disclosures, 1.6 more patent applications, 2.2 more patent grants and 3.7 times more license income per 1000 researchers.

Performance by research expenditures

Exhibit 3-22 below shows the performance in terms of economic efficiency or the estimated cost in million Euros to produce each output. For example, it costs universities in Europe on average €3.2 million of research expenditures to produce 1 invention disclosure.

Exhibit 3-22: Performance by research expenditures (million Euros to produce 1 output), EKTIS 2011 and 2012 results combined

	Universities	*Valid responses*[1]	**Other research organisations**	*Valid responses*	**Total**	*Valid responses*
Invention disclosures	3.2	*350*	3.8	*63*	3.3	*413*
Patent applications	6.3	*355*	8.8	*63*	6.6	*418*
Patent grants	9.9	*325*	13.4	*57*	10.4	*382*
USPTO patent grants[2]	42.0	*238*	75.6	*53*	47.1	*291*
Start-ups established	27.2	*324*	61.3	*61*	30.4	*385*
Successful start-ups	14.4	*262*	34.0	*51*	16.4	*313*
License agreements	6.9	*316*	11.7	*61*	7.5	*377*
License income (million €)	113.5	*287*	33.3	*54*	81.1	*341*
Research agreements	0.6	*271*	1.1	*48*	0.6	*319*
Total reported research expenditures (million €)[5]	34,470		6,602		41,072	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures).
2: Data from HE-BCI (HEFCE) survey does not include this indicator. To compare patent grants, with the US the number for USPTO patents grants from the US is placed in the row patent grants.
3: Total number of PROs: Universities, n=503, other research organisations, n=99, total EU, n=602
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

With the exception of license income, universities outperform other research organisations when research expenditures are used to standardise the results. This is in contrast to the performance outcomes when using the number of research personnel. This should not be surprising, since government and non-profit research institutes have a substantially larger research budget per staff member and are likely to perform more applied research than universities.

Performance by research expenditures EU-US

Exhibit 3-23: Performance by research expenditures EU – US

	EU		**US**[2]	
	Million € to produce[1]	*Total reported*	Million € to produce[1]	*Total reported*
Invention disclosures	3.3	12,275	2.1	21,856
Patent applications	6.6	6,125	2.3	19,905
Patent grants	10.4	3,106	9.7	4,700
Start-ups established	30.4	1,145	68.0	671
License agreements	7.5	4,850	7.5	6,051
License income (million €)	81.1	399	24.4	1,870
Total reported research expenditures (million €)	41,587		45,631	
Number of PROs surveyed	602		183	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures).
2: US data stems from the AUTM results for the fiscal year 2011.
3: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

A comparison of European performance with American PROs shows that the latter report significantly more absolute numbers for all indicators, except for start-ups, with far fewer organisations in total (183 US PROs vs. 602 EU PROs). It is therefore not surprising that American PROs are more efficient producers of invention disclosures, patent applications and license income. While European PROs spend on average €81.1 million to generate €1 million in license income, American public research organisations only spend €24.4 million to generate €1 million in license income. This shows that European PROs are not that effective yet as American PROs when it comes to commercialising research results.

Conversely, European PROs are more efficient producers of start-ups. Although 602 European PROs have reported more start-ups in total, relatively 183 American PROs reported more start-ups per average PRO, 3.7, compared to 1.9 average start-ups per European PRO. It seems that comparing the absolute numbers for licenses with start-ups, American PROs prefer to license their research results instead of being part of an entrepreneurial team in a start-up.

Performance outcomes for leading research PROs

Two additional datasets were constructed for leading research PROs. The first selects 226 leading PROs with more than 1,500 research staff. The second selects 235 leading PROs with research expenditures above €30 million. The results are presented in Exhibit 3-24 and Exhibit 3-25.

Performance of leading research PROs per 1,500 research staff

For all performance indicators at universities, the leading universities perform slightly below the averages for the full sample of universities except for license income, see Exhibit 3-24. A similar case holds for leading other research organisations, they also perform slightly below the averages for the full sample except for patent applications and patent grants.

Exhibit 3-24: Performance by leading research PROs with 1,500 or more researchers (per 1,000 research staff), EKTIS 2011 and 2012 results combined

	Universities	*Valid responses*[1]	**Other research organisations**	*Valid responses*[1]	**Total**	*Valid responses*[1]
Invention disclosures	14.3	175	21.7	33	15.2	208
Patent applications	7.6	177	12.4	34	8.3	211
Patent grants	4.4	147	10.5	31	5.4	178
USPTO patent grants[2]	1.0	108	2.5	31	1.3	139
Start-ups established	1.4	159	0.9	34	1.3	193
Successful start-ups	2.7	121	1.5	27	2.5	148
License agreements	6.2	153	4.7	33	6.0	186
License income (million €)	0.5	134	1.3	30	0.6	164
Research agreements	80.2	118	52.3	26	75.4	144
Total number of reported research staff[3]	665,601		114,241		785,679	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff).
2: Limited to PROs with 1,500 or more researchers.
3: Data from HE-BCI (HEFCE) survey does not include this indicator.
4: Total number of PROs: Universities, n=189, other research organisations, n=37, total n=226.
5: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

The leading other research organisations outperform universities on all input indicator for the potential of commercialisation knowledge such as invention disclosures, patent applications and patent grants. Furthermore, the leading other research organisations earn on average 2.8 more license income per 1.000 research staff. Leading universities outperform leading other research organisations on start-ups, successful start-ups, license agreements and research agreements.

The leading 226 PROs cover 76.3% of all researchers in the full sample but are however less efficient compared to the full sample of 602 PROs (except for patent grants). These results suggest that smaller PROs with less than 1,500 researchers are slightly more efficient in producing knowledge transfer activities.

Performance of leading research PROs by research expenditures

Remarkably for all performance indicators, except for license income at universities, the leading research institutes in terms of R&D expenditures perform slightly below the averages for the full sample. These results suggest that smaller PROs with less than €30 million research expenditures are slightly more efficient in producing knowledge transfer activities. The US results are provided for comparison.

Exhibit 3-25: Performance by leading research PROs with €30 million or more research expenditures (million Euros to produce 1 output), EKTIS 2011 and 2012 results combined

	Universities	*Valid responses*[1]	**Other research organisations**	*Valid responses*	**Total**	*Valid responses*	**US**[3]	**Ratio**[4] **(EU/US)**
Invention disclosures	3.8	182	4.4	43	3.9	225	2.1	1.9
Patent applications	7.0	185	12.2	43	7.5	228	2.3	3.3
Patent grants	10.9	165	21.8	39	12.0	204	9.7	1.2
USPTO patent grants[2]	43.8	123	84.6	38	49.8	161		
Start-ups established	36.5	163	65.4	44	39.9	207	68.0	**0.6**
Successful start-ups	16.4	132	36.8	35	18.6	167		
License agreements	8.5	161	12.1	44	8.9	205	7.5	1.2
License income (million €)	111.8	147	44.7	37	89.4	184	24.4	3.7
Research agreements	0.6	190	1.3	45	0.7	235		
Total reported research expenditures (million €)[5]	33,155		6,378		39,533		45,631	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures).
2: Data from HE-BCI (HEFCE) survey does not include this variable. To compare patent grants, with the US the number for USPTO patents grants from the US is placed in the row patent grants.
3: US data stems from the AUTM results for the fiscal year 2011.
4: **Bold**: EU performance exceeds that of US.
5: Total number of PROs: Universities, n=190, other research organisations, n=45, total, n=235.
6: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

The leading universities outperform the leading other research organisations on all input indicator except for license income. The leading universities spend on average €67 million more on research expenditures to earn €1 million euro of license income compared to the leading other research organisations.

Of note, the leading 235 PROs in terms of research expenditures account for 95.1% of all research expenditures in the sample and are consequently comparable to the AUTM panel of leading American PROs, which account for over 90% of Federal research expenditures in the HERD sector. As shown in Exhibit 3-25, the leading European PROs in terms of R&D expenditures only outperform the US on the number of start-ups established.

3.3.4 Results for additional questions

The EKTIS 2011 and 2012 surveys covered several additional topics in addition to the standard performance indicators. The results for the percent of PROs reporting one or more patent applications by subject area are presented in Exhibit 3-26 while the most frequent subject area for patent applications are presented in Exhibit 3-27. Exhibit 3-28 presents results on the successfulness of commercializing the institution's licensed technology in the last three years.

Patent applications by subject area

Out of the 489 PROs which answered this question, 69.1% had at least one patent application in the biomedical subject area. The biomedical subject area is therefore the most common subject area for patent applications at both universities (61.4%) as well as other research organisations (64.9%). Conversely, low or zero carbon energy technology was the least common subject area reported. This supports the results in Exhibit 3-19 and 3-20, which find that the biomedical field accounts for the largest share of license revenue and low/zero carbon energy technologies for the lowest share of license revenue.

Exhibit 3-26: Percent of PROs reporting at least one patent application by subject area, EKTIS 2011 and 2012 results combined

	Universities	**Other research organisations**	**Total**
Biomedical	61.4%	64.9%	69.1%
Computers, communication equipment and software (ICT)	38.8%	40.2%	43.5%
Nanotechnology and new materials	44.7%	47.4%	50.3%
Low/zero carbon energy technologies	20.9%	19.6%	23.0%
Other subject areas not listed above	53.3%	47.4%	58.1%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. Note: Based on answers for EKTIS 2011, question 7 and EKTIS 2012, question 8. Results include ASTP and UTEN (PT) respondents.

Most frequent subject area for patent applications

Exhibit 3-27 gives the distribution of patent applications by subject area. The biomedical field accounts for almost half of all patent applications by PROs (46.3%). The second most frequent subject area (ignoring the 'other' category) is the Nanotechnology and new materials field (12.8%). Low or zero carbon energy technology ranks last, with only 2.1% of all patent applications in this subject area.

Exhibit 3-27: Distribution of patent applications by subject area, EKTIS 2011 and 2012 results combined

	Universities		Other research organisations		Total	
	Count	*%*	*Count*	*%*	*Count*	*%*
Biomedical	124	45.8%	32	48.5%	156	46.3%
Computers, communication equipment and software	33	12.2%	6	9.1%	39	11.6%
Nanotechnology and new materials	31	11.4%	12	18.2%	43	12.8%
Low or zero carbon energy technologies	7	2.6%	0	0.0%	7	2.1%
Other subject areas not listed above	76	28.0%	16	24.2%	92	27.3%
Total	271	100.0%	66	100.0%	337	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 7 and EKTIS 2012, question 8. Results include ASTP and UTEN (PT) respondents.

Successful outcomes for licensed technology

As shown in Exhibit 3-28, 52.3% of all universities report at least one commercially successful licensed technology in the last three years. Whereas 63.4% of other research organisations report at least one commercially successful technology in the last three years.

Exhibit 3-28: Successfulness of PROs licensed technology in the last three years, EKTIS 2011 and 2012 results combined

	Universities			Other research organisations			Total		
	Valid responses	**Yes**	**Percent yes**	**Valid responses**	**Yes**	**Percent yes**	**Valid responses**	**Yes**	**Percent yes**
Commercially profitable products or processes	371	194	52.3%	82	52	63.4%	453	246	54.3%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 11 and EKTIS 2012, question 12. Results include ASTP and UTEN (PT) respondents.

3.3.5 Country results

This section gives combined results from the EKTIS 2011 and 2012 surveys for the key indicators for individual countries that meet the following criteria[21]:

1. A response rate over 50% and 10 or more responses from eligible PROs.
2. A response rate over 60% and between 5 and 9 responses from eligible PROs.
3. A response rate over 75% and 3 or 4 responses from eligible PROs.

These criteria mean that results are not given for countries for which there are very few responses or for countries with low response rates. For confidentiality reasons, results are furthermore not given for countries which have only one or two PROs. The eligibility requirement excludes responses from PROs that lacked a Knowledge Transfer Office (or equivalent) or which did not meet the minimum size requirements.

Based on the first criteria, 16 countries are included: Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), Finland (FI), France (FR), Germany (DE), Ireland (IE), Italy (IT), The Netherlands (NL), Norway (NO), Portugal (PT), Spain (ES), Sweden (SE), Switzerland (CH) and the United Kingdom (UK). In addition, two countries; Israel (IL) and Hungary (HU), are selected based on the second criteria and four countries; Slovenia (SI), Bulgaria (BG), Croatia (HR) and Latvia (LV) based on the third criteria.

The results are presented in separate Exhibits for each indicator. The performances for the full sample (European Union and the 12 Associated States (EU)) are included for comparison.

Exhibit 3-29: Number of top 500 PROs included in combined sample EKTIS 2011 and 2012 by country

Country	Number of PROs included (EKTIS 2011 - 2011 combined)	Number of PROs included in top 500 universities (ARWU 2012)[1]	Of which included in sample	Percent
Austria	17	7	7	100%
Belgium	12	7	7	100%
Czech Republic	10	1	1	100%
Denmark	13	4	4	100%
Finland	10	5	3	60%
France	51	20	9	45%
Germany	101	37	35	95%
Hungary	6	2	2	100%
Ireland	12	3	3	100%
Italy	41	20	14	70%
Netherlands	16	13	10	77%
Norway	10	4	4	100%
Portugal	36	3	3	100%
Spain	68	11	11	100%
Sweden	14	11	7	64%

[21] The response rate criterion is calculated as follows. The eligible sample consists of unique responses from individual PROs received trough either the EKTIS 2012 or EKTIS 2011. The response rate is then calculated with the average sample size of the EKTIS 2012 and EKTIS 2011 for each individual country as denominator.

Country	Number of PROs included (EKTIS 2011 - 2011 combined)	Number of PROs included in top 500 universities (ARWU 2012)[1]	Of which included in sample	Percent
Switzerland	22	7	7	100%
United Kingdom	103	38	38	100%
Israel	10	6	5	83%
Bulgaria	3	0	0	-
Croatia	3	1	1	100%
Latvia	3	0	0	-
Slovenia	4	1	1	100%
Total	**565**	**201**	**172**	**86%**

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: 1: Source: Academic Ranking of World Universities–2012 http://www.shanghairanking.com/ARWU2012.html

Exhibit 3-29 gives the number of leading PROs based on the Academic Ranking of World Universities 2012 included in the country analysis. Most of the leading PROs in European countries are included in the dataset except for France, Finland and Sweden.

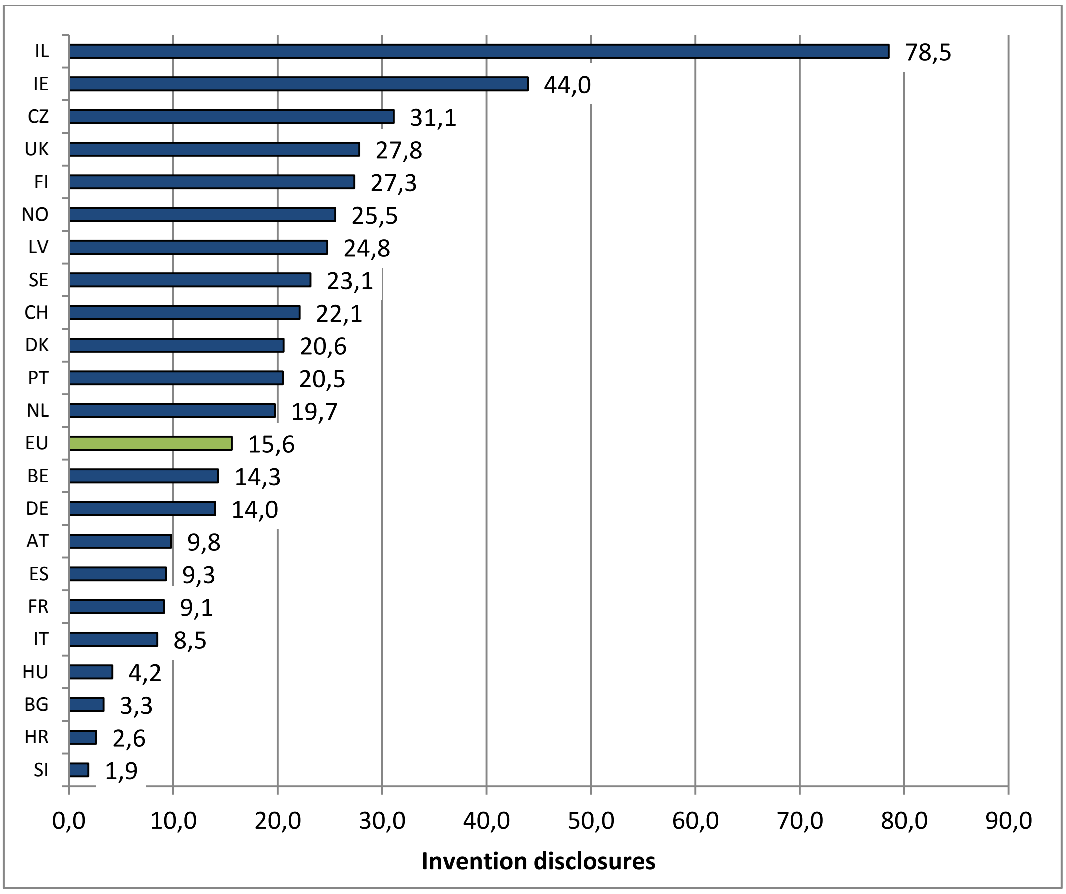
For most countries the sample is robust for country analysis based on the response rate criteria as well as the fact that most of the leading PROs in Europe are included. However the cross country results presented in this section ask for a carefully interpretation. There are several possible country specific characteristics for its performance, including one or two PROs that perform well above average or differing strategic objectives where for some countries knowledge transfer has a higher priority than in other countries.

The country results are presented using the number of research staff as common denominator across PROs. This method is preferable over using the number of research expenditures as denominator because of a higher number of PROs that were able to provide the number of research staff. Another reason why the number of research staff is preferable is due to different cost structures for research across countries. Although the research expenditures are adjusted for purchasing power parity (PPP), the PPP estimates are not limited to research expenditures but cover a wide basket of goods and services in each country.

Country performances on invention disclosures

Israel produced the most invention disclosures per 1,000 research staff. Israeli PROs produced on average 78.5 invention disclosures per 1,000 research staff. Ireland comes in second with an average of 44 invention disclosures per 1,000 research staff and the Czech Republic ranks third with an average of 31.1 invention disclosures per 1,000 research staff. Slovenia, Croatia and Bulgaria produced the least invention disclosures per 1,000 research staff.

Exhibit 3-30: Number of invention disclosures per 1,000 research staff by country, EKTIS 2011 and 2012 results combined

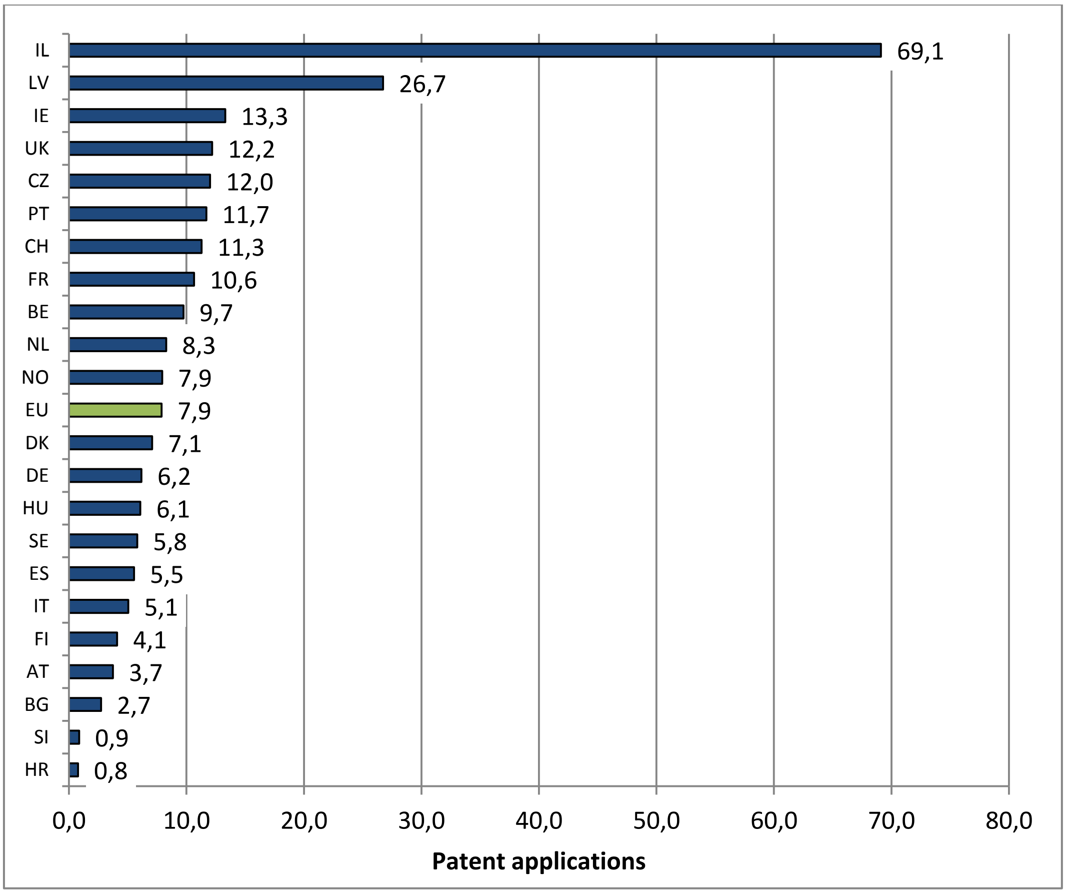


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Country performances on patent applications

Besides producing the most invention disclosures per 1,000 research staff, Israel also produced on average the most patent applications per 1,000 research staff. Israeli PROs produced on average 69.1 patent applications per 1,000 research staff. Latvia ranks second with 26.7 patent applications on average per 1,000 research staff and Ireland ranks third with 13.3 patent applications per 1,0000 research staff. Croatia, Slovenia and Bulgaria produced the least patent applications per 1,000 research staff.

Exhibit 3-31: Number of patent applications per 1,000 research staff by country, EKTIS 2011 and 2012 results combined

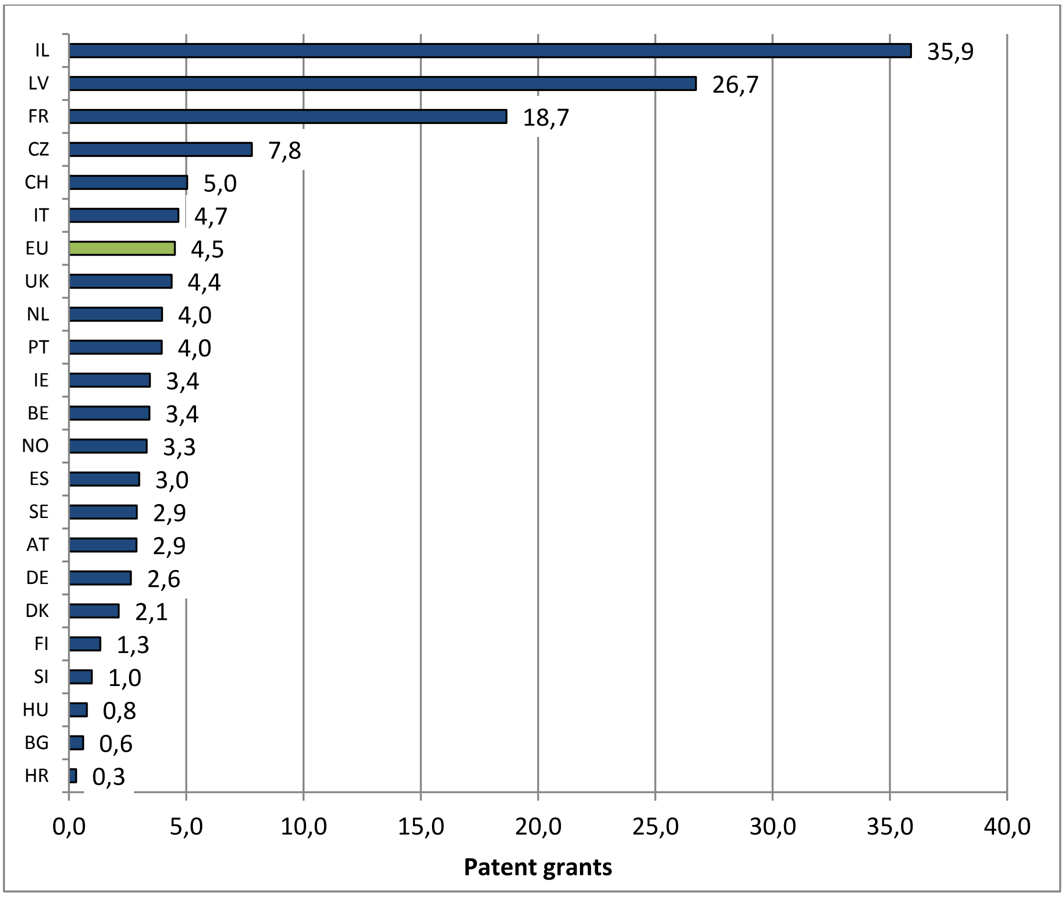


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Country performances on patent grants

Israel produced the most patent grants with an average of 35.9 patent grants per 1,000 research staff. Latvia ranks second with 26.7 patent grants on average per 1,000 research staff and France ranks third with 18.7 patent grants per 1,000 research staff. Croatia, Bulgaria and Hungary produced the least patent grants per 1,000 research staff.

Exhibit 3-32: Number of patent grants per 1,000 research staff by country, EKTIS 2011 and 2012 results combined

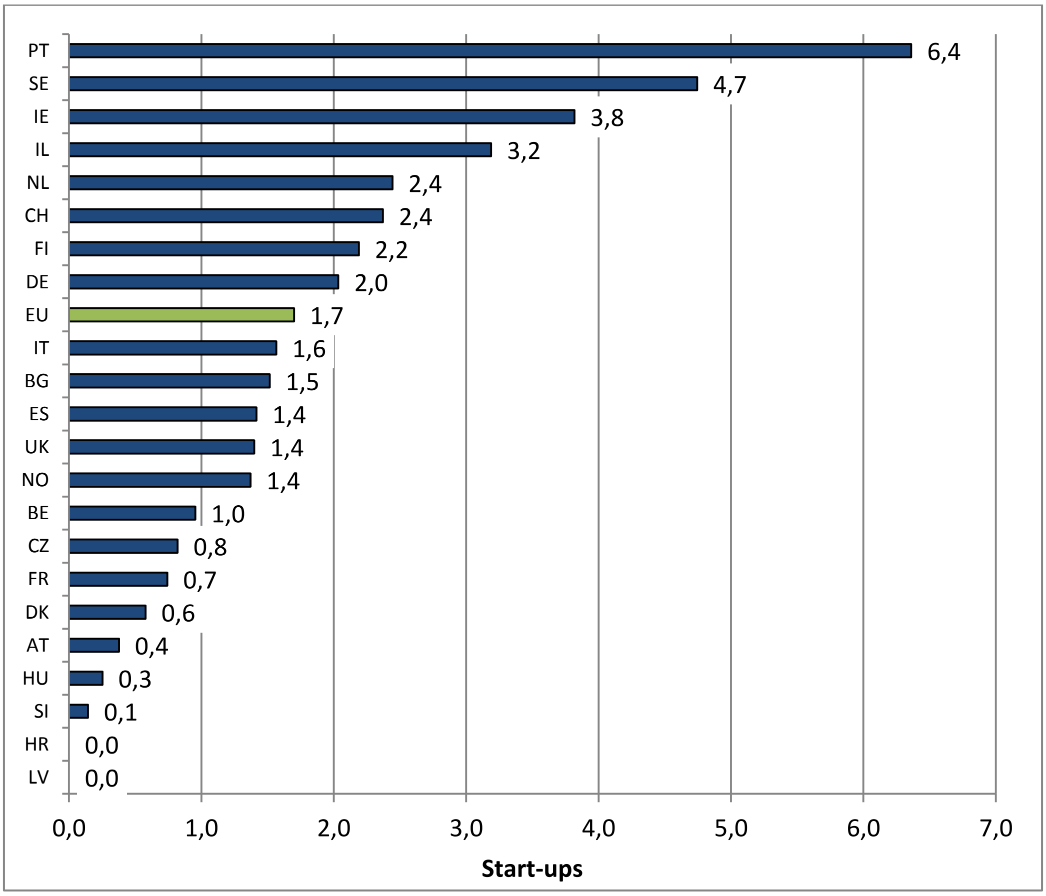


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Country performances on start-ups

Portugal produced the most start-ups per 1,000 research staff. Portuguese PROs produced on average 6.4 start-ups per 1,000 research staff. Sweden comes in second with an average of 4.7 start-ups per 1,000 research staff and the Ireland ranks third with an average of 3.8 start-ups per 1,000 research staff. Latvia, Croatia and Slovenia produced the least start-ups per 1,000 research staff.

Exhibit 3-33: Number of start-ups per 1,000 research staff by country, EKTIS 2011 and 2012 results combined

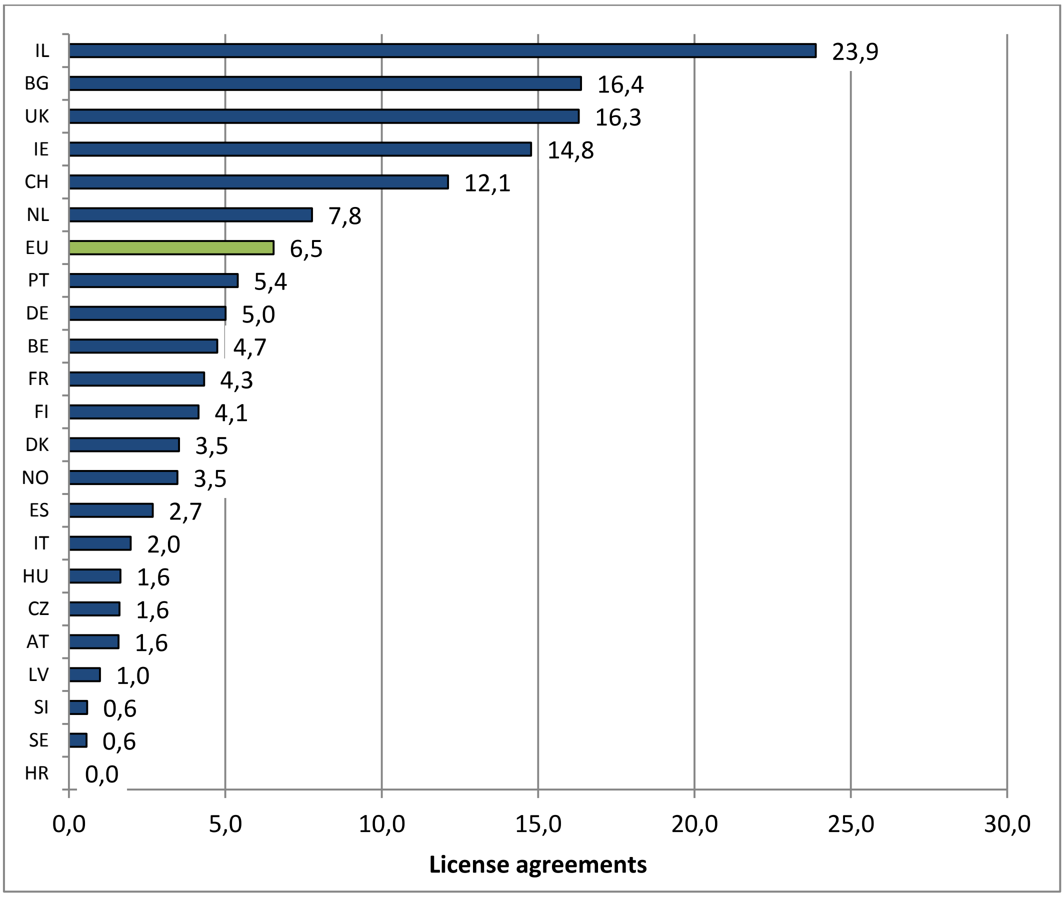


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Country performances on license agreements

Israel produced the most license agreements with an average of 23.9 license agreements per 1,000 research staff. Bulgaria ranks second with 16.4 license agreements on average per 1,000 research staff and the United Kingdom ranks third with 16.3 license agreements per 1,000 research staff. Croatia, Sweden and Slovenia produced the least license agreements per 1,000 research staff.

Exhibit 3-34: Number of license agreements per 1,000 research staff by country, EKTIS 2011 and 2012 combined

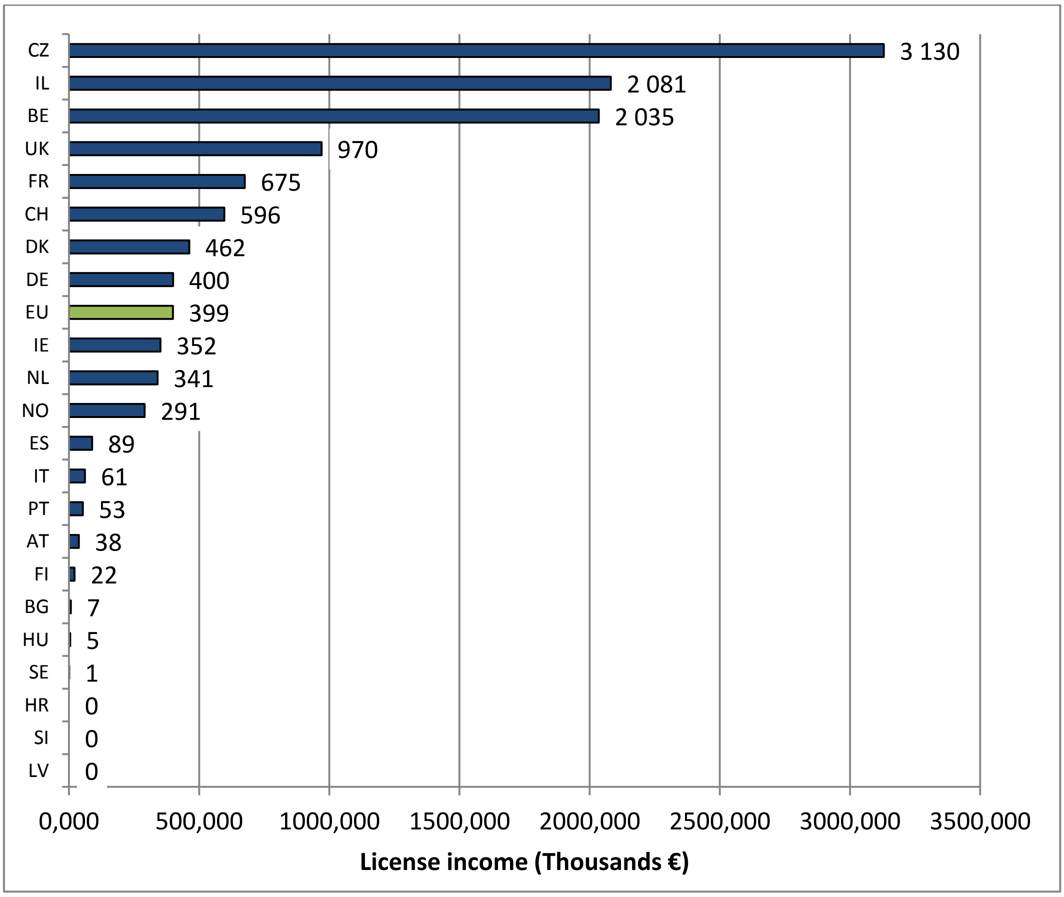


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Country performances on license income

The Czech Republic is the most productive country in generating license income with on average €3,130,000 per 1,000 research staff. Israel ranks second with on average €2,081,000 of license income per 1,000 research staff and Belgium ranks third with on average €2,035,000 of license income per 1,000 research staff. Latvia, Slovenia and Croatia are the least productive countries in generating license income.

Exhibit 3-35: Thousands Euros of license income per 1,000 research staff by country, EKTIS 2011 and 2012 results combined

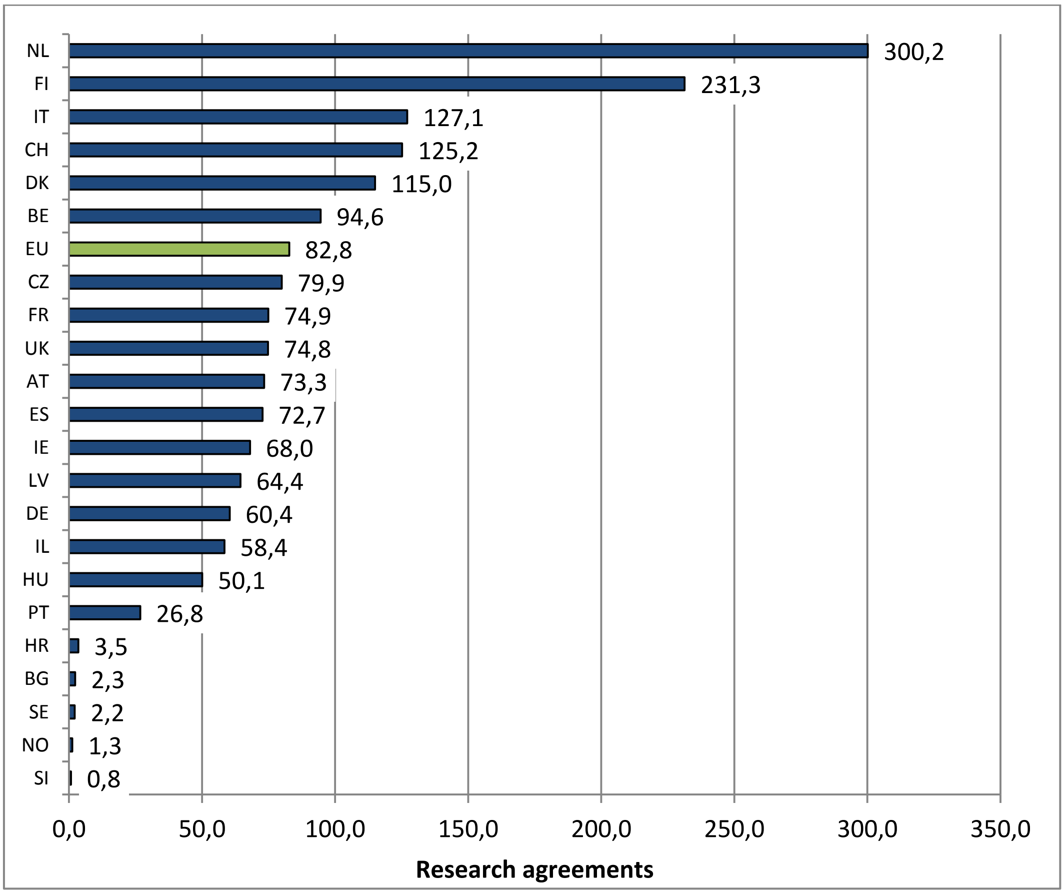


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Country performances on research agreements

The Netherlands produced the most research agreements with companies with an average of 300.2 research agreements per 1,000 research staff. Finland ranks second with 231.3 research agreements on average per 1,000 research staff and Italy ranks third with 127.1 research agreements per 1,000 research staff. Slovenia, Norway and Sweden produced the least research agreements per 1,000 research staff.

Exhibit 3-36: Number of research agreements per 1,000 research staff by country, EKTIS 2011 and 2012 results combined

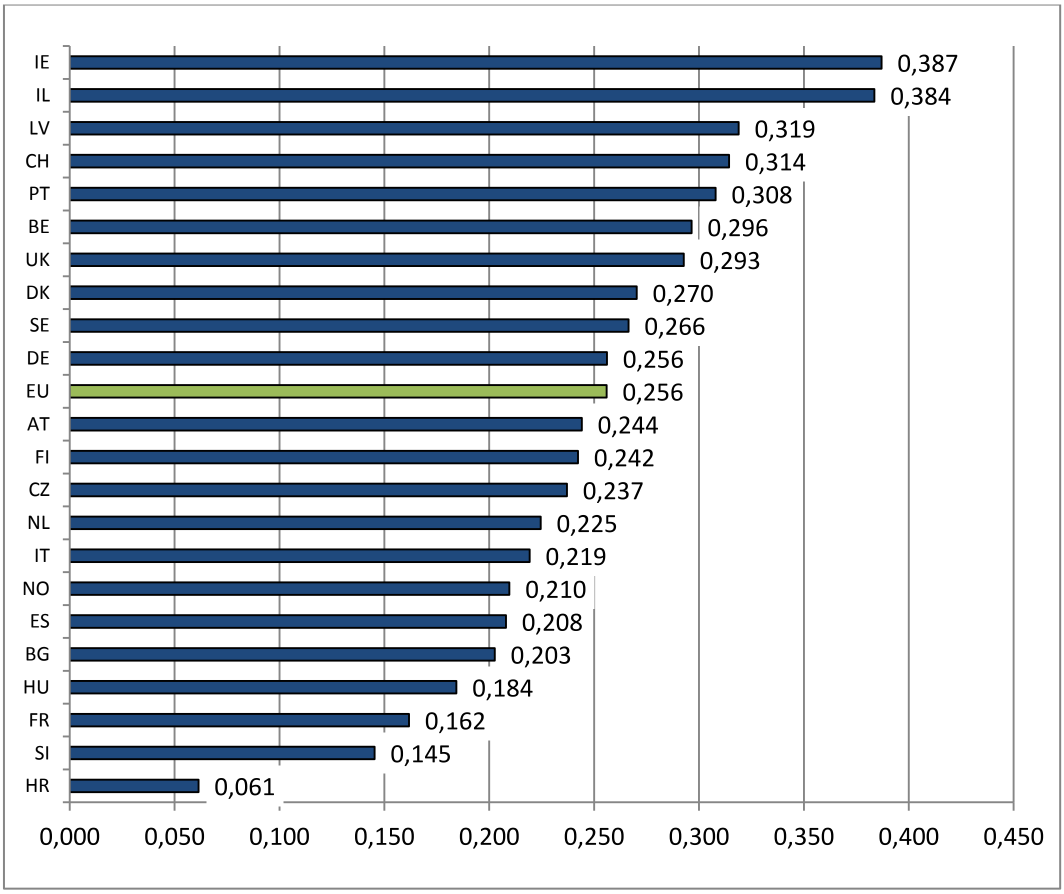


Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Composite indicator

A summary picture of the knowledge transfer performance of individual countries can be provided by a composite indicator obtained by an appropriate aggregation of the seven knowledge transfer indicators used in the cross country analysis above. The methodology used for calculating this composite KT indicator is explained in detail in Annex D. Exhibit 3-37 gives the results where each indicator is weighted equally and Exhibit 3-38 gives the results where the output indicators; start-ups, number of licenses, license income and research agreements are weighted more than the input indicator of knowledge transfer (invention disclosures, patent applications and patent grants), see Annex D for more details.

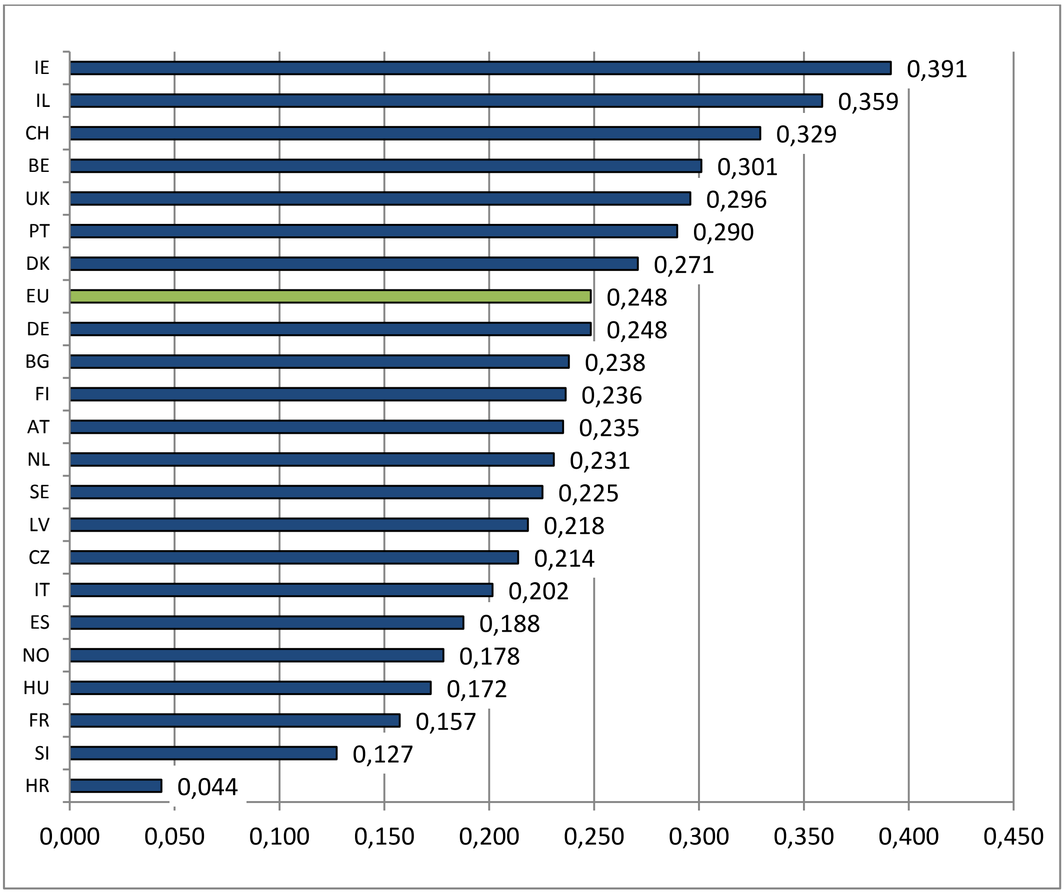
Exhibit 3-37: Knowledge transfer composite indicator with equal weights, EKTIS 2011 and 2012 results combined



Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

As Exhibit 3-37 shows, Ireland ranks first using a summary indicator of the knowledge transfer activities of public research organisations with equal weights. Israel ranks second and Latvia ranks third.

Exhibit 3-38: Knowledge transfer composite indicator with variable weights, EKTIS 2011 and 2012 results combined



Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.

Again Ireland and Israel rank first and second when more emphasis is placed on the output indicators of knowledge transfer. Switzerland now ranks third. Both Ireland and Israel perform well above average for almost all indicators presented in Exhibit 3-30 trough 3-36.

For most countries the ranking has remained relatively stable comparing the composite indicator using equal weights (Exhibit 3-37) with the composite indicator using variable weights (Exhibit 3-38) except for Latvia and Bulgaria. First of all Latvia ranked third when the seven knowledge transfer indicators weighted equally and 16th using variable weights. The reason for this can be found in Exhibits 3-30 trough 3-36. Latvia is very productive when it comes to producing input indicators of knowledge transfer. Latvia is for instance one of the most productive countries producing patent applications and patent grants. On the other hand Latvia is one the least productive countries when it comes to the output indicators of knowledge transfer such as start-ups and license income. A similar logic explains the shift in ranking of Bulgaria. Bulgaria is one of the least productive countries in producing all three input indicators while it is one of the most productive countries for license agreements.

3.4 Panel data: comparing results for 2010 and 2011

Out of the 430 respondents that replied to the EKTIS 2011, 320 responded as well to the EKTIS 2012. This chapter provides an analysis of the performance over time for these 320 KTOs that responded to both the EKTIS 2011 and EKTIS 2012.

3.4.1 Characteristics of the PROs

This section gives results on the characteristics of each PRO. The results are given for the EKTIS 2011 and 2012 panel respondents conducted by UNU-MERIT. Data obtained from the ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) surveys is added to results if they were available. A note below the exhibits clarifies if results from additional resources are included.

Type of responding PRO

Out of the panel EKTIS survey dataset, 271 PROs are universities. Of these, 33 are universities with a hospital. An additional 49 PROs are other research organisations.

Exhibit 3-39: Type of public research organisation, panel data EKTIS 2011 and 2012

	Number	Percentage
Universities	271	84.7%
Universities without a hospital	*238*	*74.4%*
Universities with a hospital	*33*	*10.3%*
Other research organisations	49	13.1%
Total	320	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for question 1, percent non-response 0% in both surveys. Results provided for panel respondents EKTIS 2011 and 2012, including UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Knowledge transfer office establishment year

On average, the KTOs at universities are 14 years old while the ones at other research organisations are 19 years old. Most of the KTOs were established after the year 2000. Exhibit 3-40 shows the distribution of the year of establishment for 244 KTOs that reported their establishment year in both the EKTIS 2011 and 2012 survey.

Exhibit 3-40: Distribution of the year of establishment of the KTO, panel data EKTIS 2011 and 2012

	Universities		Other research organisations		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Before 1990	45	22.0%	7	17.9%	52	21.3%
1990-1999	56	27.3%	10	25.6%	66	27.0%
2000-2004	43	21.0%	8	20.5%	51	20.9%
2005 or later	61	29.8%	14	35.9%	75	30.7%
Total	205	100.0%	39	100.0%	244	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for question 4.1. Results provided for panel respondents EKTIS 2011 and 2012, including UTEN (PT) and RedOTRI (ES) respondents.

Knowledge transfer office staff

The total number of KTO staff in 2010 reported by universities was 3,770 FTE and 4,093 FTE in 2011. At other research organisations the total number of KTO staff reported in 2010 was 340 FTE and 360 FTE in 2011. The total numbers reflect that, in categories with more than 2 FTE, the average KTO staff has increased in 2011 compared to 2010 for both universities and other research organisations. Exhibit 3-41 shows the development of the distribution of the number of office staff in 2010 and 2011 of 309 KTOs.

Exhibit 3-41: Distribution of the number of office staff, panel data EKTIS 2011 and 2012

	Universities				**Other research organisations**				**Total**			
	Number		**Percentage**		**Number**		**Percentage**		**Number**		**Percentage**	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
up to 2	54	45	20.2%	16.9%	6	6	14.3%	14.3%	60	51	19.4%	16.5%
2.1 - 5	62	66	23.2%	24.7%	12	13	28.6%	31.0%	74	79	23.9%	25.6%
5.1 - 10	53	57	19.9%	21.3%	14	11	33.3%	26.2%	67	68	21.7%	22.0%
> 10	98	99	36.7%	37.1%	10	12	23.8%	28.6%	108	111	35.0%	35.9%
Total	267	267	100.0%	100.0%	42	42	100.0%	100.0%	309	309	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for question 4.2. Results provided for respondents that reported the number of KTO staff in both surveys, including UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

The average KTO at universities had 14.1 FTE staff members in 2010 and 15.3 in 2011, an increase of 8.6%. The average KTO at other research organisations had 8.1 FTE staff members in 2010 and 8.6 FTE in 2011, an increase of 6.1%. The median at universities is 7 FTE both in 2010 and 2011, and the median at other research organisations is 6.5 FTE in 2010 and 6.1 FTE in 2011.The skewness of the number of KTO staff can be explained by the large average staff number of 29.1 FTE (in 2011) at KTOs in the UK.

Research personnel

The total number of research personnel covered by the panel data set was 618,745 full-time equivalents (FTEs) in 2010 and 608,565 in 2010, a decrease of 1.6%. In 2010, 540,930 FTE researchers were reported at universities and in 2011 529,977 FTE, a decrease of 2.0%. In 2010 77,814 FTE researchers were reported at other PROs and 78,588 FTE in 2011, an increase of 1.0%. Exhibit 3-42 below shows the development of the distribution of research personnel among 310 PROs in 2010 and 2011.

Exhibit 3-42: Distribution of research personnel, panel data EKTIS 2011 and 2012

	Universities				**Other research organisations**				**Total**			
	Number		**Percentage**		**Number**		**Percentage**		**Number**		**Percentage**	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
up to 499	49	44	18.2%	16.4%	10	6	17.1%	14.6%	56	50	18.1%	16.1%
500-1249	82	86	30.5%	32.0%	8	11	24.4%	26.8%	92	97	29.7%	31.3%
1250-2499	75	74	27.9%	27.5%	16	7	19.5%	17.1%	83	81	26.8%	26.1%
2500 or more	63	65	23.4%	24.2%	41	17	39.0%	41.5%	79	82	25.5%	26.5%
Total	269	269	100.0%	100.0%	0	41	100.0%	100.0%	310	310	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 12.2 and EKTIS 2012, question 13.2. Results provided for respondents that reported the number of research staff in both surveys, including UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

In 2010, average research personnel at universities were 2,011 FTE and 1,970 FTE in 2011, a decrease of 2.0%. In 2010, average research personnel at other research organisations were 1,898 FTE and 1,917 FTE at other research organisations, an increase of 1.0%.

Research expenditures

Total reported research expenditures among the PROs included in the panel dataset amounted to approximately €28 billion in 2011 and €27 billion in 2010, an increase of 4.7%. Universities reported in 2010, €23.6 billion research expenditures and €24.5 billion in 201, an increase of 3.7%. Other research organisations reported €3.9 billion of research expenditures in 2010 and €3.5 billion in 2011, an increase of 10.9%. Exhibit 3-43 below shows the development of the distribution of research expenditures as reported by 249 PROs in 2010 and 2011.

Exhibit 3-43: Distribution of research expenditures, panel data EKTIS 2011 and 2012

	Universities				**Other research organisations**				**Total**			
	Number		**Percentage**		**Number**		**Percentage**		**Number**		**Percentage**	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
up to 5 m	22	23	10.1%	10.6%	3	1	9.4%	3.1%	25	24	10.0%	9.6%
5 m - 14 m	45	44	20.7%	20.3%	1	2	3.1%	6.3%	46	46	18.5%	18.5%
15 m-39 m	45	44	20.7%	20.3%	7	8	21.9%	25.0%	52	52	20.9%	20.9%
40 m-79 m	39	41	18.0%	18.9%	5	6	15.6%	18.8%	44	47	17.7%	18.9%
80 m -159 m	32	30	14.7%	13.8%	11	8	34.4%	25.0%	43	38	17.3%	15.3%
> 160 m	34	35	15.7%	16.1%	5	7	15.6%	21.9%	39	42	15.7%	16.9%
Total	217	217	100.0%	100.0%	32	32	100.0%	100.0%	249	249	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 12.3 and EKTIS 2012, question 13.3. Results provided for respondents that reported the number of research staff in both surveys, including UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Average research expenditures were €108 million at universities in 2010 and €112 million in 2011, an increase of 3.7%. At other research organisations in 2011, average research expenditures were €111 million in 2010 and €123 million in 2011, an increase of 10.9%.

3.4.2 Performance measures

Summary for all performance measures

The EKTIS survey collected count data for several knowledge transfer activities in 2010 and 2011:

Key indicators

1. Number of invention disclosures
2. Number of priority patent applications
3. Number of technically unique patent grants
4. The number of start-ups
5. The number of licenses or option agreements with companies
6. The amount of license income earned

Supplementary indicators

7. The number of R&D agreements between the affiliated institutions and companies
8. Number of USPTO patent grants
9. The number of successful start ups (developed a product/process that is sold in the market)

Exhibit 3-44 summarises the results for these indicators for both universities as well as other research organisations. The mean number of each type of outcome is however not a performance measure, since the mean will vary depending on the number of researchers or research expenditures at each PRO. Standardised performance measures accounting for size differences are presented in Section 3.4.3.

The percent zero column in Exhibit 3-44 gives the percent of PROs that report none of each of the indicators. For example, 58.2% of universities in the sample report zero patent grants at the USPTO in 2010. Almost all PROs report at least one invention disclosure and research agreement.

Exhibit 3-44: Panel data: summary of key and supplementary indicators for universities and other public research institutes, 2010 and 2011

Universities							
	Mean		Total reported		Percent zero[2]		Valid responses[1]
Year/ Indicator	2010	2011	2010	2011	2010	2011	
Invention disclosures	33.3	34.7	8,400	8,745	9.1%	4.8%	252
Patent applications	17.0	17.5	4,363	4,488	13.6%	14.0%	257
Patent grants	9.8	9.3	2,183	2,076	24.7%	26.9%	223
USPTO patent grants	1.4	1.5	181	199	59.7%	56.0%	134
Start-ups established	2.8	3.2	626	715	35.8%	35.4%	226
Successful start-ups	7.2	6.4	1,127	1,004	16.7%	20.5%	156
Licenses executed	16.1	17.1	3,491	3,716	22.1%	18.0%	217
License income[3]	976479.6	926346.2	166,001,538	157,478,861	22.9%	20.6%	170
R&D agreements	154.3	137.6	25,159	22,423	3.7%	3.1%	163

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. Notes:
1: Number of KTOs reporting results for each performance measure (including zero outcomes) in both years.
2: Percent of respondents reporting 'zero' for each outcome. For example, 4.8% of 252 universities reported zero invention disclosures in 2011.
3: License income given in Euros.
4:Results include UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Other research organisations							
	Mean		Total reported		Percent zero[2]		Valid responses[1]
Year/ Indicator	2010	2011	2010	2011	2010	2011	
Invention disclosures	37.1	35	1,447	1,363	2.6%	7.7%	39
Patent applications	13.2	15	529	580	7.5%	7.5%	40
Patent grants	5.0	6	169	205	23.5%	14.7%	34
USPTO patent grants	0.8	1	25	28	63.3%	50.0%	30
Start-ups established	2.7	2	105	79	48.7%	35.9%	39
Successful start-ups	2.4	2	56	53	30.4%	34.8%	23
Licenses executed	8.1	11	317	433	10.3%	12.8%	39
License income[3]	4554176.6	4,863,269	141,179,474	150,761,330	19.4%	19.4%	31
R&D agreements	89.4	74	2,057	1,700	0.0%	0.0%	23

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Number of KTOs reporting results for each performance measure (including zero outcomes) in both years.
2: Percent of respondents reporting 'zero' for each outcome. For example, 7.7% of 39 othe research institutes reported zero invention disclosures in 2011.
3: License income given in Euros.
4:Results include UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Licensing

In addition to data on the number of licenses executed and license income, the survey collected data on the share of licenses that were granted to start-ups, to firms with less than 250 employees, and to firms with more than 250 employees; and license income by subject area.

License income

Total license income amongst 201 panel data respondents amounted to €307 million in 2010 and €308 million in 2011, an increase of 0.3%. Out of the 201 panel data respondents, 170 are universities and 31 other research organisations. Universities earned in 2010 in total €166 million and €157 million in 2011, a decrease of 5.1%. Other research organisations earned in 2010 in total €141 million and €151 in 2011, an increase of 6.8%. Average license income in 2010 at universities was €979,480 at universities and €926,346 in 2011, a decrease of 5.1%. At other research organisations the average license income earned in 2010 was €4,554,177 and €4,863,269 in 2011, an increase of 6.8%. Exhibit 3-45 below shows the distribution of license income for 201 PROs in 2010 and 2011.

Exhibit 3-45: Distribution of license income, panel data EKTIS 2011 and 2012

	Universities				Other research organisations				Total			
	Number		Percentage		Number		Percentage		Number		Percentage	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Zero	39	35	22.9%	20.6%	6	6	19.4%	19.4%	45	41	22.4%	20.4%
€1 - € 19,999	17	27	10.0%	15.9%	6	4	19.4%	12.9%	23	31	11.4%	15.4%
€20,000 - €99,999	35	37	20.6%	21.8%	5	5	16.1%	16.1%	40	42	19.9%	20.9%
€100,000 - €249,999	23	18	13.5%	10.6%	2	5	6.5%	16.1%	25	23	12.4%	11.4%
€250,000 - €499,999	16	14	9.4%	8.2%	1	2	3.2%	6.5%	17	16	8.5%	8.0%
€500,000 - €1,999,999	29	29	17.1%	17.1%	6	4	19.4%	12.9%	35	33	17.4%	16.4%
€2,000,000 or more	11	10	6.5%	5.9%	5	5	16.1%	16.1%	16	15	8.0%	7.5%
Total	170	170	100.0%	100.0%	31	31	100.0%	100.0%	201	201	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 9.3 and EKTIS 2012, question 10.3. Results provided for respondents that reported the amount of license income in both surveys, including UTEN (PT), RedOTRI (ES), HEFCE (UK) and DASTI (DK) respondents.

Distribution of licenses by type of licensee

The distribution of licenses is of interest as many national policies encourage licensing to either start-ups or to small firms with less than 250 employees. 3-46 below gives the results for the distribution of licenses by the type of licensee.

Exhibit 3-46: Distribution of licenses by type of licensee, panel data EKTIS 2011 and 2012

	Universities				Other research organisations				Total			
	Licenses		Percentage		Licenses		Percentage		Licenses		Percentage	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Start-up companies	80	64	13.7%	11.9%	5	3	21.7%	12.5%	85	67	14.0%	11.9%
Firms with <250 employees	210	216	36.1%	40.1%	9	18	39.1%	75.0%	219	234	36.2%	41.6%
Firms with >250 employees	292	258	50.2%	48.0%	9	3	39.1%	12.5%	301	261	49.8%	46.4%
Total	582	538	100.0%	100.0%	23	24	100.0%	100.0%	605	562	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported the number of licenses and have answered in which category the license belongs in both survey years. Based on answers for EKTIS 2011, question 9.2 and EKTIS 2012, question 10.2. Results include ASTP and UTEN (PT) respondents.

For both universities and other research organisations the largest share of their licenses are issued to large firms both in 2010 and 2011. The smallest share of their licenses are issued to start-ups. Universities that reported in which category the license belongs in both survey years, show for all categories a decrease of the number of licenses.

Share of license revenue by subject area

Respondents are asked to estimate the distribution of all license income across five subject areas, as shown in Exhibit 3-47. Excluding the 'other' subject area, the highest share of license income in 2010 and 2011 at both universities and other research organisations is from biomedical knowledge, followed by ICT. Very little licensing is for low and zero carbon energy technologies. The shares of license revenue by subject area remain relatively the same across both survey years.

Exhibit 3-47: Share of license revenue by subject area, panel data EKTIS 2011 and 2012

	Universities		Other research organisations		Total	
	2010	2011	2010	2011	2010	2011
Biomedical	37.3%	36.7%	53.6%	64.5%	40.2%	41.6%
Computers, communication equipment and software	16.7%	15.6%	10.2%	11.9%	15.6%	14.9%
Nanotechnology and new materials	9.6%	10.7%	0.8%	4.0%	8.1%	9.5%
Low or zero carbon energy technologies	3.5%	5.6%	0.0%	1.7%	2.9%	4.9%
Other subject areas not listed above	32.8%	31.4%	35.4%	17.9%	33.3%	29.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported their shares in both survey years. Based on answers for EKTIS 2011, question 10 and EKTIS 2012, question 11. Results include ASTP and UTEN (PT) respondents.

License revenue by subject area

Combining the results from Exhibit 3-47 and data on license income, shows that the largest part of all license income earned by the panel respondents is from biomedical knowledge in 2010 and 2011.

Exhibit 3-48: License revenue by subject area, panel data EKTIS 2011 and 2012

	Universities		Other research organisations		Total	
	2010	2011	2010	2011	2010	2011
Biomedical	78.9%	74.4%	98.4%	98.9%	93.3%	91.9%
Computers, communication equipment and software	4.6%	11.1%	1.4%	0.9%	2.2%	3.8%
Nanotechnology and new materials	4.4%	2.9%	0.0%	0.1%	1.2%	0.9%
Low or zero carbon energy technologies	0.5%	0.9%	0.0%	0.0%	0.1%	0.3%
Other subject areas not listed above	11.6%	10.7%	0.3%	0.1%	3.2%	3.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported their shares and the amount of license income they earned in both survey years. Based on answers for EKTIS 2011, question 9.3 and 10 and EKTIS 2012, question 10.3 and 11. Results include ASTP and UTEN (PT) respondents.

3.4.3 Standardised performance outcomes

This section gives the results for standardised indicators for the panel data set. The maximum number of possible responses is 320, but due to missing data (either for the numerator or denominator), no indicators are available for all possible respondents. The most complete coverage is for the number of patent applications per 1,000 researchers (see Exhibit 3-49), with panel data results for 289 PROs.

Performance per 1,000 research staff

Exhibit 3-49, 3-50 and 3-51 give standardised performance measures for the panel data set per 1,000 research personnel at respectively, universities, other research organisations and for the EU total.

Performance per 1,000 research staff at universities

Exhibit 3-49 below gives standardised performance measures for the panel data set per 1,000 research personnel at universities. For example, universities that responded to both surveys produced on average 16.2 invention disclosures per 1,000 FTE research staff in 2010 and 17.1 in 2011. For license income, universities earned on average €505,000 per 1,000 researchers in 2010 and €487,000 in 2011.

Exhibit 3-49: Performance per 1,000 research staff at universities, panel data 2010 and 2011

	Universities				
	2010	**2011**	**Absolute change**	**Growth rate**	***Valid responses[1]***
Invention disclosures	16.2	17.1	0.9	5.7%	*247*
Patent applications	8.4	8.8	0.4	5.1%	*252*
Patent grants	5.4	5.1	-0.3	-5.0%	*219*
USPTO patent grants[2]	0.8	0.9	0.1	10.5%	*133*
Start-ups established	1.4	1.6	0.2	17.3%	*221*
Successful start-ups	4.0	3.6	-0.4	-10.1%	*154*
License agreements	7.9	8.7	0.7	9.2%	*212*
License income (million €)	0.5	0.5	-0.0	-3.5%	*168*
Research agreements	90.5	80.5	-10.0	-11.0%	*162*
Total reported number of research staff	553,330	543,679	- 9,651	-1.7%	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: Universities, n=276.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit 3-49 shows that universities performed better in 2011 compared to 2010 on invention disclosures, patent applications, USPTO patent grants, start-ups and license agreements. The largest percentage increase is for start-ups and the largest absolute increase is for invention disclosures. Universities in 2011 performed worse on patent grants, successful start-ups, license income and research agreements. The largest percentage and absolute decrease is for research agreements.

Performance per 1,000 research staff at other research organisations

Exhibit 3-50 below gives standardised performance measures for the panel data set per 1,000 research personnel at other research organisations. For example, other research organisations that responded to both surveys produced on average 7.4 patent applications per 1,000 FTE research staff in 2010 and 8.1 in 2011. For license income, other research organisations earned on average €2.8 million per 1,000 researchers in 2010 and €2.9 million in 2011.

Exhibit 3-50: Performance per 1,000 research staff at other research organisations, panel data 2010 and 2011

	Other research organisations				
	2010	**2011**	**Absolute change**	**Growth rate**	***Valid responses[1]***
Invention disclosures	21.5	19.5	-1.9	-9.0%	*36*
Patent applications	7.4	8.1	0.7	9.4%	*37*
Patent grants	2.7	3.3	0.6	20.6%	*31*
USPTO patent grants[2]	0.5	0.5	0.0	5.8%	*28*
Start-ups established	1.6	1.2	-0.4	-26.8%	*36*
Successful start-ups	1.6	1.4	-0.2	-12.1%	*21*
License agreements	4.5	6.0	1.5	33.8%	*37*
License income (million €)	2.8	2.9	0.1	4.9%	*29*
Research agreements	45.3	35.6	-9.7	-21.4%	*20*
Total reported number of research staff	77,814	79,388	1,573	2.0%	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: Other research organisations, n=44.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit 3-50 shows that other research organisations performed better in 2011 compared to 2010 on patent applications, patent grants, USPTO patent grants, license agreements and license income. The largest percentage and absolute increase is for license agreements. Other research organisations in 2011 performed worse on invention disclosures, starts-ups, successful start-ups, and research agreements. The largest percentage decrease is for start-ups, which declined with 26.8% and the largest absolute decrease is for research agreements which declined with 9.7 per 1,000 FTE research personnel.

Performance per 1,000 research staff for all PROs

Exhibit 3-51 below gives standardised performance measures for the panel data set per 1,000 research personnel for all PROs in Europe combined. For example, PROs that responded to both surveys produced on average 5.1 patent grants per 1,000 FTE research staff in 2010 and 4.9 in 2011. For license income, all PROs earned on average €810,00 per 1,000 researchers in 2010 and €823,000 in 2011.

Exhibit 3-51: Performance per 1,000 research staff for all PROs, panel data 2010 and 2011

	Total EU				
	2010	**2011**	**Absolute change**	**Growth rate**	***Valid responses*[1]**
Invention disclosures	16.8	17.4	0.6	3.6%	*283*
Patent applications	8.3	8.7	0.5	5.5%	*289*
Patent grants	5.1	4.9	-0.2	-3.4%	*250*
USPTO patent grants[2]	0.7	0.8	0.1	9.7%	*161*
Start-ups established	1.4	1.6	0.2	10.8%	*257*
Successful start-ups	3.7	3.3	-0.4	-10.5%	*175*
License agreements	7.5	8.3	0.8	11.1%	*249*
License income (million €)	0.8	0.8	0.0	1.6%	*197*
Research agreements	85.5	75.4	-10.1	-11.8%	*182*
Total reported number of research staff	631,145	623,067	-8,078	-1.3%	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: total, n=320.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit 3-51 shows that PROs in Europe performed better in 2011 compared to 2010 on invention disclosures, patent applications, USPTO patent grants, start-ups, license agreements and license income. The largest percentage and absolute increase is for license agreements. European PROs in 2011 performed worse on patent grants, successful start-ups, and research agreements. The largest percentage and absolute decrease is for research agreements.

Performance by research expenditures

Exhibit 3-52, 3-53 and 3-54 give standardised performance measures for the panel data set by research expenditures at respectively, universities, other research organisations and for the EU total. These exhibits show the performance in terms of economic efficiency or the estimated cost in million Euros to produce each output.

Performance by research expenditures at universities

Exhibit 3-52 below gives standardised performance measures for the panel data set, by research expenditures at universities. For example, it costs universities on average €3 million research expenditures to produce 1 invention disclosures in 2010 and €3.2 million in 2011. For license income, it costs universities on average €84.8 million research expenditures to earn €1 million euro of license income in 2010 and €91.8 million in 2011.

Exhibit 3-52: Performance by research expenditures at universities, panel data 2010 and 2011

	Universities				
	2010	**2011**	**Absolute change**	**Growth rate**	***Valid responses[1]***
Invention disclosures	3.0	3.2	0.1	3.8%	*205*
Patent applications	5.8	6.1	0.3	5.0%	*208*
Patent grants	8.3	9.2	0.9	11.2%	*184*
USPTO patent grants[2]	56.1	53.5	-2.6	-4.6%	*109*
Start-ups established	35.4	32.7	-2.7	-7.7%	*184*
Successful start-ups	10.0	11.9	1.8	18.3%	*137*
License agreements	5.8	5.7	-0.1	-1.5%	*176*
License income (million €)	84.8	91.8	6.9	8.2%	*149*
Research agreements	0.6	0.6	0.1	11.3%	*143*
Total reported research expenditures (million €)	23,882	26,175	2,292	9.6%	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: Universities, n=276.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit 3-52 shows that when research expenditures are used to standardise the results universities were more economically efficient in 2011 compared to 2010 on USPTO patent grants, start-ups, and license agreements (a negative growth rate or negative absolute change indicates an improvement of economic efficiency or cost reduction). The largest improvement, both absolute and percentage wise, in efficiency is for start-ups. Estimated costs for universities in 2011 compared to 2010 increased for invention disclosures, patent applications, patent grants, successful start-ups, license income and research agreements. The largest percentage increase in costs is for successful start-ups and the largest absolute increase is for license income.

Performance by research expenditures at other research organisations

Exhibit 3-53 below gives standardised performance measures for the panel data set, by research expenditures at other research organisations. For example, it costs other research organisations on average €2.7 million research expenditures to produce 1 invention disclosures in 2010 and €3.1 million in 2011. For license income, it costs other research organisations on average €18.1 million research expenditures to earn €1 million euro of license income in 2010 and €16.6 million in 2011.

Exhibit 3-53: Performance by research expenditures at other research organisations, panel data 2010 and 2011

	Other research organisations				
	2010	**2011**	**Absolute change**	**Growth rate**	***Valid responses***[1]
Invention disclosures	2.7	3.1	0.4	13.0%	*29*
Patent applications	8.5	9.3	0.7	8.7%	*29*
Patent grants	27.5	34.1	6.6	24.1%	*25*
USPTO patent grants[2]	119.3	120.6	1.4	1.2%	*21*
Start-ups established	34.4	55.2	20.8	60.7%	*30*
Successful start-ups	53.5	56.5	3.0	5.6%	*18*
License agreements	12.9	10.0	-2.9	-22.7%	*31*
License income (million €)	18.1	16.6	-1.5	-8.1%	*24*
Research agreements	1.0	1.3	0.3	28.8%	*19*
Total reported research expenditures (million €)	3,843	4,103	260	6.8%	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: Other research organisations, n=44.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit 3-53 shows that when research expenditures are used to standardise the results other research organisations were more economically efficient in 2011 compared to 2010 only for license agreements and license income. For all other indicators other research organisations performed worse in 2011 compared to 2010. The largest absolute and percentage improvement in efficiency is for license agreement. The largest absolute and percentage cost increase is for start-ups.

Performance by research expenditures for all PROs

Exhibit 3-54 below gives standardised performance measures for the panel data set, by research expenditures for all PROs in Europe combined. For example, it costs PROs on average €3.0 million research expenditures to produce 1 invention disclosures in 2010 and €3.1 million in 2011. For license income, it costs PROs on average €54.2 million research expenditures to earn €1 million euro of license income in 2010 and €54.8 million in 2011.

Exhibit 3-54: Performance by research expenditures for all PROs, panel data 2010 and 2011

	Total EU				
	2010	**2011**	**Absolute change**	**Growth rate**	***Valid responses[1]***
Invention disclosures	3.0	3.1	0.1	4.9%	234
Patent applications	6.0	6.4	0.3	5.6%	237
Patent grants	9.2	10.3	1.2	12.6%	209
USPTO patent grants[2]	63.6	60.9	-2.8	-4.3%	130
Start-ups established	35.2	35.1	-0.2	-0.4%	214
Successful start-ups	11.8	13.8	2.0	16.9%	155
License agreements	6.3	6.1	-0.2	-3.1%	207
License income (million €)	54.2	54.8	0.6	1.1%	173
Research agreements	0.6	0.7	0.1	12.5%	162
Total reported research expenditures (million €)	27,725	30,277	2,552	9.2%	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Notes:
1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research expenditures) for both years.
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of PROs: total, n=320.
4: Based on answers for EKTIS 2011 and 2011 combined. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Exhibit 3-54 shows that when research expenditures are used to standardise the results all PROs in Europe were more economically efficient in 2011 compared to 2010 for USPTO patent grants, start-ups and license agreements. For all other indicators PROs in Europe performed worse in 2011 compared to 2010. The largest absolute and percentage improvement in efficiency is for USPTO patent grants. The largest absolute and percentage cost increase is for successful start-ups.

3.4.4 Results for additional questions

The EKTIS 2011 and 2012 surveys covered several additional topics in addition to the standard performance indicators. The results for the percent of PROs reporting one or more patent applications by subject area are presented in Exhibit 3-55 while the most frequent subject area for patent applications are presented in Exhibit 3-56. Exhibit 3-57 presents results on the successfulness of commercialising the institution's licensed technology in the last three years.

Patent applications by subject area

The biomedical subject area is the most common subject area for patent applications at both universities as well as other research organisations. The percent of PROs, both universities and other research organisations, reporting at least one patent application in the biomedical subject area increased in 2011 compared to 2010. Conversely, low or zero carbon energy technology was the least common subject area reported. This supports the results in Exhibit 3-47 and 3-48, which find that the biomedical field accounts for the largest share of license revenue and low/zero carbon energy technologies for the lowest share of license revenue. However the percent of PROs, both universities and other research organisations, reporting at least one patent application increased in 2011 compared to 2010 for all subject areas.

Exhibit 3-55: Percent of PROs reporting at least one patent application by subject area, panel data EKTIS 2011 and 2012

	Universities		Other research organisations		Total	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**
Biomedical	60.2%	71.3%	77.8%	86.1%	63.3%	73.9%
ICT: Computers, communication equipment and software	38.6%	46.2%	38.9%	41.7%	38.6%	45.4%
Nanotechnology and new materials	44.4%	56.1%	38.9%	50.0%	43.5%	55.1%
Low or zero carbon energy technologies	19.9%	28.7%	2.8%	16.7%	16.9%	26.6%
Other subject areas not listed above	59.6%	62.0%	50.0%	55.6%	58.0%	60.9%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported the subject area for their patent applications in both survey years. Based on answers for EKTIS 2011, question 7 and EKTIS 2012, question 8. Results include ASTP and UTEN (PT) respondents.

Most frequent subject area for patent applications

Exhibit 3-56 gives the distribution of patent applications by subject area. The biomedical field accounts for the most frequent subject area for patent applications by PROs, at both universities and other research organisations. The second most frequent subject area (ignoring the 'other' category) is the Nanotechnology and new materials field. Low or zero carbon energy technology ranks last, with not more that 2.0% of all patent applications both in 2010 and in 2011.

Exhibit 3-56: Distribution of patent applications by subject area, panel data EKTIS 2011 and 2012

	Universities		Other research organisations		Total	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**
Biomedical	45.9%	45.9%	69.6%	73.9%	50.0%	50.7%
Computers, communication equipment and software	5.4%	8.1%	8.7%	8.7%	6.0%	8.2%
Nanotechnology and new materials	14.4%	12.6%	4.3%	8.7%	12.7%	11.9%
Low or zero carbon energy technologies	1.8%	0.9%	0.0%	0.0%	1.5%	0.7%
Other subject areas not listed above	32.4%	32.4%	17.4%	8.7%	29.9%	28.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported their most frequent subject area for patent applications in both survey years. Based on answers for EKTIS 2011, question 7 and EKTIS 2012, question 8. Results include ASTP and UTEN (PT) respondents.

Successful outcomes for licensed technology

As shown in Exhibit 3-57, the percent universities that report at least one commercially successful licensed technology in the last three years decreased in 2011 compared to 2010. For other research organisations the percent remained the same.

Exhibit 3-57: Successfulness of PROs licensed technology in the last three years, panel data EKTIS 2011 and 2012

	Universities			Other research organisations			Total		
	Valid responses	**Yes**	**Percent yes**	**Valid responses**	**Yes**	**Percent yes**	**Valid responses**	**Yes**	**Percent yes**
2010	161	105	65.2%	31	18	58.1%	192	123	64.1%
2011	161	93	57.8%	31	18	58.1%	192	111	57.8%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported at least one commercially successful licensed technology in both survey years. Based on answers for EKTIS 2011, question 11 and EKTIS 2012, question 12. Results include ASTP and UTEN (PT) respondents.

3.5 Summary and conclusions of WP2

Characteristics of KTOs

Combining the two datasets for 2010 and 2011 it is found that **most European Knowledge Transfer Offices (KTOs) are young**, with only 16.5% established before 1990 and more than half, 60.7%, established after 2000. Furthermore, **52.1% have fewer than five employees** (in full-time equivalents). These results suggest that most KTOs in Europe are still developing experience and capabilities with managing the IP produced by their affiliated university or research institute. Furthermore the regression results in chapter 3.4 have shown that the size of the KTO measured by its employees has a significant and positive impact on the number of invention disclosures, license agreements, license income and start-ups. Many KTOs could therefore be struggling with a lack of sufficient and experienced staff in catching up with the performance of their peers in the US.

At most PROs the **ownership of IP is in the hands of the institution itself** exclusively (23.5%) or in some kind of combination between the institution and other parties (51.4%). The total number of research personnel covered by the combined data set is 1,021,731 full-time equivalents (FTEs). Out of this total, 872,915 researchers are working at universities and the remaining 148,816 researchers at other research organisations. Total reported research expenditures among the responding PROs amounted to approximately €41.6 billion. Out of the total amount, €34.9 billion was spent on research by universities and €6.7 billion by other research organisations.

Performance measures

License income is highly concentrated, with the top 10% of universities accounting for 86.5% of all licence income. This could partly be due to a lack of experience or staff, but other factors could be equally or more important, such as large differences in the size of PROs (larger PROs are likely to produce more IP and therefore earn more license income), a focus on different research areas (PROs active in biomedical research could have more opportunities for earning license income), and serendipity – based on the US experience, IP that generates large revenue streams are very rare and could be near randomly distributed among PROs.

Biomedical IP is the largest generator of license revenue, accounting for 87.0% of the total license revenue for 2011, followed by 'other subject areas' at 6.0% and by ICT at 3.9%. This suggests that the presence of a strong health or medical faculty at a university or research institute is likely to result in above average performance for license revenue.

The majority of licenses are issued to SMEs or large firms, 80.3% combined. The remaining 19.8% are issued to start-ups. Although national policies often encourage licensing to start-ups or small firms, this could be difficult to achieve if small firms lack the ability, interest, or finance to license intellectual property. Unfortunately, there are no data in this study that can be used to investigate why most licenses are issued to large firms.

License income provides only a small financial gain to European PROs. Limited to respondents that reported license income and research expenditures, total license income only accounted for 0.9% of research expenditures by universities, 3.0% of research expenditures by other research organisations, and 1.2% of all research expenditures by PROs. Similarly in the United States, license income only accounted for 4.1% of total research expenditures. On this basis, license income is unlikely to ever account for a significant share of research expenditures and is consequently a poor justification for supporting KTOs. The main function of a KTO lies in the commercialisation of knowledge, whether or not this generates significant income for its associated institution. In this respect, the much higher rate of research agreements at universities (82.8 per 1,000 researchers) versus patent grants (4.5 per 1,000 researchers) indicates that **research agreements are a very important channel for knowledge transfer**, even though they may generate little license income. A further advantage of research agreements is that they can cause knowledge to flow in both directions, not only from PROs to firms but also from firms to PROs.

Standardised performance outcomes

The standardised performance indicators are provided for both the number of outcomes per 1,000 research staff and the cost in Euros to produce one output. For comparisons within Europe, the former method is preferable because of a higher number of valid responses (for instance the results for invention disclosures are based on 526 responses using the number of researchers versus 413 responses using research expenditures) and because research numbers could be more comparable than Euros due to different cost structures for research across countries. Although the research expenditure data are adjusted for purchasing power parity (PPP), the PPP estimates are not limited to research costs, but cover a wide basket of goods and services in each country. However, no data on the number of research staff is available for the AUTM results for the United States and consequently this report provides standardised performance indicators by research expenditures for cross-country comparisons.

Standardised performance measures for the combined data set per 1,000 research personnel have shown that **universities outperform other research organisations on the number of start-ups, successful start ups and research agreements**. Other research organisations, however, have 1.4 more invention disclosures, 1.6 more patent applications, 2.2 more patent grants and 3.7 times more license income per 1000 researchers. When performance is measured in terms of research expenditures, universities are more efficient than other research organisations for all performance indicators except for license income.

Performance results on leading PROs have shown that larger PROs in terms of research expenditures (30 million or more) or research personnel (1,500 or more) are slightly less efficient than smaller PROs. This does not necessarily indicate that there are inefficiencies of large size. These results might for instance indicate that other forms of knowledge transfer, such as publishing, networking and teaching play an important role for larger PROs.

Comparing the result internationally we find that the **US outperforms Europe on invention disclosures, patent applications and license income. Europe outperforms the US on the number of start-ups established and on the number of license agreements**.

Despite the underperformance of European PROs on the three input indicators of the potential of commercialisation of knowledge (disclosures, patent applications and patent grants) this should only be of limited concern to policy makers as they do not measure the actual uptake of knowledge by firms[22]. Furthermore, if seen in isolation, it may be a bad public policy but good KTO strategy to maximise these input indicators for a given supply of resources. For instance a 'sub-prime' patent (Harhoff, 2008) may cost more to launch than the benefits that will accrue for the PRO. Thus the quality of the input indicators may in fact be more important than the quality. However, considering that European PROs require on average 3.3 times more research expenditures to earn €1

[22] Metrics for Knowledge Transfer from Public Research Organisations in Europe. Report from the European Commission's Expert Group on Knowledge Transfer Metrics (2009).

million indicates that there is considerable room for efficiency improvements in terms of commercialising research results.

Panel data results

Out of the 430 respondents that replied to the EKTIS 2011, 320 responded as well to the EKTIS 2012. The **average KTO staff has increased in 2011** compared to 2010 for both universities (8.6%) and other research organisations (6.1%). Average research personnel at universities reported by panel respondents has decreased with 2.0% and increased with 1.0% at other research organisations. Average research expenditures increased with 3.7 % to €112 million at universities and with 10.9% to €123 million at other research organisations in 2011. **Average license income at universities decreased** with 5.1% to €926,346 in 2011 and increased at other research organisations in 2011 with 6.8% to €4,863,269.

Standardised performance measures for the panel data set per 1,000 research personnel have shown that **universities performed better in 2011 compared to 2010 on invention disclosures, patent applications, USPTO patent grants, start-ups and license agreements**. Universities in 2011 performed worse on patent grants, successful start-ups, license income and research agreements. **Other research organisations performed better in 2011 compared to 2010 on patent applications, patent grants, USPTO patent grants, license agreements and license income**. Other research organisations in 2011 performed worse on invention disclosures, starts-ups, successful start-ups, and research agreements. For all PROs combined, the largest percentage and absolute increase is for license agreements and the largest percentage and absolute decrease is for research agreements.

When performance is measured in terms of research expenditures, universities were more economically efficient in 2011 compared to 2010 on USPTO patent grants, start-ups, and license agreements. Estimated costs for universities in 2011 compared to 2010 increased for invention disclosures, patent applications, patent grants, successful start-ups, license income and research agreements. Other research organisations were more economically efficient in 2011 compared to 2010 only for license agreements and license income. For all other indicators other research organisations performed worse in 2011 compared to 2010. For all PROs combined, the largest absolute and percentage improvement in efficiency is for USPTO patent grants. The largest absolute and percentage cost increase is for successful start-ups.

4 CODE OF PRACTICE IMPLEMENTATION AND IMPACT (WP3)

4.1 Objectives of work package 3

This part of the report answers to the Commission's request to analyse the implementation and impact of the Code of Practice for a sample of at least 200 public research organisations and universities performing research.

It reports on

- two online surveys conducted in 2011 and 2012 with a sample of 322 public research organisations and universities performing research (PROs),
- interviews conducted in 2012 with a subset of 100 PROs,
- and interviews with 60 companies in R&D intensive sectors held in 2011.

The analysis answers

- to what extent the principles of the Commission's Code of Practice (CoP) are used in European PROs,
- whether use of the principles of the CoP differs across different types of PROs (those from different geographical areas in Europe, of different sizes, with older/younger knowledge transfer offices, with bigger/smaller knowledge transfer offices),
- whether use of the principles of the CoP differs across PROs from different countries,
- what the main drivers and barriers to more efficient and effective knowledge transfer are from the perspective of companies and PROs,
- what impact the CoP has according to the view of European companies (on the impact on PRO performance see the regression analyses in the previous chapter).

4.2 CoP implementation and impact surveys 2011 and 2012

This section of the report describes the methods and results of the 2011 and 2012 surveys among universities performing research and other public research organisations (PROs) on the use and impact of the principles of the Commission's Code of Practice (CoP). First we give an overview of the survey approach and the responses obtained Section 1.2.2 presents the knowledge transfer services offered by the transfer offices (KTOs). In section 1.2.3 the results about the implementation of IP policies are introduced, while the following section deals with incentives for IP protection and exploitation (e.g. models for sharing revenues). Section 1.2.5 discusses IP exploitation mechanisms and practices. Sections 1.2.6 and 1.2.7 focus on different exploitation policies, starting with licensing policies and their implementation to be followed by start-up policies (the terms start-up, spin-off and spin-out are used synonymously throughout this section). Section 1.2.8 looks at PROs activities in the area of monitoring and communicating their research capabilities and results, IP and knowledge transfer. In section 1.2.9 we distinguish between collaborative and contract research and show how the rules and practices between both types differ among the PROs participating in this pilot survey. The last section gives a short summary by contrasting the survey results with the principles of the CoP.

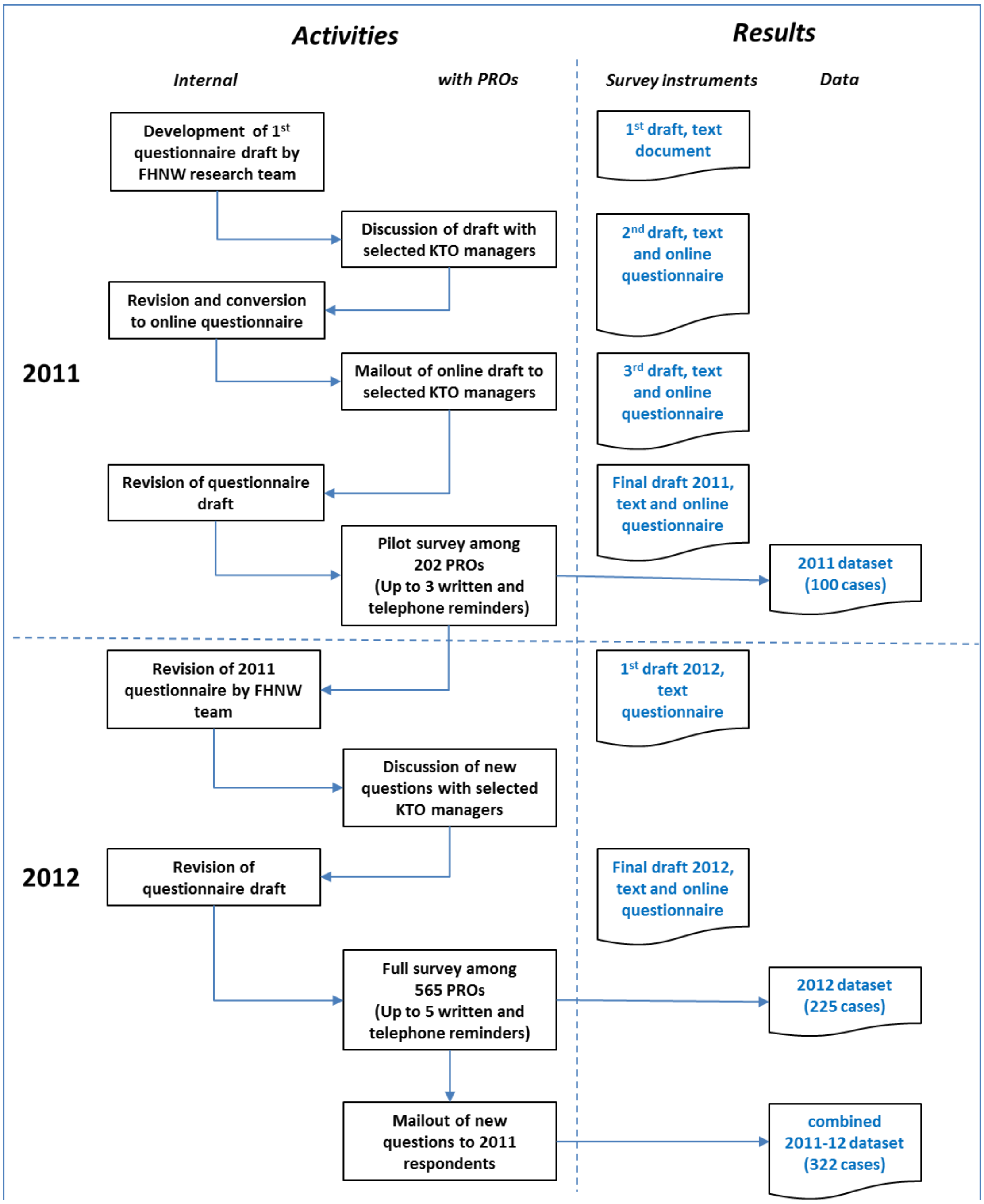
4.2.1 Methods and data

Questionnaires

The major steps of the data collection are shown in Exhibit 4-1. The questionnaires used in WP 3 were developed and improved across an extended time period and with the involvement of KTO managers in both, face-to-face interviews as well as pilot surveys.

The 2011 pilot questionnaire consisted of 41 questions and the 2012 final questionnaire of 42 questions (see annex). A reduced questionnaire of 18 questions was used in a final reminder sent to a sample of 243 non-respondents. The large overlap of the 2011 and 2012 questionnaires permitted us to pool the data and approach in 2012 only institutions which had not responded in the 2011 survey.

Exhibit 4-1: Process of data collection in the WP 3 online surveys



Source: FHNW / Knowledge Transfer Study 2010-2012

Furthermore, to reduce possible response barriers we opted for a multi-modal approach and offered the survey participants a printable or printed version of the online survey upon request.

Samples and field work

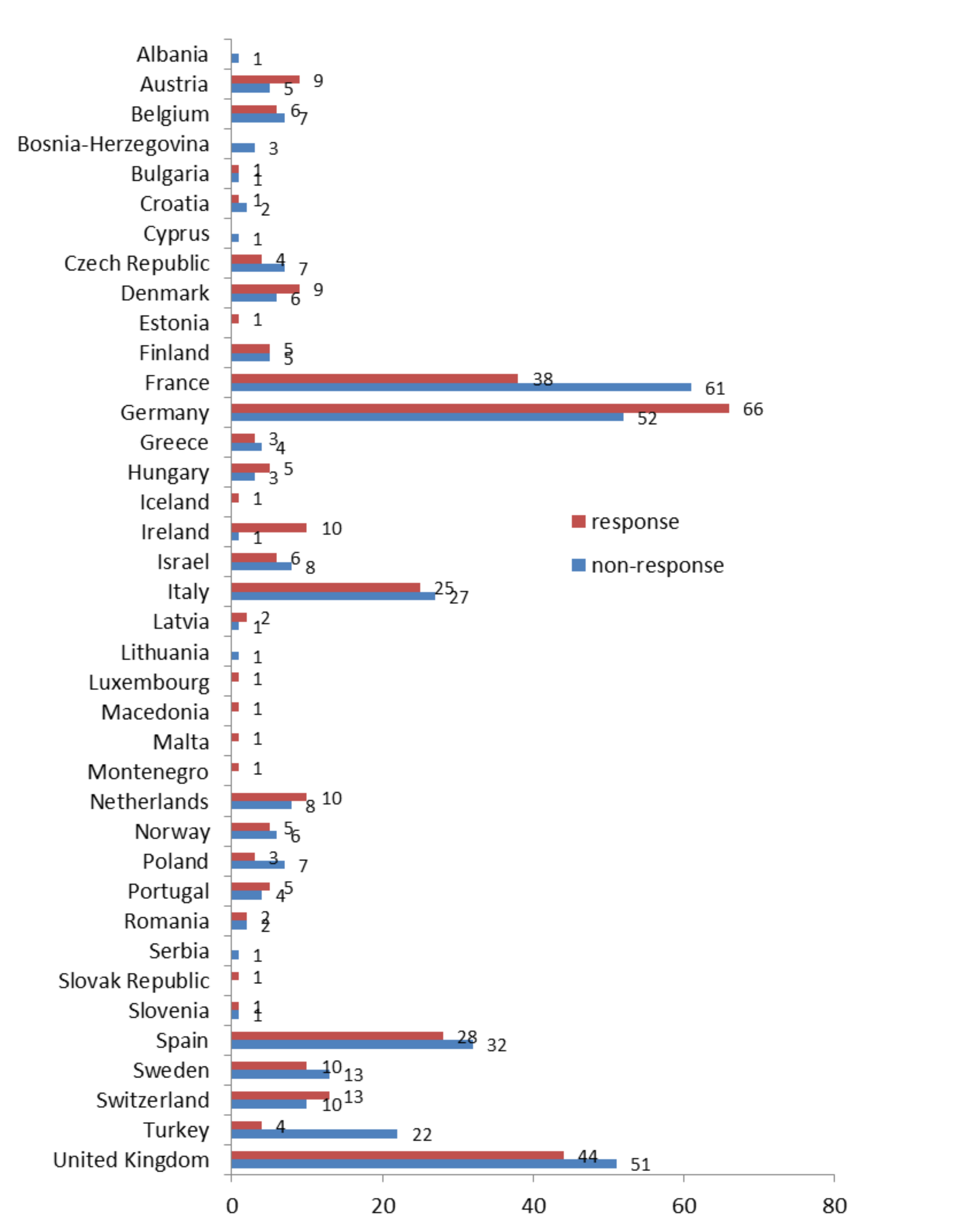
The samples drawn in 2011 and 2012 were both nested with the earlier WP 2 surveys conducted by UNU-MERIT. The respondents were the same persons, usually staff of KTOs or research support offices.

- The 2011 pilot survey sample consisted of 200 PROs. Data collection took place between June and September 2011. A total of 150 KTOs activated the link to the online questionnaire (75.0%) and 27 (13.5%) replied in another mode (email or telephone) to the invitation (non-additive, as some may have replied using both modes). We received a total of 100 usable responses (50.0%) after two email reminders and follow-up telephone calls.
- The 2012 survey sample consisted of 565 PROs which had either replied in 2011 or in 2012 to the UNU-MERIT surveys (or for which we expected to obtain data from national surveys) and which had not replied to the 2011 WP 3 survey. The link to the online questionnaire was activated by 351 PROs (62.1%) after up to 5 written or telephone reminders and the mailout of a reduced questionnaire to non-respondents. We received in total 225 usable responses (39.8%).

The combined 2011-12 WP 3 sample consisted of 675 institutions. A total of 322 valid responses could be pooled (47.7% of gross sample). Three PROs were surveyed both in 2011 and in 2012 due to changed contact e-mails – only the 2012 responses were kept for the analysis.

Responses are from a broad set of 33 European countries, with Germany contributing more than one fifth, and the UK and France more than 10% of the responses (see Exhibit 4-2 on responses per country in detail). Response rates vary by country from 0 to 100% (usually countries with only 1 institute in the sample which either responded or not, see Table 6-1 in the annex on country-specific response rates). From 6 out of the 39 countries included in the study we did not obtain any responses (Albania, Bosnia-Herzegovina, Cyprus, Liechtenstein, Lithuania, Serbia). These are mostly countries with only one institution in the gross sample.

Exhibit 4-2: Total and realised sample by country (N)



Source: FHNW / Knowledge Transfer Study 2010-2012

Groupings of responses for the descriptive analysis

The organisation and practices of intellectual property management, knowledge transfer and collaborative and contract R&D in universities and other PROs as well as the impact of the CoP on these issues may vary between organisations according to several characteristics. We compared the responses to the survey by exploring country- and organisation-level variables as follows:

PRO location (country level, identical for all responding PROs from a country):

- *Geography*, distinguishing between PROs from Nordic (9%), Western (61%), Central Eastern (7%) and Southern European (including Israel) countries (22%);

- *EU*-membership with the three groups of PROs: a) from non-member states (10%), b) from what were known for some time as "Accession Countries" (countries entering the EU after 01.05.2004, 7%) and c) from "old" member states (as of 30.04.2004, 83%), which dominate the response set,
- *R&D-densit*y of the country, operationalised as the R&D personnel per 1000 employees in the country. The majority of responses come from PROs in high density countries (51%), 41% from middle density and merely 7.5% from low density countries.

Organisation level:

- The variable *type of institution* compares universities (69% of responses), with universities with hospital (18%) and non-university PROs (14%). The existence of a hospital and medical school has been found influential in previous studies of KTO performance (Belenzon & Schankerman, 2009; Chapple, Lockett, Siegel, & Wright, 2005; Siegel, Waldman, & Link, 2003; Thursby & Kemp, 2002).
- *Size of the PRO:* Larger PROs might produce more practically relevant R&D output and dedicate more resources to KTT (Rogers, Takegami, & Yin, 2001). Responses were grouped into categories of less than 500 (22%), 500-1249 (26.5%), 1250-2499 (24.5%) and 2500 or more (27%) research personnel.
- The *founding date of a KTO* stands for the experience of both, the organisation and the KTO staff, which also influences transfer success (Carlsson & Fridh, 2002; Conti, 2009; Siegel, Waldman, & Link, 2003). We distinguished four groups of older (before 1990, 1990 to 1999) and younger (2000-2004, 2005 and younger) KTOs. Roughly 60% of the responses are from younger KTOs.
- *Size of the KTO:* Last but not least the size of a KTO is an indicator for both, the resources dedicated to KTT in the PRO as well as the possibilities of a KTO to actively engage in IP management and KTT and obtain specialist knowledge in its different areas. It has been found influential in several previous studies (Conti, 2009; Siegel, Waldman, & Link, 2003; Thursby & Kemp, 2002). We distinguished KTOs with up to 2 (24%), 2.1-5 (29%), 5.1-10 (20%) and more than 10 employees in FTEs (28%).

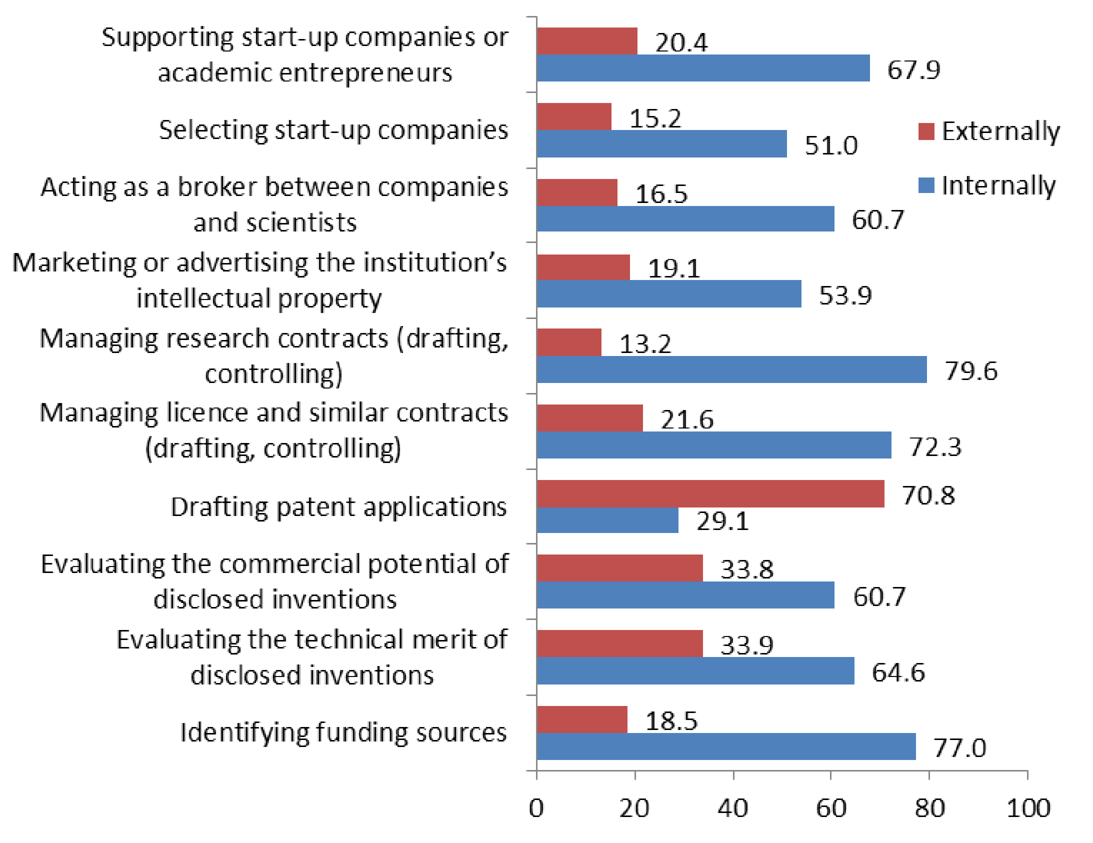
4.2.2 Knowledge transfer services and qualifications of staff

The CoP principle 10 stresses that PROs should have access to professional knowledge transfer services and staff with a technical background and CoP 6 adds to this by suggesting training actions. In the questionnaire respondents were firstly asked for the types of services provided to employees/students interested in protecting and exploiting/ commercializing IP and whether they are provided by internal or external offices and secondly for the qualifications of the KTO staff and training offers.

Organisational set-up of the transfer office and IP protection and knowledge transfer services

The large majority of 85% of the surveyed knowledge transfer offices (KTOs) are part of the institution for which they responded. 9% are (parts of) private for-profit organisations and 4% are (parts of) public not for-profit organisations outside the PRO.

Exhibit 4-3: Services provided internally by the PRO or by external service providers (in %)



Source: FHNW / Knowledge Transfer Study 2010-2012

Asked who provides the IP- and knowledge and technology transfer-related services at their institution, the responding offices (or similar) at the institution or external service providers (like consultants, patent attorneys, exploitation agencies and the like) the response pattern reveals four types of services (see Exhibit 4-3):

- Those provided widely across institutions and always or more often than not by internal offices, in particular managing (research and licence) contracts, identifying funding sources, and supporting start-up companies,
- Services provided internally, but not in all institutions, such as selecting start-up companies, marketing IP, acting as broker between companies and scientists,
- Services provided mostly internally but with a considerable involvement of external service providers, notably the technical and commercial evaluation of disclosed inventions,
- Services obtained from external service providers with a significant internal contribution – this applies only for the drafting of patent applications.

All services are provided more often internally and less often externally the larger the PRO and the larger the KTO. There is only one exception to this rule: external support for drafting patent applications is sought more often in larger than in very small PROs and KTOs, probably because many small institutions have rather irregular patenting activities.

Qualifications of the KTO staff and training offers

CoP 6 suggests training actions for staff (and students). Entrepreneurial training (CoP 6) is available in 51.5% of all PROs for employees and in 70% for students. This is in line with the recent finding (based on US data) that start-ups are more commonly founded by graduates than by university staff and that graduate-founded start-ups are not of inferior quality (Åstebro, Bazzazian, & Braguinsky, 2012).

It is not surprising that entrepreneurial training for students (and less so for staff) is more common among universities than among non-university research institutions. In addition, it is considerably more common in the EU countries than in other European countries. Last but not least the experience with KTT activities (measured as the founding date of the KTO), the size of KTO, and the size of the institution are correlated with entrepreneurial training offers as shown in the following Table 4-1.

Table 4-1: Entrepreneurial training for employees and students by EU status of the country, type of institution, founding of KTO, size of KTO, and size of institution (in %)

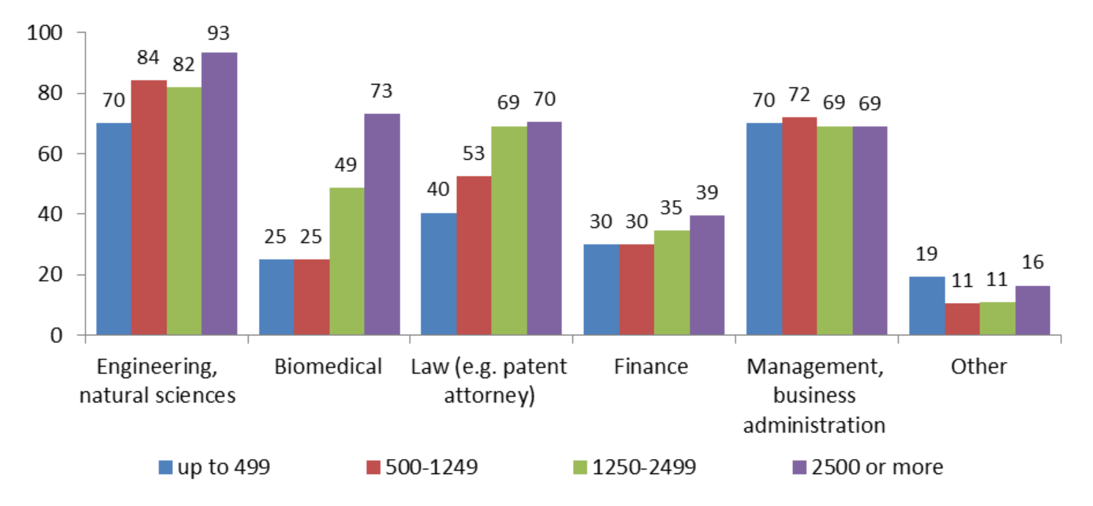
	Employees	**Students**	**None**
Type of institution			
Other institution	39.5	28.9	55.3
University	59.2	83.7	13.6
University with hospital	41.3	58.7	30.4
EU status of the country			
EU 15: EU members up to 30.04.2004	53.8	70.5	22.7
EU 12: accession countries on/after 01.05.2004	55.0	90.0	10.0
No EU members	31.3	56.3	37.5
Founding of KTO			
before 1990	59.0	76.9	20.5
1990-1999	61.9	69.8	23.8
2000-2004	54.7	73.6	18.9
2005 or later	39.6	68.1	26.4
Size of KTO			
up to 2	41.8	71.6	23.9
2.1 to 5	48.1	66.2	28.6
5.1 to 10	67.3	79.6	12.2
more than 10	60.0	72.0	21.3
Size of PRO			
up to 499	43.1	62.7	31.4
500-1249	58.3	71.7	23.3
1250-2499	56.1	75.4	17.5
2500 or more	68.8	76.6	14.1
All	**51.5**	**70.3**	**23.4**

Source: FHNW / Knowledge Transfer Study 2010-2012

Four out of five responding KTOs employ staff with a formal degree in engineering or natural science (see Exhibit 4-4). Two third of the participants employ personnel with management or business administration degrees, 58% with a formal law training, 36.5% with biomedical and 32% with finance degrees. Other degrees or experience include expertise in other social sciences and humanities (journalism, human geography, political science), patent engineering and technology management (14.5%).

The larger a KTO the more competencies it can provide and the more diverse the staff qualifications (see Exhibit 6-3 in the annex). Only one tenth of the KTOs with two or less full time equivalents of staff employ staff with a biomedical degree, whereas 30% of the KTOs with 2-5 FTEs and two thirds of KTOs with more than 10 FTEs have such staff. The composition of KTO staff varies also according to type and size of the PRO. It comes with little surprise that universities with a hospital considerably more often employ KTO staff with a biomedical degree than universities without hospitals and other PROs (see annex Exhibit 6-3). However, it is more surprising that 45% of the KTOs of universities with hospitals employ staff with a degree in finance, whereas this share is only 31% in universities and 22% in non-university PROs. Staff with a management degree exists in approximately 70% of the PROs, independent of their size. All other qualifications are more often found in KTOs the larger the institution (see Exhibit 4-4).

Exhibit 4-4: Formal qualification of KTO personnel by size of the PRO (N=220)



Source: FHNW / Knowledge Transfer Study 2010-2012

In terms of working experience in the private sector 48% of the heads of the surveyed KTOs have worked there for five or more years, 22% for less than five years and 30% not at all. This mirrors the findings of the CEMI survey among 211 European universities in 2008, in which 43% of the respondents answered that the head of the KTO five or more years working experience in industry (Conti & Gaulé, 2008). Industry experience of the head of the KTO is most common in Scandinavia (more than 80% of responding PROs) and least common in Southern Europe (only 53% of the PROs). In addition, it is more often found in larger than in smaller transfer offices.

4.2.3 IP policy

Existence of IP policy

CoP 1 of the EC Recommendation suggests the development and publication of an IP policy. 80% of the respondents indicate that they have an IP policy and another 10% state that such a policy does not yet exist but is planned for the future. The majority (65%) has laid down this IP policy in writing. The shares of institutions **without** such an IP policy are comparatively high among PROs with a long tradition of institutionalised knowledge and technology transfer – 25% of those which established their KTO before 2000 do not have an IP policy – and smaller institutions with smaller KTOs (see Table 6-2 in the annex).

Publication of IP policy

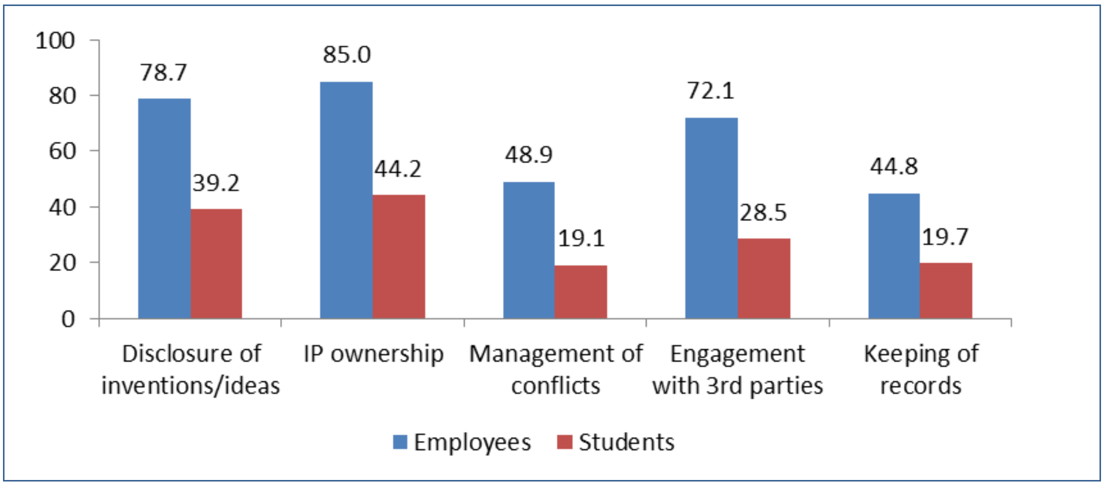
Of the 242 respondents with an IP policy, slightly less than one third have published their IP policy internally as well as externally and 40% have published their IP policy for internal use only. Four percent of the respondents plan to publish their IP policy in the future and the same share of PROs has not published their IP policy at all. In the majority of PROs IP publication practice is not in line with the CoP 1 suggestion to publicize the IP policy internally and externally.

Again, the general public availability of the IP rules and regulations is lower in PROs with older and smaller transfer offices and in smaller PROs in general. Only one quarter of the PROs from Western European countries published their IP policies internally and externally and 60% restrict at least some part to internal readers – in Eastern and Southern Europe it is the opposite, and it will be interesting to see whether this difference in publication practice relates to transfer performance. The data clearly points to a need for research and discussion of this practice of not making such policies generally available as suggested by the CoP.

Content of the IP policy

Rules for IP related issues such as the disclosure of inventions and new ideas with potential commercial interest, the ownership of IP, how to deal with conflicts or how to engage with third parties and keeping records indicate the level of depth of an IP policy and are addressed by CoP 2. CoP 2 stipulates that an IP policy should provide clear rules on these issues, specifically for staff and students.[23] There is a distinction between rules for employees and students. The results show that rules for employees mostly cover the ownership of IP (85%), disclosure of inventions and ideas (79%), and engagement with third parties (72%), while management of conflicts (49%) and keeping of records (45%) play less important roles and are less common. For students the same pattern applies but to a lesser extent (see Exhibit 4-5).[24]

Exhibit 4-5: Binding rules of IP policy issues by target group (in %, N=318 for employees and N=303 for students)



Source: FHNW / Knowledge Transfer Study 2010-2012

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23 In the 2011 pilot survey 94% of the respondents with an IP-policy based on written rules and regulations stated that the IP policy is binding for their employees. For the other groups this share was considerably lower and between one fifth (sub-contractors) and one third (students). The question was not included anymore in the 2012 survey.

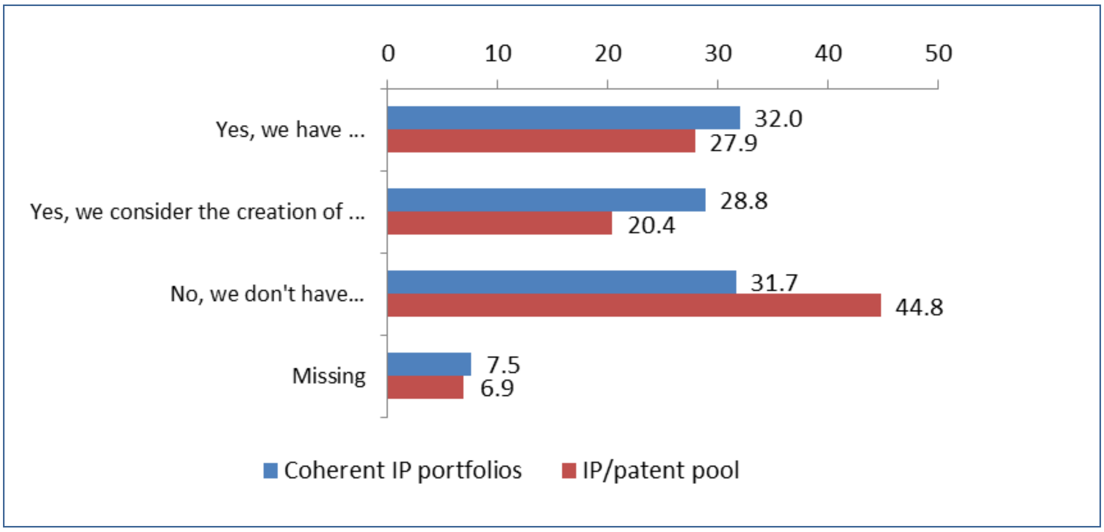
24 It should be noted that the existence of clear rules, in particular on how to deal with conflicts of interest between knowledge transfer and teaching, has been found to relate to performance indicators in a previous study of Spanish universities (Caldera & Debande, 2010).

More binding rules for employees are issued the larger the PRO and the larger its KTO. In particular, in smaller PROs and those with fewer KTO staff employees less often find clear rules on the management of conflicts of interest and the keeping of records.

IP portfolios/pools

Coherent IP portfolios and or IP/patent pools are another indicator of the stage of development of IP policies and are reflected by CoP 5, which suggests considering the creation of coherent IP portfolios and where appropriate, the setting-up of patent/IP pools. IP portfolios or pools might concentrate PROs' offers to private companies, reduce costs, and increase visibility and transfer success. According to the online surveys 32% of the respondents have created coherent IP portfolios, and 28% pool their IP/patents with other institutions; however, even these low numbers might be too high, as the interviews showed that many respondents applied a rather wide definition of pooling (see p. 195). The creation of coherent IP portfolios is considered by 29% and creation of IP/patent pools by 20% of the participants (see Exhibit 4-6).

Exhibit 4-6: Coherent IP/patent portfolios and/or IP/patent pools (in %, N=319)



Source: FHNW / Knowledge Transfer Study 2010-2012

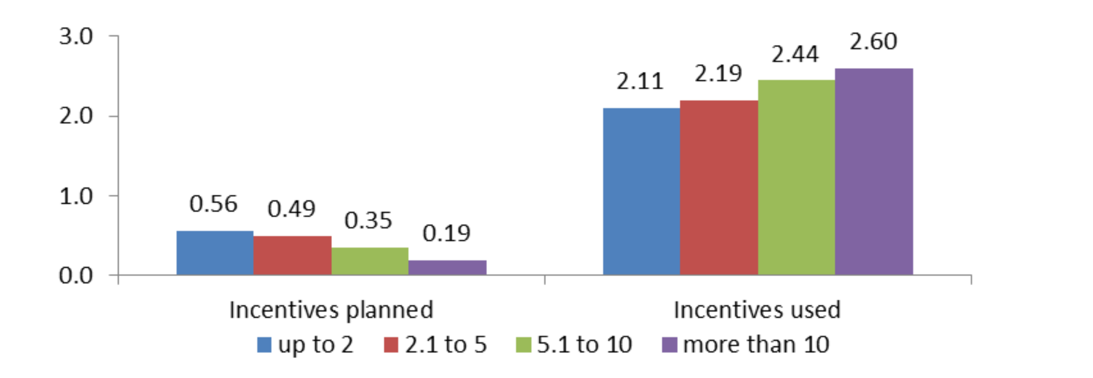
It is interesting to see that in the 2012 survey the share of those who answered that they have IP portfolios (IP pools) was 10% (15%) larger than in the 2011 survey – whereas the shares of those who answered that they considered the introduction of the measure were smaller. Both, IP portfolios and IP pools are more common in larger PROs and in PROs with larger KTOs.

4.2.4 Incentives for IP protection and exploitation

Incentives

CoP 4 suggests the introduction of incentives for becoming involved in the implementation of the IP policy, and highlights the necessity for non-monetary incentives in particular. 97% of the respondents, i.e. 280 out of 289 respondents who answered the question, stated that their institution provides at least one incentive to its employees and/or students to protect and exploit IP. On average, an institution provides 2-3 different transfer incentives to their employees; the larger the transfer office, the more incentives are provided (see Exhibit 4-7). However, smaller KTOs are catching up and considering more often the introduction of a new incentive (0.56 "incentives planned" in the smallest KTO size class).

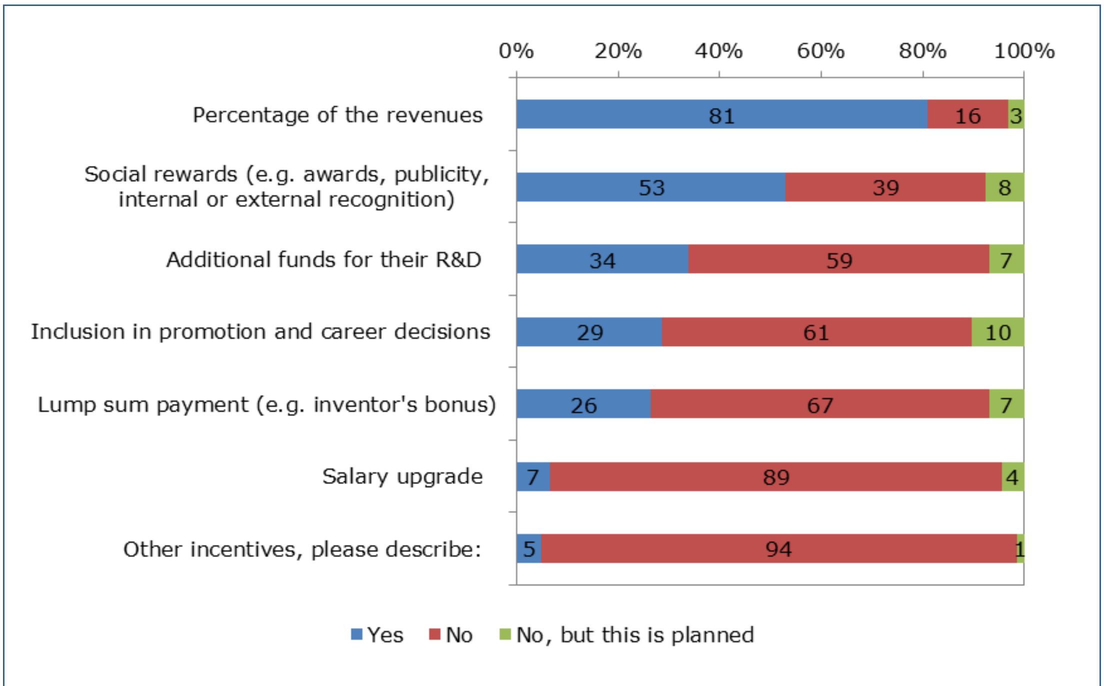
Exhibit 4-7: Number of incentives for protecting and exploiting IP of institutions by size of the KTO (in %, N=257)



Source: FHNW / Knowledge Transfer Study 2010-2012

By far the most common incentive among the surveyed PROs is to offer inventors a percentage of the revenues (81%). Social rewards (e.g. awards, publicity, internal or external recognition) (53%), additional funds for R&D (34%), and the inclusion in promotion and career decisions (29%) as well as lump sum payments (e.g. inventor's bonus) (26%) are used considerably less often. 10% of the institutions have planned to include promotion and career decisions as an incentive to protect and exploit IP (see Exhibit 4-8). Overall financial incentives are dominant among the surveyed PROs as opposed to the suggestions of CoP 4, which emphasizes other incentives such as promoting career progressions.

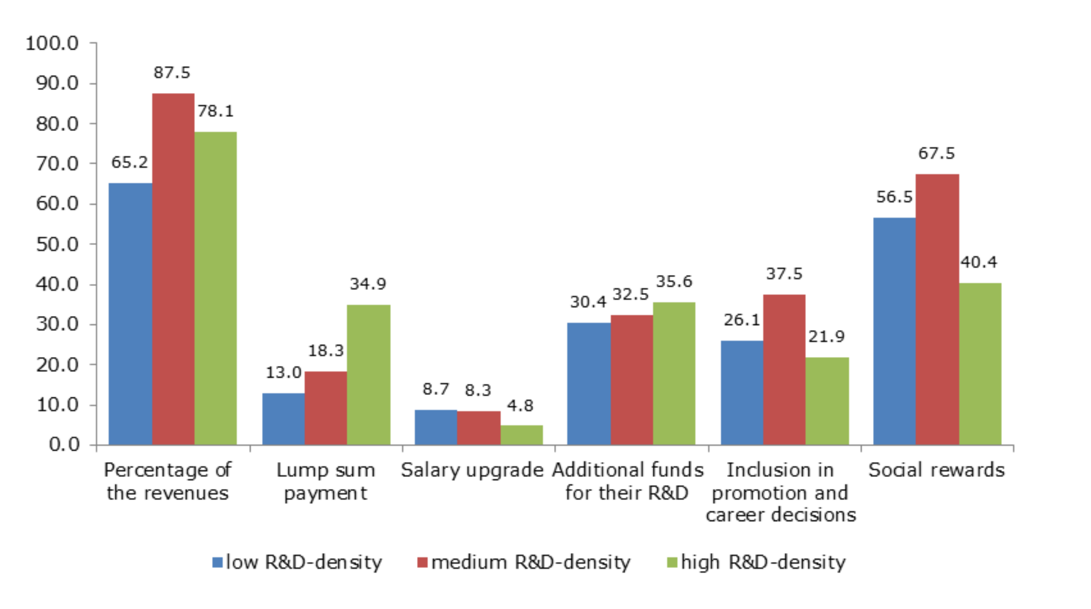
Exhibit 4-8: Incentives for protecting and exploiting IP of institutions (in %, N=289)



Source: FHNW / Knowledge Transfer Study 2010-2012

Financial incentives are more common among PROs from countries in the middle and top range of R&D-density (number of research personnel per 1000 employees) which are presumably the wealthier countries (see Exhibit 4-9). In countries with overall lower R&D activities (and presumably "poorer" PROs), PROs resort nearly as often to social rewards (and less often also career benefits) for securing the interest of their employees and/or students in the protection and exploitation of Intellectual Property.

Exhibit 4-9: Provision of incentives by R&D-density of the country (in %, N=289)



Source: FHNW / Knowledge Transfer Study 2010-2012

PROs in Scandinavian and Eastern European countries less often rely on percentages of the revenues as incentive and instead more often use lump sum payments than their counterparts in Western and Southern Europe (see Exhibit 6-1 in the annex). Additional funds for R&D are most common in Western Europe. The larger a PRO the more common it is to offer the employees a share of the revenues: in PROs with less than 500 researchers this is done by two third of all PROs, in PROs with 500-1250 and 1250-2499 employees by 85% and in the largest PROs (2500 or more researchers) by 95%.

Models for sharing revenues

One important incentive to engage in IP protection and knowledge transfer activities can be the possibility of participating in the revenues. Several studies with the AUTM dataset have shown that inventors' shares of the revenues are positively related to license incomes in US research universities (Friedman & Silberman, 2003; Jensen & Thursby, 2001; Lach & Schankerman, 2004, 2008; Link & Siegel, 2005). Studies outside the US have found positive links of inventors' shares with licence income in Spanish universities (Caldera & Debande, 2010) and income from industry in Japanese universities (Woolgar, 2007), and with patent applications in Italian universities (Baldini, 2010). Thursby, Fuller, & Thursby (2009) show that in the US lower shares for inventors raise the likelihood that patents are assigned not to the university (as should be according to Bayh-Dole) but to start-ups in which the inventor is a principal. Lower shares to inventors may thus create an incentive to have patents assigned to start-ups and/or reduce the disclosure of inventions to the university. This is also cited as possible explanation for the negative relationship between inventors' royalty shares and the number of start-ups in other studies (Di Gregorio & Shane, 2003; Markman, Gianiodis, Phan, & Balkin, 2004). Markman, Gianiodis, & Phan (2009) obtain the counterintuitive result that a high inventor's share is negatively related to total licence income in a sample of 128 institutions (of the US AUTM 1999 population). They explain this with inflated inventor's shares at underperforming institutions which are paid to reverse poor licensing track records and with an overall low importance of this incentive for scientists wishing to advance their careers.

Not only revenues to the inventors themselves, but also to their departments and institutes have been found to be effective for raising licence income (Markman, et al., 2009). But there is no effect on generating start-ups (Markman, et al., 2004).

Principles 4 and 13 in the CoP can therefore be connected. Established clear principles for the sharing of knowledge transfer revenues among the organisation and inventors, as suggested in CoP 13, exist in two third of the surveyed institutions. In one third the distribution is decided on a case-by-case basis. The larger the institution and its transfer office, the more likely it is that such principles exist (see Table 6-4 in the annex). In 41% of the institutions all expenses, and in 30% some expenses (e.g. out of pocket costs for external services) are deducted from gross revenue before this is shared. The percentage of PROs not deducting any expenses reaches 29% and seems to be high.

Out of the 242 respondents 16 (6.6%) answered that inventor(s) usually do not receive a share of the revenues generated from the IP; 88 (36.4%) stated that institutional units don't receive a share and 48 (20%) answered that the PRO is not entitled to revenues. The knowledge transfer office does **not** receive any direct revenues in the large majority of PROs (70%).

Revenues are on average shared as shown in Table 4-2: 40.7% of the revenues are given to the inventors and researchers of the institution; 18.8% to the respective department, institute or other institutional units with which inventors are affiliated; 31.6% are allocated to the institution as a whole and 7.6% to its KTO; 2.3% go to other beneficiaries. The inventor's share tends to be lower in Western European PROs and in non-university PROs, where the percentage of revenues kept by the institution is larger.

The average percentage given to inventors is very similar to that found in the US for (parts of) the AUTM sample where institutions attribute approximately 40% to inventors (Jensen & Thursby, 2001; Markman, Gianiodis, Phan, & Balkin, 2004; Thursby, Jensen, & Thursby, 2009); the revenue share for inventors' departments is one fourth lower than among AUTM respondents which on average gave 26% to departments in fiscal year 1999 (Markman, Gianiodis, Phan, & Balkin, 2004).[25]

Table 4-2: Share of revenues from IP and knowledge transfer by beneficiary (% of the total revenue allocated to the beneficiary, N= 242)

	Inventors	Department(s), institute(s) or other inst. units	Institution[a]	KTO[ab]	Other beneficiaries[a]
Mean	40.7	18.8	31.6	7.6	2.3
S.E. of Mean	1.3	1.2	1.6	1.0	0.6
Median	33.7	20.0	33.2	0.0	0.0

a Only the 2012 survey asked for the revenue shares accruing to KTOs and other intermediaries in transfers. In the 2011 survey this separate response was not included and respondents attributed KTOs' and intermediaries' shares either to the institution or to other beneficiaries. According to the 2012 data, the institutional share is 29.8% and the share of others is 1.6%, which is probably closer to the "true" average shares.
b N=209.

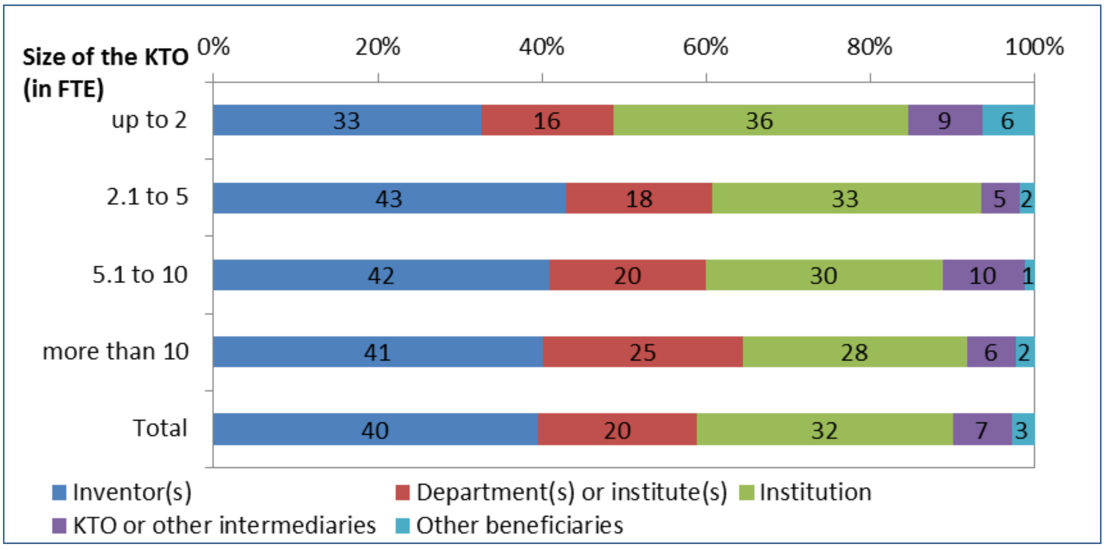
Source: FHNW / Knowledge Transfer Study 2010-2012

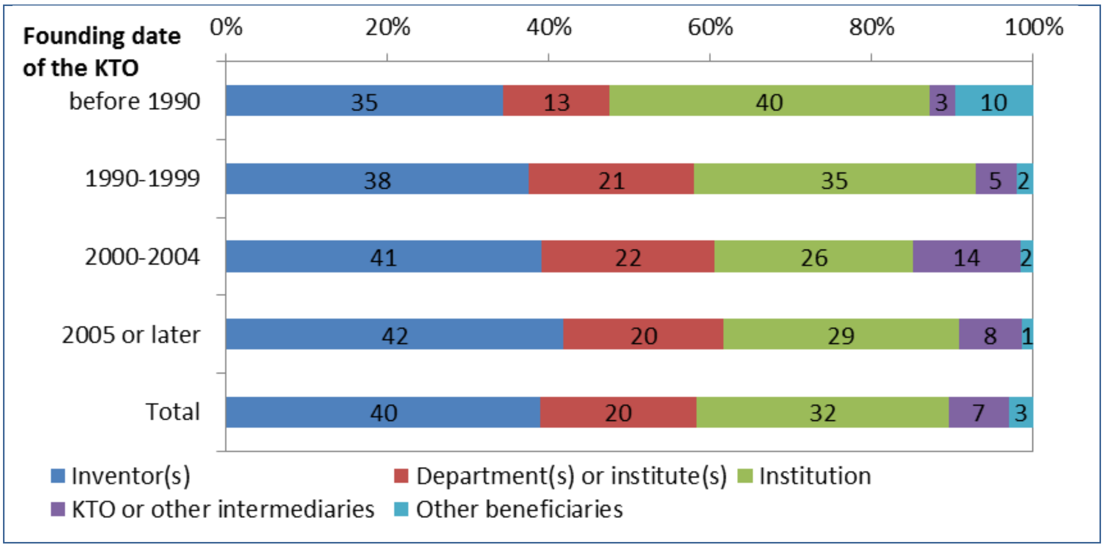
25 We do not have more recent data and departments' share might have changed since then.

Distinguishing these revenue shares by types of respondents we also find a few regularities which are partially easy and partially not so easy to explain:

- Inventors' shares are significantly higher in Scandinavia, which is due to 10 Swedish responses which give an average share of inventors of 90% (which is in line with the Swedish legal situation in regard to IP).
- The lower the R&D-density of the country the higher the share reserved for inventors and the lower the shares for the KTOs/other intermediaries and other beneficiaries (see Table 6-5 in the annex). We would explain this with less institutionalised transfer arrangements and fewer institutions which contribute to realising transfers.
- In non-university research institutes the revenue share of the institution is considerably higher (48%) and that of inventors lower (26%) than in universities (see Table 6-5 in the annex) – one reason for this could be cultural differences and a tradition of "academic freedom" which requires stronger incentives to motivate university researchers to become involved in KTT.
- Smaller KTOs reserve a higher share for themselves and pay more to other beneficiaries which presumably contribute some services to IP protection and commercialization which the KTO does not provide itself (see Exhibit 4-10, upper part, also section 1.2.2 on KTO services). Mainly inventors and their departments need to "pay" for this.
- Older KTOs pay a lower share to themselves and more to other beneficiaries and the overall institutional budget (see Exhibit 4-10, bottom). Younger KTOs on the other hand obtain a higher direct funding contribution from the transfer revenues. The differences for inventors and departments shown in Exhibit 4-10 are not significant at the 5%-level.

Exhibit 4-10: Share of revenues from IP and knowledge transfer by beneficiary, size and founding date of the KTO in FTE (% of the total revenue allocated to the beneficiary)





Source: FHNW / Knowledge Transfer Study 2010-2012

4.2.5 Exploitation and commercialisation practice

Importance of IP exploitation mechanisms

In CoP 8 the EC suggested that PROs select the most appropriate exploitation mechanisms and partners from broad sets and in CoP 7/CoP 3 it stressed that open access/public domain approaches should not be disregarded.

Taking these principles together, we asked respondents to rank the mechanisms to exploit IP by importance, which resulted in the following order (based on median, mode, and difference between frequencies of highest and lowest rank resulting from the survey):

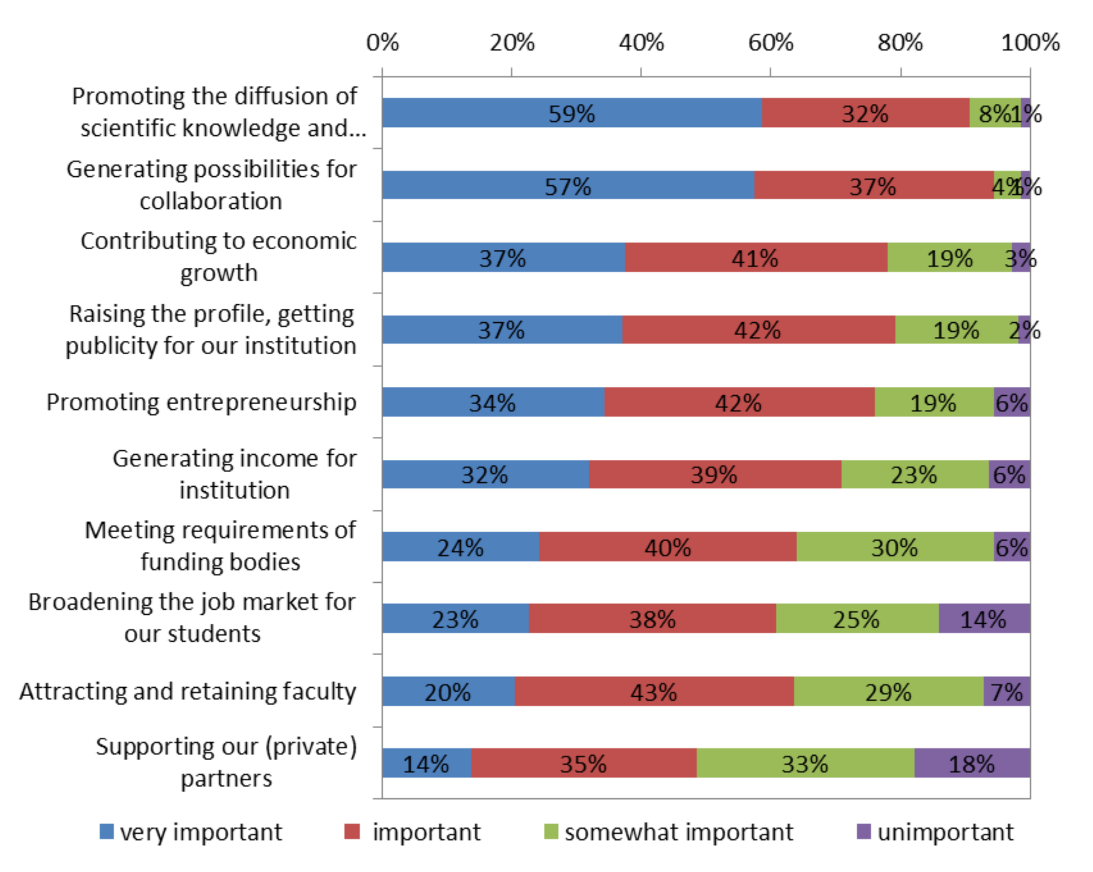
- 1st rank: Licensing of the IP to existing companies which was considered as most important by 107 PROs (44%),
- 2nd rank: Other cooperation with existing companies (e.g. joint ventures, development collaborations) ranked first by 51 PROs (21%),
- 3rd rank: Formation of a new company (e.g. spin-off, spin-out, start-up) given the first rank by 37 PROs (15%),
- 4th rank: Sale and transfer of the IP to existing companies (assignments) put in first place by 30 PROs (12%),
- 5th rank: Providing open access to IP by putting it in the public domain, institutional repositories, open access publications etc. placed first by only 20 PROs (8%).

There are slight variations across types of institution as well as KTO and PRO size classes. In particular, the importance of start-ups varies (higher in universities with hospital, KTOs with more staff and larger PROs); smaller KTOs and smaller institutions resort more often to the sale and transfer of IP to their exploitation partners than larger KTOs/PROs. However, the most and least important mechanisms remain the same for all groups.

Objectives for IP and exploitation policies

Principle 9 in the CoP states that generating additional revenues should not be the prime objective of PROs IP/KT policy. In the 2012 survey respondents were asked to rate ten possible objectives for their IP and exploitation policies according to their importance on a 4-point scale from very important to unimportant. Promoting the diffusion of scientific knowledge and technology (59%) and generating possibilities for collaboration in research and teaching (57%) were most often mentioned as very important objectives (and often as important) by the study participants. Contributing to economic growth, raising the profile and getting publicity, promoting entrepreneurship, and generating revenues were also each mentioned by 70-80% of the respondents as very important or important. Meeting requirements of funding bodies, supporting (private) partners, attracting and retaining faculty as well as broadening the job market for students were least important (see Exhibit 4-11). The high importance of spreading scientific knowledge and technology confirms the findings of the 2008 CEMI survey of more than 200 universities from 15 European countries (Conti & Gaulé, 2008).

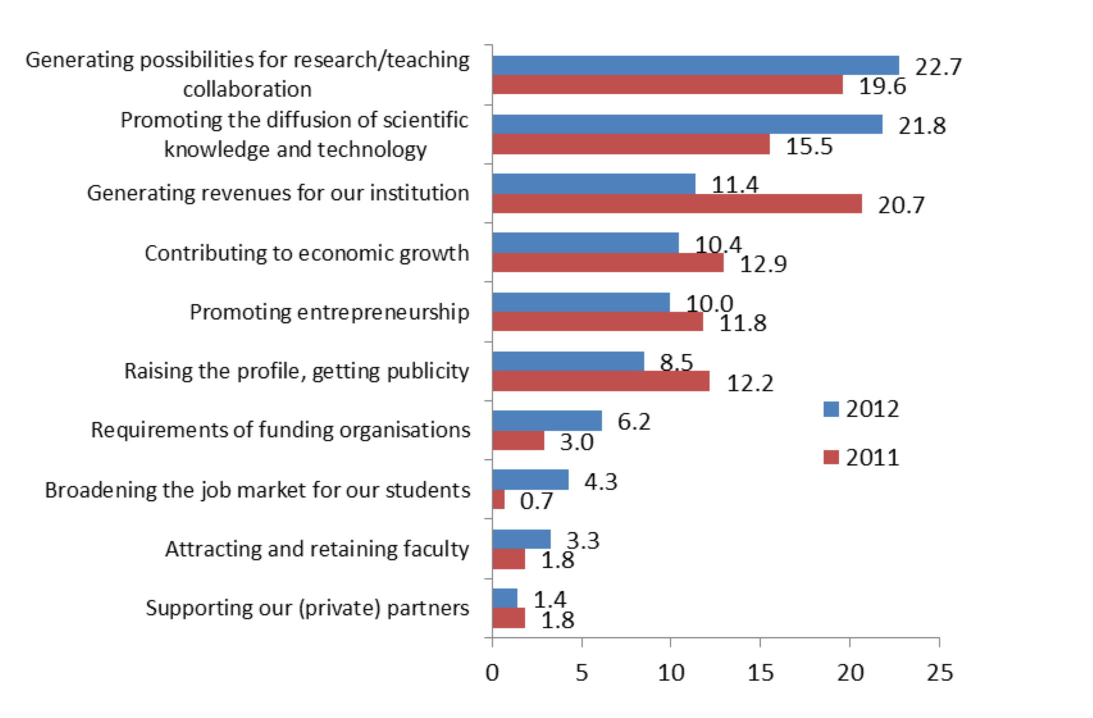
Exhibit 4-11: Objectives for IP and exploitation policies of institutions (in %, N=212)



Source: FHNW / Knowledge Transfer Study 2010-2012

The question was changed in 2012 compared to 2011 in so far, as in the 2011 pilot survey respondents had to select the three most important objectives for their IP and exploitation policies. This prioritisation of objectives was included on purpose, as transfer objectives can be mutually exclusive; for instance, US universities which rated the local development objective high generated less licence income than universities which rated it low (Belenzon & Schankerman, 2009). It seems that the forced prioritisation in 2011 worked in favour of including monetary returns as an objective (see Exhibit 4-12) as it was nearly twice as often mentioned in 2011 than in 2012. Promoting the diffusion of scientific knowledge and technology and broadening the job market for students gained in importance with the 2012 wording of the question.

Exhibit 4-12: Important objectives for IP and exploitation policies for institutions by survey year (in % of times mentioned, N=217)



Source: FHNW / Knowledge Transfer Study 2010-2012

There are few clear differences between PROs in regard to the objectives. One exception appears if we compare universities and other institutions (see Exhibit 6-2 in the annex): supporting (private) partners, broadening the job market for students, promoting entrepreneurship and attracting and retaining faculty are less important in non-university research institutions.

It needs to be stated that the objectives of IP/KTT policies are frequently not set independently by PROs, but in discussion and accord with their funders and stakeholders which might exercise some pressure on the generation of revenues (Mora, Detmer, & Vieira, 2010, pp. 86-88).

4.2.6 Licensing policy

Existence and publication of a licensing policy

CoP 11 promotes developing and publicising a licensing policy in order to harmonise practices within the institution. While 40% of the respondents indicate that their PRO has a licensing policy, 25% also agree that this policy is based on a written document. 18% of the respondents said that a licensing policy is planned for the future. The existence and form of licensing policies are related to the size and age of the KTOs. Smaller and younger KTOs have such a policy less often than larger and older KTOs.

Of the 78 respondents with written rules and regulations, only 18 answered that this policy is publicly available; 41 publish their licensing policy for internal use of members only. Five PROs plan to publish it and in fourteen PROs the policy is not published.

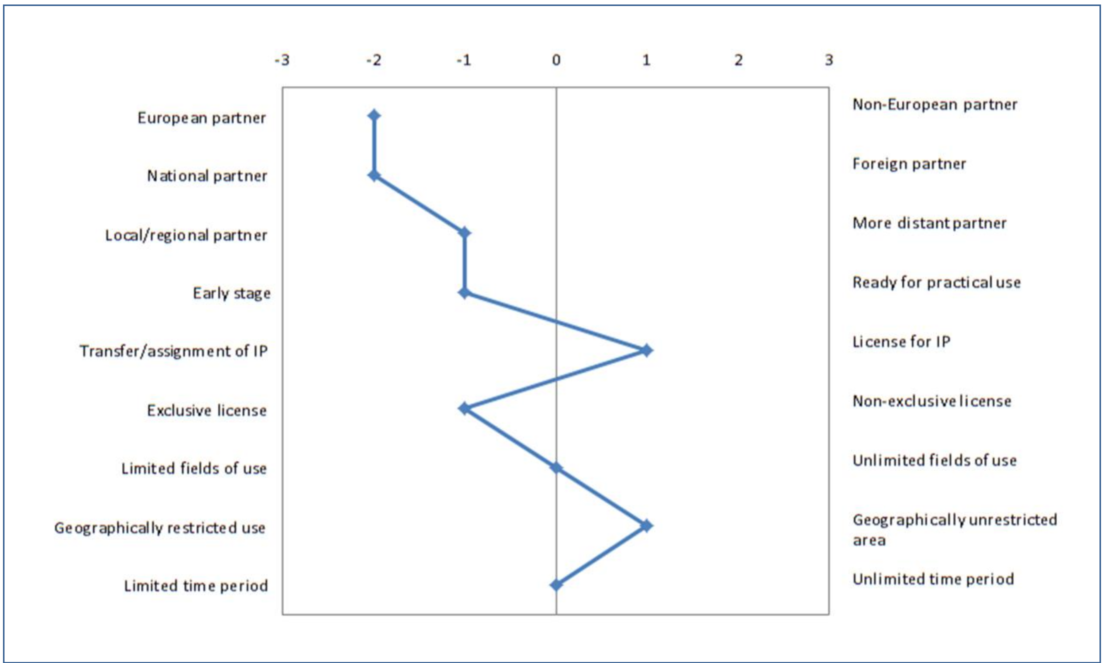
We explored the reasons for (not) having and publishing licence policies in the interviews with KTO managers (see section 1.4.4, p. 201).

Characteristics of licensing/IP transfer practices

The majority of PROs have completed licensing or IP transfer contracts since 2008 (see CoP 11): 73% have concluded one or more exclusive licence contracts, 67% one or more non-exclusive contracts and again 67% IP transfer contracts. Size of the KTO and size of the institution have a significant influence on the use of such contracts: the more transfer staff and the more researchers the more common it is that each of the types of contracts is used.

Respondents were asked to describe their most common licensing/IP transfer practices along geographical characteristics of the partners and a set of possible restrictions in such contracts. The results show that participants typically worked within European partnerships, which is further narrowed down to national partners instead of foreign partners and a slightly higher frequency of local or regional partners (see Exhibit 4-13). The transferred technologies are rather in an early stage, i.e. they need further development and research before being suitable for practical use. Licences for IP are more common than transfers/assignments of IP and exclusive licences are slightly more often applied than non-exclusive licences. Fields of use and licence duration are in the middle position, i.e. equal use is made of limited and unlimited contracts. Contracts are typically *not* geographically restricted.

Exhibit 4-13: Characteristics of common licensing/IP transfer practices of institutions (median values, N=234)[a]



a The underlying question 23 in the survey was asked with a semantic differential scale. Respondents should select the box closest to their common practice. The numerical values above the graphic are for illustration and easier interpretation and they were not included in the questionnaire (to avoid biasing respondents); they do not stand for positive/negative value judgements (i.e. having European partners is not any regard negative, having distant partners is not in any regard positive). N for early stage/ready for practical use = 159.

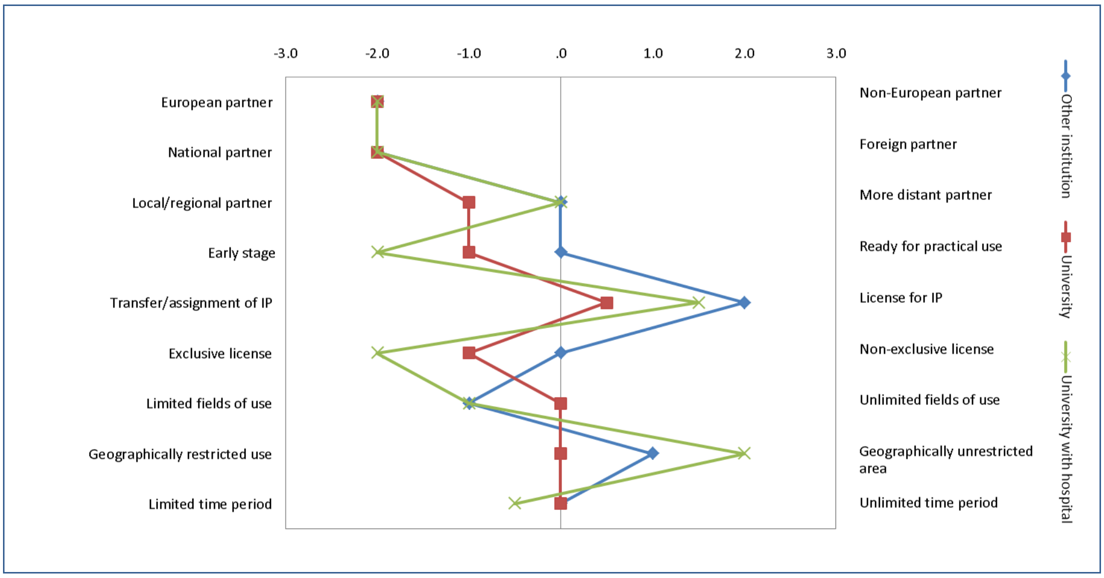
Source: FHNW / Knowledge Transfer Study 2010-2012

There are a few distinctions between PROs in regard to the licensing practice:

- The more staff the KTO has, the more common are contracts with more distant partners outside of the surrounding region and even beyond national borders. In addition, larger KTOs answered slightly more often that in their transfer practice early stage technologies are common, and they usually conclude licence contracts and rarely IP transfer contracts; smaller KTOs conclude IP transfer contracts as often as licence contracts.

- Along the same lines, older KTOs also have a greater focus on licence contracts whereas younger KTOs state to use both, licence and IP transfer contracts with similar frequencies. Another specificity of older KTOs is to restrict the geographical range of their licences which younger KTOs tend to do less often.
- Further differences are related to the type of institution (see Exhibit 4-14). Universities with hospitals transfer typically early-stage technologies and they have the most industry-friendly practice (exclusive licences, global scope). Other PROs transfer in later stages and conclude more often non-exclusive licence contracts.

Exhibit 4-14: Characteristics of common licensing/IP transfer practices of institutions by type of institution (median values, N=207)



Source: FHNW / Knowledge Transfer Study 2010-2012

4.2.7 Start-up policy

Existence and publication of a start-up policy

The CoP 12 suggests developing and publicising a policy for the creation of start-ups (or spin-offs). More than half (58%) of the surveyed organizations have a specific start-up policy. Overall 42% do not have a start-up policy yet, but 18% plan to create one. 124 organizations (39%) have written rules or regulations for this start-up policy. Of the PROs with a written start-up policy merely 50 (16% of all PROs and 40% of the 124 PROs with a written start-up policy) stated that this policy has been published internally and externally, and another 54 pointed out that it is accessible for internal use of staff/students only. In the remaining twenty cases the start-up policy is not published. This shows that principle 12 of the CoP has not been fully implemented.

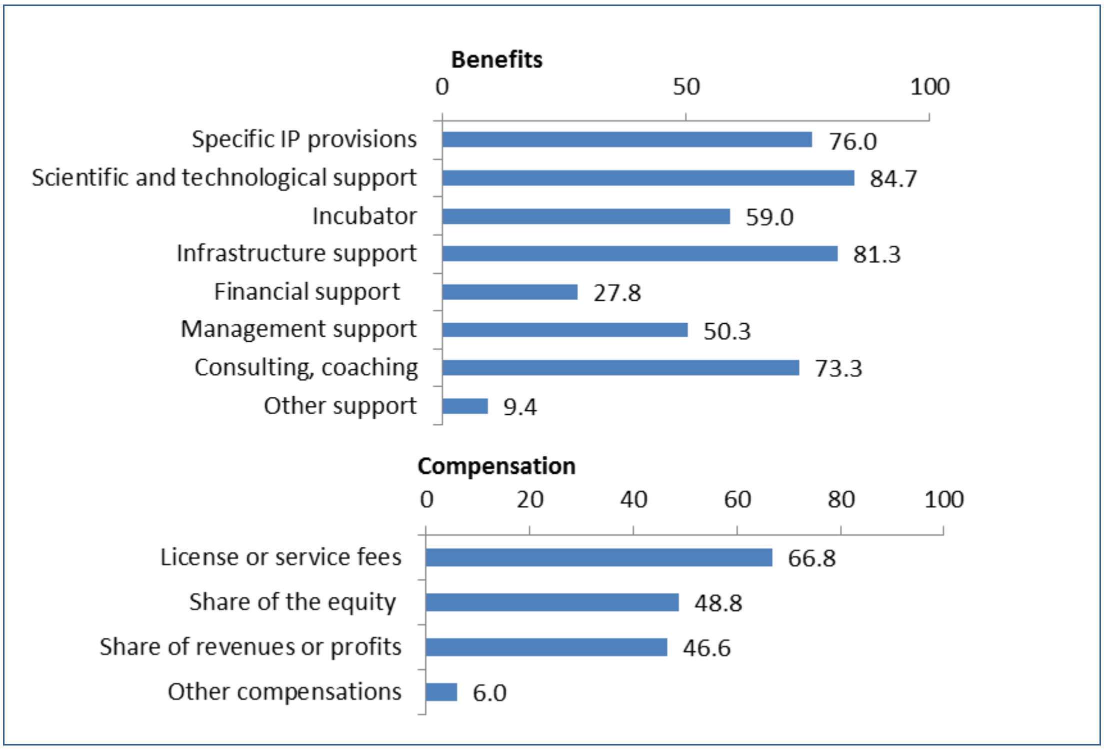
In particular small institutions with less than 1'250 FTE of researchers and institutions with small KTOs of up to two staff members often have no start-up policies (see Table 6-123 in the annex).

Benefits for start-up companies and compensations for PROs

Another question of the survey asked for the special benefits which start-up companies usually receive from the PRO or third parties acting on its behalf. This question helps to assess the support and encouragement provided in the start-up phase (see also CoP 12). It was followed by a question asking for the compensations that the university or other public research organisation receive in return from the start-up companies.

More than three quarter of all PROs or third parties acting on their behalf grant scientific and technological support (e.g. research agreement), infrastructure support (e.g. rental of working space, access to equipment), special access rights to IP, and consulting or coaching offers (e.g. on commercial or financial matters) to newly formed start-ups. Incubators, management support (e.g. by seconded employees from the institution) are less common but still offered by the majority of PROs (see Exhibit 4-15).[26] Financial support is only provided by few institutions. The amount of support offered to start-ups depends again on the size of the transfer office and on the size of the institution: larger offices/PROs provide more support than smaller offices/PROs, in particular in regard to financial support, incubators and specific IP access rights. Scandinavian PROs also provide overall less often support to their start-ups, with the exception of financial support and incubators; in particular scientific and technological support, specific IP provisions and infrastructure support are less common.

Exhibit 4-15: Special benefits for start-ups and compensations taken by PROs (in %, Benefits: N=288, Compensations: N=283)



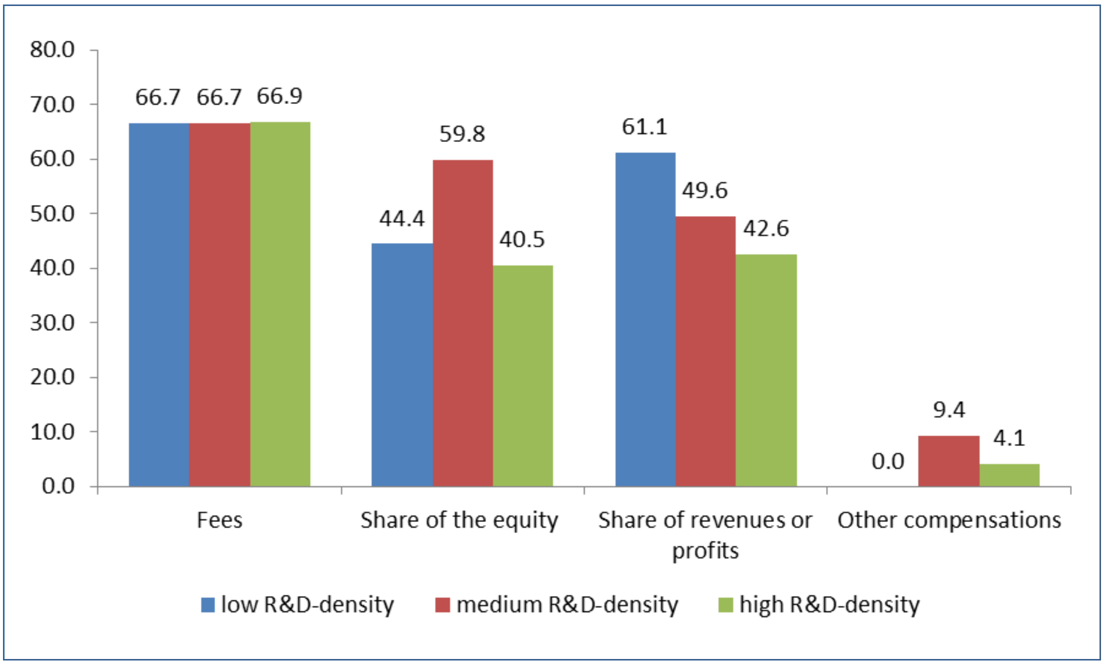
Source: FHNW / Knowledge Transfer Study 2010-2012

Overall 67% of the institutions receive licence or service fees from their start-up companies in return for the IP and/or services, 49% take a share of the equity, and 47% a share of revenues or profits (see Exhibit 4-15). Larger KTOs and larger PROs demand more often any type of compensation than smaller KTOs/PROs. In addition, the compensations vary by R&D-density (measured as R&D personnel per 1000 employees)

[26] On a related finding for 18 case studies see Mora, et al. (2010, p. 103).

of the country: fees are taken by two thirds of all PROs in all countries, shares of the equity are more common in countries with medium R&D density, and shares of revenues/profits are most common in countries with low R&D densities (see Exhibit 4-16).

Exhibit 4-16: Compensations taken by PROs from their start-ups by R&D-intensity of the country (in % of responding PROs, N=283)



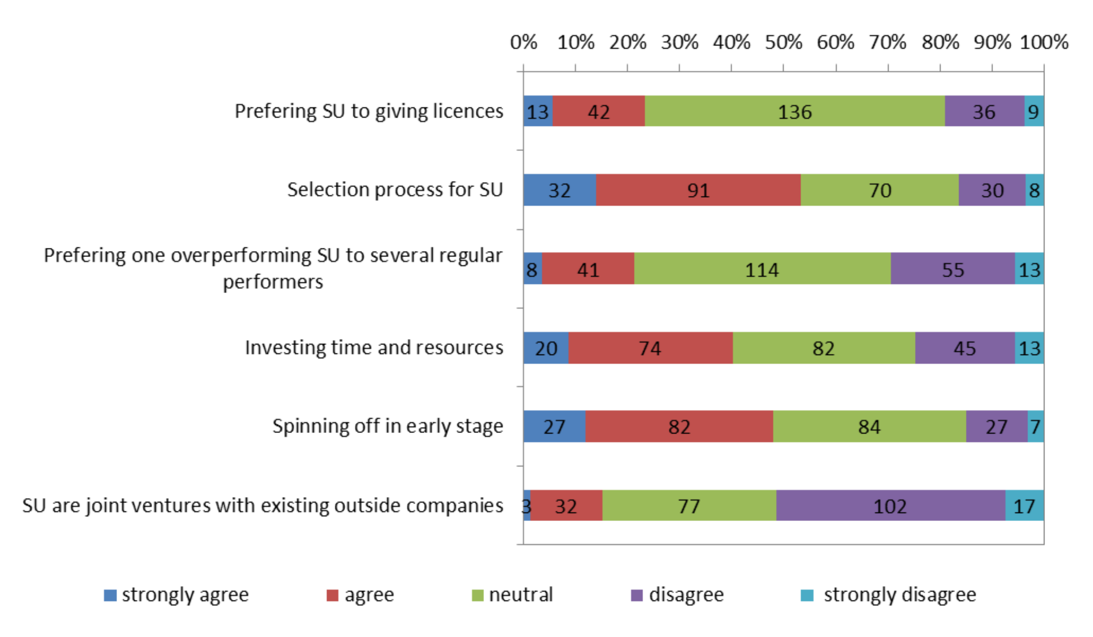
Source: FHNW / Knowledge Transfer Study 2010-2012

Start-up strategies

It has been shown in previous work that different start-up strategies generate different numbers and types of start-ups (Clarysse, Wright, Lockett, Van de Velde, & Vohora, 2005). The low selective model, the supportive model and the incubator model each come along with a different set of activities to support start-ups. Spin-off policies in academic institutions significantly affect the growth potential of ventures (Degroof & Roberts, 2004).

The PROs responding in 2012 to the survey (plus some of those responding in 2011 who were contacted again for an interview) were asked to what extent they agree with a set of questions which represent start-up support activities. The responses are shown in Exhibit 4-17. The highest degree of agreement was with the statements on a selection process and on spinning off in an early stage: approximately 50% agreed and only 15% disagreed with these statements. 40% of the respondents also agreed that their institutions invest considerable time and resources in their start-ups (one quarter disagreed with this). More or less equal shares of respondents agreed and disagreed with the statements on institutional preferences on either start-ups or licences to existing firms and high quality start-ups over regular performers; for both questions the "neutral" replies clearly dominate. Only in few cases start-ups are joint ventures with existing companies.

Exhibit 4-17: Agreement with statements on start-up (SU) support (in % of responding PROs, N=227)

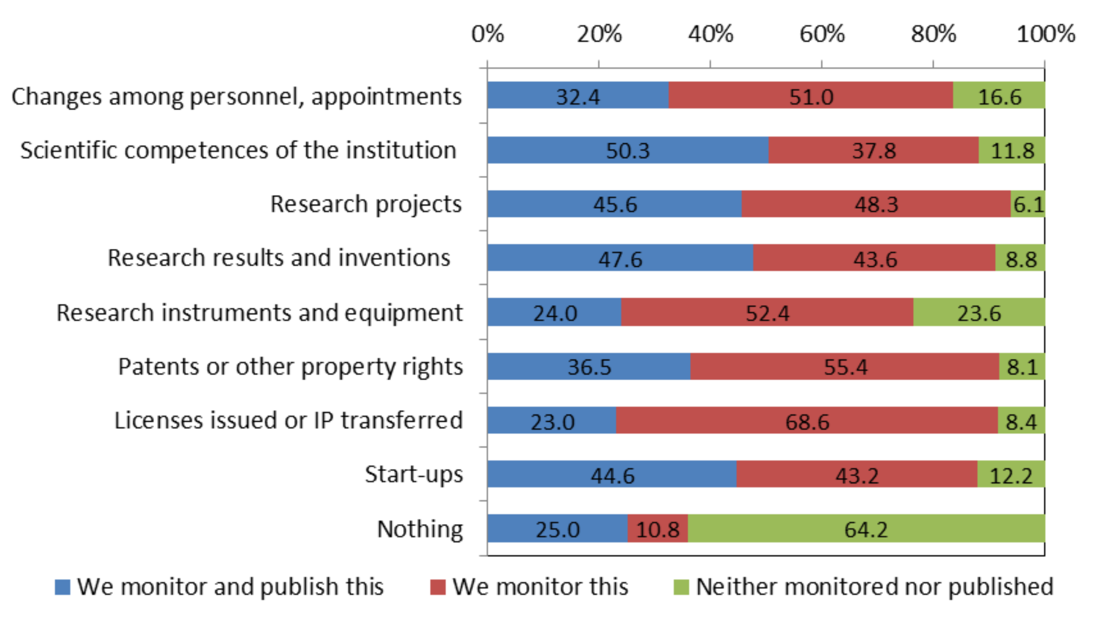


Source: FHNW / Knowledge Transfer Study 2010-2012

4.2.8 Monitoring and communication of research, IP and knowledge transfer

Respondents were asked to what extent they monitor and/or publish information regularly on research, IP and knowledge transfer as suggested by CoP 14. Overall most attention is paid to information about research projects – only 6% neither monitor nor publish this information – followed by information about patents or other property rights, licences and IP transfers, and research results and inventions. Least attention is paid to changes among research personnel, and to research instruments and equipment. In sum, competences and achievements receive more attention than human resources or equipment topics (see Exhibit 4-18).

Exhibit 4-18: Monitoring and publishing of information about research, IP and knowledge transfer by institutions (in %, N=296)

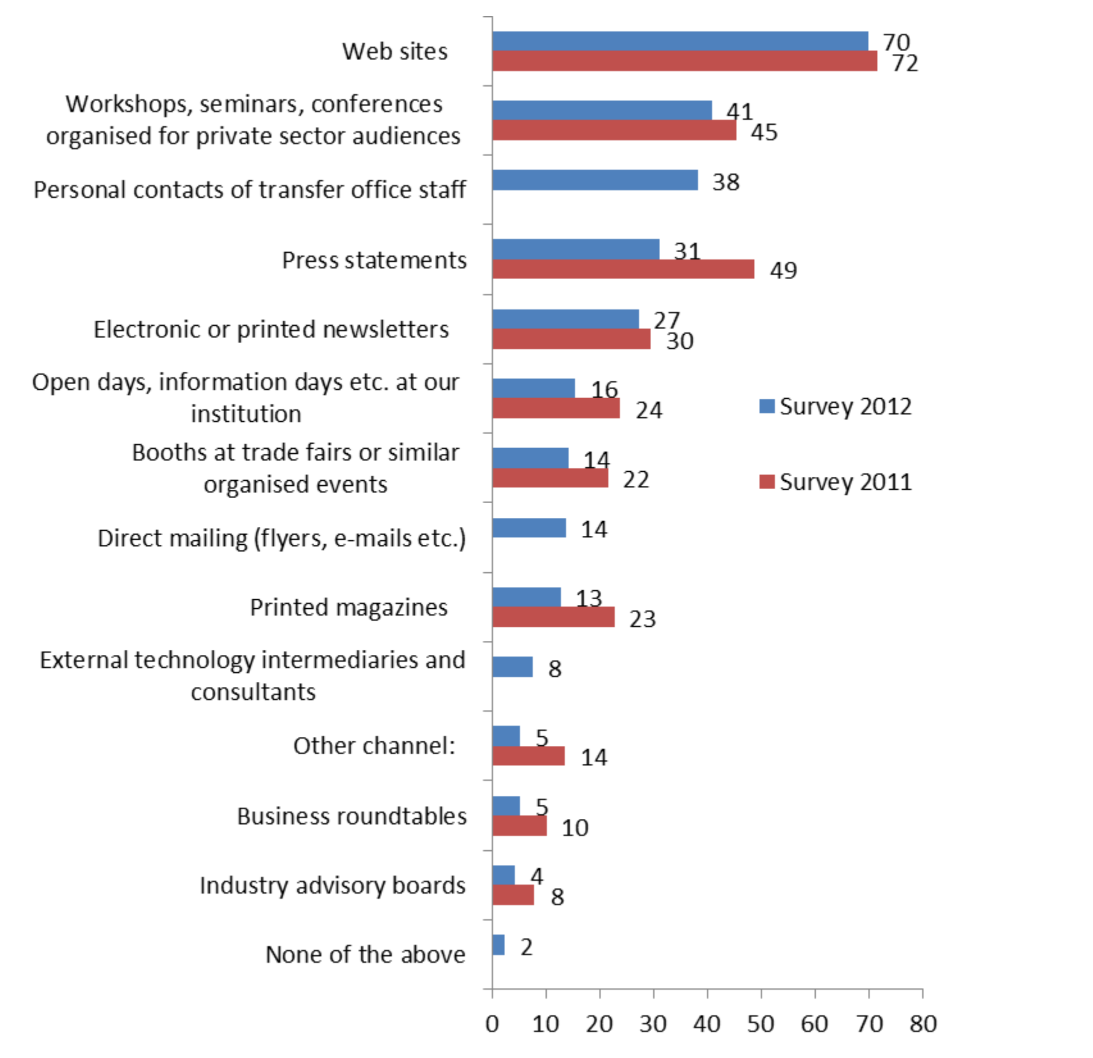


Source: FHNW / Knowledge Transfer Study 2010-2012

In addition to the content we also assessed the channels created and used to communicate information on research, IP and knowledge transfer opportunities to the private sector. In the 2012 survey three channels were added which were not included in 2011. As the question permitted only a selection of up to three channels (the most important ones) the number of possible answers will affect the distribution of responses. Hence we show below the results for both survey waves separately (see Exhibit 4-19).

The most important channel used to communicate information on research, IP and knowledge transfer to industry is the World Wide Web: 70% of the respondents answering this question pointed to the web as a channel for publishing information. Workshops, seminars, conferences organized for private sector audiences and the personal contacts of KTO staff are also of key importance for approximately 40% of all responding KTOs. Press statements rank fourth and were even more important in the 2011 survey (the reduction in 2012 is probably due to the inclusion of direct mailing as further response alternative). The least favoured channels are business roundtables and industry advisory boards, other channels and external service providers.

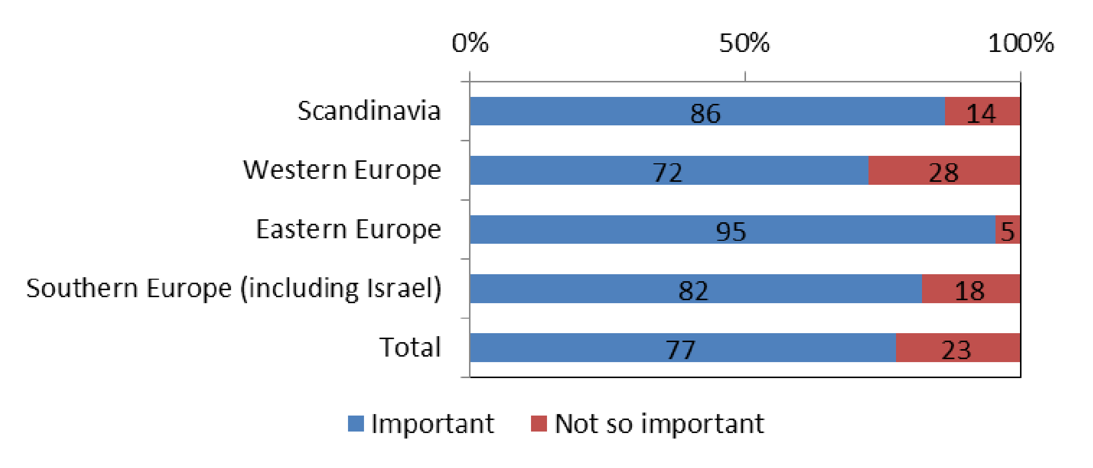
Exhibit 4-19: Most important channels for communicating information to the private sector (in %, 2011: N=88, 2012: N=212)



Source: FHNW / Knowledge Transfer Study 2010-2012

If we group the channels in those that require personal interaction (personal contacts, workshops, trade fairs, open days, intermediaries, roundtables, advisory boards) and those that rely primarily on printed and electronic media (press statements, mailings, magazines, newsletters, web sites), we find that personal channels are less often chosen as important in Western European countries. In this part of Europe more than one in four KTOs relies mainly on print and electronic media (see Exhibit 4-20).

Exhibit 4-20: Respondents by importance of personal channels for communicating information to the private sector and country of PRO (in %, N=300)



Source: FHNW / Knowledge Transfer Study 2010-2012

4.2.9 Collaborative and contract research with private sector partners

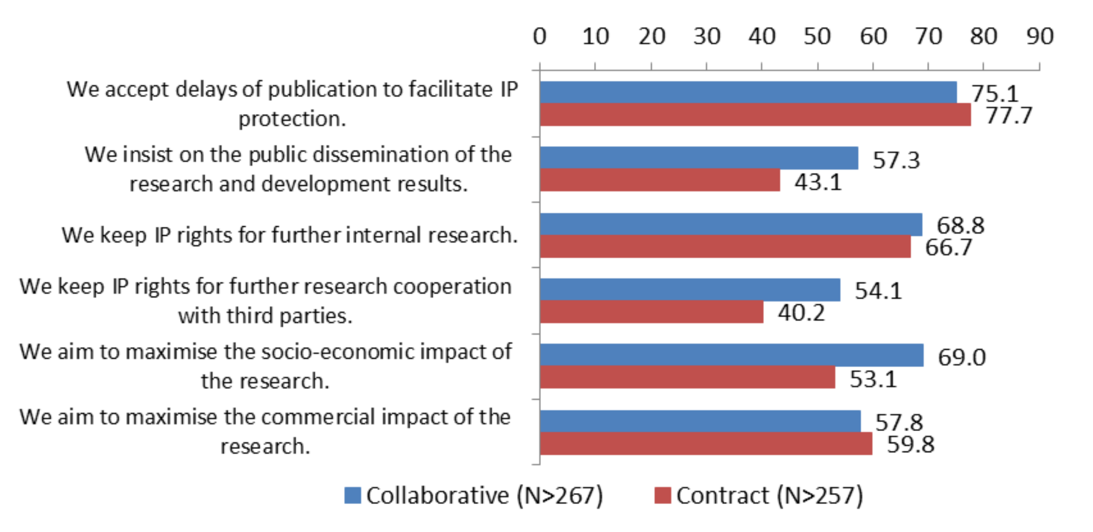
Collaborative research (all partners carry out R&D tasks) is the most common form of research partnerships with private sector partners and carried out at virtually all institutions. Contract research (R&D is contracted out to a public organisation by a private company) is conducted by 92%, while service agreements (existing knowledge or infrastructure is used, new IP is not produced by the institution) are done by more than three out of four institutions (78%). Among other activities (7%) consulting, sponsorship, clinical trials, and use of infrastructure were mentioned.

Rules and practices in regard to collaborative and contract research activities

In the questionnaire we converted the recommendation of CoP 15 to two separate parts (collaborative and contract) letting respondents rate on a scale from 1 (strongly agree) to 5 (strongly disagree) statements, for instance on the acceptance of delays for publications or keeping IP rights for their research activities. The following Exhibit 4-21 shows the percentage of respondents agreeing with each statement.

- For *collaborative research* acceptance of delays of publication to facilitate IP protection (see also CoP 7), keeping IPR for further internal research, and maximising the socio-economic impact of the research received the highest shares of agreement. In more than half of the cases respondents also agreed to maximise the commercial impact of the research, insist on the public dissemination of the R&D results and keep IPR for further research cooperation with third parties.
- For *contract research* the picture changes slightly: publication delays are accepted, ensuring the commercial impact is at least as important and IPR are kept for further internal research as well. The other statements received lower consent. In only 40% of the cases the institutions keep the IPR for further research cooperation with third parties and in a few more cases they insist on publishing the results.

Exhibit 4-21: Respondents agreeing to statements on rules and practices for collaborative and contract research (in %)



The question was asked on 5-point scale from 1= strong agreement to 5= strong disagreement to the statements. For this exhibit we calculated the percentage of respondents who agreed (values 1 and 2).

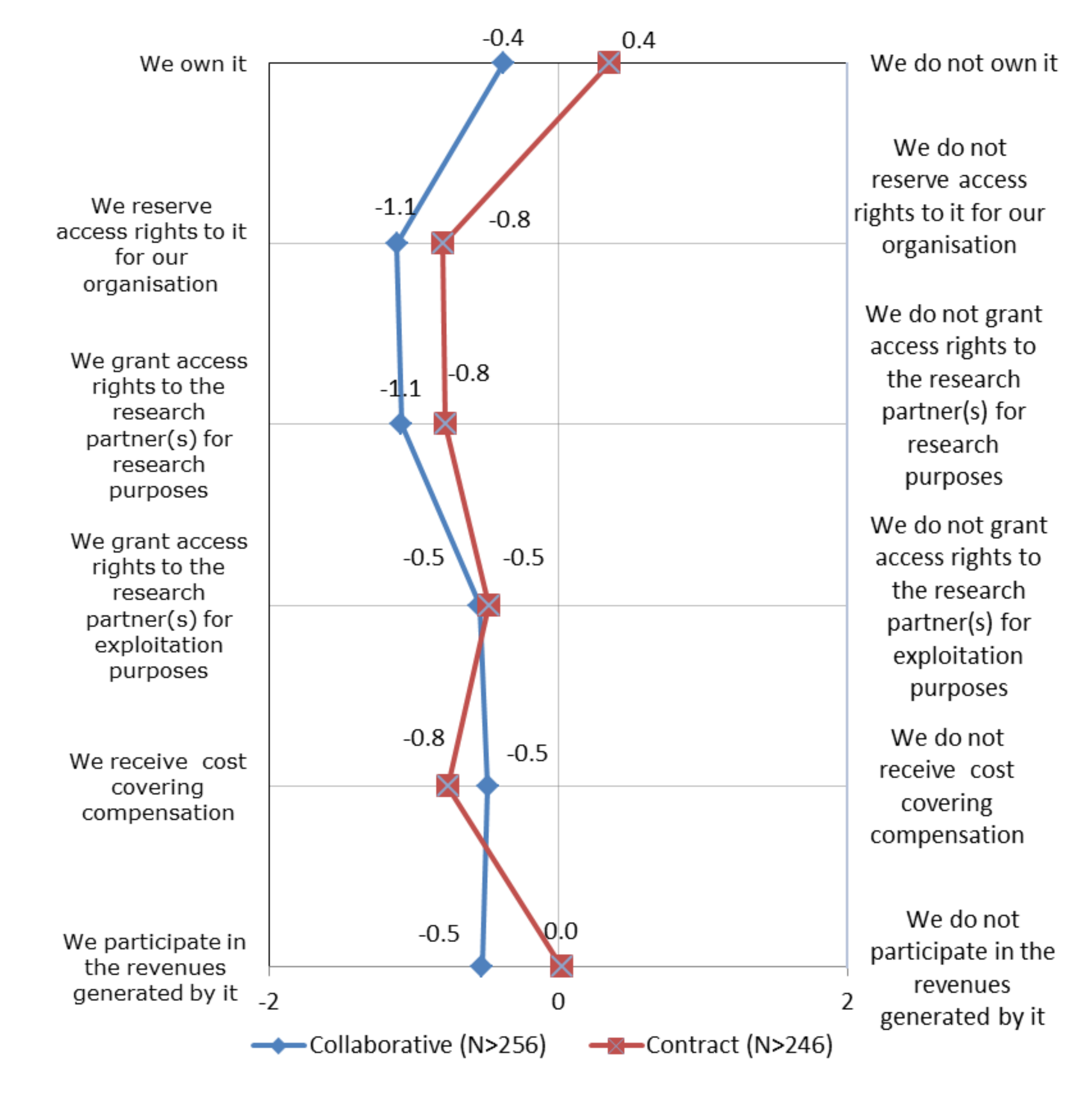
Source: FHNW / Knowledge Transfer Study 2010-2012

The pilot survey in 2011 also included a set of questions on the timing of dealing with IP issues. In both, collaborative and contract research, the majority of issues is usually clarified before project start. The differences between both types of research were rather minor. The sharing of revenues resulting from the foreground is the only issue in both types that is negotiated in 35-40% of the cases after the project has started (or not at all, but this answer was probably chosen by respondents whose organisations do not generate IP in their research). The question was not repeated in the 2012 survey as it provided very little variation of results.

Ownership, access rights and revenues for foreground and background IP

Respondents were asked to position their institution in regard to how it generally deals with foreground IP generated in collaborative and/or contract research with private sector partners. On a five-point scale we asked for ownership, access rights and the participation in revenues. In order to provide an overview of the differences between collaborative and contract research we converted the responses to profiles, taking the arithmetic mean of all responding institutions as the measure. As we would expect, PROs tend to have a stronger position in collaborative research contracts (see Exhibit 4-22). They slightly more often own the resulting foreground IP, reserve access rights for themselves and participate in the revenues.

Exhibit 4-22: PROs' general position in regard to foreground IP in contract and collaborative research (arithmetic means)

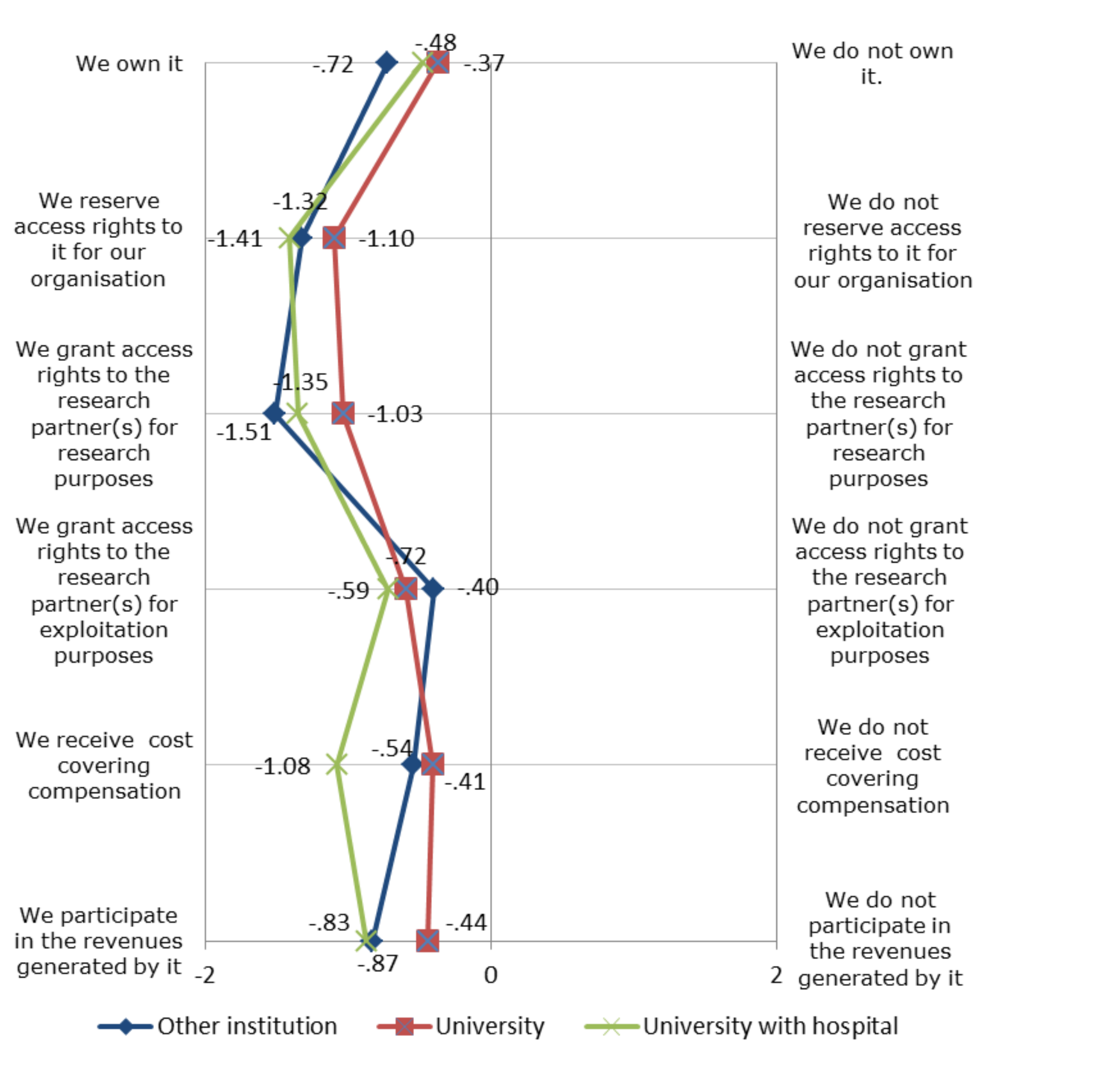


Again this question was asked with a semantic differential scale. Negative numbers cannot be interpreted as value judgements (see the explanation below Exhibit 4-13).

Source: FHNW / Knowledge Transfer Study 2010-2012

Practices for collaborative research differ slightly between types of PROs: Other institutions grant more often access rights for research purposes to their partners than universities; cost covering compensations are received more often by universities with hospitals than in the other two types of institutions and general universities participate less often in the revenues (see Exhibit 4-23).

Exhibit 4-23: General position in regard to foreground IP in collaborative research by type of institution (median values, N=228)



Source: FHNW / Knowledge Transfer Study 2010-2012

A comparison of the results with the CoP recommendations reveals several points:

- A minority of 25% state that their organisation usually owns the IP resulting from contract research, which – according to the CoP, principle 17 – should indeed be owned by the private sector clients.
- The PROs usually keep access rights to the foreground for further research, as recommended in the CoP 15.
- Whether access rights to foreground for research/exploitation are usually granted to the private partner depends not at last on their requests. Hence, we can interpret a lower value for contract research also as the result of lower demand from private partners (as they typically issue a research contract because they do not want to engage themselves in research on a topic).
- The differences between collaborative and contract research in regard to costs and participation in revenues are mostly as one would expect. Indeed, cost covering compensations could be more common for contract and less common for collaborative research to account for the different purposes of both types.

In the same manner respondents were asked on their background IP (already owned by institution at project start) in collaborative and/or contract research with private sector partners. Results are not shown as there are virtually no differences between collaborative and contract research in regard to background IP with the only exception of the revenue position, which is slightly better in collaborative research (as we would expect). In addition, for background IP non-university PROs maintain a stronger ownership position than universities in both collaborative and contract research (see Exhibits 6-5 and 6-6 in the annex). However, whereas in collaborative research it is more common to participate in the revenues, in contract research it is more common to ask for cost coverage up-front.

4.2.10 Summary

Degree of use of the principles of the Code of Practice in the surveyed 100 PROs

In this section we summarise the results of the surveys in 2011 and 2012 of in total 322 universities and public research organisations and juxtapose the findings to the Code of Practice. A few general issues can be taken from this exercise (see Tables 6-21 and 6-22 in the annex on the 18 principles and the related survey results):

(1) Three of the principles are seemingly not widespread let alone generally accepted among PROs: the creation of coherent IP portfolios and patent/IP pools (CoP 5), the existence and publication of a licensing policy (CoP 11), and the publication of start-up policies (CoP 12). However, 20% of the respondents have plans in the areas of licensing and start-ups, 20% regarding IP/patent pools, and 29% in regard to portfolios.

The other 15 principles are at least partially accepted and in the majority of surveyed institutions implemented.

Universities, universities with hospitals and non-university institutions have specific transfer patterns. A general backlog in regard to the implementation of the CoP principles appears for small PROs (CoP 1, 2, 4, 5, 6, 8, 10, and 12) and PROs with small transfer offices (CoP 1, 2, 4, 5, 6, 8, 10, 12, and 13).

(2) Setting out policies in writing is only general practice in the area of intellectual property (CoP 1); making them publicly available is not common for any of the studied policy areas (IP, publication/dissemination, licensing, and start-up policies). Along the same lines, while PROs are aware of the need of monitoring internally their IP protection and knowledge transfer activities and achievements (CoP 14), they neglect, to some extent, the publication and dissemination side and consequently might fail to raise their visibility to the private sector. This applies especially to respondents from Western Europe (including Germany, the UK, Switzerland, Austria, Ireland, France, Belgium and the Netherlands in our dataset).

(3) PROs provide incentives to mobilise their employees for IP issues and KTT and they let them participate in the resulting revenues in one way or the other (CoP 4, 13). Monetary incentives are, however, a lot more frequent than other incentives, above all among PROs from countries with established R&D systems (medium to high R&D-density). Using incentives which are more strongly related to the academic culture, such as taking IP/KTT issues into account in career decisions, is still not common practice in the surveyed PROs, though some of them (one out of ten respondents) have begun to consider it.

(4) Access to and provision of professional KTT services is generally widespread and most KTOs have some staff with a technical background and formal qualification in science or engineering (CoP 10). This applies less to small PROs and PROs with small KTOs, where personnel with management degrees is often common.

Training actions are more common for students and less for staff (CoP 6) and they are more popular among the larger institutions and transfer offices.

(5) Licences are the most frequent mechanism and existing companies the most frequent partners in the exploitation of IP generated in universities and other public research organisations (CoP 8). Start-ups come third in most institutions; in smaller PROs and PROs with small KTOs IP assignments are more important. The most important objectives of IP and exploitation policies are the diffusion of scientific knowledge and technology and generating possibilities for collaboration (CoP 9). The financial revenues possibly resulting from transfer activities are less often considered as important.

(6) The type of research (collaborative or contract and the funding arrangements that come with either one) and the type of IP (foreground or background) influence the negotiation of ownership and access rights in the conclusion of research contracts (CoP 17, 18). Common practice is to define this before a project starts, though expressly the sharing of revenues might be agreed upon later in the project or when it becomes clear that such revenues might accrue (CoP 16).

4.3 Country comparison of survey results

4.3.1 Overview

This section will present selected findings aggregated to country level. Countries are included and shown only if they meet the following criteria:

- 10 or more valid responses and a response rate over 30%: France, Germany, Ireland, Italy, Spain, Sweden, Switzerland, the UK,
- between 5 and 9 valid responses but a response rate over 40%: Austria, Belgium, Denmark, Finland, Hungary, Israel, the Netherlands, Norway, Portugal,
- no country results for any country with fewer than 5 valid responses; these institutions are included in the category "other countries", depending on item non-responses covering the countries Bulgaria, Croatia, Czech Republic, Estonia, Greece, Iceland, Latvia, Luxembourg, Macedonia, Malta, Montenegro, Poland, Romania, Slovak Republic, Slovenia, and Turkey.

We found in the above analysis, that KTT regulations and practices differ between groups of countries but also between groups of institutions depending on the type, size, years of transfer experience (founding of the KTO) and size of the KTO. In order to avoid that structural differences between respondents at institutional level are misinterpreted as country particularities, the first step of this comparison looks at differences of respondents' structural characteristics by countries. The data is included in annex tables (see Table 6-6 and Table 6-7) and the following findings should be kept in mind when looking at the results shown below:

- In Norway and the Netherlands large shares of respondents are from universities with hospitals.
- In Ireland, Sweden and Switzerland we received mostly responses from small PROs and in the Netherlands, Hungary and Spain from large PROs.
- All responding Austrian and Norwegian PROs set up their KTOs after 1999, as well as the majority of the responding Danish, French, Hungarian, Irish, Italian, and Swiss PROs. Larger shares of older and supposedly more experienced KTOs answered in Belgium, Germany, Israel, and Spain.
- Small KTOs are common among responding PROs from Austria, Italy and Sweden. Large KTOs among PROs from the Netherlands, Spain, and the UK.

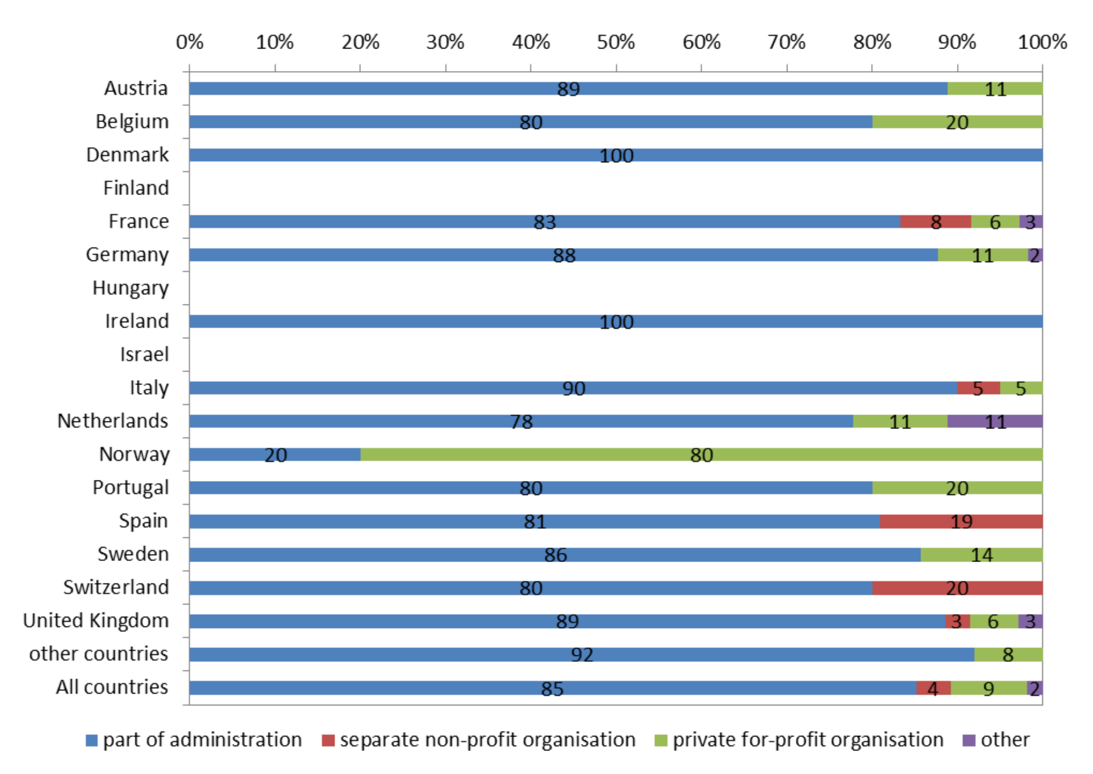
4.3.2 Knowledge transfer services and qualifications of staff

Organizational set-up of the transfer office and IP protection and knowledge transfer services

The organizational set-up of the KTO is largely similar across countries with two exceptions (see Exhibit 4-24):

- In Norway internal KTOs are an exception and the KTO is in most cases organised as an external for-profit organization,
- Switzerland and Spain make more use of outplaced not for-profit organisations than the rest of the included countries.

Exhibit 4-24: Organizational set-up of KTOs by country (in %, N=269)



Source: FHNW / Knowledge Transfer Study 2010-2012

Professional knowledge transfer services can be provided internally, by staff of the PRO, and externally by commissioned service providers. The analysis showed that four types of KTT services exist, according to who provided them: 1) Services provided widely across institutions and always or more often than not by internal offices, 2) Services provided internally, but not in all institutions, 3) services provided mostly internally but with a considerable involvement of external service providers, and 4) services obtained from external service providers (see p. 132 following).

Comparing these patterns of KTT service provision across countries, the following peculiarities are remarkable (see Tables 6-9 to 6-11 in the annex):

- In three countries the provision of KTT services is overall low and large percentages of institutions stated that services and activities are not regularly provided: in Sweden (marketing of institutional IP usually not done), Switzerland (it is uncommon that KTOs or external service providers act as brokers to industry, select and support start-ups), and Denmark (also rarely selection of and support to start-up companies),

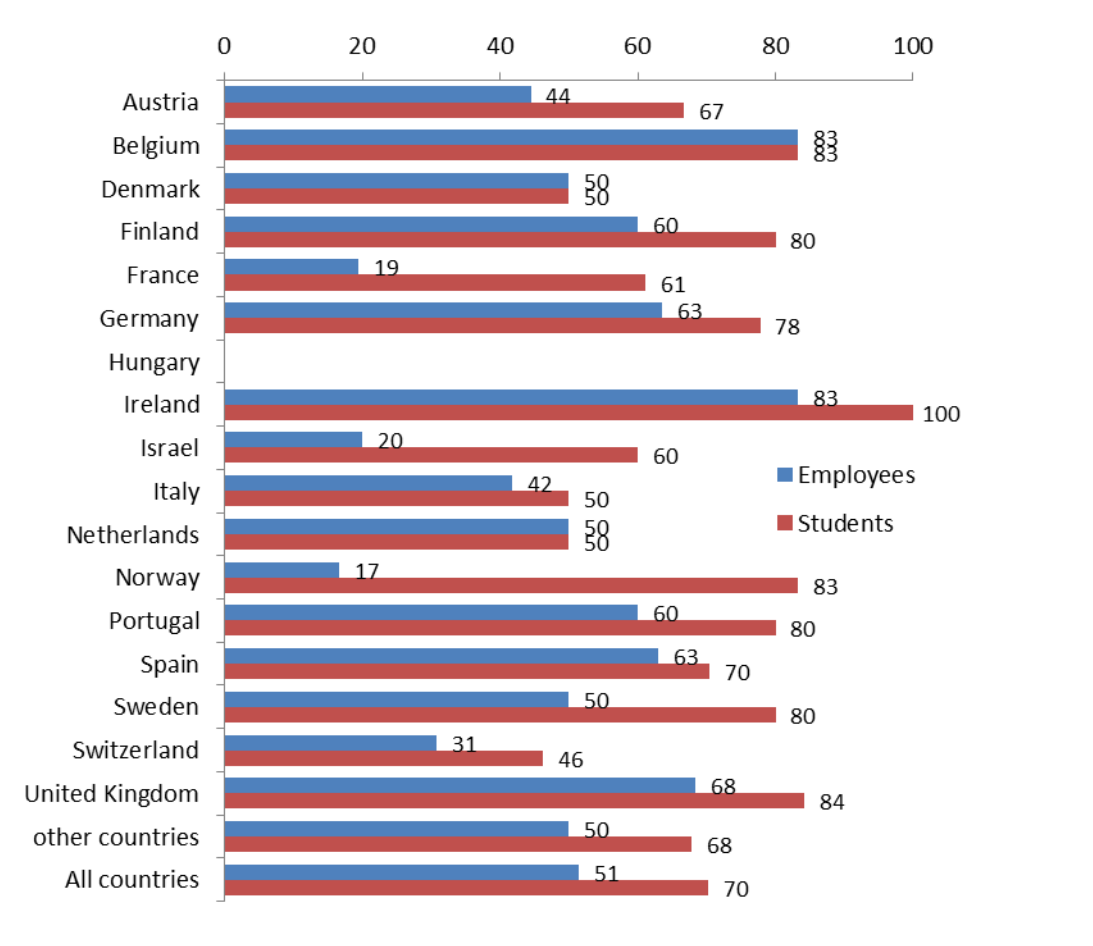
- Internal, institutional service provision is predominant in Belgium, Ireland and the Netherlands; in these countries the second group of activities which are not common in all countries, such as selecting start-up companies, marketing IP, acting as broker between companies and scientists, are also regularly provided and overall service provision is most comprehensive,
- Involvement of external service providers is common in Germany and Sweden for nearly all services and not very common in Italy, the Netherlands, Switzerland and the UK.

Qualifications of the KTO staff and training offers

As requested in the CoP, principle 10, technically qualified staff worked in most of the surveyed KTOs. It was slightly less common in the KTOs of some southern European countries, in particular Italy, Portugal, and Israel (see Table 6-8 in the annex).

Entrepreneurial training is provided extensively across all countries only for students (see Exhibit 4-25). In several countries only few institutions provide entrepreneurial training to employees: in France (19%), Israel (20%), Norway (17%), and Switzerland (31%). In Switzerland also less than half of the surveyed institutions stated that they offer such training for students.

Exhibit 4-25: Entrepreneurial training to staff and students by country (in %, N=303)



Source: FHNW / Knowledge Transfer Study 2010-2012

4.3.3 IP policy

Out of all institutions responding to the questions on the existence and publication of an institutional IP policy, those from Austria, Belgium, Denmark, Finland, the Netherlands, Portugal, and the UK most often point to the existence of a written policy and limited availability for internal stakeholders only. On the bottom end we find Sweden, as we would expect because of its particular IP ownership regime making it less attractive for universities to develop an IP policy. However, also in France and Germany less than half of the PROs have a codified IP policy and only few publish this policy. Institutions in Ireland, Italy and the group of smaller other countries most often publish the IP policies and make it available to internal and external stakeholders.

Table 4-3: Existence and publication of an IP policy by country

	N	IP policy exists (in %)	Written IP policy exists (in %)	IP policy is published (in %)	
				Internally only	Internally and externally
Austria	9	78	78	44	33
Belgium	6	100	100	83	17
Denmark	8	75	75	50	25
Finland	5	80	80	40	40
France	36	78	42	28	3
Germany	64	64	47	30	6
Hungary	4	–	–	–	–
Ireland	6	100	100	17	67
Israel	5	80	60	40	20
Italy	24	83	63	8	46
The Netherlands	10	100	100	40	40
Norway	6	83	67	33	33
Portugal	5	100	100	60	40
Spain	27	89	70	22	41
Sweden	10	20	0	0	0
Switzerland	13	85	77	38	31
United Kingdom	38	97	89	55	24
other countries	28	81	78	25	50
All countries	304	80	65	32	25

Source: FHNW / Knowledge Transfer Study 2010-2012

Looking in more detail at the content of these IP policies and what issues are included in them, we see that Belgium, Ireland, Israel, the Netherlands, Portugal and the UK have the broadest coverage, both for employees and students (see Table 6-12 in the annex).

The use of IP portfolios and cross-institutional IP/patent pools varies across countries. It is hard to distinguish a clear pattern, except for the specific position of Sweden (see Exhibit 6-7 and Exhibit 6-8 in the annex). It is notable that the UK and Switzerland, both countries with rather well-performing transfer systems, rarely use of the concept of pooling.

4.3.4 Incentives for IP protection and exploitation

Incentives

Respondents were asked for the incentives that they offer to inventors at their institutions to become involved in knowledge and technology transfer. As shown in Exhibit 4-8 on page 138 above, a certain percentage of the revenues is by far the most common incentive. This applies to all countries in this comparison except for Sweden, where due to the IP regime inventors already own the revenues and social rewards are therefore the most common incentive. The revenue shares allocated to departments and institutions vary (see Table 6-13 in the annex). Direct funding of KTOs from these transfer revenues is significant in some countries (Norway, Israel, and Austria) and virtually inexistent in others (Denmark, Germany, Italy, Portugal, Spain, Sweden, the UK and the large group of other countries).

Table 4-4: Incentives for protecting and exploiting IP of institutions by country (in %, N=289)

	N	Lump sum payment	Percentage of the revenues	Additional funds for their R&D	Salary upgrade	Inclusion in promotion and career decisions	Social rewards	Other incentives
Austria	8	25	100	50	0	0	38	0
Belgium	6	33	83	50	17	67	83	0
Denmark	8	75	75	13	13	38	38	0
Finland	5	80	80	20	0	0	40	0
France	28	54	79	25	0	43	36	0
Germany	60	33	87	42	7	18	35	7
Hungary	5	20	80	20	0	40	80	40
Ireland	10	20	100	30	0	50	90	0
Israel	6	17	67	50	17	33	33	17
Italy	18	17	83	22	11	22	50	6
The Netherlands	10	10	60	30	10	30	60	10
Norway	6	17	67	50	0	0	50	0
Portugal	5	20	60	40	20	40	60	0
Spain	27	11	93	41	11	26	63	4
Sweden	9	0	33	11	0	22	78	22
Switzerland	11	0	73	36	9	0	45	0
United Kingdom	40	15	93	35	5	48	75	3
other countries	27	30	67	30	7	26	52	4
All countries	289	26	81	34	7	29	53	5

Source: FHNW / Knowledge Transfer Study 2010-2012

Some further differences are noteworthy (see Table 4-4):

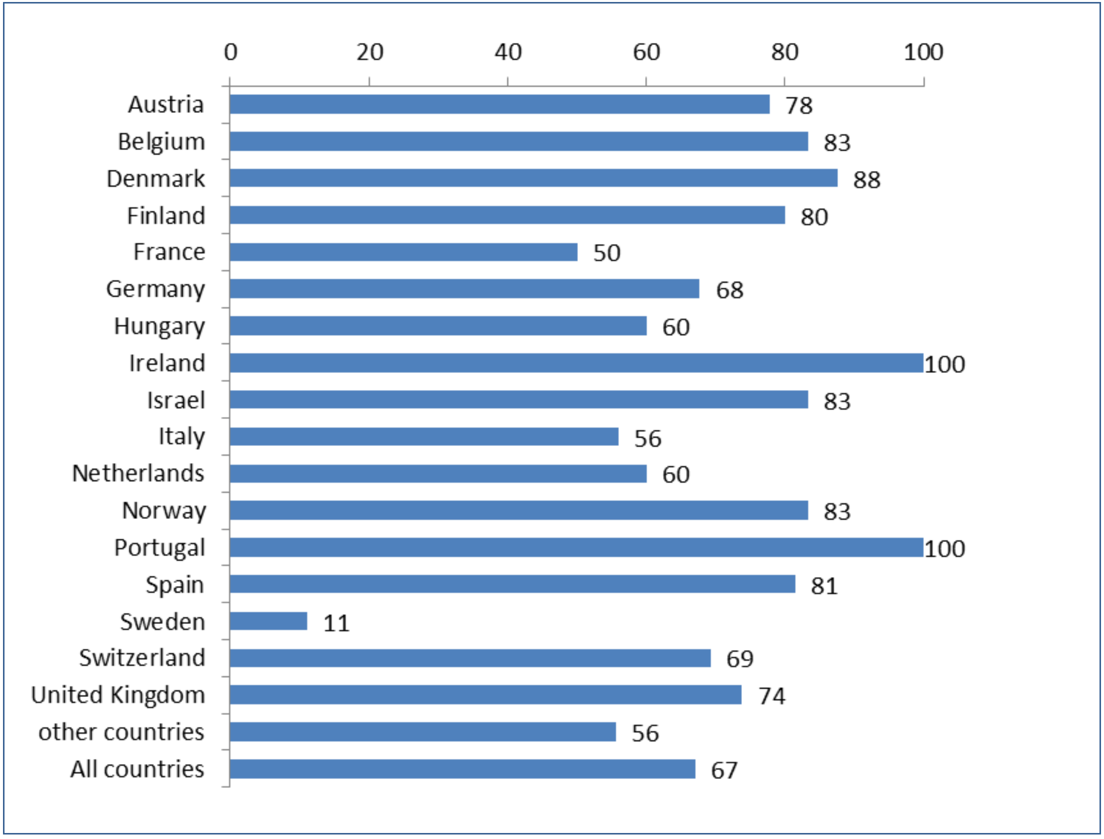
- In some countries lump sum payments to inventors are also common (Finland, Denmark, France) whereas they are virtually inexistent in others (Switzerland, Sweden again for the discussed reasons, the Netherlands, and Spain).

- Additional funds for R&D play a role in most countries whereas the frequency of salary upgrades as a premium to inventors is negligible.
- Immaterial rewards, such as the inclusion in promotions and social rewards, seem less common in Scandinavian countries (Finland, Norway, Denmark, but Sweden as an exception) and in the German-speaking countries (Austria, Germany, Switzerland). In the other countries, in particular Ireland and the UK, the importance of these reward forms is higher.

Models for sharing revenues

The establishment of clear principles for sharing financial returns resulting from KTT can be interpreted as the existence of a clear model (see Exhibit 4-26) and ensuring that all parties participate at these returns (see Table 6-13 in the annex).[27] Accordingly, in Sweden there is an imbalance to the disadvantage of PROs which might create a disincentive to dedicate institutional resources to KTT. In a few countries the average inventors' shares are rather low (Belgium, Denmark, Germany, the Netherlands, and Switzerland) which might lead to lower disclosure rates. Ireland sticks out again, both because all surveyed PROs have written sharing models and inventors, departments and the institutions themselves are participating in the resulting financial gains.

Exhibit 4-26: Existence of a model for sharing revenues resulting from the exploitation of IP by country (in %, N=313)



Source: FHNW / Knowledge Transfer Study 2010-2012

[27] This refers to the institutional level as put forth in the Code of Practice. However, the institutional level is also a reflection of the situation at national level: if the principles at national level are clear, institutions will not have to issue their own rules. Results at the institutional level need to be put into the national context before any strong conclusions can be drawn.

4.3.5 Exploitation and commercialisation practice

Above we showed that licensing of the IP to existing companies is the most important mechanism to exploit IP generated at European PROs, followed by other cooperation with existing companies (e.g. joint ventures, development collaborations), the formation of start-ups, and IP transfers. Providing open access to IP by putting it in the public domain, institutional repositories or using open access publications is the least important mechanism. Differentiating this by country we find a few variations to this pattern:

- Licensing is less important in responding PROs from Finland and Sweden, where the formation of start-ups and other cooperation with companies are more important.
- Other cooperation with existing companies is more (or at least as) important as licensing and in first place in Belgium, Sweden, and Switzerland.
- Start-ups as commercialization partners are less important in Austria and Switzerland but more important in Finland, Ireland, Italy, and Sweden.

Asked about the importance of different objectives of IP and commercialization policies the most important objectives are the same for all countries, i.e. to promote the diffusion of knowledge and technology and to generate possibilities for collaboration in research and teaching for faculty. The objectives of less importance were given slightly different priorities (see Table 6-14 in the annex):

- In Denmark promoting the diffusion of scientific knowledge and technology and meeting requirements of funding bodies were less often considered important. In France and Portugal requirements of funding bodies are also less often important.
- In Sweden, Ireland, and Portugal responding PROs considered it less often important to generate revenues but all the other objectives were considered more often as important, especially helping students to find a job, raising institutional profile, attracting faculty, promoting entrepreneurship, and supporting (private) partners.
- In Italy supporting (private) partners was stated less often as an objective.
- In Switzerland this was more often considered as important, as well as attracting faculty. Promoting entrepreneurship, however, was less often ranked highly.

4.3.6 Licensing policy

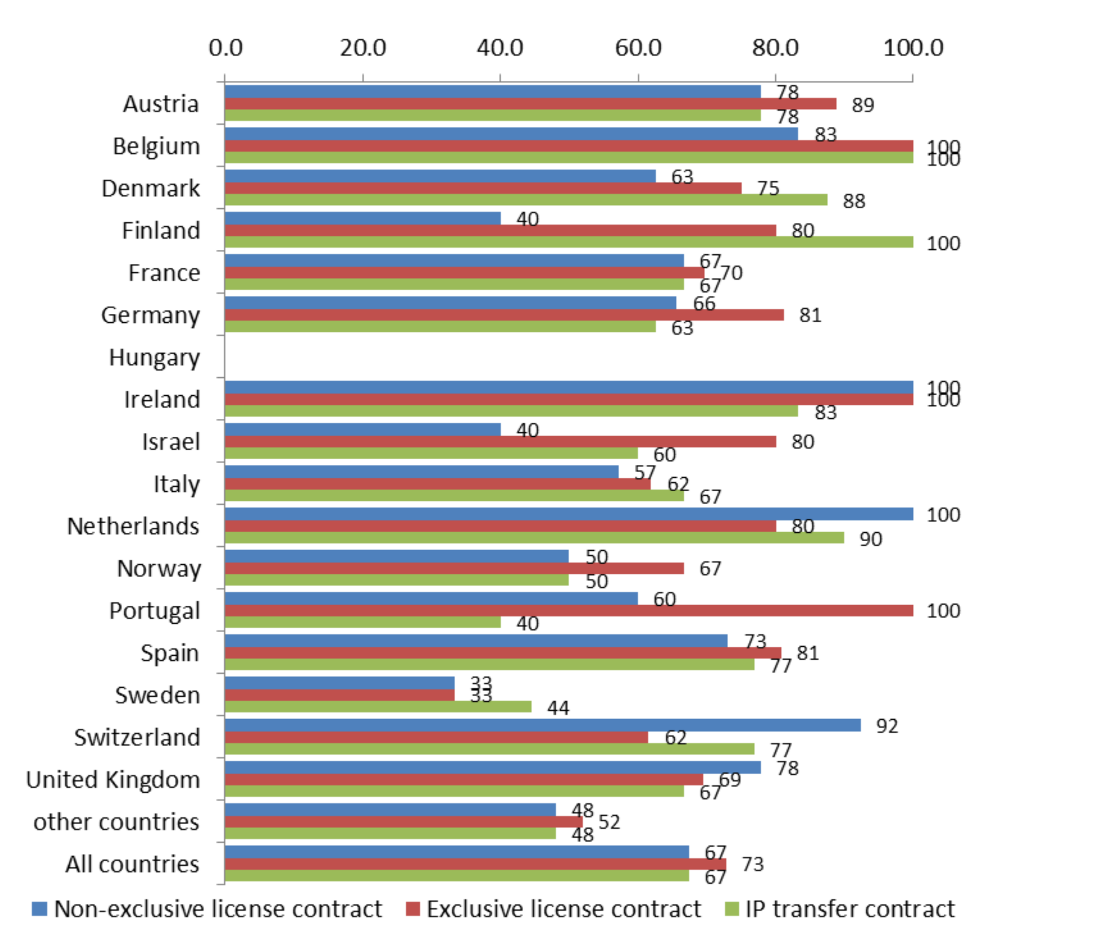
Licensing policies as stipulated by principle 11 in the CoP exist in 44% of the institutions (see Table 4-5). Their complete absence in Sweden is remarkable but at the same time easily explained by what has been said above. In addition, it is notable that such a policy is less common in Denmark. In nearly all countries the policy is not published at all or only internally, with the exception of Ireland and the Netherlands where a few more institutions make it publicly available.

Table 4-5: Existence and publication of a licensing policy by country

	N	Licensing policy exists (in %)	Written licensing policy exists (in %)	Licensing policy is published (in %)	
				Internally only	Internally and externally
Austria	8	38	38	25	13
Belgium	6	67	50	33	0
Denmark	8	13	0	0	0
Finland	5	40	20	0	0
France	34	53	15	9	0
Germany	64	45	27	16	0
Hungary	3	–	–	–	–
Ireland	6	67	50	0	33
Israel	5	60	0	0	0
Italy	23	43	26	9	13
The Netherlands	10	50	40	10	20
Norway	6	33	17	0	0
Portugal	5	60	40	40	0
Spain	26	35	23	12	12
Sweden	9	0	0	0	0
Switzerland	12	42	25	25	0
United Kingdom	36	61	47	28	8
other countries	27	30	22	11	11
All countries	293	44	27	14	6

Source: FHNW / Knowledge Transfer Study 2010-2012

Exhibit 4-27: Types of contracts concluded by the PROs in the previous five years by country (in % of all PROs)



Source: FHNW / Knowledge Transfer Study 2010-2012

We saw above that each type of contracts, non-exclusive licence contract, exclusive licence contract and IP transfer contract is concluded nearly equally often by approximately seven out of ten PROs. However, in some countries certain types are more (less) common (see Exhibit 4-27): In Sweden, Norway and the set of other countries all contracts are less common. In Belgium, Ireland, and the Netherlands all contracts are more common. In addition, non-exclusive licence contracts were concluded by a larger share of PROs only in Switzerland. Exclusive licence contracts in Austria, Israel, and Portugal. IP transfer contracts in Denmark and Finland.

Further characteristics of licensing and IP transfer practice were also assessed (see Table 6-15 in the annex), but the resulting pattern is rather diverse and not rendering itself to any clear interpretations.

4.3.7 Start-up policy

Existence and publication of a start-up policy

In regard to the start-up policy the picture is remarkably different to the one for the IP policy (see Table 4-6): PROs in Belgium, Italy, the Netherlands, and Ireland most often point to the existence of a written policy. In Ireland and Italy this policy is also published, in Belgium it is only internally available. In all the other countries only up to 50% of the PROs – in most cases significantly less – have a start-up policy. At the bottom of the list are Denmark, Finland, Israel, Sweden and Switzerland, where a codified institutional start-up policy is not the norm.

Table 4-6: Existence and publication of a start-up policy by country

	N	Start-up policy exists (in %)	Written start-up policy exists (in %)	Start-up policy is published (in %)	
				Internally only	Internally and externally
Austria	9	56	44	11	11
Belgium	6	100	100	83	0
Denmark	8	25	13	13	0
Finland	5	40	20	0	20
France	35	57	31	17	9
Germany	64	59	41	25	6
Hungary	4	–	–	–	–
Ireland	6	83	67	0	67
Israel	5	40	0	0	0
Italy	22	91	77	14	59
The Netherlands	10	90	70	40	20
Norway	6	50	33	17	0
Portugal	5	80	40	20	20
Spain	26	62	50	4	46
Sweden	10	50	20	10	0
Switzerland	13	23	23	15	8
United Kingdom	37	68	46	24	8
other countries	27	29	26	10	16
All countries	298	58	42	18	17

Source: FHNW / Knowledge Transfer Study 2010-2012

Benefits for start-up companies and compensations for PROs

Next we look at the services that PROs provide to their start-ups and the compensations which they request from them (see Table 4-7). Financial support is given only in few institutions in most countries except for Belgium and Sweden, where more than 60% of the responding PROs offer this. Incubators are rare among Danish and Italian respondents and management support is not so common in a number of countries, above all Austria, Denmark again, and Spain. Denmark is at the bottom of the list being the only country where consistently small shares of the surveyed PROs offer a particular support (and few ask for compensations). PROs in Sweden and Italy also request rather little compensation from their start-ups which is probably related to the specific IP ownership regime compared to the other countries. All in all, approaches vary to some extent. Respondents from Ireland mostly rely on shares of the equity and fees, whereas in Hungary, the Netherlands, Switzerland and the UK shares of revenues or profits are nearly equally frequent.

Table 4-7: Services to and compensations from start-ups by country (in %)

	N	Services								Compensations			
		Scientific and technological support	Consulting, coaching	Financial support	Incubator	Infrastructure support	Specific pract-ices regarding IP provision	Management support	Other support	Fees	Share of the equity	Share of re-venues/profits	Other compen-sations
Austria	8	88	75	25	40	88	88	13	0	88	38	50	0
Belgium	6	100	100	67		100	100	50	0	100	67	67	0
Denmark	8	38	25	13	20	63	50	25	25	50	38	25	13
Finland	5	80	80	20		80	60	40	0	80	60	40	0
France	35	86	51	26	67	74	80	51	11	69	31	46	6
Germany	60	85	83	18	62	92	82	55	13	72	37	40	3
Hungary	4/5	–	–	–	–	–	–	–	–	60	60	80	0
Ireland	10	90	100	10	67	100	100	50	10	90	100	50	0
Israel	4	–	–	–	–	–	–	–	–	–	–	–	–
Italy	21	90	62	33	27	71	67	67	5	32	47	37	16
The Netherlands	9	100	89	44	67	100	78	33	22	67	67	56	11
Norway	6	67	67	33		83	50	50	0	50	67	17	0
Portugal	5	100	80	0	100	100	60	60	0	100	20	20	0
Spain	25	88	76	24	56	72	68	20	0	75	42	42	13
Sweden	10	70	100	60	86	60	60	50	10	22	33	22	0
Switzerland	12	92	58	17	50	92	92	33	17	82	45	64	9
United Kingdom	38	79	76	47	65	82	79	76	13	61	74	58	11
other countries	23	90	68	19	55	71	71	52	3	69	50	62	0
All countries	**289**	**85**	**73**	**28**	**59**	**81**	**76**	**51**	**9**	**67**	**49**	**46**	**6**

Source: FHNW / Knowledge Transfer Study 2010-2012

4.3.8 Monitoring and communication of research, IP and knowledge transfer

In its principle 14 the CoP suggests that PROs monitor IP and KTT activities and publicize them to increase their visibility to the private sector and promote their exploitation. We saw in Exhibit 4-18 above (see p. 150) that most issues are monitored and information on some issues, namely scientific competencies, research results, research projects and start-ups is also published by nearly half of the surveyed PROs. While the monitoring activities are extensive in all countries, publication efforts are lower in some (see Tables 6-16 and 6-17 in the annex): Norwegian PROs hardly publish and comparatively few PROs from Belgium and the UK publish the information items asked for in the survey. On the other end, Hungarian, Italian and Dutch PROs included in the survey monitor and publish extensively information on their activities.

4.3.9 Collaborative and contract research with private sector partners

Rules and practices in regard to collaborative and contract research activities

Across all countries PROs generally govern collaborative and contract research activities as stipulated in the EC Code of Practice: results are generally published, though delays might be accepted. IP rights are kept for further internal research and – less so – also for research cooperation with others. There is a strong tendency to maximize the socio-economic and – less so – the commercial impact of the research. Funding is taken into account accordingly and the IP position/rights of the PROs are stronger in collaborative than in contract research which is usually funded by the private partner. This pattern generally applies with a few notable exceptions at country level (see Table 6-18 in the annex):

- In particular in Denmark, Ireland, Finland, the Netherlands and Austria the rules vary considerably between collaborative and contract research, whereas the PROs in France, Italy, Spain, Sweden and from the group of other smaller countries make almost no distinction between both types.
- In Austria and Finland the publication of R&D results is less enforced than in other countries. This might also explain the comparatively low acceptance of publication delays in Finland (delays are not necessary if publication is not foreseen in the first place). However, in Austria, as well as in Belgium, France, Ireland, Portugal, Spain, and Switzerland such delays are granted in most institutions, for findings resulting from both, collaborative and contract research (see also CoP principle 7).
- The institutional IP positions are overall weak in Sweden, and in Austria when it comes to rights for research cooperation with third parties.
- In Denmark, Ireland, Portugal and Switzerland the focus in collaborative research is on the socio-economic impact and in contract research on the commercial impact. In other countries there is almost no distinction: PROs in Norway, the Netherlands, Spain, the UK, and the other countries hardly distinguished between commercial and socio-economic impacts.

The differences across countries are not very clear-cut; the governance of collaborative and contract research in PROs seems to be more in line with the suggestions of principle 15 in the CoP in Ireland and less in Sweden and Spain.

Ownership, access rights and revenues for foreground and background IP

According to the CoP, principle 17, the ownership of foreground IP should be differentiated between collaborative and contract research: in collaborative research the generating party should own the foreground and in contract research the private-sector party. Practice in PROs by and large is compliant with this principle (see Exhibit 4-28); most clearly in Ireland, Finland, Austria, the Netherlands, Norway and the UK. In Sweden, we find the expected difference, as ownership is usually with the inventors according to the ruling professor's privilege. More surprising is the fact that in Switzerland IP from collaborative research is also mostly owned by the private sector partner.[28] Furthermore, foreground ownership in Belgium seems to be in contradiction with CoP 17, as foreground resulting from contract research is more often than not owned by the PRO.

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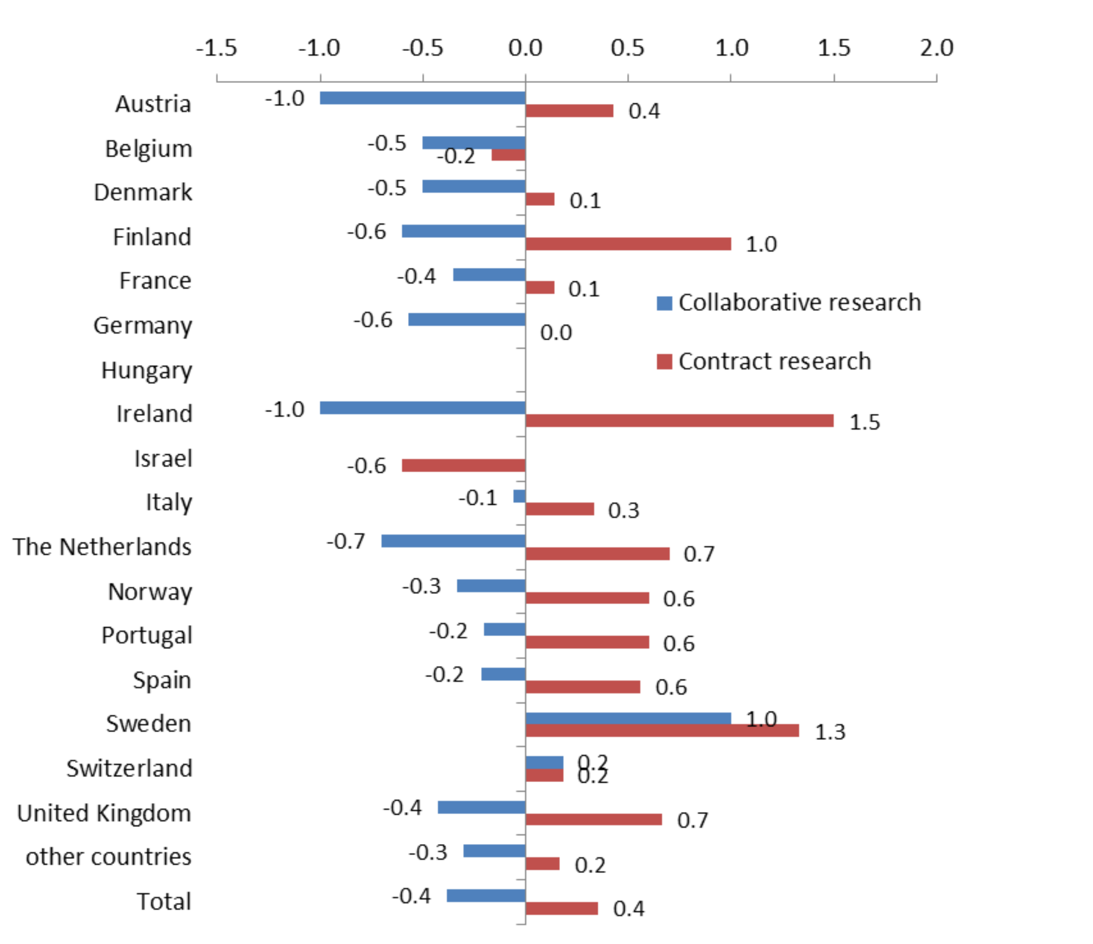
[28] This is eventually an outcome of the changed (from 01.01.2011 onwards) Regulation on the Swiss Research and Innovation Promotion Law (Art. 10y2 V-FIFG) which stipulates that IP resulting from federally funded collaborative research is owned by the private sector partner.

Exhibit 4-28: Ownership of foreground IP by type of research and country (arithmetic mean of rating from -2 = We own it. to 2 = We do not own it.)



Source: FHNW / Knowledge Transfer Study 2010-2012

COP 17 also puts forth, that the ownership of background IP should not be affected. Standard practice in European PROs is generally in line with this recommendation (see Table 6-20 in the annex). Only in Switzerland companies might eventually obtain ownership to background IP, though also there it is more common not to transfer this.

As suggested in CoP 18 PROs usually grant access rights to their foreground IP with the exception of Portugal, where such access rights are not common for collaborative research (see Table 6-19 in the annex). In regard to background IP the picture is more varied (see Table 6-20 in the annex):

- In some countries it is common to grant access rights to background IP resulting from both types, collaborative and contract research, namely in Belgium, Ireland, Germany, Switzerland and the UK,
- In a number of other countries access rights to background IP are granted for research, but not for exploitation purposes, in particular among PROs in Austria, Denmark, and the set of other countries (combining PROs from several smaller, mostly Eastern and Southern European countries),
- In Finland, the Netherlands, and Norway access rights to background IP are generally granted, but not if the private sector partner wants them for exploitation purposes in collaborative research.

4.3.10 Summary of the country comparison

The comparison of regulations and practices in PROs with the European Commission's 2008 Code of Practice between PROs from different countries is in many countries based on small N. Several times different issues collapsed into one CoP principle had to be separated into different survey questions; as we would expect, this frequently generated ambiguous results which could not always be reconciled.

However, the comparison permits a general overview of the practice in the included 17 countries and the group of PROs from smaller countries. This overview is visually represented in Table 4-8, where green fields stand for very good alignment of PRO practice with the CoP; yellow fields point to average alignment; red fields signal a contrast between practice in the surveyed PROs of the particular country and grey fields the abse4nce of sufficient data. The comparison could be realised for 15 of the 18 principles of the CoP. The most important results are the following:

- The practice of PROs in Ireland follows the CoP nearly perfectly.
- For PROs from the Netherlands and from Portugal we also get only green and yellow fields indicating general alignment with several CoP principles. In Belgium and the UK green and yellow fields clearly dominate over a few red fields indicating non-alignment of PRO practice and the CoP.
- Red fields indicating a deviating national practice dominate in Sweden (9 out of 15 principles). They are also fairly common in Switzerland (6 principles), Denmark and Finland (4 principles each), though in these countries we also find that practice follows the CoP in regard to several issues.

Table 4-8: Regulations and practices in regard to the CoP principles by country

	1	2	3[a]	4	5	6[b]	7[c]	8[d]	9	10	11	12	13	14	15	16[d]	17	18
Austria																		
Belgium																		
Denmark																		
Finland																		
France																		
Germany																		
Hungary																		
Ireland																		
Israel																		
Italy																		
The Netherlands																		
Norway																		
Portugal																		
Spain																		
Sweden																		
Switzerland																		
United Kingdom																		
other countries																		
All countries																		

Colour coding:	Practice not in line with CoP	Practice somewhat in line with CoP	Practice very much in line with CoP	No data

a See principle 7.
b Referring only to training; on skills see principle 10.
c Referring to use of open access publications and commonness of publication delays to facilitate IP protection.
d Survey results do not permit a country comparison.

Source: FHNW / Knowledge Transfer Study 2010-2012

4.4 Regression analyses

Data from the European Knowledge Transfer Indicator Survey 2011 and 2012 and European Knowledge and Technology Transfer Practice Survey 2011 and 2012 are combined in a single dataset to analyse the impact of the Code of Practice on the transfer performance of PROs. The presented results below are for a maximum of 228 PROs that replied both to the European Knowledge Transfer Indicator Survey as well as to the Code of Practice Survey.

4.4.1 Methodological preface

Approach

The regression analyses used six performance indicators for which data was collected in the WP2 surveys:

1. Invention disclosures
2. Patent applications
3. Licence agreements
4. Licence revenues
5. Start-ups established
6. R&D agreements with companies

Depending on the nature of the dependent variable either Negative Binomial (NEGBIN) models for count data (variables 1-3, 5, and 6) or Ordinary Least Squares (OLS) regressions (variable 4) were estimated. The regressions took the baseline models shown below as the starting points which included variables on the size and type of the PRO, the size and age of the KTO, and ownership of IP as control variables. In additional regressions we added the policy variables to these models. Not all policy variables were regressed on all performance variables, but to reduce the scope of the analysis and ensure feasibility within the given time and resource restrictions a selection was made based on expected relations; for instance, we regressed the variables on entrepreneurial training only on start-ups, but not on disclosures, patent applications or the licensing variables, presuming that the most plausible effect of entrepreneurship training would be the outcome measure for entrepreneurship, i.e. the number of start-ups.

Due to the cross-sectional nature of the data – the variables measuring the implementation of the principles of the CoP and the variables for transfer performance are available for the same year – it is usually not possible to assess causalities; for instance, a significant relationship between the use of a policy and the number of patent applications could mean a) that patent applications reacted positively to the implementation of the policy, b) that because the institution has had a high or low number of patent applications the policy was implemented, and c) that both patent applications and policies are driven by a third variable which has not been observed in the survey. We have tried to provide tentative explanations based on evidence from other survey questions, the conducted interviews and the plausibility of causes and effects, but this was not always possible.

In order to make it easier to relate the results to the CoP we will structure the findings according to the CoP.

Baseline regressions

The baseline regressions for every dependent variable included at start the same set of structural variables representing PRO and KTO characteristics.

All regressions included a variable for the size of the institution – the number of researchers as provided by the respondents to the EKTIS survey – and another variable for the size of the KTO which were significant in all regressions (except for the KTO size variable on the number of R&D agreements with companies, see Table 4-9).

Depending on their explanatory power in the baseline regressions the other variables were kept or omitted in the policy regressions. Most models also included the variable for the founding date of the KTO; older KTOs performed generally better than younger ones. The dummy for non-university research institutes was significantly positive in the regressions on invention disclosures, patent applications and licence agreements and negative in the regressions on start-ups. The existence of a hospital and whether inventors owned (part of) the IP was only significant in few models.

Table 4-9: Regression results on control variables

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
Number of researchers	+++	+++	+++	+++	+++	+++
Inventors own (part of) the IPR	NS	NS	NS	+	NS	NS
With hospital	+++	NS	NS	+	NS	NS
Non-university research institute	+	+	++	NS	---	NS
KTO founded before 2000	NS	+	++	+++	NS	+++
KTO size (in FTE)	+++	+++	+++	+++	+++	NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

4.4.2 Principles for an internal intellectual property policy (CoP 1-7)

Existence and content of an IP policy

The first set of regressions looked at the existence – implicit or explicit, i.e. in written form – and publication of an IP policy, defined as principles implemented to identify, protect and manage the IP resulting from R&D activities in which faculty or staff from the institution is involved. This operationalizes principles 1 and 2 of the CoP.

The results presented in Table 4-10 show first that the mere existence of an implicit IP policy is not related to the performance measures, but that only for an explicit policy we find a positive and significant relationship with the dependent variables. This matches with Baldini et al. (2006) who showed with panel data on Italian universities that the introduction of an IPR regulation increased their patent applications.

Publishing the policy does not lead to any further positive statistical effect; to the opposite, institutions which stated that they published their IP policies obtained on average fewer licence revenues and generated fewer start-ups than those PROs which did not publish their IP policies. This suggests that the need and benefit of clarifying and codifying institutional practice in regard to IPR is more internal than external: if PROs are confronted frequently with invention disclosures, patent applications and licence issues an IP policy ensures consistent practice and handling. To achieve this, the IP policy does not have to be published. The negative signs of the published IP policy for licence revenues and start-ups might come from a different logic: if KTOs do not perform well on these measures, they might resort to publishing the underlying policy documents (among other things) to raise awareness and improve performance. However, we cannot back this explanation with any of the collected data.

Looking at the content of the IP policy and whether the existence of certain rules relates to performance (see Table 4-10), we find that rules for both, employees and students, are quite strongly related to invention disclosures and licence agreements and slightly less to patent applications. In particular, the overall numbers of rules or issues included in the IP policy and the existence of rules for employees on dealing with conflicts of interest and on invention disclosures have significant coefficients. This matches the findings of Caldera and Debande (2010). However, we do not know if many disclosures/applications create a need for formalising approaches to dealing with conflicts, or whether such rules are conducive to increasing disclosures and subsequent patent applications. Another result might help to get a better understanding of the direction of the statistical relationship: The provision of rules on the disclosure of inventions is positively correlated with invention disclosures and negatively with licence agreements. This latter finding makes us believe that policies are driven by performance rather than vice versa. Institutions with an unsatisfactory licensing performance might find that one approach to change this is by tightening the screws on their faculty's handling of inventions.

Table 4-10: Regression results on IP policy

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agreements with companies
Existence and publication of IP policy						
IP policy	NS	+	NS	NS	NS	NS
Written IP policy	+++	+++	+++	NS	NS	++
Published IP policy	NS	NS	NS	---	---	NS
Rules for employees						
Rule on disclosures	++	+	-			NS
Rule on IP ownership	+++	+	NS			NS
Rule on conflict management	+	++	++			NS
Rule on 3rd party involvement	NS	NS	++			NS
Rule on record keeping	NS	NS	NS			NS
Number of rules	++	+++	NS			NS
Rules for students						
Rule on disclosures	+++	+	NS			NS
Rule on IP ownership	+++	NS	++			--
Rule on conflict management	+	NS	+++			NS
Rule on 3rd party involvement	+	NS	+++			NS
Rule on record keeping	++	NS	+++			NS
Number of rules	+++	++	+++			NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01. Grey cells indicated relationships which were not tested.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

Incentives for implementing the IP policy and becoming involved in KTT

Another aspect addressed by the CoP is the provision of incentives which – according to principle 4 of the CoP – should not only be of a financial nature but also include non-monetary incentives, such as the inclusion of transfer activities in appraisal procedures.

The only incentive that has a consistently positive effect in our regressions on the outcome measures is to give inventors a share of the revenues. The causality seems to be clear in this case, as a university would find little reason to motivate their faculty to become involved in transfer activities if it already performs well. Hence we would conclude that this particular type of incentive has a positive effect on the willingness of faculty to dedicate time to transfer activities. Raising the salary as an incentive also has a positive effect, though notably not on licence agreements. Of note, non-monetary rewards such as career enhancements or social rewards have no consistent effect. The relevant recommendation of the CoP to support these types of rewards (in principle 4) does not seem to be justified and a focus on monetary rewards might indeed be adequate. Offering additional funds for R&D even is negatively correlated to the number of start-ups and R&D agreements with companies. This might even suggest that honouring transfer involvement in this way might crowd out third-party funds and constitute a negative incentive for faculty to become entrepreneurial.

Table 4-11: Regression results on incentives

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
Incentive: % of revenues	+	++	+++	NS	+++	NS
Incentive: lump-sum	NS	NS	--	+++	NS	NS
Incentive: inclusion in promotion decisions	NS	NS	NS	+++	NS	NS
Incentive: more funds for R&D	NS	NS	NS	NS	--	-
Incentive: higher salary	++	++	NS	+++	NS	+++
Incentive: social rewards	NS	NS	NS	NS	+++	NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

Constructing IP portfolios and pooling IP

In its principle 5 the CoP suggests that PROs consider the creation of coherent IP portfolios, e.g. in specific technological areas, or the setting up of patent/IP pools with other PROs. We find a positive relationship ($p<0.05$) between the use of IP portfolios and the number of patent applications. A larger number of patent applications makes a portfolio approach more common, e.g. to manage and market the IP better, but it does obviously not lead to more selectiveness when it comes to patenting. Licence revenues are significantly lower, if either a portfolio and/or a pooling approach are chosen (portfolio $p<0.05$, pooling $p<0.01$). Again, it is not possible to say whether IP portfolios and patent pools reduce revenues, or whether either approach is chosen by PROs which underperform on licence revenues and resort to portfolio management and pooling to get better results. Longitudinal data would be needed to answer this.

Entrepreneurial training

In principle 6 the CoP points among other things to the positive effects of training activities for staff and students. Our regressions confirm the positive relationship between the existence of entrepreneurial training for employees and/or for students and the number of start-ups established by a PRO per year (both employees and students $p<0.01$).

Publishing and IP protection

The CoP argues in principle 7 for a broad dissemination of R&D results and a publication/dissemination policy. Content of such a policy would be, for instance, rules on the acceptance of publication delays for giving time for the protection of IP or on the possibility to abstain from publication at all. We evaluated in regressions whether these two rules are related to the number of invention disclosures, patent applications or R&D agreements signed with companies. Only the acceptance of publication delays in order to protect IP is positively related to one of these measures, namely to the number of R&D agreements. PROs which often make such agreements usually also accept such delays ($p<0.01$).

4.4.3 Principles for a knowledge transfer policy

Exploitation mechanisms

The CoP suggested that in order to maximize the socio-economic impact all types of exploitation mechanisms and exploitation partners should be considered. The knowledge transfer practice survey conducted within this study let respondents rank the importance of different transfer mechanisms: licences, IP transfers/assignments, other cooperations with existing companies (e.g. joint ventures), start-ups, or open access provision of findings.

When relating these mechanisms to the selected performance measures, we get the results shown in Table 4-12. The number of licence agreements correlates negatively with the importance of IP transfers, other forms of cooperation and open access. IP transfers correlate positively with the number of start-ups established.

Table 4-12: Regression results on transfer mechanisms

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
Transfer mechanism: Licence	NS	NS	NS	NS	NS	
Transfer mechanism: IP transfers	NS	NS	--	NS	+	
Transfer mechanism: Other cooperation	NS	NS	---	NS	NS	
Transfer mechanism: start-up	NS	NS	NS	NS	NS	
Transfer mechanism: Open access	NS	-	---	NS	NS	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01. Grey cells indicated relationships which were not tested.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

Objectives of IP/KT policy

Knowledge transfer activities might be done for many different reasons and the CoP puts forth that generating additional revenues should not be the prime objective (principle 9). We collected data on the importance of a broad set of 10 objectives and regressed them on the performance measures.

Table 4-13 shows the results. They are not always intuitive and easy to explain. For instance, institutions pursuing the objective of generating possibilities for collaboration for R&D and teaching for their faculty close more licence agreements, but not research contracts with companies. Both, a focus on creating job opportunities for students and supporting entrepreneurship correlate negatively with licence agreements which are obviously not perceived as adequate mechanisms to reach these goals. It seems plausible that PROs which give a high priority to the diffusion of knowledge have less patent applications (plus the invention disclosures as input), because a consistent internal policy would put more efforts on publishing and informal transfers than IP protection and formal transfers. Also the negative relationship to start-ups can be explained, as start-ups commercialize findings but not necessarily disseminate them widely.

Table 4-13: Regression results on objectives

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
Objectives: generating revenues	NS	NS	NS	NS	NS	NS
Objectives: collaboration for R&D and teaching	NS	NS	+++	NS	NS	NS
Objectives: job market for students	NS	NS	--	NS	NS	NS
Objectives: publicity for the institution	NS	NS	NS	NS	NS	NS
Objectives: attracting faculty	++	NS	NS	NS	NS	NS
Objectives: supporting entrepreneurship	NS	NS	--	NS	NS	NS
Objectives: supporting private partners	NS	NS	NS	NS	NS	NS
Objectives: contributing to economic growth	NS	NS	--	NS	---	NS
Objectives: promoting knowledge diffusion	-	-	NS	NS	---	NS
Objectives: meeting funders�behaviour requirement	NS	NS	+	NS	NS	NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

Professional knowledge transfer services

Two detailed matrix questions in the European Knowledge and Technology Transfer Practice Surveys were dedicated to the provision of services – either internally or externally – to the institution. The questions collected data on principle 10 of the CoP which requested professional knowledge transfer services. Three variables for each service were regressed on the performance measures: a) is the service being provided always or more often than not by an internal office of the PRO; b) is the service being provided always or more often than not by an external service provider on behalf of the PRO; c) a combination of a) and b) on whether the service is provided always or more often than not either internally or externally.

The results in the following table suggest a number of conclusions:

- Evaluating the technical merit and the commercial potential of an invention, either internally or externally, are related to more commercialisation results on the patent/licence track.
- Drafting patent applications internally – we saw in section (4.2.2 in draft) that this is the only service provided predominantly externally – correlates with more patent applications but also higher licence revenues. This could indicate that profound knowledge of the technical state-of-the-art which is needed for a patent application could be conducive to transfer success and also getting optimal returns from a patented invention.
- Contracts are usually managed internally by the KTO or other offices of the PRO, however, if the number gets too big external support might be needed. This is reflected in the positive and negative signs for the two contract management variables.
- Of note is that licence revenues and the number of research agreements with companies correlate with the existence of broker or matchmaker services between companies and PROs. For raising licence revenues it would be beneficial if the service is provided externally and not by the KTO itself; however, for closing R&D agreements the coefficient for internal service provision is significant. This could suggest that the KTO is in an advantageous position as it can help companies to overcome entry barriers.
- The more start-ups an institution generates, the more common it is to select candidates and provide internal and/or external support.

Table 4-14: Regression results on activities and services in the area of IP/KTT

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
a) internal funding consultancy						+
b) external funding consultancy						-
c) in/external funding consultancy						NS
a) internal evaluation technical merit	+++	NS	NS	NS		
b) external evaluation technical merit	NS	NS	NS	+++		
c) in/external evaluation technical merit	+++	+	NS	++		
a) internal evaluation comm. potential	NS	NS	NS	NS		
b) external evaluation comm. potential	NS	NS	NS	+++		
c) in/external evaluation comm. Potential	+++	+	+	NS		
a) internal patent application	NS	++	NS	++		
b) external patent application	NS	NS	NS	NS		
c) in/external patent application	++	+++	++	NS		
a) internal lic. contract management			NS	NS		
b) external lic. contract management			NS	+++		
c) in/external lic. contract management			++	NS		
a) internal research contract managemt.						-
b) external research contract managemt.						NS
c) in/external research contract managemt.						-
a) internal IP marketing			NS	NS		
b) external IP marketing			NS	+++		
c) in/external IP marketing			NS	NS		
a) internal brokerage			NS	---		+++
b) external brokerage			NS	+++		NS
c) in/external brokerage			NS	---		++
a) internal start-up selection					+++	
b) external start-up selection					NS	
c) in/external start-up selection					+++	
a) internal start-up support					+++	
b) external start-up support					+++	
c) in/external start-up support					+++	

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01. Grey cells indicated relationships which were not tested.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

Existence of a licence policy

Another set of regressions looked at the existence – implicit or explicit, i.e. in written form – and publication of a licence policy, defined in the survey as principles that rule the granting of licences or similar rights to users of IP owned by the institution. This operationalizes the first part of principle 11 of the CoP. We regressed three variables (licence policy exists, licence policy exists in written form, licence policy is published externally) on licence agreements and licence revenues of the PRO. The result is fairly consistent in regard to the existence of a written licence policy which correlates with the number of licence agreements and the licence revenues. There is no benefit from publishing the licence policy for the former performance variable. However, licence revenues are significantly smaller in PROs which published the licence policy than in PROs which have not published it ($p<0.05$). As for the IP policy we would argue, that underperforming institutions might use a publication of their licence policy to raise awareness among potential licensees (see page 173 above).

Existence and content of a start-up policy

Principle 12 of the CoP suggests the development and publication of a policy for the creation of spin-offs. We asked again whether such a policy exists, whether it exists in writing and whether it has been published. In addition, we included two further questions where respondents were asked a) for the special benefits that start-ups usually receive from the institution or third parties acting on its behalf and b) for the compensations which they requested from the start-ups for the provided IP and/or services.

The mere existence of a start-up policy, also if it is implicit and not documented in writing, correlates with start-up numbers ($p<0.1$). A published start-up policy is again negatively correlated with the start-up numbers ($p<0.1$). The causality seems to be clear in this case: there is no reason to believe why publishing institutional rules for the handling of start-ups should have a negative effect. Even if the rules might disillusion some potential entrepreneurs such disenchantment would also be the result of a first discussion with the KTO. Hence, we strongly believe that performance drives policy and that underperforming PROs try to stimulate entrepreneurial activities of their faculty and students by talking and writing more about this issue.

Among the benefits offered to start-ups preferential treatment regarding the access to IP (owned by the institution), infrastructure support (rental of working space, equipment), management support and mentoring, coaching, consulting or training services are all highly significant ($p<0.01$) statistical predictors of a large number of start-ups. Scientific and technological support, financial support and having an incubator are insignificant.

Principles on the sharing of financial returns

In principle 13 the CoP requests that PROs establish clear principles for the sharing of revenues resulting from knowledge transfers. As Table 4-15 shows there is a positive correlation between the existence of a revenue-sharing model and invention disclosures and licence agreements. If institutions have frequent invention disclosures and licence agreements then they also establish a framework for this.

The share of revenues from transfer activities that is allocated to inventors is unrelated to most of the outcome measures, which might seem illogical and counter-intuitive. It is certainly not in line with American experience (see on licence agreements Link & Siegel, 2005, and on licence revenues e.g. Lach & Schankerman, 2004, 2008). One explanation could be the large variety of IP ownership rules in Europe (Geuna & Rossi, 2011), possibly leading to poor enforcement.[29] Universities which either give the inventors the IP or which do not enforce university ownership rights will have fewer invention disclosures and patent applications because the inventor will either not need to or actively avoid disclosing potentially valuable inventions. Other universities operating in a legal framework where they own the IP generated by their faculty, e.g. based on national university laws, might raise invention disclosures by offering their faculty higher personal benefits such as revenue shares. Essentially, different logics apply. We can confirm this argument by comparing the revenue shares given to inventors between organisations where inventors also own (some of) the IP, and where they don't: in the former the inventors' share of revenues from IP is on average 48% and in the latter, at 36%, significantly lower (ANOVA, p<0.01). This might also suggest that organisations are forced to provide higher revenue shares when the inventor has the option of commercialising the invention privately.

Table 4-15: Regression results on revenue sharing arrangements

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
Revenue-sharing model exists	+++	NS	+++	NS	NS	NS
Deduction of expenses before revenues are shared	NS	NS	++	NS	NS	NS
Inventor's share	NS	NS	NS	--	+++	NS
Departmental share	++	NS	+++	NS	---	+++
Institutional share	--	NS	NS	+++	+	--
KTO share	NS	NS	--	NS	NS	NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

Monitoring and publication of IP and KTT activities

As the CoP stressed in its principle 14 that PROs should monitor and publicize regularly their achievements in the area of IP protection and knowledge transfer and that these and any related expertise should be made more visible to the private sector, we added in the questionnaire corresponding questions on what content is being monitored and published and which channels are being created and used regularly to communicate this to the private sector. The result of the regressions on published content and channels in which this was published or diffused is shown in Table 4-16. A few points strike us as remarkable:

- The publishing on IPR, licences and start-up activities, i.e. the core KTO outputs, is negatively related to licence revenues (and unrelated to the other two measures). In other words: the less a PRO earns with its licences, the more the KTO talks about them (and patents and start-ups) to raise awareness. It is striking to see in this context that those PROs who don't publish anything have on average significantly higher licence revenues and more R&D agreements with companies.

[29] There are no data for enforcement, but several KTO managers interviewed by the authors reported reasons for low enforcement of IP ownership rules at their university.

- Among the marketing channels the first two channels, personal and print channels, result from composite indicators which integrate the more detailed answers to the individual marketing channels.[30] In regard to licencing the message is clear: the use of print channels is positively related and the use of personal channels negatively related to licences and licence income.

Table 4-16: Regression results on published content and marketing channels

	Invention disclosures	Patent applications	Licence agreements	Licence revenues	Start-ups established	R&D agree-ments with companies
Published content						
Staff changes, new appointments			NS	NS		NS
Scientific competences			NS	NS		NS
Research projects			NS	NS		NS
Research results, inventions			NS	++		NS
Research instruments and equipment			NS	NS		NS
Patents or other property rights			-	---		NS
Licences issued			NS	---		NS
Start-ups			NS	---		NS
None of the above			NS	+++		++
Marketing channels						
Personal channels			--	---		*NS*
Print channels			+	+		*NS*
Press statements			+++	NS		---
Printed magazines			NS	NS		--
Newsletters			NS	+++		NS
Web sites			++	NS		++
Workshops, seminars, conferences			NS	NS		NS
Trade fairs			+	---		NS
Open days			---	-		NS
Business roundtables			--	NS		NS
Industry advisory boards			NS	NS		NS
Direct mailing			NS	+++		NS
Personal contacts of KTO staff			---	---		NS
External technology intermediaries			NS	---		NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01. Grey cells indicated relationships which were not tested.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

30 We classified workshops etc., trade fairs, open days, roundtables, personal contacts of KTO staff and external intermediaries as personal channels, and press statements, magazines, newsletters, web sites, and direct mailings as print channels.

- Using web sites is positively correlated with licence agreements and R&D agreements. We could argue, that KTOs use the WWW as a platform to present their success stories (which they surely do) and that therefore we find that positive link. However, as we also know what content they frequently publish (upper half of the table) we can control for this by including the variable on licences in the licence agreement regression and research projects in the R&D agreements regression. The results (not shown) are not different to the presented results. This suggests the following: web sites might indeed raise awareness of PROs potential clients of the products and services which they offer and contribute to making deals.
- On the other hand, all organised events such as open days and roundtables and relying mainly on the personal contacts of KTO staff seem to be rather ineffective.

4.4.4 Principles regarding collaborative and contract research

In its final section the CoP suggests a number of good practices in regard to the rules that govern collaborative and contract research, such as the ownership of foreground IP generated in a project and the access to background IP that existed already at project start.

General rules on collaborative and contract research

Respondents were asked twice in the survey – once for collaborative R&D and once for contract R&D – to what extent (5-point scale) they agreed to the following statements:

- We accept delays of publication to facilitate IP protection.
- We insist on the public dissemination of the research and development results.
- We keep the IP rights for further internal research.
- We keep the IP rights for research cooperation with third parties.
- We aim to maximise the socio-economic impact of the research.
- We aim to maximise the commercial impact of the research.

For only three out of twelve possible correlations we get significant coefficients in regressions on the number of research agreements with companies:

- If publication delays are accepted to facilitate IP protection in collaborative R&D, the number of research agreements is significantly higher than if such delays are not accepted ($p<0.01$).
- The same applies if IPR are kept for further internal research.
- If respondents stated that they aim to maximize the commercial impact of contract R&D the number of research agreements was also higher than if they declined this.

Ownership to foreground IP and access rights to background IP

Only for collaborative R&D we find significant relationships between institutional rules and practices and the number of R&D agreements with companies (see Table 4-17). Most notably, how PROs handle the foreground in collaborative R&D seems to be affected: there is a significant positive correlation ($p<0.05$) between the number of agreements and whether PROs grant access rights for research purposes or not. In addition, if they own the IP resulting from collaborative R&D and if they ask for cost covering compensation they also have on average more R&D agreements. This is counter-intuitive, as we would expect that both rules rather constitute barriers than drivers of collaborating in R&D. However, obviously this is not the case. Last but not least, if PROs reserve access rights to the foreground for themselves and if they participate in the revenues generated by background IP they have less R&D agreements on average.

Table 4-17: Regression results on rules regarding ownership of foreground and access rights to background and R&D agreements with companies

	R&D agreements with companies			
	Foreground IP		Background IP	
	Collaborative R&D	Contract R&D	Collaborative R&D	Contract R&D
We own it.	++	NS		
We transfer ownership to the research partner(s).			NS	NS
We reserve access rights to it for our organisation.	-	NS		
We grant access rights to the research partner(s) for research purposes.	++	NS	NS	NS
We grant access rights to the research partner(s) for exploitation purposes.	NS	NS	NS	NS
We receive cost covering compensation.	++	NS	NS	NS
We participate in the revenues generated by it.	NS	NS	-	NS

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012. FHNW, European Knowledge and Technology Transfer Practice Survey 2011 and 2012.
Note: NS = no significant effect, + = positive effect and p < .1; ++ = positive effect and p < .05; +++ = positive effect and p <.01; - = negative effect and p < .1; -- = negative effect and p < .05; --- = negative effect and p < .01. Grey cells indicated relationships which were not tested.

Source: MERIT/FHNW / Knowledge Transfer Study 2010-2012

4.4.5 Summary

The current section undertook a large number of regression analyses to evaluate the relationship between institutional rules and practices in IP management and knowledge transfer and institutional performance in knowledge transfer. A number of findings strike us as remarkable:

1. Universities and other PROs having policies on Intellectual Property, licensing and start-ups also are more successful in the different areas of KTT. In particular, if these policies are in written form they can contribute to a consistent management of different projects. Publishing the content of these policies as well as the available patents, license offers, or new start-ups is not linked to a better performance; to the opposite, institutions with a lower KTT performance tend to publish more, presumably with the intention to raise awareness and improve their performance in the future. Whether this is successful cannot be answered with the available cross-sectional data.

2. While the European Commission’s Code of Practice puts forth in principle 4 that institutional incentives to faculty in order to raise awareness and involvement in IP and transfer issues should not only be monetary, our regressions clearly show that non-monetary incentives are rather ineffective. In institutions where inventors are entitled to a share of the revenues and/or they receive higher salaries the transfer performance measures are significantly higher. However, the percentage given to inventors is **not** related to performance, contrary to studies using the US AUTM dataset. We explain this

with the still rather heterogeneous IP ownership situation for university faculty in Europe and a lower degree of IPR law enforcement than in the US.

3. Knowledge transfer services can either be provided internally, i.e. by the KTO or other offices of the PRO, or externally by service providers on a contract basis. We evaluated whether either form of service provision is related to any of the performance measures. Two findings are remarkable:

- Drafting patent applications is the only service that is predominantly provided externally, in roughly 70% of all PROs. However, institutions (also) providing it internally do not only have significantly higher patent applications, but also higher licence revenues. The ability to draft a patent application requires considerable technical and legal understanding, the existence of which is obviously also conducive to commercialization.
- Serving as a broker between faculty and companies is done mostly internally – by 60% of the PROs – and only by one out of six PROs externally. For raising licence revenues it is beneficial if the service is provided externally and not by the KTO itself; however, for closing R&D agreements the opposite is the case and the KTO is in an advantageous position helping companies to overcome entry barriers.

Supporting start-ups with preferential IP access, infrastructure, management and capacity-building services (training, coaching etc.) is correlated with the number of start-ups. Providing scientific, technological or financial support and having an incubator are insignificant.

4. Among the different marketing channels, personal channels, such as open days, business roundtables, or personal contacts are rather ineffective for marketing IP and closing licence agreements. Print and electronic channels and in particular the World Wide Web, on the other hand, correlate positively with performance measures.

4.5 Interviews with universities and other public research organisations

This part of the report describes the interviews with universities and other Public Research Institutes. Firstly, it describes the methodology and approach used in the PRO interviews. It follows with an analysis of the organisational set-up of knowledge and technology transfer activities and then looks in greater detail at the position of the KTT in the overall mission of the PRO. Furthermore, it investigates the practical issues related to interactions with the recipients of knowledge and technology in the private sector highlighting drivers of and barriers to more effective and efficient KTT.

4.5.1 Introduction

Objectives and outline

After the corporate interviews conducted in 2011 with company managers, this part of the study focuses on the experiences of PROs. The main aim of this part of the report was to find the perceptions of universities and other public research organisations (in the text abbreviated as PROs) on the impact of the code of practice as well as the drivers and barriers to more efficient and effective knowledge transfer from universities and public research institutes to the private sector in Europe. It is based on interviews conducted in 2012 with 100 PROs from 28 countries.

The main objective of the interviews with the PROs, is to:

- determine how closely the knowledge transfer activities of universities and other PROs reflect the Commission's Code of Practice (either intentionally or unintentionally)
- establish expected future changes in these practices.
- explore other influences on knowledge transfer activities, including drivers and barriers to efficient and effective knowledge transfer.

The 100 interviews were conducted using a semi-structured interview guideline (see Exhibit 6-9 with the full interview guide in the annex), the guide was tested using three pilot interviews conducted in May and June 2012.

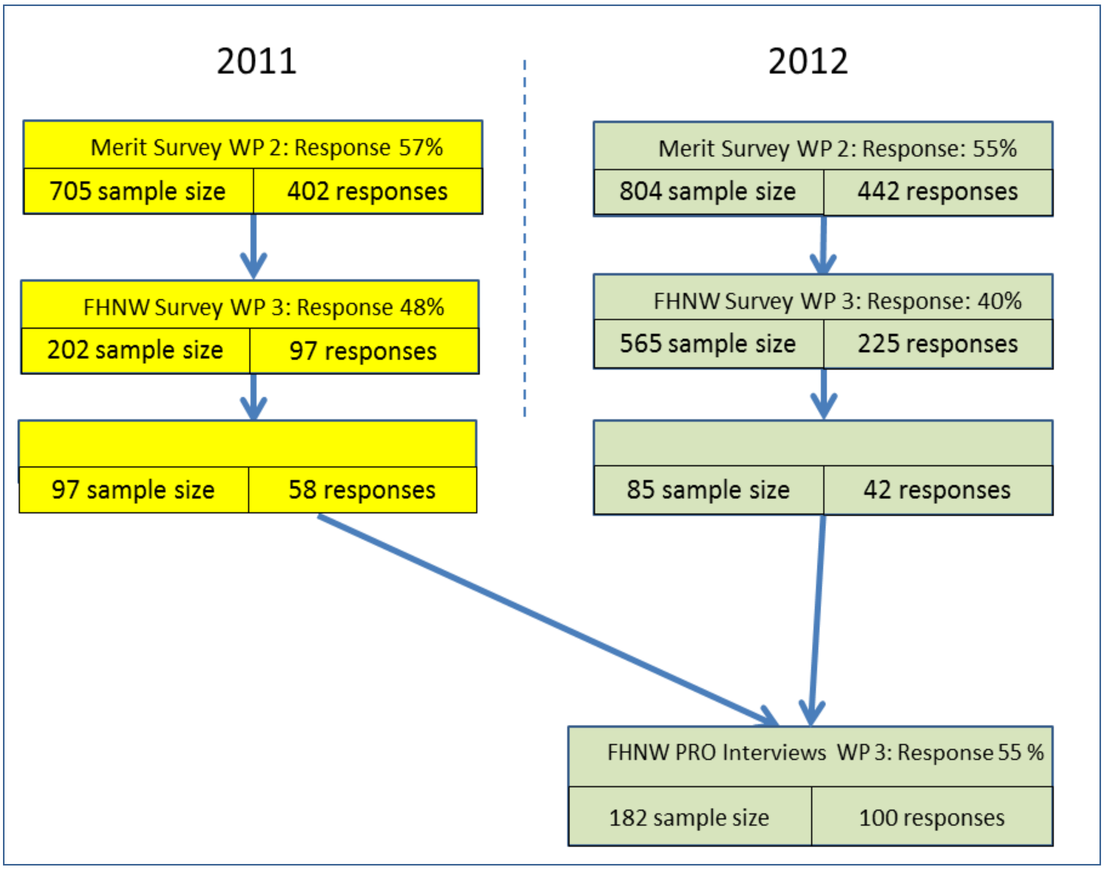
Sampling method

The samples drawn in 2012 were nested with the earlier WP2 and WP3 surveys conducted by UNU-MERIT and FHNW. Nesting the sample provides additional benefits: the interview data can be linked with the background data from the previously undertaken surveys; thus facilitating a richer and more detailed analysis of the similarities and differences between qualitative responses.

Respondents were generally the same people, usually staff of KTOs or research support offices, who had previously undertaken the 2011 /2012 surveys.

A subsample of 182 PROs was selected from the respondents to the 2011 and 2012 European Knowledge Transfer Indicators surveys ("MERIT survey WP 2" in Exhibit 4-29); 97 from the 2011 surveys (58 responses) and 85 from the 2012 surveys (42 responses). The original sample is from a broad set of 33 European countries. To enable a uniform schedule to conduct interviews, respondents were invited in five separate batches.

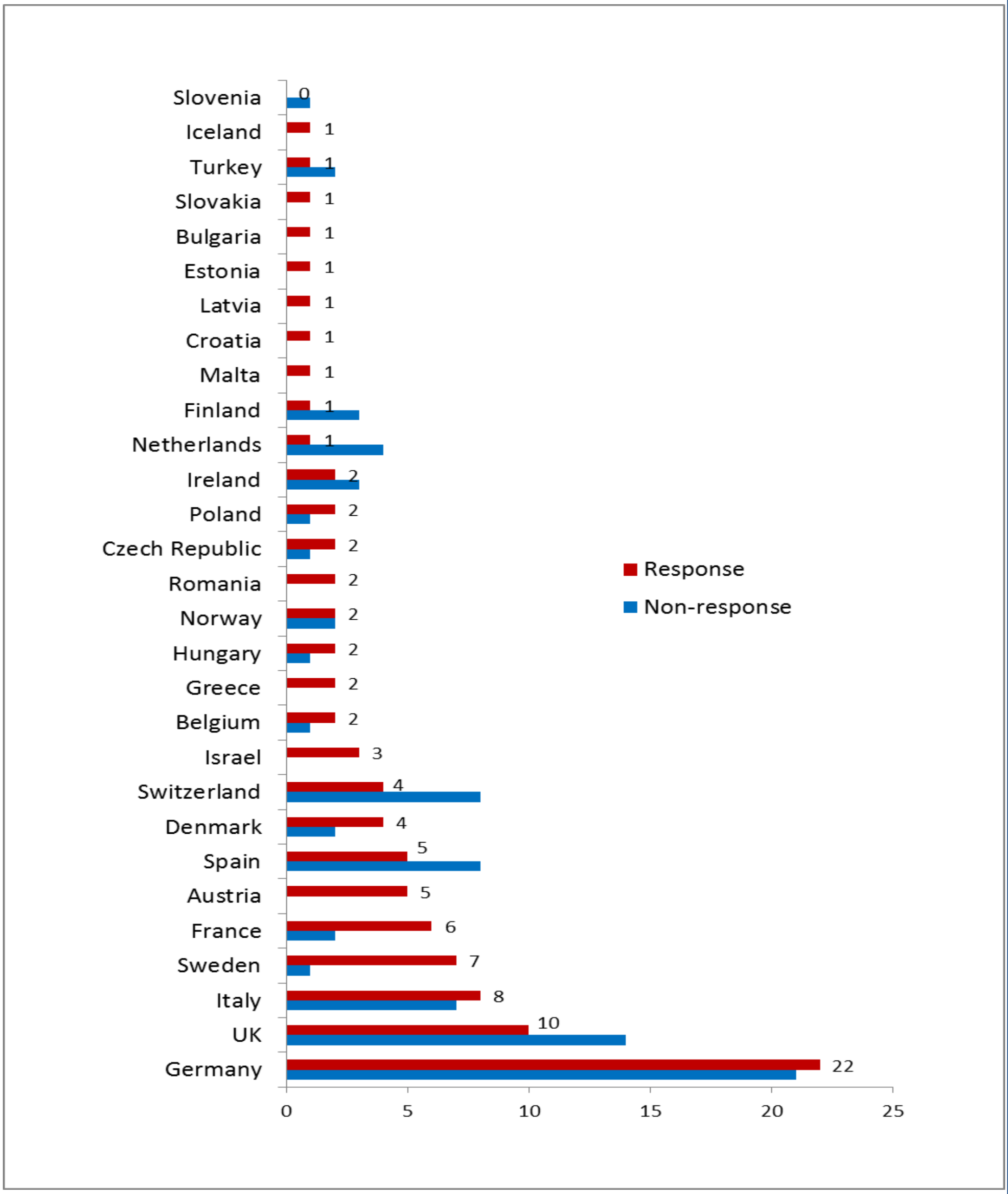
Exhibit 4-29: Overview of Nested Interview Sampling



Source: FHNW / Knowledge Transfer Study 2010-2012

The WP3 sample consisted of 182 institutions. Represented countries and responses are illustrated in Exhibit 4-30. A total of 100 PROs contributed responses from a total of 28 different countries. Germany contributed more than one fifth, the UK 10% while France, Austria, Italy, Spain and Sweden contributed individually between 5% and 7% of responses. All countries included in the sample, except Slovenia, are represented in the PRO interviews.

Exhibit 4-30: Total and realised sample by country



Source: FHNW / Knowledge Transfer Study 2010-2012

Groupings of responses for the descriptive analysis

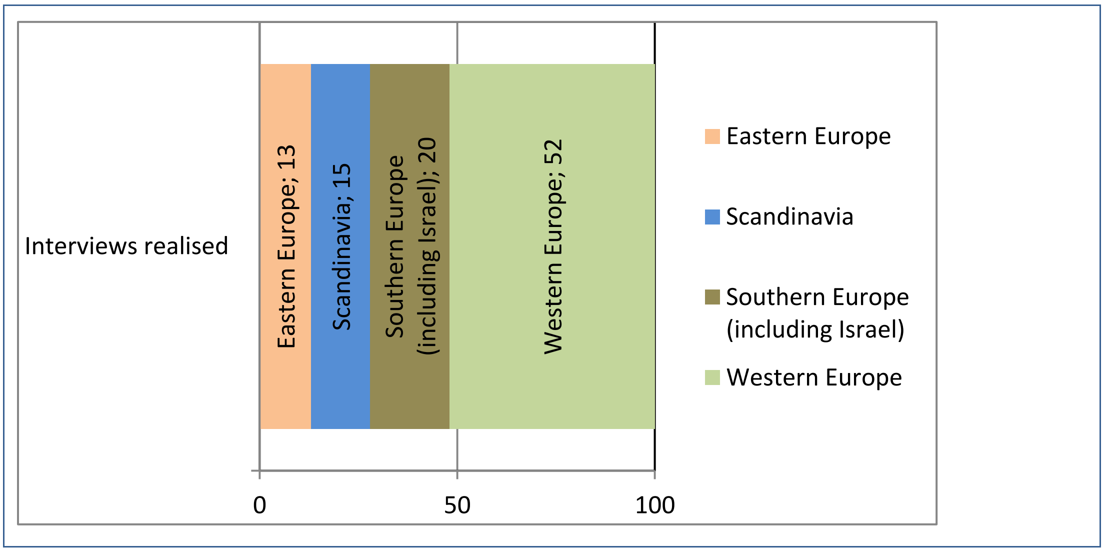
The characteristics of the organisations were explored in further depth based on the following criteria:

- Geography, distinguishing between PROs from Eastern Europe, Scandinavia, Southern Europe and Western Europe (see Exhibit 4-31)

- *EU*-membership with the three groups of PROs: a) from non-member states (12%), b) from what were known for some time as "Accession Countries" (countries entering the EU after 01.05.2004, 13%) and c) from "old" member states (as of 30.04.2004, 75%), which represent the majority of the response set,
- *R&D-densit*y of the country, operationalised as the R&D personnel per 1000 employees in the country. The majority of responses came from PROs in high density countries (55%), 31% from middle density and 14% from low density countries.
- Organisation level, differentiating between *type of institution, Size of the PRO, founding date of a KTO* and the *Size of the KTO*

These groupings of countries and organisational characteristics were considered as part of the interview analysis in the same way as for the WP3 Code of Practice Survey 2012 (see section 1.2.1, p. 131, above).

Exhibit 4-31: Realised interviews according to geographical regions



Source: FHNW / Knowledge Transfer Study 2010-2012

Methodology and overview of responses

182 institutions received an invitation to participate in the study and contribute with a telephone interview of approximately 30 minutes. The invitation was sent to the same contact person as listed in the survey data, who generally are all senior members of the KTO. First contact was by email; PROs not reacting to the first invitation were approached by telephone and some were then approached with a second email. Out of the 182 invited organisations, 100 (55%) agreed to be interviewed; only 2 (0.1%) rejected the interview and for the remaining 80 no definite answer could be obtained in the survey period.

The majority of interviews were conducted using Skype by a core team of trained interviewers from the FHNW research team. Two were conducted face-to-face. The average interview duration was 33 minutes. All interviews were recorded and fully transcribed.

After quality checks, all interview transcripts were analysed and coded with the software Atlas.ti by three team members. The coding concept was jointly developed and several interviews were coded by all three team members and subsequently discussed to ensure a common understanding and consistent implementation of the code system (see in the annex). The adopted code system contained four top-level code families with several sub-families:

- The stakeholders in KTT
- The issues related to the Knowledge Transfer Office (KTO and other service providers at/for the PRO
- PRO IPR and KTT policies and practices
- Dynamics (changes, improvements, deteriorations)

The qualitative data was thus quantified and further analysed using the developed coding system in Atlas.ti. In addition the survey data from the original 2011 and 2012 surveys were merged, linked to the transcripts (in the software) and analysed to provide richer and more robust comparisons of the PRO interviews.

The company interviews (see section 4.6.7, in particular p. 236ff.) as well as other literature (Perkmann & West, 2012; Siegel et al., 2003), highlight the high transition costs of research partnerships caused by the increasingly ambitious IP policies in the US and Europe. Such policies, designed to increase the commercialisation costs of research, have discouraged companies from engaging with universities and thus frustrating academics in their attempts to work with industry (Bruneel et al., 2010; Hertzfeld et al., 2006).

The next section provides details of the KTO characteristics including their mission and objectives.

4.5.2 Organisational set-up of knowledge and technology transfer activities

This section looks into the organisational set-up of knowledge and technology transfer activities. It discusses the following issues as they were raised in the interviews:

- The centralisation or decentralisation of resources and policies in universities and other public research organisations (PROs) for knowledge transfers,
- influences on decision-making on IP/transfer issues in PROs,
- funding of IP-related and transfer activities,
- and collaboration of KTOs.

Results were analysed for the whole set of 100 interviews. If applicable response patterns were analysed by country, type of institution (university vs. non-university PRO, large vs. small PRO) and type of KTO (large vs. small KTO, young vs. old office, etc.)

Centralised or decentralised set-up of KTOs

Third mission activities in a PRO can be arranged in a centralised or decentralised manner – or a combination thereof. With a fully central approach an institution applies one set of rules throughout the institution and its KTT staff is centralised in one single office. It is probably correct to assume that in such a setting the second statement of the first principle of the EC CoP on knowledge transfer is also realised and that these offices serve as the single responsible contact point of the PRO for IP and KTT issues. Seventy percent of the interviewed 100 PROs organised their KTOs in such a centralised set-up. Centralised KTOs serve as contact for faculty members as well as point of entry for potential external clients. In most cases these central KTOs are part of the institutions' administrations. Despite the centralised organisation independent connections of faculty members to companies are usually supported.

Eleven respondents pointed to decentralised KTT operations, i.e. they apply different sets of rules throughout their institution and KTT lies usually within the responsibility of different faculties or their individual members. In twelve cases institutions offer despite a decentralised set-up some central and facultative support. Respondents from Eastern Europe pointed more often to a decentralised set-up than respondents from other regions (see Exhibit 4-32). A mixed approach (centralised as well as decentralised aspects) is claimed by every fifth questioned KTO and it is most common among PROs from Southern Europe.

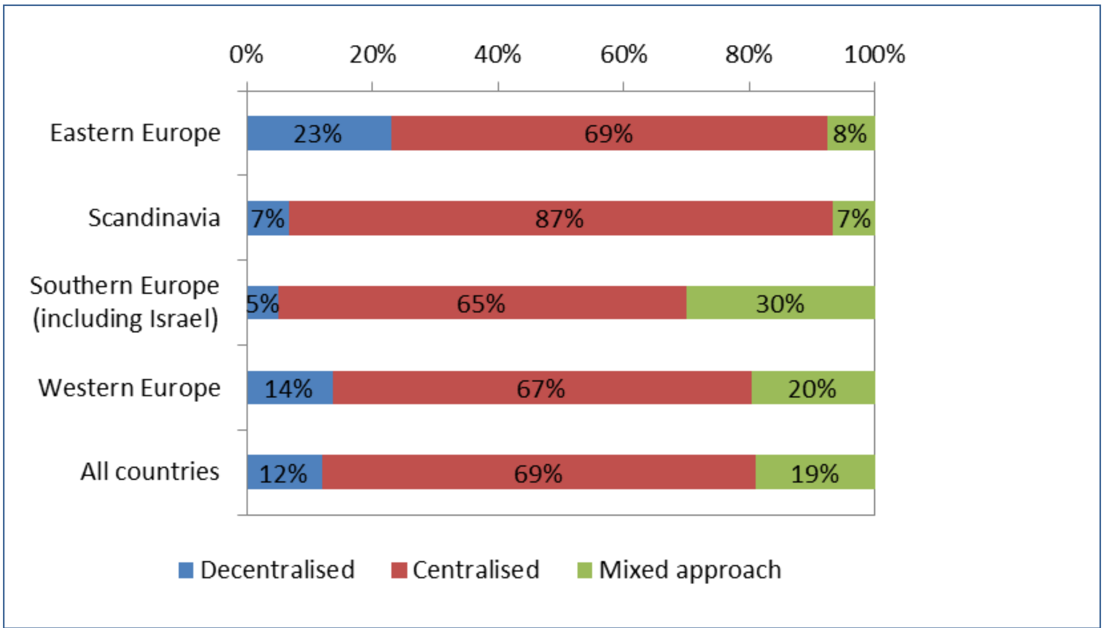
Selected quotes on centralised and decentralised set-up of KTOs

But academics don't have to use that function. If individuals want to have their industrial relationship which they want to exploit themselves, they're able to do so without this central function being involved. (Interview 64)

It is decentralised because each department is taking care of its own findings that it wants to commercialise. (Interview 33)

We have some regulations that we expect them to follow, but we actually do not measure them if they do follow those. And I know several of the training units have their own processes. (Interview 80)

Exhibit 4-32: Organisational set-up by country regions in percentage (N=100)



Source: FHNW / Knowledge Transfer Study 2010-2012

Decision-making on IP and KTT issues

Management boards are the KTO's key internal stakeholders, followed by faculties. Decisions on IP and KTT issues are generally taken by the institutions' directors and management boards. In most PROs the board, usually represented by the director/president or vice-president for research, has signatory power or a right of rescission of all contracts on IP/KTT issues. Though the KTOs usually have to follow certain guidelines and strategies, they also enjoy some degrees of freedom on how they approach their tasks. In five cases KTOs said that they report to research committees or spin-off commissions. In Poland, Germany, Austria, and Finland some of the interviewed institutions commented that KTT targets are strongly influenced by their respective governments and research and higher education administrations.

> ***Selected quotes on decision-making by the board***
>
> *Our office proposes the decision to the board, the research commission and they take that decision. (Interview 16)*
>
> *Once the main IP strategy has been made by our board of directors and our president then we have some independence to use our tools or to organise specific activities in the best way. (Interview 18)*
>
> ***Selected quotes on governmental influences on decision-making***
>
> *The governing body defines the guidelines that I mentioned earlier and then also the very broad goals. The minister gives us some goals in regard to the research results, but they are mainly based on quantity, not quality. They measure us in a financing scheme, for example what publications we produce and the research funding we are able to gather. In the future, our funding will be partly based on those results, so that's how they guide us in that direction. (Interview 80)*

KTO funding

KTO funding was mentioned repeatedly as a barrier to more transfer success in the interviews. Though we addressed funding problems only indirectly in some of the interviews (only the part of the sample that had replied to the online questionnaire in 2011) by asking whether the KTO was entitled to a certain share of the revenues from knowledge transfers every third respondent pointed to funding problems.

The key issue is the lack of institutional funding for KTT. Public funding is usually given for teaching and research, but not or not sufficiently for transfer. In addition, KTOs are frequently considered as "cost centres" and not as "profit centres" by their institutional boards, i.e. they generate costs but contribute little to institutional performance in research and teaching. This creates an incentive to limit their budgets. In particular, respondents from Eastern and Southern European countries commented on the low amount of funding by the government, while financial issues were least often mentioned by Scandinavian KTOs. The scarce institutional funding creates pressure to look for other funding sources, e.g. project–based funding from governments or the EC. This takes away resources from more productive activities such as IP management and commercialisation. Employing staff on projects and grants raises staff turnover with adverse effects on the development of expertise and experience in KTOs as well as their attractiveness as employers (and ability to attract highly qualified and experienced staff).

> ***Selected quotes on KTO funding***
>
> *We need more funding from the […] government for the transfer and the commercialisation and not only for teaching and research. (Interview 33)*
>
> *The biggest barrier is the little funding. We cannot cooperate with professionals, e.g. in marketing. We would like to be more active in commercialisation, but we cannot afford it. (Interview 53)*
>
> *We have few budgeted positions in transfer and a lot of project-based funding. Hence, long-term career advancement possibilities are lacking. They [project-funded staff] are here and once they have understood how everything works, they are almost gone again, as they cannot find a follow-up project. 'Sustainability' is a nice word for this – you cannot build big structures on revenues from patents … (Interview 60, authors' translation)*

Collaboration among knowledge transfer offices

Almost all, i.e. 94 of the interviewed 100 institutions for which data on this question is available, declared to collaborate with other KTOs. However collaboration can be interpreted differently: It can cover formal collaborations, contract-based arrangements where PROs/KTOs pool resources, jointly generate and support institutions to take care of certain steps in the KTT value chain, or provide specific functions to each other based on specific competencies. All KTOs – and it can be assumed even those which did not mention it explicitly – collaborate informally with some external partners, exchange information, share good practice or formulate their demands towards the public bodies that govern science and research. Another reason for collaborations is the realisation of economies of scale, meaning that some KTOs are too small to handle all KTT tasks by themselves; additional expertise is contributed by collaboration partners, e.g. in law, marketing, etc. The following types of collaborations were mentioned frequently:

- Joint realisation of certain activities such as seminars on patenting and IP protection, entrepreneurship or the like,
- Patenting collaboration: PROs and their KTOs collaborate in the assessment of patentable findings, harmonization of patent practices, patent registration, or commercialisation of patents. Patent-pools are another level of such collaborations (see below).
- Collaboration in creating start-ups is practised by eleven – mainly German – KTOs. German respondents pointed to networks for supporting start-ups and offering joint presentations about their KTT activities.
- Further collaboration with other universities or organisations is used for additional services such as external assessment of patents, and marketing activities.

Selected quotes on KTO collaboration

When we have patents with other universities, all together we try to find a partner to sell the patent or to sell a license of the patent. So our probabilities increase respective to when we are alone. (Interview 100)

We usually do research activities with other universities. During these activities we can find new IP and patents and after, we try to sell the IP or patents with the other university. We usually sell all the patents together, because my part of a patent is not very useful for the person that wants to buy it. (Interview 45)

So around each campus, we collaborate with many other players, universities, patent offices, incubators, or other network organisations that have various businesses and so on. So very often it helps if we have a patent to look at patents from another university, or a technology that we could put together with ours so we have a stronger position. Sometimes we also invest in a start-up company together. There are many advantages in that. (Interview 86)

Main barriers for collaboration and reasons not to collaborate are in the first place a lack of potential partners and in the second place a rather competitive approach, where other PROs are considered as competitors for research funding and transfer activities.

Pooling of patents and other Intellectual Property Rights

It was possible to address the issue of IP/patent pooling in 83 of the 100 interviews. First it became clear, that the interviewees subsumed many different concepts under the heading of IP/patent pooling. The pooling of patents and/or other IP within a specific technological area but across institutions in order to raise their technological significance and commercial value was only one of many perspectives taken by the interviewees. Others were for instance:

- The pooling of patents on certain technologies within one institution,
- The pooling of competencies across institutions to obtain research contracts,
- The management of jointly owned patents resulting from research collaborations,
- The marketing of patents via specialized websites, such as EEN or Flintbox.com,
- The commercialization of patents via patent valorisation agencies or similar.

Some of these conceptualisations of patent pools are not in line with our understanding of this concept as it formed the basis for the interviews and previous surveys of PROs. In the online surveys in 2011 and 2012 28% of the respondents said that they would currently use patent pools and another 20% replied that they would consider this (see page 137 above). Extrapolating the replies from the 83 interviewed PROs the share of PROs currently working with patent pools as defined above is reduced to about half the previous number, that is approximately 15% of all PROs.

The survey replies shed light on a varied set of advantages and disadvantages which come along with patent pools: the main advantage of patent pools that was mentioned in one way or another by 27 out of 83 PROs (33%) is the effect of reaching a critical mass of technological offers in a field which increases visibility (in particular outside the surrounding region or even internationally), strengthens technology marketing and raises the probability of finding clients for the offered technologies. Other advantages are that a pooling of resources is being done in the framework of more extensive collaborations which also support specialisation on specific services or activities in the value chain and the resulting scale economies; larger technological pools also constitute stronger offers to companies.

In line with the rather low use of patent pools, interview respondents pointed more often to disadvantages of pools and barriers to using them:

- Most often respondents explained their disregard of IP/patent pools with the fact that they need a lot of resources for coordination and decision-making, as they are very complex and in the set-up institutions need to take care of many detailed issues, while at the same time the benefits are not obvious and probably not big either. This argument was made by 34% of the interviewed PROs answering the related question.
- 14 (17%) of the 83 PROs pointed to their small patent portfolios and lack of critical mass to justify the efforts of setting up pools in specific fields.
- Another 9 respondents (11%) said that they fear to lose control over the use of their IP with potential consequences for accessing it for their own research purposes or misuse by patent trolls and less commercial use at the end.
- 8 respondents were sceptical whether pooling is actually conducive to commercialization, as it raises the distance between the inventors and the marketers of IP; as it is important to work with the inventors, be close to the institution and be prepared to do further research in order to commercialize successfully, such an increased distance would only have a negative impact on commercialization success.

- Further arguments raised by fewer respondents were, that institutional competition for research funding and reputation stands in the way of more pooling and collaboration; that the legal situation does not support it (respondents from Sweden and Italy); that it is too early for their institution to think about this as it started only recently to build up patent portfolios; that there are no regional or national partners for such a pool; that they essentially believe that patent pooling by universities is not the right approach, but that any pooling should be started and driven by the needs of companies.

Quotes on patent pools

But this "being very close to the researchers" is very important for us. And that's one of the reasons that we don't think that a national technology transfer or a pooled resource function is wise because this pooled function would not be very close to the researchers. We really believe that with our scouts we can be integrated in the research environment to have the maximum output. The disadvantage is that there is a limit to our knowledge. And because of this we need to pay for consultancy. We cannot build up sufficient knowledge about all research areas, and market and industries, because we are a smaller function at a smaller university. And of course we could have a bigger knowledge and a higher volume of cases if we were a bigger department. But we believe that being very near and integrated in the research environment is the basis for technology transfer. (Interview 56)

This pooling thing to me is more theoretical rather than anything else. It's like a bundling of everything where it's all one big happy family. But in reality we are in business. And if we are in business for example we just licence something from the University of Western Australia. I am not pooling that technology as far as I am concerned, I have licenced it in and we will then do something with that technology. That's not pooling for me - that's pure business basically. (Interview 63)

I would see an advantage in sharing each other's networks rather than pooling IP. So, for example, being in such a small country, we find it is problematic […] to find companies that might be interested in licencing our IP, because the market is so small. So we would see a benefit in, for example, having a pooled resource where you have marketing of IP to each other's network. So we would see what IP other universities have and see if any of it is applicable to the local industry for licencing and likewise, we can pool in our IP there and they can try to disseminate it among their own networks. So it is kind of pooling IP, but maybe broader than that, it is pooling of resources and networks. (Interview 79)

But the advantage would obviously be that it strengthens the IP of one field on IP. And it should make it a more attractive investment package for a company or an investor interested in a technology. And the earlier the investment, the easier it is to maintain the patents, because the fees will be the offset with the investment so that's the advantage. And hopefully he's got a more attractive portfolio you can attract earlier investments. This is an advantage. But again the first step is with the inventors and what their expectations are and how they would want to continue to develop the technology. (Interview 87)

4.5.3 Position of KTT in the overall mission of the PRO

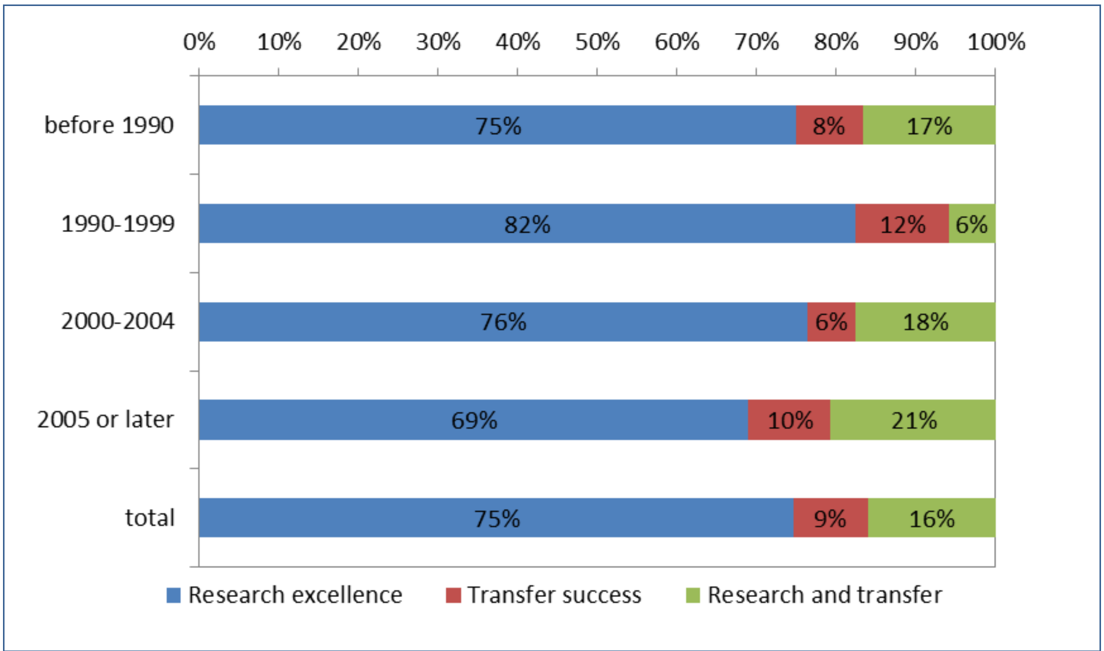
This section is dedicated to the position of KTT in the overall mission of the PRO. The subsequent issues were raised by the 100 respondents and are discussed in the following order:

- The importance of KTT in the overall mission of the PRO, and the relationship between research excellence and transfer success,
- on the objectives of the KTT activities, decision making thereof and the importance of generating revenues,
- and activities for students and staff to raise awareness for KTT.

Mission of PRO

In order to shed more light on the overall importance of knowledge transfers and other "third mission" activities, respondents were asked about the importance and relationship of research excellence and transfer success. A majority of 75% of the interviewed PROs places research excellence above transfer success in the general mission of the institution (see Exhibit 4-33). It seems that in PROs which institutionalised their transfer activities more recently, i.e. the KTO was established more recently, third mission activities are considered slightly more often as equally important as research.

Exhibit 4-33: Main mission of PRO by founding date of the KTO (in % of KTOs, N=75)



Source: FHNW / Knowledge Transfer Study 2010-2012

In several KTOs a change took place in recent years: previously research excellence clearly dominated, but KTT has become more important over the past 10-15 years, for instance resulting in more support to researchers from KTOs. Respondents noted that while excellence in research is certainly still very important, it is at least as important to give something back to the society, especially in the current world economic situation. The relation between research and transfer is considered to be an ambiguous one.

Forty interviewees described the relationship between research and transfer as mutually reinforcing. Some respondents explain that the findings in specific disciplines or fields such as climate research or physics are more difficult to exploit commercially than, for example, in engineering or biochemistry which results in a looser relationship of the discipline to transfer.

Eleven respondents experience a conflicting relationship between excellence in research and transferring knowledge and technology. The main argument is that researchers rather focus on their publications than producing transferable results, because the current tenure track systems value publications higher than transferred technologies or created spin-offs. This difference between researchers, who usually focus on excellence in research and publications, and KTOs, which have to concentrate on KTT, is a difference of priorities; its potentially conflicting nature was also found in previous interviews in US universities (Siegel, Waldman, Atwater, & Link, 2003, 2004).

The importance for creating good structures for KTT was mentioned several times. This includes drivers for researchers such as monetary incentives or adapted tenure tracks that take KTT into account; another support of the transfer idea could result from publicizing successful role models of scientists which were successful in KTT activities. KTT staff or academic personnel with experience in the respective field of research as well as in the industry were mentioned as beneficial for a healthy relationship between excellence in research and transfer.

Selected quotes on the relationship between research and transfer

Drivers of the whole thing are probably several really good professors who understand that his is important and they are good in their field and have some kind of status among the university. So when they decide something a lot of people follow them. (Interview 9)

For us, they're not different missions, both tied up together. As a recipient of publicly funded research, we are obliged to do the knowledge transfer part, it cannot be separated. (Interview 19)

For me it would be the transfer, but the researchers are more concerned with the excellence because for them it is more important to publish than to transfer. (Interview 31)

They worry that researchers will be put off if they feel they have to commercialize their inventions. (Interview 37)

There are a lot of problems and debates about it. There is a competition between the scholarly way of doing things and entrepreneurial way of doing things and the clash. It is a problem. (Interview 61)

There is a lack of culture. Many researchers think that technology transfer is boring and not their job. (Interview 97)

Objectives of KTT activities

According to the realised online surveys of PROs the most important objectives of institutional KTT activities are to promote the diffusion of scientific knowledge and technology and to generate possibilities for collaboration in research and teaching (see Exhibit 4-11, page 143). In the interviews PROs were asked, who set the objectives for KTT activities and, if revenues were considered as important, why this was the case.

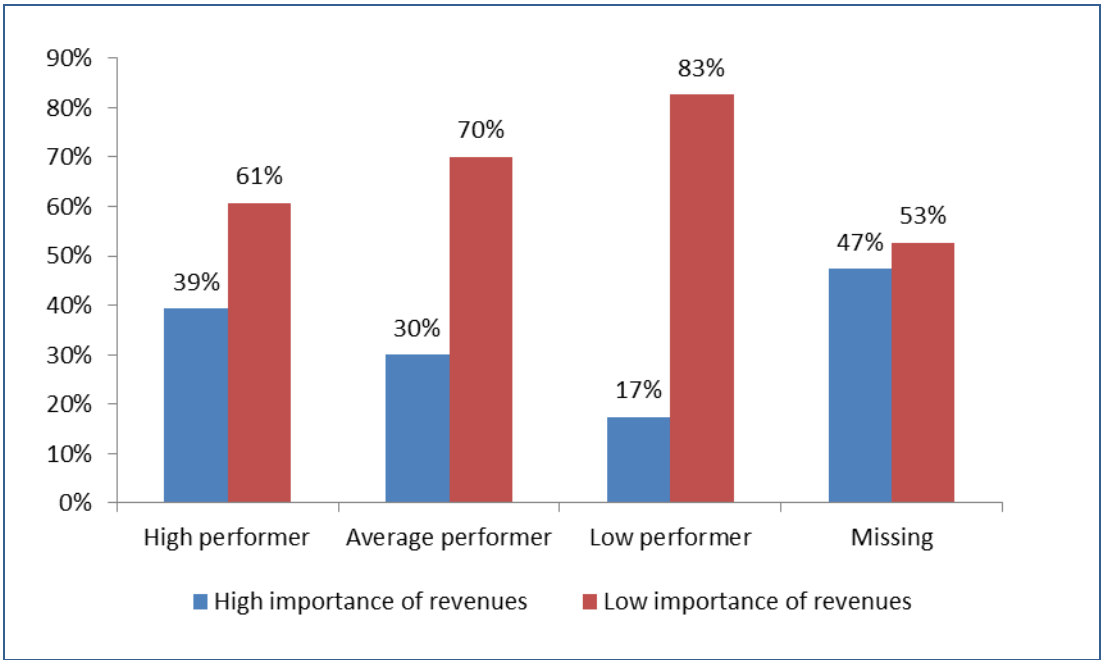
In thirty-seven of the one hundred interviewed PROs the institutional boards decide on the main objectives pursued with transfer activities; in the other cases faculties or the

KTO directors decide. As mentioned above external stakeholders like governments or other funding bodies also influence the goals of transfer activities.

In the 2011 pilot survey of PROs, revenues, either in form of third-party funds, or royalties, were mentioned frequently as key objective of transfer activities (putting KTT practice into contradiction with the EC Code of Practice and its principle 9 which stipulates that additional revenues should not be the prime objective of PROs IP/KT policy). The following reasons for this focus on revenues were mentioned: Some KTOs have to finance themselves to a certain degree, or they should operate by covering their costs. Revenues are a common measure for success, and they attract usually additional funding which can be reinvested into research. It was also mentioned that royalties are a simple one-way transaction with no further liability, or that that kind of revenue doesn't need to be allocated to a specific target such as students or research facilities by law, but can be used for any purpose and extras such as new equipment. This makes them an attractive add-on to budgetary allocations to PROs.

Generating revenues play a more important goal to those KTOs that are already successfully selling licences (see Exhibit 4-34). Hence it can be concluded that there is some congruence between the importance of revenues and actual institutional capacity to generate such, without being able, however, to deduce any causality.

Exhibit 4-34: Importance of revenues by performance of the KTO in regard to licences per total R&D personnel of the PRO (N=100)



Source: FHNW / Knowledge Transfer Study 2010-2012

Some respondents perceive a conflict between generating revenues from KTT activities and actually transferring knowledge and express their dissatisfaction with the institution’s decision to focus on generating revenue. However, other interviewees point to a virtuous circle: Generating revenues allows further research, which will then create other opportunities. The latter is especially important for KTOs that have to share government funding with the PRO's research departments.

Selected quotes on KTOs' objectives

We as a public institution cannot lock out the public duty; it is our mission to generate knowledge, to create working places and innovation. Revenues can never be the first goal. (Interview 25)

We have done many transfers without any financial return. It does not mean we are upset about it because it may have helped a company. Our satisfaction is of course greater when we get revenues. This objective seems essential. However, it cannot be the only one. The financial returns are proving the success. We do not expect huge returns but at least something to support us regarding seed funds for new projects …. (Interview 29)

We are not profit oriented. Our focus is somehow to transfer technology generated in our house. Socio-economic background is crucial. If it is possible to earn money with it this is a welcome side-effect. (Interview 35)

Because […] there are many people against the office, asking why we should spend money for technology transfer, while there is not enough money for research because of the governmental reduction of the budget […] And if you can realise some money and sign contracts, generate income, then you can prove it is very important and you can invest back to the basic research and motivate professors who are against tech transfer. (Interview 78)

Raising awareness for KTT

Respondents use different tools to raise internal awareness for KTT in their institutions: Print media, such as newsletters, publicizing for instance success stories are quite common. Online tools, e.g. intranets, websites, are also instruments applied to generate attention for KTT. Internal professional trainings or on-the-job trainings for employees are considered as an excellent method to reach the right persons. Interviewees also conduct regularly workshops and seminars for research staff. Several KTOs report on specific briefings of new staff members on KTT activities and regulations. Usually the target group of any awareness raising activities consists of the PROs' staff. Most interviewees attempt a multichannel approach, although personal contacts between researchers and KTO's staff seem to generate the highest impact on awareness for KTT.

Innovation programs and other various entrepreneurial courses which are offered to students and staff – mostly PhD students – play also an important role in raising KTT awareness.

4.5.4 Role of the licence policy

Many universities have given TTOs the task of protecting the university's intellectual property rights and initiating licence deals with commercial buyers (Siegel et al, 2003). Licensing is particularly appropriate in sectors where intellectual property plays an important part, e.g. biotechnology and ICT (Niosi, 2006).

In his comparison of university and corporate interaction in Germany and the USA, Schmoch (1999) suggests that the main roles of an active licence policy are to:

- generate additional long-term financial resources
- reduce the financial risk and partner search away from the researchers
- increase the number of invention disclosures and the number of economically relevant inventions

The interviews with PRO explored the role of the licence policy. As part of the analysis we investigated interviewees' perceptions of the importance of having a licence policy;

including the advantages and disadvantages. A clear majority of respondents do not have a licence policy, while Western Europe has the highest proportion of universities with a policy. Nationally, all countries had more institutions without a licence policy than with one. None of the seven interviewed Swedish institutions stated that they had a policy (see also the survey results in sections 4.2.6 and 0). In Sweden the legal situation with the professors' privilege means that professors own intellectual property.

Almost 30% of those universities which do not have a licence policy cited increased flexibility and the ability to negotiate on a case-by-case basis as being the main advantage of **not** having a licence policy. However, implementing and publishing a licence policy may as well be beneficial. Ten per cent of interviewees consider that the main advantage is that the policy presents transparency, in particular internal transparency and openness, which may be helpful when negotiating. However, 6% of total interviewees suggested that openness in publishing the policy may be considered as a competitive negotiating disadvantage. If a licence policy is too rigid or complex it may be ineffective in its implementation. Simplicity of the document was considered as important by a small number of interviewees. However, simplifying the process too much was mentioned as being undesirable by one respondent. The ability to be flexible when the case arises was also considered by a small number of interviewees as being important.

Some interviewees questioned whether it is really worth conducting hard negotiations for intellectual property which can take a great deal of time. There may be a conflict between the concept of open science and the corporate strategy of creating commercial advantage by restricting access. Indeed, increased use of intellectual property rights (IPR) in scientific research has initiated a fierce academic and policy debate over what is known as the "anti-commons effect" (Murray and Stern, 2007).

Selected quotes on the concept of focusing on IP

The second issue, I think is, most of the IP is rather pointless, actually. You never make loads of money out of IP. It's just a little bit of the world. And universities hold on to too much, thinking it's far too valuable and it actually isn't. The best way would be to release it, make it easy for the company to access it. But, at the same time, get something out of it. (Interview 24)

I believe in open innovation. It should be given away for a small amount or fee. My older colleagues think different about this. I think it will get faster and less complicated due to new young researchers who don't believe in the fast and big money. They understand that nobody really wants our inventions we are not that good or unique. Older people think they have discovered some particle and they think it's very useful but it's not and younger people understand that already. (Interview 43)

University policies influence the comparative cost of technology transfer, and the interviews show there is significant variation in the composition of university-company relationships across institutions and the ways in which participation in technology transfer activities is rewarded (see also the results of the online survey on incentives in section 4.2.4 on p. 137). The next part of the report investigates some of the factors that can influence contract negotiations and possible ways in which negotiations can be optimised and speeded up. Both the company interviews and the university interviews show that by consideration of the other side's considerations, they may considerably enhance the motivation and engagement

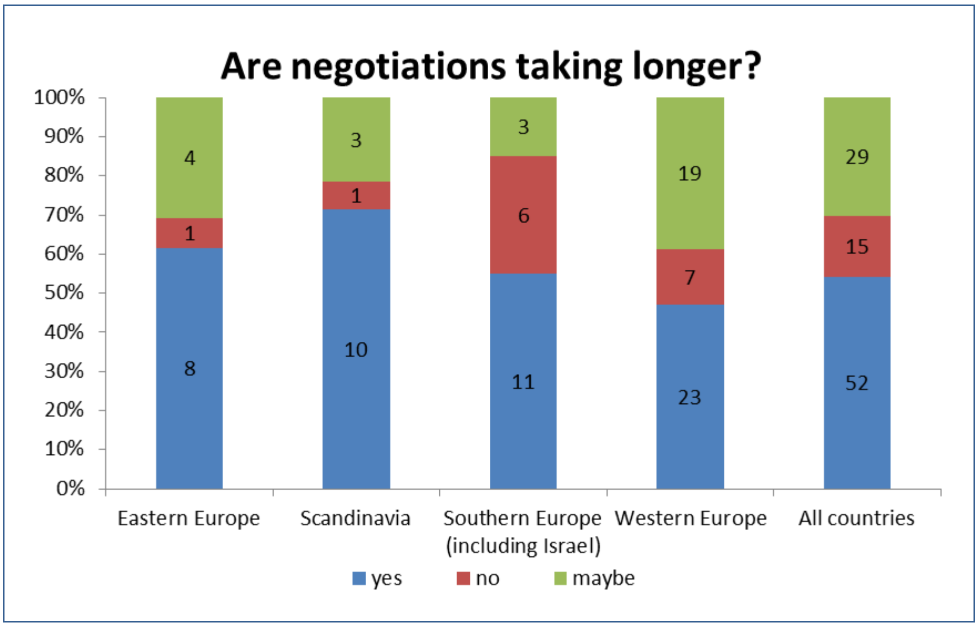
4.5.5 Contract Negotiations

The interviews with PROs and universities discussed specific aspects of contract negotiations. After the feedback from companies that negotiations were generally taking longer (see p. 237), the institutions were asked to comment on this hypothesis. In addition, factors influencing contract negotiations were explored; respondents were asked how negotiations with the corporate sector could be speeded up.

Negotiations are taking longer

The majority of PRO interviewees generally agreed with the companies that interviews were taking longer (see Exhibit 4-35). Nevertheless, almost 15% disagreed that negotiations were taking longer, these included more respondents from countries from southern and western Europe.

Exhibit 4-35: Replies to the question "Are negotiations taking longer?" by geographic region of the PRO



Source: FHNW / Knowledge Transfer Study 2010-2012

Respondents mentioned a number of different reasons for this. The size of the partner in the negotiations, i.e. the corporation or business enterprise, was considered as being a factor by some interviewees; negotiations with larger corporations were quoted as being particularly challenging. Other factors affecting negotiations included the following: centralisation of negotiations, i.e. the more people and offices were involved, the longer it takes to reach conclusion; lack of experience (e.g. in the private sector) or adequate training of KTO staff.

Selected quotes on the factors affecting the duration of negotiations
Sometimes it is more difficult to negotiate with big companies. (Interview 46)
The process is long as well with the large corporations. There have their own ideas about the partner. There can be difficulties also due to a lack of staff and resources inducing a weak reactivity. The faults come from both sides and not just from the university. (Interview 58)

> *The university needs new policies on how to handle contracts and collaborative research with private sector partners. I think it should be mandatory that every contract goes through the central administration our institution. The negotiations should be more centralised. (Interview 48)*
>
> *Sometimes, industry is talking to people who are not used to negotiation, which would lead to a lot of potential conflicts. So what would help is if the company had somebody to talk to in the university that they know and universities should have professionals to talk to the companies. That would make things easier. The problem is really that for instance the language they use at the university and in companies is so different. (Interview 98)*
>
> *I think a lot of the time the experience of the negotiator is important; so for example if the university negotiator has had experience in the private sector, it can have an advantage. (Interview 76)*

Speeding up negotiations: model contracts

Interviews also explored how negotiations could be speeded up and one third of institutions suggested that model contracts are, or would be, an effective way of shortening the negotiation time. Almost one third of universities highlighted the use of model contracts and almost one fifth of interviewees who had not yet had model contracts in use suggested that they should use them or intended to use them in the near future.

> ***Selected quotes on the use of model contracts in negotiations***
>
> *What was happening in Ireland was there were a lot of large-scale collaborations with lots of companies and lots of universities were taking a very long time to negotiate. For some reason it didn't go down the path that framework models have gone, where you have the Deskin model or the IPIC model, the different model agreements. We didn't seem to have a model agreement that worked, because you could have a pharmaceutical cluster, you could have a software cluster and there were different requirements. So we tended to be building agreements from the ground up. And consensus took a long time. The perception was that's the university's fault and there was a set of guidelines that were quite rigid. And I'd say I personally would be concerned that this rigidity will create less agreement, will make it much harder to get consensus than before because in the past you had flexibility, you could say ultimately this is open innovation, let's go with an open innovation model, it's software space, let everyone has non-exclusive rights. (Interview 20)*
>
> *One of the ways that I've heard about are model contracts. Which is what they have in the UK and I've heard they have some sort of initiative in Germany. To have some sort of a basic template for most usual situations. So we have actually used the Lambert guide, not the contracts, because they're in English and it's a different legal system. But the Lambert guide, to help us to make a decision, what would be the best course of action and also to help the researchers understand and industry understand why we are making a certain decision. So something like this can speed up things. (Interview 85)*

Other suggestions mentioned by respondents to speed up the negotiating process included (see also selected quotes below):

- Including the inventor / research as part of the negotiating process thus protecting the researcher's needs
- Not including the researcher as part of the negotiating process
- Model contract to be backed by PROs and private sector
- Model contracts should be as short and simple as possible
- Using the right people (e.g. with legal training) with appropriate experience
- If these people are not available, sharing resources could be considered
- Involving the company at an early stage to pay for preliminary research
- More funding and training for KTT staff

Selected quotes on speeding up the process in negotiations

Moreover when there are 5,6,7 shareholders, it becomes difficult. That is why there should be frame contracts and a fair retribution for the universities. I think the universities do not ask to get everything, a small return at least, something for the researchers to motivate them to work and help the companies; this is a good thing at the end for the society. Maybe Europe should offer a kind of policy in its contracts. (Interview 8)

It's also a very key point, because the inventor must collaborate very deeply in the contract. It's not so common, especially when the inventor is a medical doctor. Because he has a lot of other duties, other things to do. (Interview 45)

Experience of negotiators and training

Braun and Hadwiger (2001) observed that continuous professional development (CPD) of knowledge transfer staff can be a challenge in Europe. Besides CPD of Knowledge Transfer staff being available in only a limited number of countries, it is often inadequate in terms of cost and/ or delivery. The recent European framework which provides new knowledge transfer officers with a qualification will help to address this problem. In addition national and transnational incentives like:

- **The UK "Institute of Knowledge Transfer"** intends to provide a structured career path for KT sector employees
- **ProTon Europe**, a non-profit association representing European Universities KTOs, has the assistance of university – company interaction as one of its key goals
- **Entente, the European network,** dedicated for knowledge transfer in health, with a key aim of promoting transnational collaboration between industry and academia in the health sector.

Interviewees suggested that previous experience of negotiations on both sides, company and academia, is important. Experienced negotiators, depending on the country were considered as a scarce resource (interview 22), while some of these negotiations would also need to be undertaken in English. Many interviewees stressed the importance of KTO employee experience and some suggested that this could speed up the process.

Selected quotes on the influence of experience in negotiations

More people. Could be shared. The trouble is, we can't justify a whole legal person for all the business work. We could share with someone, but it's not easy finding somebody with the quality in France who can speak and write excellent English, because a lot of our legal documents are going to be in English. (Interview 22)

I think experience on both sides is indeed very important. That both parties understand what technology transfer is about and what the basis is for a good collaboration. I think there also has to be a very good fit between what the company wants and what the university professor wants. The vision of what the company wants to achieve in the future has to correspond to what the professor wants to achieve. (Interview 23)

Depends on the experience of the academic if they've been through the cycle many times before, they will know what to expect, otherwise they will need a bit more guidance and handholding. (Interview 64)

I think a lot of the time the experience of the negotiator is important; so for example if the university negotiator has had experience in the private sector, it can have an advantage. (Interview 76)

In a comparison of European and US TTOs, based on econometric results, Conti & Gaule (2010) suggest, that employment of TTO staff with experience in the industry sector is important and appropriate when negotiating licences with the private sector, in particular when negotiating the final clauses of licence agreements. In addition, despite the homogeneity of TTOs in Europe, their analysis (ibid.) suggests that US TTOs do not attach more importance to generating revenue as an objective than their European counterparts.

The skills' experience of KTO staff has been investigated by a number of authors, Siegel et al (2003) recommend that KTOs need highly qualified staff with a low attrition rate. In addition an investment in capability enables more experience in order to work more efficiently as well as to build up trust among the companies (cf. Siegel et al., 2003b). Trust can help to reduce fears that one of the partners will act opportunistically (Dodgson, 1993). Conti et al (2007) showed that the skills mix of a TTO can contribute to its productivity.

Governance by trust versus governance by contract clauses

Trust and face-to-face contact in negotiations was a point mentioned on many occasions in the context of helping to speed up negotiations:

Selected quotes on the influence of trust in negotiations

It might be speeded up, when the company's really interested, just to send one of their team to our university. In one day, you can solve a lot of issues. And I think that having a call over skype or phone is a great possibility, but you should build trust based on personal meetings. (Interview 9)

This depends often whether the researcher knows the company or not and they have worked together previously. The first time it is very difficult in terms of trust. If we had a contract before, it is very easy and the contract is only one page, based on trust. The first time the contract has 10 pages. (Interview 47)

We have looked at this in various ways, and one of the easiest ways of speeding up negotiations, something that we do, is try to organise the meetings to be face to face rather through emails and telephones. That tends to speed up things. You can crack through deals a lot faster. (Interview 63)

19 interviewees commented on different aspects of lawyers being a key factor in the negotiating process. These views including both positive and negative comments of how lawyers can influence the negotiating process. The size of the company was also related to the presence of more lawyers and perhaps even implications that this may present barriers (see text box below).

Selected quotes on the negative influence of lawyers

"But we got lawyers into the case and they started to mess up what we thought was a relatively simple thing. Because of this suspicion, people which we were dealing with were very suspicious and were over-guarding their interest. They tried to put into the contract in many cases things which we thought should not be there, which were not necessary." (Interview 21)

"I think it is really important that all parties are professional. It is not a given that the company is professional. If it's a high-tech company run by engineers…engineers are usually not very professional when it comes to legal stuff, they are very pragmatic. We definitely need to be professional. Not to involve the lawyers in the beginning then people agree what can be done." (Interview 94)

"There is a bureaucracy, of course. But mostly, the problem is that it's too difficult for us to negotiate. Because the industries have important legal offices. And the researcher usually goes on his own to face these lawyers and when he comes home, they killed him, we have to rebuild out of the situation." (Interview 98)

"I don't want to blame our own lawyers and the other party's lawyers but very often it is very time consuming because the lawyer needs a lot of time. If we have a good start-up meeting with the industry partner then we usually get everything clarified in the first meeting and we know exactly what to do…. And we schedule what this is all about and then it is sent to the lawyers; and our lawyers and the external partner's lawyers need months in agreeing on the text." (Interview 56)

"The second way I have tried to speed up negotiations is by trying to avoid lawyers because lawyers will then complicate matters and yes, we are trying to make a deal but we look at risk aspects. Sometimes minutia may come into effect, so lawyers will complicate matters." (Interview 63)

"Having direct contact with the company solicitors is very important. Direct contact between the two negotiation bodies is very important, rather than going through different people." (Interview 19)

"It depends on the company we are negotiating with and the requests of them. Sometimes it is more difficult to negotiate with big companies. Because they are slow, they are full of lawyers who want to impose absurd clauses to our contracts. It's not easy to reach an agreement on our standard contracts. It's a paradox, many times large companies are slower than public administrations like our university." (Interview 46)

However, a few institutions pointed to the positive influence of lawyers on negotiations: some suggested including lawyers early on in the process, while others suggested that lawyers were difficult to find or that too few were employed by universities.

Selected quotes on the positive influence of lawyers

So there are possibilities for improvement if it was possible to engage the lawyers earlier. (Interview 56)

And in my own institution, there's one lawyer. Our institutional income is £280 million or something crazy like that. So this poor girl has to do everything from NHS contracting to spinning out, if I want to do that. So to make it easier, put some bloody lawyers in place. Universities should have legal staff to speed it up. (Interview 24)

The university doesn't have enough lawyers to look at the contracts. (Interview 48)

In line with CoP 10 there is a requirement for PROs to carefully examine the skills of their knowledge transfer staff and their access to professional knowledge transfer services, such as legal, financial and commercial advisors as well as personnel with knowledge of the industry they are dealing with.

4.5.6 Assessment of the commercial value of research findings

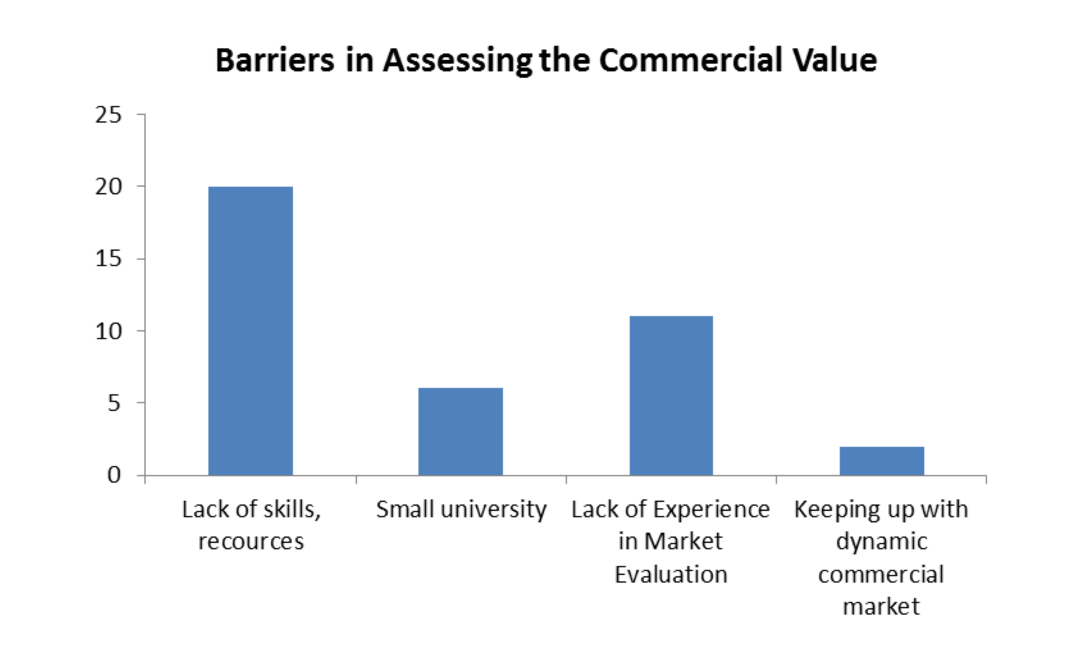
Evaluation appears to be a relatively underexplored area (Lavis et al, 2003). Researchers may find it challenging to assess the commercial value of their invention (Siegel et al, 2003 and Macho-Stadler et al., 2007). Possible reasons include a lack of infrastructure for evaluation, a lack of knowledge of how to undertake such an evaluation, the difficulties associated with undertaking such an evaluation, and concern about how the findings of an evaluation will be acted on (Lavis, Ross, McLeod et al. 2003).

Interviewees highlighted some of the barriers associated with the assessment of the commercial value of research findings. Institutions often found difficulty in establishing the market value of a particular invention and this was linked to the experience and availability of resources at their disposal.

The following barriers were mentioned:

- Lack of skills and resources to undertake market evaluation
- Small university and inability to invest significantly into market evaluation
- Lack of experience in the market evaluation
- Keeping up with a very dynamic commercial market

Exhibit 4-36: Barriers in Assessing the Commercial Value of Inventions



Source: FHNW / Knowledge Transfer Study 2010-2012

We asked interviewees how they undertake their evaluation. The majority of interviewed PROs (52%) use an internal process to evaluate the value of an invention or a research finding. The institutions mentioned different possibilities of assessment, which may be undertaken either internally at the institution or using external sources such as consultants:

1. Use of external experts
2. Use of tools, which may be in operation at a national level

These points were explored in more detail in particular with relation to both barriers and drivers.

Selected quotes on assessment of the commercial value of inventions

We have a very simple model for evaluating IP that is "How good is the researcher, what's his standing as a researcher?" And invariably you'll find that the greater the standing of the researcher, the greater the research and the greater the potential value of the research results. It's a fairly simple model and therefore we use it to identify who our key clients are. You're probably going to have 6-10 people who are going to have the breakthrough and have really valuable IP. We do use external consultants to evaluate the market, we do use tools to determine whether the technologies are incremental, you know are creating a cost-saving in the industry, what is the potential. You can have a general sense of the value of the IP but a specific value is always going to be difficult. (Interview 20)

We could look at, for example, the number of papers, number of sub-contract companies. But in the liaison office, we were mainly concerned that if there was an innovation that could be used outside of the university it was more or less our obligation to get it going. Yes, I think we have an ideal way of assessing, but we should really look at the total activities on this – how many *contracts do you make, how many partners are you working on, how many start-ups and what is the involvement of the university. Use the innovation and get the innovation outside, whichever way you do it. (Interview 21)*

I can't say that we have any good procedures or methods for that. We try to do a market evaluation, but it's very difficult. I don't know how this would be done in an ideal situation. (Interview 48)

There are different ways. We have our own business developers and through the innovation office south, in the matters where we don't have the competences within the university, we can buy the services from business developers from outside. And we have funding to do that. (Interview 51)

It is easier to assess and calculate a value if you can find similar projects that you can compare to. The important knowledge we need to have is market information. We need to be able to calculate the market value. If we bring a certain product or service to the market, then we need to know the value of the market and decide on what kind of market share we expect and that's the value of the product. The most important ideal situation is that we would have good market information. (Interview 56)

4.5.7 Patent/IP-based transfer strategies versus collaboration-based strategies

Knowledge transfer between universities and the corporate sector is based on many different forms of interaction. Interviewees were asked about their transfer strategies in particular about the collaboration and issues of commercialisation as well as exploiting IPR. Agrawal and Henderson (2002) suggested that patent counts do not reflect the overall output of new knowledge and that patenting may play a relatively small role in the transfer of knowledge out of the university. Approximately every fifth respondent in our interviews stressed that collaboration and teamwork with companies are more important than a focus on intellectual property. Indeed Walsh et al. (2003) suggest that the "patent landscape" is becoming increasingly more complex. Saraga, (2007), in an analysis of negotiations in research collaborations between UK universities and companies, stressed the excessive emphasis on IP, when it is often not the most important aspect of the research collaboration. He recommends that university management should encourage a balanced approach to IP negotiations.

There is clear evidence to show that non-patent channels of knowledge transfer such as collaborative research between universities and companies are economically important (Agrawal, 2003; Levy et al, 2009). Collaborative research is the most common form of research partnerships and undertaken at almost all European PROs (see online surveys, section 4.2.9). In the PRO interviews we explored PRO strategies of transferring knowledge and a significant number of PROs mentioned collaborative research and its importance in their overall strategy. There was also specific reference to methodologies and cognitive learning models which foster interaction and collaboration through the use of face-to-face interaction.

Selected quotes on non-patent channels of knowledge transfer

The important part for us is indeed the collaboration with industry. There also know-how is generated that can be patented. This is then used directly. (Interview 1)

KTT is not only about IP but covers a much wider range, about collaborative research, transfer via heads etc. There are other mechanisms in which our University of Technology has historically been very strong … (Interview 7)

I think both under consideration of the financial volume as well as ultimately the transferred knowledge, the main theme of technology transfer and the main issue is the cooperation with companies…. So cooperation with practical partners is key with far more significance than with pure IP. There is more money available, more knowledge is transferred, it is taken over by the university staff, this is also the transfer of knowledge and the regional effects are much larger. (Interview 13)

We're focusing much more on creating value with industry, through framework funding, collaborations in research services. And patents is kind of way down the bottom of the list. (Interview 22)

If anything I would say the shift is more towards collaboration. It's more about funding research rather than making money out of licences. (Interview 37)

And this university has basically been working together with industry for a century, basically, because we're specialised in the green sector, agriculture, biology, genetics etc. So the research has traditionally worked with farmers, industry in that sector, companies in that sector, so it's a very pragmatic, solution-oriented institute. (Interview 86)

Also I'd like to point out the way that research has been extremely successful. Especially since they've put a lot of time and effort into building these arenas, which is what we call "integrated working arenas", we believe in this very strongly, they have been extremely successful. We have cognitive education models for the engineering and business learning programmes. The arenas are built in a way that for our researchers and R&D people and the company workers work together, they sit together and share coffee together and that means that once you get the idea, once you have tested the idea and published this information, it has the advantage that you can move forward and people in other organisations can apply it very quickly in their organisation. So, knowledge being developed at our university can be used in production in companies and other organisations in a very short time after the discovery has been made. (Interview 94)

4.5.8 Encouragement and support of start-ups

Many authors suggest that it is appropriate to devote more attention to the focus on entrepreneurship in technology transfer (Wright et al, 2004). Our interviews suggest that in line with CoP 8, KTOs are considering types of possible exploitation mechanisms (such as licencing and spin-off creation) and are positioning themselves more as key commercialisation partners (see also the online surveys, section 4.2.7).

56 interviewees spoke about the active support for start-up companies in a variety of different ways. Of these 20 are active in either collaborative start-up activities with external partners. 4 institutions mentioned the use of entrepreneurship centres and innovation centres which may also be embedded at regional level with a focused business

model. Institutions mentioned the use of external offices or organisations which support start-up activities. 5 interviewees whose institutions had not yet had any activities in the field of start-ups also confirmed their intention to do so in the near future. Finally, the effective organisation and leadership of the entrepreneurial and start-up activities was emphasised by a number of PROs as being important.

However, establishing the focus on start-up and entrepreneurial activities is not without its challenges. Some of the barriers mentioned in the context of encouraging start-up activities at PROs included the challenge of the PRO researcher who may not be familiar with the world of commercialisation. Lack of professor entrepreneurship was mentioned as a challenge by a small number of interviewees.

Comparing entrepreneurial and academic characteristics, Jain et al (2009) emphasise that entrepreneurial orientation will typically require intense single-mindedness of effort "a short-term focus" and an emphasis on profit (see Table 4-18 below). They observe that this typically requires research scientists to create a hybrid role identity in which they 'overlay elements of a commercial orientation onto an academic one' (ibid) and the differences between scholarly and commercial logics are becoming blurred (Owen-Smith, 2003).

Table 4-18: Academic and entrepreneurial role identity compared

	Academic	Entrepreneurial
Norms	Universalism Uniqueness Disinterestedness Scepticism	Universalism
Processes	Experimentation Long-term orientation Individualistic / Small group	Focus Short-term orientation Team management
Outputs	Papers Peer recognition/status	Products Profits

Source: Jain et al (2009)

There are indeed general conclusions and implications. Start-ups can be stimulated by creating an appropriate culture to encourage academic entrepreneurship and commercialisation. Consideration of science parks as a way of providing an appropriate environment should be carefully considered. The use of the innovation centre or a business incubator is a way to facilitate and stimulate technology commercialisation. Phan and Siegel (2006), suggest that incubators appear to work best when the university is an "entrepreneurial university" with a complementary innovation system, which includes academic entrepreneurs, science parks, incubators and angel networks.

Clarysse et al. (2005) recognize three types of university incubation approaches; each with different resource requirements:

- the support of a small number of high-potential start-ups aimed at becoming global businesses, which generate significant capital gains.
- an incubation approach which focuses on businesses that already generate revenue streams,
- a focus on a larger number of smaller consultancy and service businesses that generate local employment.

Most importantly, universities should match their commercialization and spin-off objectives with appropriate resource-capability mixes, with realistic consideration given to their science and technology base (Markman & al., 2008). A number of interviewees echoed the requirements for KTOs to adopt a more customised approach to the incubation of different types of spin-offs. So some universities could follow a fairly narrow strategy focusing on world-class innovations (Thornhill and White, 2007) while others, perhaps the majority, should pursue a more modest approach developing broader innovations that are more appropriate in a regional and local context (Clarysse et al., 2005).

Selected quotes on the support of start-ups

Within our School of Technology, we have a spin-out, type of joint-venture company, called the […] Innovation Centre. Made up from professors and inventors, where they take areas of products or processes that are quite innovative, mainly products, and then they look at it in a commercial manner. So we look at making a connection, setting up deals, patents, licences, whatever it may be, with them. (Interview 72)

We have a partnership, in terms of a spinout activity, with the London-based IP group. What it does is an early stage investor and pre-investment sounding-board for a lot of our spinout opportunities. And they bring forth both capital for investment and a lot of expertise that we can tap into. We're one of ten universities in UK that has this tie-up with the IP group. (Interview 73)

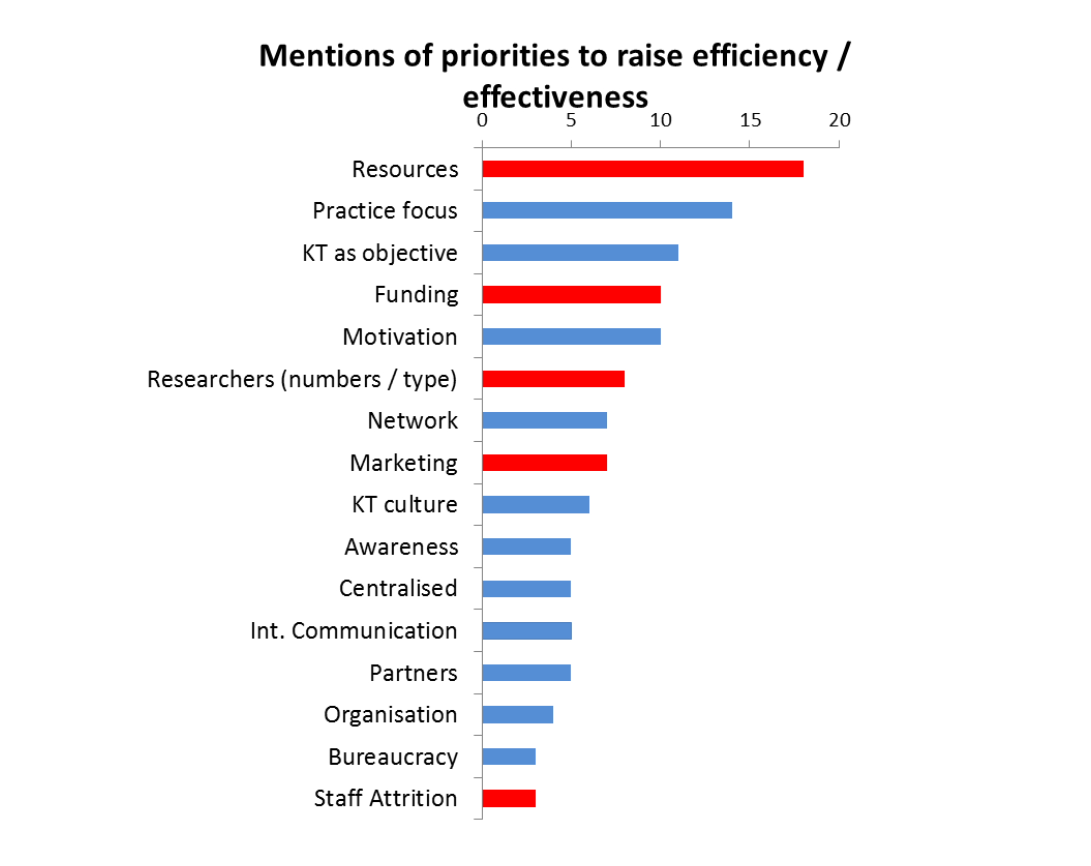
We have an intellectual property share policy, which governs the royalty that the university will share royalty income with inventors. With regard to start-ups, we don't. It is a case by case for the licencing technology into start-ups. (Interview 87)

At the moment, what's important for my institution is the support of new enterprises for young people, this is a value of the institution. Even if we don't have big revenues. Sometimes we have a share in these new enterprises, but we don't have the mission to have a new Google enterprise. It's not a goal of the office. What is important, is to support these new enterprises, for example, and to give them advice. For example, as a university we can only have a maximum of 10% of the share of the capital, which is about 2000 euros per company. The spin-off companies of the university are not only companies that will make big revenues in future. Sometimes, we know that the companies will just have 'normal' revenues and not the big winners of the market. At the moment, it's not an issue. I think the big issue will be to demonstrate to the region that our research is also important to the 'normal' people on the street. (Interview 97)

4.5.9 Perceived institutional priorities for efficient and effective knowledge transfer

There have been studies of the efficiency and effectiveness of university technology transfer (Owen-Smith & Powell, 2003; Siegel et al., 2003). Our interviews included an exploration of effective and efficient knowledge transfer at the interviewees' institution and suggestions were requested as to how knowledge transfer could become more effective and / or more efficient (see Exhibit 4-37). Those priorities that have a direct link to financial needs are highlighted in red.

Exhibit 4-37: Priorities suggested by interviewees to raise efficiency/effectiveness of their institution's transfer activities



Source: FHNW / Knowledge Transfer Study 2010-2012

The need for knowledge transfer to be defined as a key objective and financial commitment by institutions was mentioned by 10 different interviewees as a key priority of focus. The specific mention of researchers not being able to dedicate enough of their time to knowledge transfer because of other priorities such as teaching and publications was considered as a barrier by 4 interviewees. 14 different institutions mentioned the need to be closer to practice and industry.

The need for more funding both at national level and university level was mentioned as an important priority by 10 PROs, this was also emphasised by a significant number of interviewees who suggested the need for more incentives to motivate research staff to focus on knowledge transfer activities, i.e. the overall model.

Motivation of research staff or the system itself was perceived as a priority in 14 institutions. It was also suggested that researchers should be educated on the need to understand the relationship between funding and innovation in knowledge transfer.

6 interviewees highlighted the need to focus on KT culture and the challenge of developing this culture, which was perceived as often being caused by a general overall lack of awareness of KT within the faculty.

Awareness measures by KT staff was dealt with separately (see p. 201), however the need for more awareness as a priority was mentioned on 12 separate occasions. Awareness may be lacking in faculty or in industry.

As well as internal communications being a driver to develop trust and confidence between researchers and KTO staff (5 mentions), KT as a management strategy was also considered as being a priority by 7 interviewees. In addition, the organisation of KT within the overall university structure was perceived as an important priority by 4 of PROs.

A general lack of faculty resources was highlighted by 19 interviewees and in some cases those resources were perceived to be unduly stretched with an unnecessary administrative burden. Overall bureaucracy was perceived to be a barrier in 3 institutions.

The requirement to facilitate knowledge transfer by focusing on collaborations and relationships with business practice was suggested as being a priority by 8 interviewees. In 2 cases regional collaboration was mentioned as a priority. As well as a need for the careful selection of the right partners; those that will provide a sustainable long-term and trustful relationship was considered as a priority.

4.5.10 Summary of the interviews with universities and other PROs

A few points of key importance for being successful in the area of knowledge and technology transfer resulted from these interviews. They are briefly summarised in this section.

1. *Relationship between KTO funding and staff is crucial.* In the interviews, KTO funding was repeatedly mentioned as a barrier to more transfer success. A general lack or little stability of resources have many negative effects: KTOs need to look and apply for resources, e.g. in the form of project grants, which takes away time from their main tasks of managing the institutional IP and transferring knowledge and technologies to users outside academia; KTOs will limit their activities and focus on the early steps of the KTT value chain, the identification and protection of institutional IP, neglecting later steps, in particular technology marketing and scouting in industry. Most importantly, funding problems reduce the attractiveness of KTOs as employers, as remuneration and possibilities for career advancement will be rather low. At the same time, KTO employees need to bring many different competencies and qualifications to their jobs: they need to have a good technical understanding of their fields of activity, and corresponding training and degrees (in engineering, biomedicine etc.) – as also mentioned in the CoP – are essential; as brokers KTO staff needs to be able to understand the interests of scholars and faculty as well as the needs of managers and engineers and know the industry in order to be effective in assessing the commercial potential and value of an invention, helping to find users/customers for their technologies, negotiating and concluding contracts and the like; in the best case they also know the stumbling blocks of start-ups and are able to understand and support entrepreneurial faculty and students – therefore it is logical that industry experience has been found as an important asset of transfer staff (Conti & Gaulé, 2008).
2. *Formal collaboration between PROs in the area of IP/KTT is still in an early stage of development.* Virtually all PROs collaborate informally on IP/KTT issues and exchange information, share good practice, lobby towards their political decision-makers, or hold joint workshops and seminars; many KTOs collaborate with or subcontract to external service providers for instance to draft patent applications, provide start-up support, or obtain other services not available internally. However, formal, contract-based collaboration among PROs are still rather an exception: few interviewees pointed to it, and more advanced collaboration types as IP/patent pools are rarely found. Cross-institutional collaboration could have several advantages: PROs could specialize on certain activities, realise scale economies and reach critical mass; they would increase their reach and create links to partners in industry (and academia) outside their existing networks. It would contribute to the professionalization of the trade and a more varied institutional landscape, which is still very much dominated by

the small internal office of the university board or administration (85% of all PROs are internal and two third had 8 or fewer full-time equivalents of staff). Of course, collaboration also creates some costs, entails a loss of control and self-sustainability and eventually places additional distance to the internal audience of scientists and faculty. But still, in the light of the survey finding that small KTOs are less versatile in regard to their KTT principles and practices. It would make a lot of sense for them to further explore the possibilities of collaboration.

3. *Having a written and published licensing policy has advantages as well as disadvantages.* The EC Code of practice states in its principle 10 that PROs should "[d]evelop and publicize a licensing policy, in order to harmonise practices within the public research organisation and ensure fairness in all deals." Only few PROs have done this, as the conducted online surveys found out. In the interviews, the KTOs pointed out that the main reason was that without a licensing policy they were more flexible and negotiations could be conducted on a case-by-case basis. In addition, communicating the principles of their licensing practice also to their partners in industry would weaken their position in negotiations. Another important reason was that a meaningful licensing policy would need to be quite detailed and complex to accommodate the large variety of possible issues which in turn decreases the main advantage of having it, transparency towards the stakeholders involved in KTT.
4. *Using model contracts, collecting experiences and developing trust can speed-up contract negotiations.* The frequent complaint from the company interviews in 2011 that contract negotiations with PROs have become longer and more complex over the years was followed up in the PRO interviews. The majority of PROs agreed to this opinion as well. They suggested three main roads to speeding up negotiations: 1) Developing and using model contracts which are backed by PROs and the private sector/industry associations and provide a widely accepted basis for the different types of arrangements; 2) building up negotiation experiences and using staff with such experience and good knowledge of the constraints and needs of the other sector in negotiations; 3) developing trust among the involved parties and reducing the importance of the legal perspective in favour of a technology- and competence-related perspective. The latter is not a plea for being naïve about the importance of contract clauses and contractual arrangements, but more the insight gained by our interview partners that in R&D and innovation projects not all eventual developments and pathways can be foreseen and taken into account up front in the contracts. However, if trust prevails and the parties accept that eventualities will be dealt with in a cooperative and mutually supportive manner, then lengthy haggling about eventually minor contract clauses would not have to take place.
5. *KTOs role in transfers not based on IP/patents is a difficult one.* In the majority of European countries with an institutional ownership of the Intellectual Property resulting from academic research, KTOs are the guardians of this institutional IP. Their role in transfer channels not primarily based on IP is influenced by this. R&D collaborations, contract research, and consultancy services were mentioned in the interviews with KTO managers as more important transfer channels than licensing out internally generated IPRs. However, these activities are fully within the responsibility of faculty and staff and KTOs can do little to support them, except for influencing the framework conditions (as outlined in the CoP principles 15-18). In regard to start-ups, they have few tools and means to influence as well: first of all, fostering entrepreneurial spirit and generating an entrepreneurial culture are institutional, regional or even national tasks and heavily influenced by other systems outside higher education and public research. Incubators and other supportive infrastructure are of little use without a steady flow of academic entrepreneurs. Second, as parts of the university administration, KTOs are not really close to the business sector themselves (which many try to remedy by outsourcing their start-up support activities). Third, for one of the most pressing problems of start-ups and academic

entrepreneurship, the provision of seed and venture capital, PROs usually lack instruments and resources.

4.6 Interviews with companies in R&D-intensive sectors

Introduction

This chapter presents the results of interviews with 59 European companies in R&D-intensive sectors. In the first section we briefly describe the population and the selected sample of companies. Section 4.6.2 presents the survey approach and gives an overview of the responses. The following section briefly describes the interviewed companies mainly in regard to their internal R&D activities taking data from the interviews and the European Industrial R&D Investment Scoreboard (http://iri.jrc.es/research/scoreboard_2010.htm). Sections 4.6.4 to 4.6.7 present the results of the interviews, starting with an overview of the geographical scope of cooperation with the public research sector and the mechanisms of cooperation and KTT. In section 4.6.6 we discuss at length the incentives and barriers to knowledge and technology transfer, their overall importance, connection to countries or regions, and relevance for different types of companies. Section 4.6.7 relates the interview content to the European Commission's Code of Practice and presents the trends and changes in IP management and KTT practice as perceived by the interviewed companies. The last section 4.6.8 summarises the findings and selects a few key points which will provide input for policy decisions.

4.6.1 Population and sample of firms

The task of the company interviews was to obtain information from at least 50 companies from R&D-intensive sectors, who themselves invest a high percentage of their turnover in R&D. The population of companies from which the sample was selected consisted of all European companies – EU member states plus non EU countries associated to the 7th Framework Program – included in the 2010 EU Industrial R&D Investment Scoreboard.

EU Industrial R&D Investment Scoreboard 2010

"The 2010 'EU Industrial R&D Investment Scoreboard', released in October 2010, presents information on the top 1000 EU companies and 1000 non-EU companies [1] investing in R&D in 2009. The Scoreboard includes data on R&D investment along with other economic and financial data from the last four financial years.

The data for the Scoreboard are taken from the companies' latest published accounts, i.e. the 2009 fiscal year accounts and indicate the R&D invested by companies' own funds, independently of the location of the R&D activity."

[1] The term 'EU company' concerns companies whose ultimate parent has its registered office in a Member State of the EU. Likewise, 'non-EU company' applies when the ultimate parent company is located outside the EU (see also in the Annex the glossary and definitions as well as the handling of parent companies and subsidiaries).

(http://iri.jrc.es/research/scoreboard_2010.htm)

An industry-level analysis of the 2009 Scoreboard – the 2010 Scoreboard was not yet available then – revealed, that the most R&D-intensive sectors were by far the

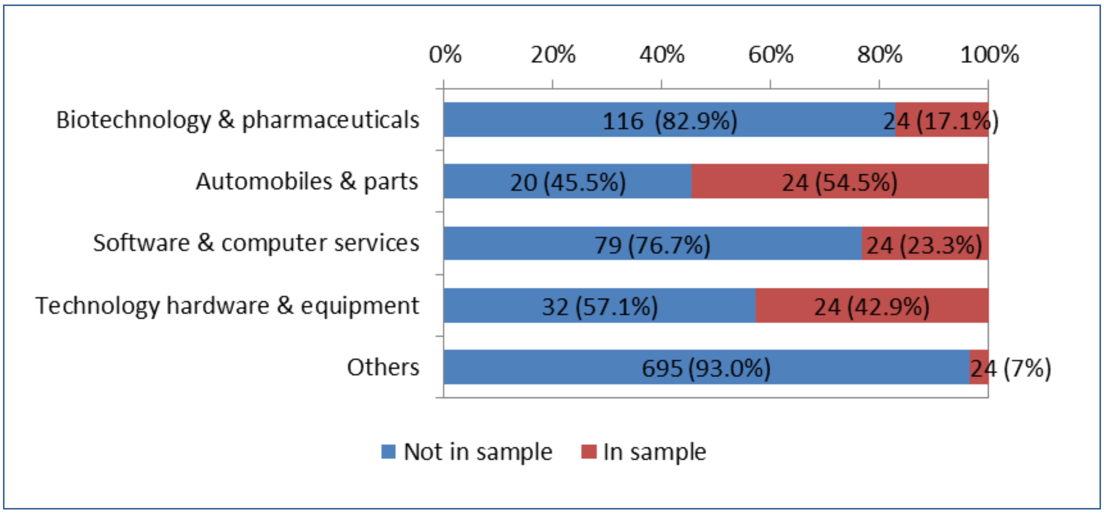
Biotechnology and Pharmaceuticals (16.3%) and Technology Hardware and Equipment (13.6%) industries. Software and Computer Services ranked third (8.1%). The Automobiles and Parts sector had only the sixth highest R&D intensity 2008 (5.2%), but, due to many large companies, it ranked second in regard to total R&D expenditures in 2008. Therefore, the following 4 sectors were included as core sectors of the sample: Biotechnology and Pharmaceuticals, Technology Hardware and Equipment, Software and Computer Services, Automobiles and Parts.

To be invited to participate in the study, companies should satisfy four criteria:

- High R&D intensity measured as R&D expenditures divided by net sales 2009,
- Distribution across all 4 selected sectors plus a small set of companies from other sectors,
- Distribution across several European countries, including some companies from non-EU countries,
- Distribution across different size classes in terms of employment and R&D spending.

In total 343 of the companies in the scoreboard from the 39 countries – EU member states plus non EU countries associated to the 7th Framework Program (FP7) – are from the 4 "core" sectors and 719 are form other, "non-core" sectors. Exhibit 4-38 shows the distribution of companies by sector. The 120 companies in the sample come mainly from the core study sectors – 24 per sector. In these core sectors between 17% (24 out of 140 in biotechnology & pharma) and 55% (24 out of 44 in automobiles & parts) of all companies in the scoreboard were invited. In the non-core sectors (other industries) only 7% of the companies (24 out of 719) received an invitation to participate.

Exhibit 4-38: Scoreboard 2010 companies by sector and inclusion in the sample



Source: FHNW based on EU Industrial R&D Investment Scoreboard 2010.

The large majority of companies in the sample have their headquarters in one of the 27 EU member states, 87 from the core sectors and 22 from non-core sectors. The 87 sample companies add up to more than one quarter of all EU companies in these four sectors. From the 12 associated countries we included 11 companies (9.25%).

4.6.2 Survey approach and overview of the responses

The 120 companies in the sample received an invitation to participate in the study and contribute with a telephone interview of 30-45 minutes expected duration. The invitation was sent to contact persons in the area of R&D and university cooperation whenever possible. A set of 41 addresses from IPTS of contact persons who had agreed in a previous study to be contacted again could be used. For the remaining 79 companies either contact persons in the area of R&D or general company addresses were searched on the internet. After two pilot interviews in April 2011, the remaining companies were invited between May and August 2011 to participate in the study.

First contact was in the majority of cases established by email (90 companies); postal mail (26 companies), telephone (2 companies) and personal contact (2 companies) were of less importance. All written invitations were accompanied by a support letter from the EC and a privacy statement. Companies not reacting to the first invitation were approached by telephone (58 companies could be reached) and/or received a second invitation by email. Out of the 120 invited companies, 65 agreed to participate (51.4%), 11 rejected the invitation (9.2%); one company was excluded, as it had been acquired recently by another participant to the study; from 43 companies (35.8%), a final answer could not be obtained.

Interviews could be scheduled and conducted with 60 of the 65 companies which upfront had agreed to participate (50% of the sample).[31] As Table 4-19 shows, the distribution of interviewed companies by sector is fairly even. Companies are on average rather large with 83mEUR R&D expenditures and 7'000 employees in 2009. Only 8% of all interviewed firms were SMEs.

Table 4-19: Interview respondents by industry

	N	Median R&D investment 2009 in mEUR	Median R&D-intensity 2009 in %	Median employees 2009	Share of SMEs
Biotechnology & pharmaceuticals	13	131.7	16.2%	3‘875	15.4%
Automobiles & parts	11	106.9	5.4%	10‘031	0%
Software & computer Services	10	18.7	13.9%	1‘316	20%
Technology hardware & equipment	15	93.9	15.2%	2‘119	0%
Other industries	11	81.0	1.3%	28‘165	9.1%
Total	60	83.0	12.1%	7‘036	8.3%

Source: FHNW / Knowledge Transfer Study 2010-2012

All in all companies from 17 countries were interviewed. The largest shares were from Germany (12 companies), the UK (8), Italy, Denmark and the Netherlands (each 5). Overall Western European companies constitute the biggest part (57%), but one fifth are from Scandinavia and one fifth from the South of Europe. Only one company from Eastern Europe could be included.

[31] We gratefully acknowledge the contributions from: CIE Automotive, GKN, KTM Sportmotorcycle, MAHLE, Tofas, Piaggio & C. Spa and 5 further firms from the automotive sector; Chiesi Farmaceutici SpA, Krka, Novartis, Novo Nordisk, Pharming Group, Recipharm and 7 further firms from the biotech/pharma sector; Amadeus IT Group, F-Secure, Indra Sistemas, Novabase, Readsoft, SAP, Systar, TXT e-solutions and 2 further firms from the software sector; ADVA Optical Networking, ARM, ASM International, ASML, austriamicrosystems, Ericsson, Infineon Technologies, Nokia, NXP Semiconductors, Option, STMicroelectronics, SUSS MicroTec and 3 further firms from the technology hardware sector; Isra, Plastic Logic, SNCF and 8 other firms from a variety of other sectors. The unnamed firms wished to remain anonymous.

The large majority of interviews, 54 out of 60, were conducted by telephone or Skype; 6 interviews were conducted face-to-face. In all but one case the interviews were carried out by one senior team member (the first interview was done by two interviewers). Usually interviews were conducted with one interview partner from the company; in few cases one or two further company representatives contributed. Average interview duration was 45 minutes. All interviews were recorded and fully transcribed, except for one which was of extremely poor quality and not processed further. The resulting 59 transcripts were sent back to the interviewees with a request for validation and authorisation to which roughly two third replied. All interview transcripts were then uploaded into software for qualitative data analysis (Atlas.ti) and coded by the two senior team members. The coding scheme was jointly developed and several interviews were coded by both and discussed to ensure a common understanding and consistent implementation of the code system.

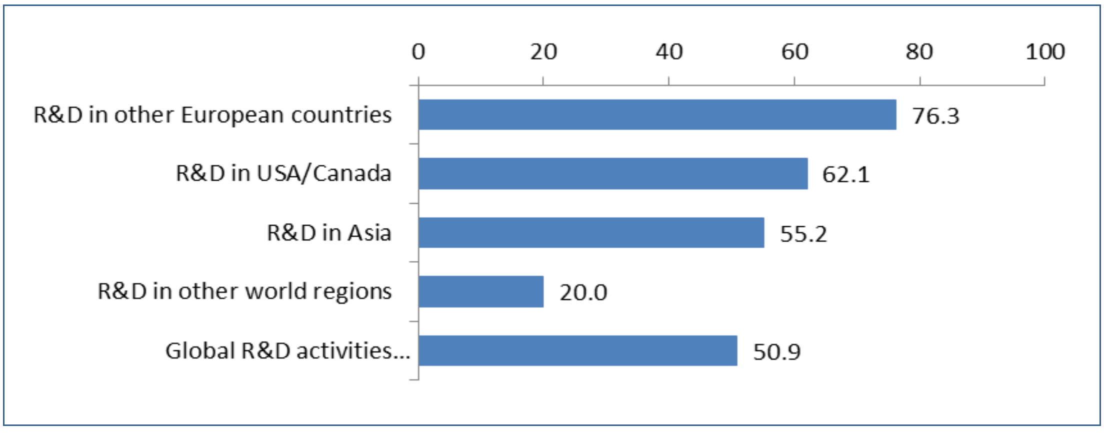
4.6.3 Research and development activities of the companies

In terms of their own research activities, the interviewed companies invested on average 83 mEUR (median value) in R&D in 2009. Their average R&D-intensity was 12.1% (R&D expenditures divided by net sales) (see Table 4-19 above). On average the largest amount was spent by the companies in the biotechnology & pharmaceuticals (132 mEUR) and automobiles and parts sectors (107 mEUR). R&D-intensity was highest in biotechnology & pharmaceuticals (16.2%) and technology hardware & equipment (15.2%) sectors.

Geographical scope

All interviewed companies conduct R&D in their "home country", i.e. their country of origin and usually headquarters. A majority of the companies stated in the interviews also that they have R&D activities in other European countries (see Exhibit 4-39). Roughly 60% of the companies carry out R&D in the US or Canada and still more than 50% in Asian countries. R&D activities in other world regions (Australia, Latin America, or Africa) were less common. On average, companies stated to carry out R&D activities in 5 countries including their home country. Half of the interviewed companies can be considered global players in regard to their R&D with activities in Europe and at least two other continents. The global extension of internal R&D is a function of company size and firm location: large companies from Northern and Western Europe more often conduct R&D at global level and in a larger set of countries than small and medium-sized companies from Southern or Eastern Europe.

Exhibit 4-39: Scope of R&D activities by world regions (N=57)



Source: FHNW / Knowledge Transfer Study 2010-2012

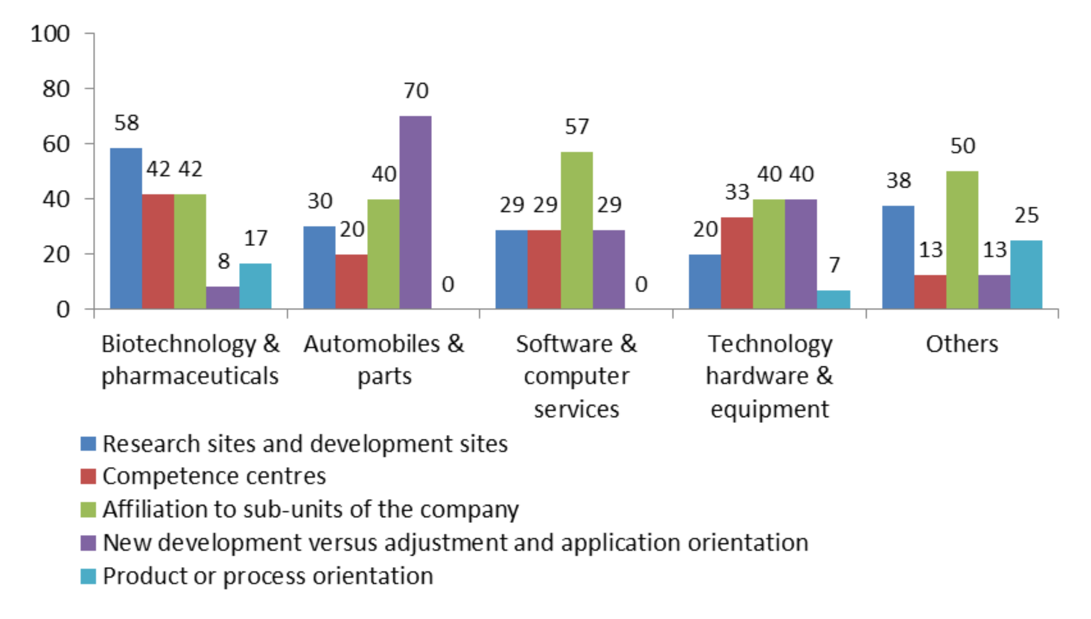
Division of labour and coordination of R&D

Companies were also asked about the structure of their R&D organisation with respect to two issues:

- the division of labour between the R&D sites,
- the degree of central coordination of the R&D activities.

Ad a) Division of labour of companies' R&D activities. Companies answering this question pointed often to a separation of R&D activities by business division or other sub-unit of the company (44%) or they distinguished between research sites and development sites (35%) in which projects are handed over from research to development teams. Nearly equally important is a division between new or forward looking development and R&D targeted at existing products or services and their adjustment to local markets (33%). Less frequent are set ups in competence centres (29%) and a distinction between product and process orientation (10%). There are slight variations across industries in regard to the importance of the different organisation principles (see Exhibit 4-40).

Exhibit 4-40: Division of labour of companies' R&D activities by industry (N=52, multiple responses possible)



Source: FHNW / Knowledge Transfer Study 2010-2012

Ad b) Central coordination and autonomy of R&D. The interviews permitted an analysis based on the degree of centralization and autonomy of R&D in a company for roughly 70% of the interviewed companies. The majority of respondents stated that their R&D sites are centrally coordinated (58%) and only one out of six pointed to considerable autonomy of the sites over the content and type of projects that they execute.

Dynamics of internal R&D

Interviewees were also asked about the dynamics and trends of their internal R&D. Roughly 60% of the companies pointed to growing R&D activities, either as a result of internal growth or due to acquisitions of companies with R&D activities. Internal growth takes place above all in Asia: in particular China and India were selected by several interviewees as countries with new and/or growing R&D centres, but also Singapore, Malaysia or Vietnam were mentioned. Russia and Romania also came up in 2-3 interviews as European locations with growing R&D efforts. Only in a few cases was growth in

Asia/Eastern Europe connected to reductions at other sites. Growth of internal R&D in connection to an acquisition usually meant growth at European and/or US locations. In several companies internal R&D activities had undergone reorganisation in the recent past, for instance resulting in a concentration of R&D sites, different set-up of responsibilities or the like. While a few companies mentioned dips in their R&D activities in the wake of the financial crisis 2008/2009, only one company experienced a significant reduction due to a structural crisis.[32]

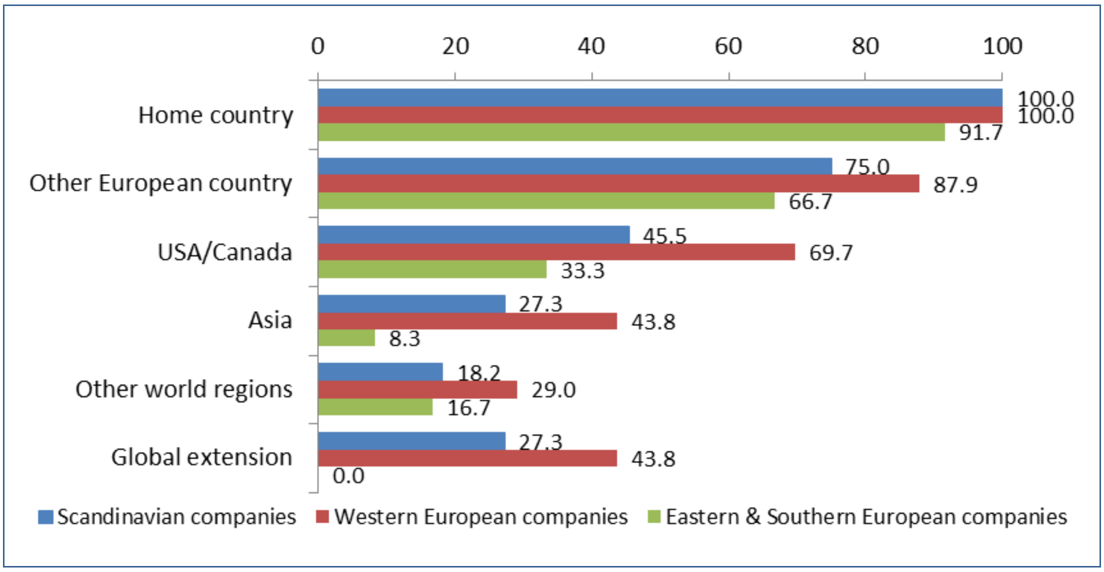
4.6.4 Geographical scope of the cooperation with the public research sector

Collaboration between academic institutions and industry is supported by spatial proximity (Arundel & Geuna, 2004; Audretsch & Stephan, 1996; Jaffe, Trajtenberg, & Henderson, 1993). Hence, practically all companies pointed to their home countries when asked about the locations of their public research partners (54 out of 55 or 98%). Cooperation with PROs from at least one other European country was also quite usual and found in four out of five companies. With PROs in North America collaborate 57% and with Asian PROs one third of the respondents; one quarter are involved in partnerships in other world areas. All in all 31% of the interviewed companies have partners in the public research sector in Europe and at least two other world areas, making them global players in this respect. Most frequently the interviewees mentioned China (including Hong Kong), Japan, Korea and India among the Asian countries and Australia and selected countries in Latin America (Argentina, Brazil, Mexico) among the other countries.

We see some notable differences of the global extension of R&D between different types of companies: Those from countries in Western Europe are more often globally active than those companies from the South and East (see Exhibit 4-41). Only one out of 12 companies from Eastern or Southern Europe who answered this question had a cooperation with an academic partner from Asia and none with partners from Europe and at least two other world regions. Differences also exist between different company sizes – the larger a company the wider the geographical distribution of its public research partners.

[32] Contrasting this to the R&D Scoreboard data we see that the interview statements might have been too positive, as 6 (11%) of the interviewed companies reduced their R&D spending between 2006 and 2009 by more than 5% according to the Scoreboard; however, the Scoreboard data also clearly points to a growth trend: 39 interviewed companies (70%) increased their R&D spending by more than 5% between 2006 and 2009 and 11 companies (20%) stagnated (-5% to +5% change of R&D expenditure, no data for 4 interviewed companies, own calculations based on data from the EU Industrial R&D Investment Scoreboard).

Exhibit 4-41: Location of partners in public research by origin of the company (in %, N=55)[a]

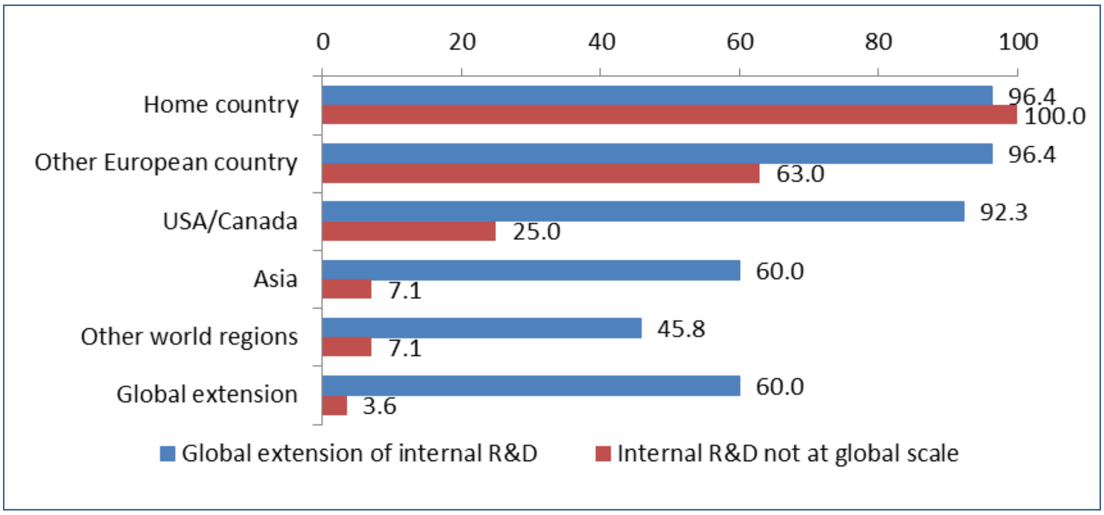


a Eastern and Southern European companies were added due to small numbers.

Source: FHNW / Knowledge Transfer Study 2010-2012

The geographical scope of the partner network bears a relationship to the geographical scope of internal R&D, as companies tend to look for collaboration partners close to their own R&D locations. In sum, companies which have their own R&D globally distributed also have a wider geographical set of collaboration partners (see Exhibit 4-42).

Exhibit 4-42: Location of partners in public research by geographic scope of internal R&D (in %, N=53)



Source: FHNW / Knowledge Transfer Study 2010-2012

4.6.5 Mechanisms of cooperation with the public research sector and KT

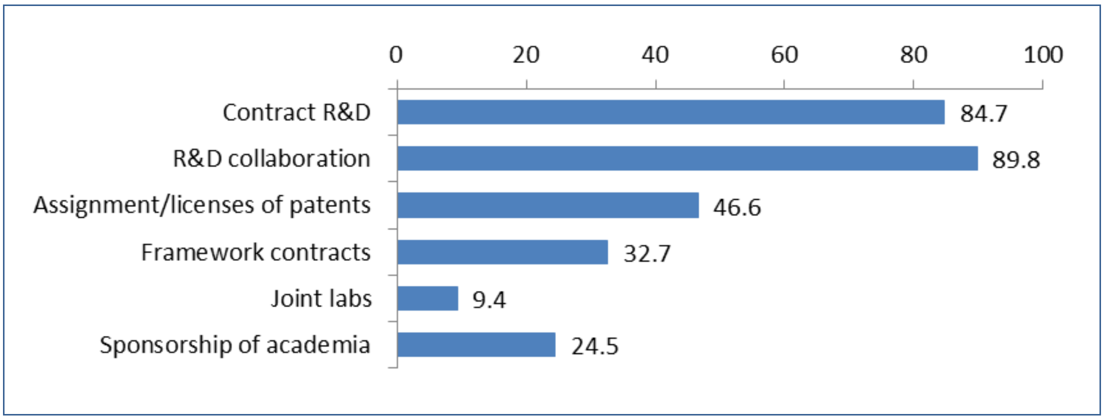
An important part of the interviews dealt with the mechanisms or methods of collaboration with the public research sector or, in other words, the channels of knowledge and technology transfer. The use and importance of different formal channels, based on contracts between organisations, and informal channels was assessed. In addition, the dynamics and changes of importance of formal and informal collaboration mechanisms were discussed.

Of course, the distinction between formal and informal mechanisms is mainly analytical and many companies pointed to the fact that, in practice, these are often interrelated and even complementary.

Formal mechanisms of cooperation

Among the formal mechanisms, contract research and collaborative research are clearly the most important mechanisms for obtaining knowledge from the public research sector. A large majority of the interviewed companies had used them recently (see Exhibit 4-43). The assignment or licensing of academic patents, sponsorship of academic activities and more long-term framework contracts were only mentioned by a minority of the interviewees. Joint labs are not common.[33]

Exhibit 4-43: Formal mechanisms of knowledge and technology transfer (in %, N=59)



Source: FHNW / Knowledge Transfer Study 2010-2012

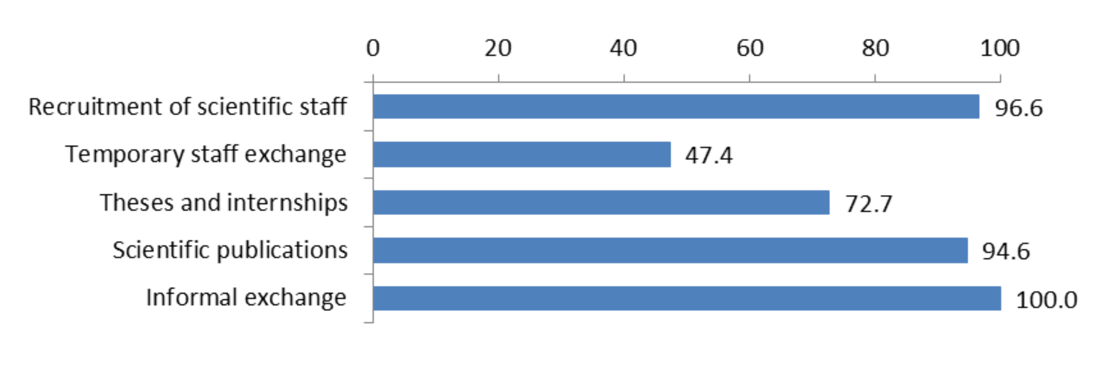
Several of the formal mechanisms were more often used by larger companies in the sample. In particular assignments/licences of academic patents, framework contracts and sponsorship of academic activities is only common among the largest companies in the sample. In addition, contract research is notably more common among large firms. Further variations exist between industries: obtaining technologies by means of purchasing or licensing patents is mainly used in the biotech & pharmaceuticals and hardware sectors; automotive companies and suppliers and software and computer services companies rely on this mechanism a lot less often. Only three companies had no formal relations to PROs, all of them companies in the software and computer services industry and all of them having less than 4000 employees.

Informal mechanisms of cooperation

Informal mechanisms of interaction with the public research sector were not the core content of the interviews but a few questions were asked and issues were picked up in passing. They are widely used across the board (see Exhibit 4-44) and were classified by some interviewees as first steps in co-operations which then become formalised. Virtually all interviewed companies see the recruitment of qualified staff, the reading of scientific publications and informal exchanges (at conferences etc.) as legitimate channels to obtain knowledge. Only temporary staff exchange was less widely used.

[33] Spin-offs were not included among these mechanisms, as we expected that not many of the interview partners would be able to relate spin-offs to their company.

Exhibit 4-44: Informal mechanisms of knowledge and technology transfer (in %, N=59)



Source: FHNW / Knowledge Transfer Study 2010-2012

4.6.6 Incentives and barriers

Incentives for and barriers to cooperation with the public research sector: overview

Incentives for as well as barriers to cooperation with the public research sector were discussed at length in the interviews. Still, the frame of reference was not the same in all responses. Some interviewees answered the question as it was asked; others compared partners in their country with foreign partners, partners in universities with partners in other types of PROs, or public sector research partners with partners in the private sector. In some answers the origin of an incentive or barrier was the key issue, e.g. governmental funding rules, specific university infrastructure, lack of capacities in the company; others focussed more on the type, such as technical or cultural, and again others stressed the position in the innovation process, for instance setting the theoretical basis and generating understanding of fundamental issues, technical proof-of-concept, proto-typing etc.

We opted to differentiate incentives and barriers (I/B) mainly by their type and distinguish between nine different types (all these types of I/B have been found as influential in previous studies on the topic, see the cited literature in the text box):

- Competence-related I/B refer to accessing knowledge and skills, the experience with university-industry collaboration and transfer;
- technical I/B address the quality, relevance, or usefulness of research results and technology;
- informational I/B include in particular the existence/lack of information on (potential) partners or interesting research;
- financial I/B refer to revenues and costs and obtaining funding;
- organizational I/B refer to capacities (personnel, instruments, substances), coordination between organisations, negotiations and contractual arrangements;
- legal I/B cover the laws and regulations which govern interactions and transfers;
- sociocultural I/B are related to differences of cultural characteristics, habits, traditions and practices between science and business;
- spatial I/B cover the proximity or distance between organisations;
- other I/B cover issues not fitting into any of the other categories, such as strategies, business models.

Findings on incentives and barriers in the KTT literature

Competence: The main incentive for business enterprises to work with universities and other PROs is their contribution to solving problems which cannot (or not as fast or good) be resolved internally or with other partners and to the understanding of fundamental business-related issues (Bishop, D'Este, & Neely, 2011; Cohen, Nelson, & Walsh, 2002).

Technical: An uncounted number of studies have looked at the role of technologies and other research results in KTT. The properties of a technology such as the innovativeness, degree of codification, development stage, complexity or cost determine whether business enterprises are interested in a transfer and whether the transfer is sticky, i.e. needs to overcome many barriers to be successful (Barjak, 2011; Goldhor & Lund, 1983; Szulanski, 1996; Wood & EerNisse, 1992).

Informational: Informational barriers were found influential above all for SMEs (Laursen & Salter, 2004; Santoro & Chakrabarti, 2002). They refer to companies' abilities to scout for relevant technologies, monitor their technological and scientific environment and maintain an overview of potential funding sources for supporting their R&D activities. Informational incentives are for instance discussed in the context of signalling technological capacities to clients and partners (Fontana, Geuna, & Matt, 2006).

Financial: In addition to the direct costs of a technology and transfer discussed early on for instance in Arrow (1969) and Teece (1977), the indirect costs of doing less basic research and more applied research, services and consultancy have been in the focus of academic research (Feller, 1990; Larsen, 2011).

Organizational: Interactions between PROs and companies are governed by different types of coordination mechanisms (Amesse & Cohendet, 2001; Bidault & Fischer, 1994): hierarchical mechanisms (e.g. governmental laws and regulations, university by-laws), market mechanisms (e.g. contracts stipulating quantities and prices of the transfer), or mechanisms of networks (e.g. trust). Organizational drivers and barriers to KTT are related to the costs and risks of a transaction and technology access (Barjak, 2011; Siegel, Waldman, & Link, 2003).

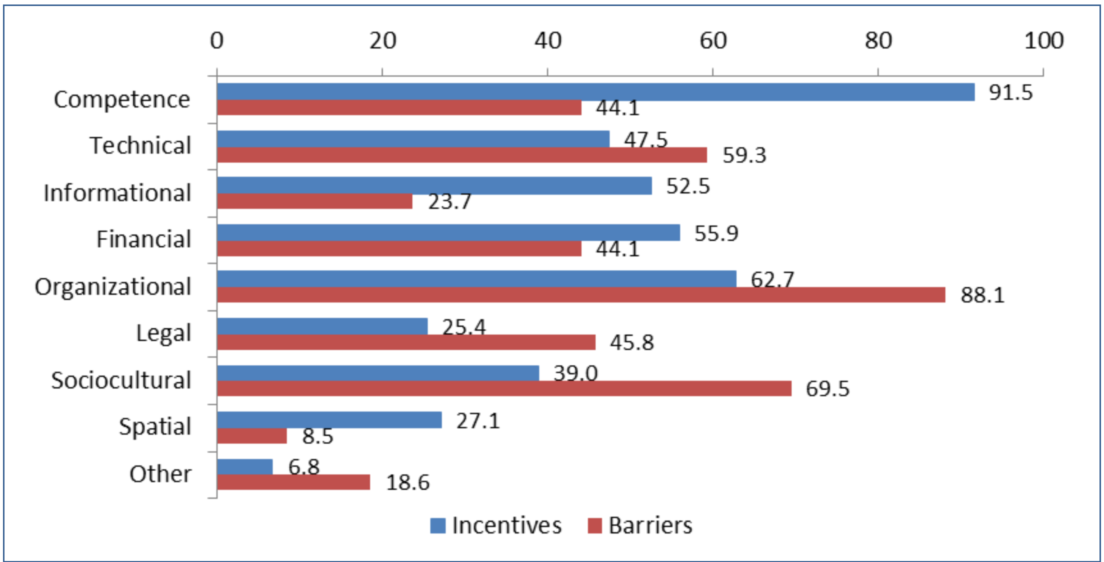
Legal: Previous studies have pointed to the importance of IP regulations (Mowery & Sampat, 2005; Valentin & Jensen, 2007); university regulations on a wide set of issues such as incentives for invention disclosures (Markman, Gianiodis, Phan, & Balkin, 2005); the resources, skills and missions of university administrators and technology transfer intermediaries (Siegel, Waldman, & Link, 2003; Siegel, Waldman, Atwater, & Link, 2003, 2004). In particular the recent reforms in many European countries of the ownership of IP resulting from publicly funded academic research (Geuna & Rossi, 2011; OECD, 2003), following the 1980 US Bayh-Dole-Act, have been discussed critically in regard to their consequences for commercialization (Ledebur, Buenstorf, & Hummel, 2009; Valentin & Jensen, 2007).

Sociocultural: The partners in university-industry KTT are from different subsystems of society and follow different logics: Ziman (1994, pp. 177-178) has called it the CUDOS (communality, universalism, disinterestedness, originality and scepticism) system of science – based on the Mertonian norms – versus the PLACE (proprietary, local, authoritarian, commissioned, expert) system of technology. Dasgupta & David (1994) contrast Polanyi's (1962) *term "Republic of Science" with a "Realm of Technology" which is different mainly because of its differing reward systems and practices of disclosing results. Also at the individual level differences of personality traits, goals, values and believes between scientists and engineers were found (Pinelli, Bishop, Barclay, & Kennedy, 1993). These cultural differences between universities and firms can create barriers to collaboration and limit transfer success (Rahm, 1994; Siegel, Waldman, Atwater, et al., 2003).*

Spatial: The empirical evidence that KTT happens more often at local and regional than at wider spatial levels is substantial (Jaffe, 1989; Jaffe, et al., 1993; Acs, Audretsch, & Feldman, 1991). In particular informal forms of KTT benefit from spatial proximity, whereas it is less important for formal types (Audretsch & Stephan, 1996; Grotz & Braun, 1997).

By far the most important incentive for collaborating with PROs is the access to competences, know-how, and expertise of scientists and others working in PROs. Nearly all interviewed companies pointed to this incentive (see Exhibit 4-45). Also common are organizational, financial and information-related incentives. Technical, legal, spatial and sociocultural incentives were mentioned less frequently. However, the picture with regard to barriers is different. Organizational barriers were mentioned most frequently, followed by sociocultural and technical issues. Financial, competence-related and legal barriers are of medium significance; informational, spatial and other barriers are not significant.

Exhibit 4-45: Incentives for and barriers to cooperation with the public research sector (in %, N=59)



Source: FHNW / Knowledge Transfer Study 2010-2012

Incentives and barriers in connection with mechanisms of collaboration and transfer

Next we evaluated to what extent I/B were mentioned in connection with the mechanisms of collaboration and transfer, distinguishing between contract research, collaborative R&D, assignments or licences of academic patents and informal mechanisms. Not all I/B were linked to transfer mechanisms to the same degree and some were rather addressed as general problems. Overall, I/B were mentioned most frequently in connection with contract R&D and R&D collaborations (see Table 4-20).

1) *Contract R&D* is usually fully company-funded; consequently, financial incentives do not play a role. However, some of the further patterns are notable. The most important incentive to engage in contract R&D is accessing specific competences in PROs, as mentioned by more than half of the interviewed companies. One third of the companies points to organizational incentives, such as expanding on their internal research capacities, accessing specific infrastructure and instrumentation, shorter lead times and faster project realisation, or easier access to the generated IP (than via collaborative research).

Organizational barriers are the most important in contract R&D and the interviewed companies referred to a broad set of issues, like:

- the variety of rules on contract R&D in PROs that is costly to monitor and understand,
- difficult and extended negotiations of contracts and IP ownership or access,
- the difficulty of following-up the results of universities due to the fluctuation of students and staff,
- the lack of professional project management in PROs.

Other barriers in regard to contract R&D relate to different socio-cultural values and habits, e.g. interpretation of deadlines, agreements, and confidentiality; insecurity about the technical results and the ability to interpret and integrate them (if no internal knowledge exists or is built up in parallel).

2) In *collaborative R&D* a wider set of incentives was brought up:

- pooling competencies and approaches,
- accessing specific know-how of scientists,
- obtaining technology and research results,
- risk reduction/sharing thanks to (governmental) financial support or resource pooling,
- working within an established contractual framework,
- getting to know new partners and technologies.

were arguments which frequently came up in the interviews. In particular, we find that technical, informational and financial incentives were more frequently linked to collaborative R&D.

Organizational issues were by far the most frequently mentioned barrier linked to collaborative R&D. Interviewees lamented above all:

- the difficulties of negotiating contracts (and agreeing on the various issues related to IP ownership and access rights),
- coordinating, steering and securing the benefits of participation in projects with multiple partners,
- cumbersome application procedures for funded projects,
- timeframes in general.

Roughly one fourth of the interview partners also reflected upon the difference between academic and corporate culture in the context of collaborative R&D, e.g. the adherence to goals and schedules, the meaning of confidentiality, flexibility and openness to changes etc. and the problems encountered in overcoming these.

3) *Assignment/licences of academic patents:* The single main driver for purchasing or licensing academic patents is getting access to technology faster and quicker than through other means. The weakness of academic patents and main barrier against licensing them is for many companies – even in the biotechnology and pharmaceuticals industry for which patents are an important mechanism of protecting IP – their lack of practical relevance and quality. Among companies whose business depends on strong IP positions the inability to control fully the patent management and licensing practice of PROs shows up as a reason for avoiding licences to academic patents. In addition, some of the previously mentioned organizational problems were also quoted in relation to patents.

4) *Informal mechanisms* are mainly used as a source of new ideas, to get an overview of the academic state-of-the-art and new trends, to collect information when entering new fields, to identify and recruit talented graduates or scientists and the like. They are easy to set-up and maintain, need few resources (in comparison to formal KT channels) and facilitate frequent and rich communication in regional or local settings.

Table 4-20: Connection of incentives and barriers to mechanisms of KTT (in % of interviewed companies, N=59)

Type	Contract R&D		R&D collaboration		Assignment/licen –ces of patents		Informal mechanisms	
	Incent.	Barr.	Incent.	Barr.	Incent.	Barr.	Incent.	Barr.
Competence	57.6	16.9	54.2	13.6	6.8	1.7	25.4	1.7
Technical	13.6	16.9	28.8	18.6	15.3	28.8	0.0	3.4
Informational	6.8	10.2	30.5	11.9	3.4	13.6	1.7	0.0
Financial	0.0	5.1	20.3	1.7	1.7	0.0	16.9	3.4
Organizational	37.3	42.4	20.3	55.9	0.0	16.9	1.7	3.4
Legal	1.7	5.1	8.5	15.3	1.7	1.7	0.0	0.0
Sociocultural	6.8	23.7	8.5	25.4	1.7	5.1	5.1	0.0
Spatial	1.7	0.0	1.7	0.0	0.0	0.0	8.5	1.7
Other	0.0	3.4	1.7	6.8	0.0	1.7	0.0	0.0

Source: FHNW / Knowledge Transfer Study 2010-2012

Incentives and barriers by countries and country groups

Linking the incentives and barriers to countries, we find that the home countries of the companies were most frequently mentioned with a positive connotation: 24 out of 59 companies (41%) pointed to positive aspects in their home countries, 16 (27%) to negative aspects. Discounting the home country brings a long tail of countries mentioned once or twice, but also a few with more frequent appearances.

- Positive aspects were most frequently mentioned outside the home country in connection with the USA (17 companies, 29% of the 59 in total), the UK (8 companies, 14%) and Germany (7 companies, 12%). In addition to the comments at country level, Europe as a whole receives a number of favourable remarks (10 companies, 17%), mainly commenting on research funding and the framework programmes. Among Asian countries Singapore and China (including Hong Kong) were most often quoted as interesting for university-industry collaboration (see the text box on selected quotes).
- Negative aspects were mentioned by 19 companies (32%) in connection with the USA and by 13 companies (22%) in relation to Europe as a whole (not counting

comments made on individual European countries). The comments on the US stress the problems of obtaining IP, the resulting costs and the legalistic approaches and culture (see examples in the box). The negative comments on Europe criticize the requirements, lead times and bureaucracy of EU funding procedures, but also criticize European universities for their lack of flexibility and openness towards industry. A few companies mentioned cultural barriers to collaborating with Asian universities.

Selected quotes on incentives and barriers by countries/regions

Incentives

Europe: "The European FPs are very important for us, because they are a unique meeting place for our industry. It is not only the funding but more the structure and the meeting place and the collaboration which can take place under such funding programs." (Interview Hardware8).

UK, Germany: "Yes, there are countries where it is very easy to find collaborations because of the infrastructure and/or culture (that's the Anglo-Saxon world, Germany, the UK). Maybe we don't finalise any agreement, but it is easy to talk, find and discuss terms." (Interview BiotechPharma7)

United States: "They have highly qualified TTOs. […] In the US TT is less government-driven and rather originating in a few innovative centres of excellence." (Interview BiotechPharma2, translation by the authors)

Barriers

Europe: "The EU approach to include as many countries and regions as possible creates complex constructs with international exchange but an extremely difficult organisation. Often potentially useful projects fail because of diverging interests and the resulting endless negotiations. Smaller teams are more efficient independent of the size of the project." (Interview OtherInd1, translation by the authors)

"European universities are more institutions looking very much like they did 50 years ago. The promotion in an academic career depends very much on the number of publications, the depth of knowledge in one area. It doesn't promote interaction and innovation with companies in the same way, because that doesn't help your personal career." (Interview Hardware8)

United States: "Yes we do find that universities tend to hide behind some IRS regulations and also behind the Bayh-Dole Act. How much of that is a negotiating ploy and how much is real, but it is an issue, so to have the Bayh-Dole Act in Europe would be a nightmare in my opinion." (Interview BiotechPharma12)

Asia: "Because we simply got into cultural conflicts, the way they are operating, the way we are operating, timeframes, whom to speak to (e.g. a midrange Chinese professor would only talk to our CEO)." (Interview OtherInd10)

Incentives and barriers in different types of companies

In order to shed further light on the importance of incentives and barriers for different groups of companies we grouped the companies according to 9 characteristics and compared the interview statements between the resulting groups:

- *Geographical location of the headquarter:* Scandinavia, Western Europe, Eastern & Southern Europe
- *R&D-density (R&D personnel per 1000 employees) of the* ***country*** *of headquarter:* low-medium versus high R&D-density
- *Industry:* Biotechnology & pharmaceuticals, Automobiles & parts, Software & computer services, Technology hardware & equipment, Others
- *Company size (employees 2009):* below 250, 250-999, 1000-3999, 4000-14999, 15000 or more
- *Amount of R&D investment 2009:* less than 10 mEUR, 10-19.99 mEUR, 20-59.99 mEUR, 60mEUR or more
- *R&D-intensity (R&D expenditure divided by total sales) 2009 of the company:* below 4%, 4-9.99%, 10-19.99%, 20% or higher
- Globalisation of internal R&D (R&D in Europe and at least two other continent): Internal R&D not at global scale versus global extension of internal R&D
- *Level of coordination of R&D activities:* R&D centrally coordinated, some degree of coordination/autonomy, R&D not centrally coordinated

Company size seems to matter for the experiences regarding both, incentives and barriers. Small and medium-sized companies below 1000 employees (due to few responses the groups below 250 and 250-999 had to be combined) generally mention less often incentives than large companies (see Table 4-21). When it comes to barriers the pattern gets more complex: small and medium-sized firms stress among others financial and informational barriers – as indicated in the literature (Laursen & Salter, 2004; Santoro & Chakrabarti, 2002) – whereas large companies are more affected by legal barriers.

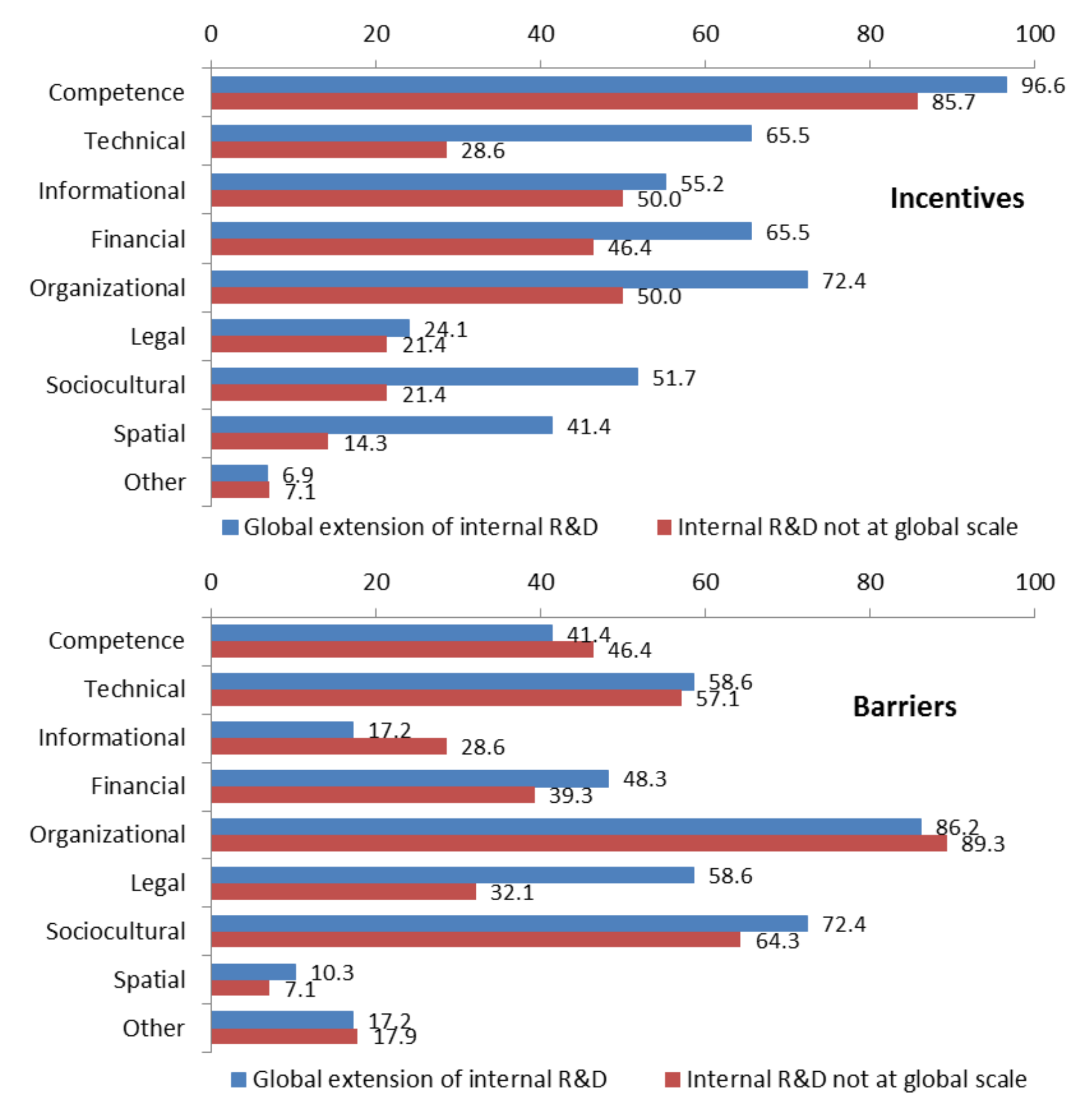
Table 4-21: Incentives and barriers by company size (in % of interviewed companies per size group, N=59)

	Size of the company (employee 2009)				
	below 1000	1000-3999	4000-14999	15000 or more	Total
Incentives					
Competence	71.4	92.3	100.0	100.0	91.5
Technical	35.7	53.8	54.5	47.6	47.5
Informational	42.9	53.8	54.5	57.1	52.5
Financial	35.7	46.2	81.8	61.9	55.9
Organizational	42.9	53.8	63.6	81.0	62.7
Legal	21.4	15.4	27.3	33.3	25.4
Sociocultural	21.4	53.8	18.2	52.4	39.0
Spatial	14.3	0.0	36.4	47.6	27.1
Other	0.0	15.4	0.0	9.5	6.8
Barriers					
Competence	42.9	46.2	18.2	57.1	44.1
Technical	57.1	69.2	54.5	57.1	59.3
Informational	28.6	38.5	9.1	19.0	23.7
Financial	57.1	30.8	54.5	38.1	44.1
Organizational	85.7	84.6	81.8	95.2	88.1
Legal	21.4	30.8	54.5	66.7	45.8
Sociocultural	64.3	69.2	63.6	76.2	69.5
Spatial	7.1	0.0	9.1	14.3	8.5
Other	7.1	23.1	9.1	28.6	18.6

Source: FHNW / Knowledge Transfer Study 2010-2012

A pattern appears when we look at the geographical extension of the internal R&D and distinguish between companies with R&D activities in Europe and at least two other continents (“global”) and those with less geographically spread R&D. In particular when considering incentives for engaging with PROs we find huge differences: larger shares of global R&D players point to accessing public sector technology, financial drivers (cost reduction), sociocultural incentives (e.g. differing roles of tech transfer in scientists’ career models and openness for U/I cooperation), and spatial incentives (e.g. placement of internal R&D units close to particular competencies in PROs). Companies with a global extension of their R&D also stress more often legal and sociocultural barriers. It should be noted that the extension of R&D is correlated with company size, however.

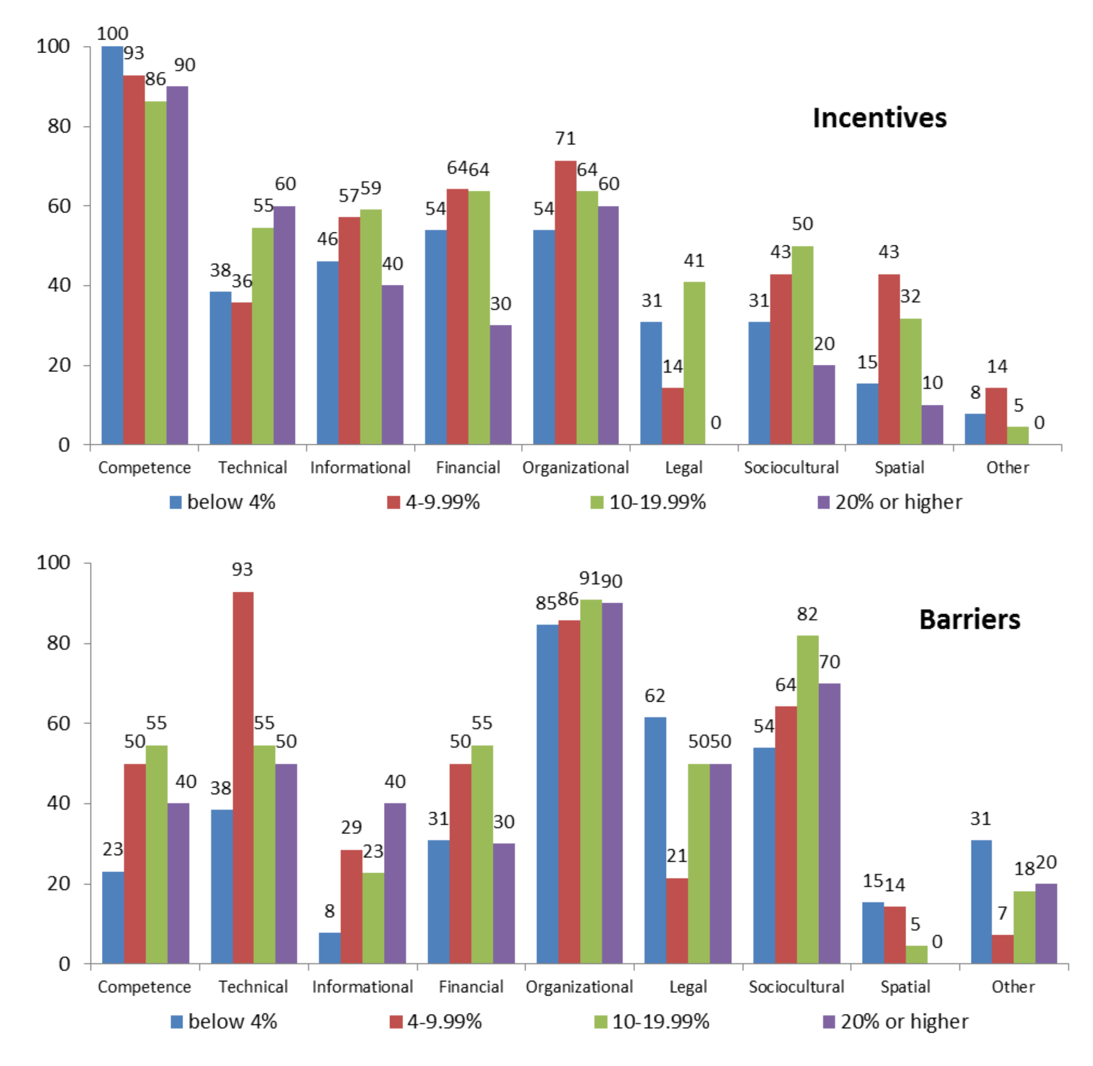
Exhibit 4-46: Incentives and barriers by global extension of internal R&D (in %, N=38)



Source: FHNW / Knowledge Transfer Study 2010-2012

Further patterns appear for selected I/B depending on the R&D-intensity of the company. R&D-intensive companies are more often driven by technical incentives, such as obtaining a technology, research results and/or the property rights to it, whereas most of the other incentives are less important than for other companies. Organizational and sociocultural barriers are most important in R&D-intensive as in all other companies, however, informational barriers were more often mentioned by R&D-intensive companies than by others.

Exhibit 4-47: Incentives and barriers by R&D-intensity (in %, N=59)



Source: FHNW / Knowledge Transfer Study 2010-2012

Another result shows the limits of the chosen method and the resulting findings and should be taken as a call to interpret the results cautiously: when we compare companies with centrally coordinated internal R&D with companies with no/less centrally coordinated R&D, we find that barriers that are experienced more in the daily interaction and work with PROs, i.e. problems with competencies, technologies, information, or different cultures, were *less* often mentioned by the latter group. They referred primarily to organizational, legal and financial barriers. However, our interview partners in the companies tended to be affiliated to the companies' headquarters and central R&D management or university relations – so there is some risk that they were not aware of the full extent of barriers and incentives, in particular when the internal set-up of R&D does not require close interaction between local R&D units and the company headquarter/a central R&D unit. So we cannot rule out the possibility that the selection of interview partners create to some extent a bias against awareness of the softer barriers that are more felt in the daily interaction between scientists and engineers.

4.6.7 Impressions on the impact of the EC Code of Practice

Assessing the impact of the Code of Practice (CoP) from the perspective of business enterprises is a challenging task for different reasons:

- The CoP addresses universities and other public research organisations and not primarily business enterprises and several principles address internal issues. Companies will only experience an impact if the CoP is implemented by the public research sector. Both the implementation and the trickling-down to the level of individual projects and contracts take time and as the CoP was only issued three years ago, in 2008, many companies will not yet have had a chance to experience its effects.
- The CoP is one of many initiatives and programmes at international, national, sub-national and even organizational levels. These initiatives are not necessarily fully consistent and companies receive different messages depending on the organisation or even on individual partners. In addition, the changes of IP ownership in several European countries since 2000 overshadow some of the more recent changes.[34]
- In order to assess the impact of the CoP it would be necessary to have comparable data on the situation before and after its publication. Data on transfer practices before the publication of the CoP is not available and were not collected, as interview partners were expected either not to be in the position to know or not to remember reliably the situation before 2008. Therefore, the collected data only makes it possible to say whether current practices are rather in line or not in line with the CoP. In addition, it is impossible to find out reliably to what degree any change was induced by the CoP.

Keeping this in mind we pursued the following approach:

(1) We asked the interview partners, whether they experienced any changes over time in obtaining knowledge and technology from the public research sector. The questions referred to the years after 2005; however, the nature of the answers suggests that respondents often outlined general trends which started earlier.

(2) We look at the importance of transfer practices which are in line or not in line with the CoP principles according to the interviewees' experiences.

Dynamics of transfer and collaboration over time

The interview partners pointed to a broad set of different and partially opposing dynamics and changes of incentives and barriers to more efficient and effective knowledge and technology transfer in Europe of which several bear relationship to the CoP. They originate in changing governmental policies and laws, structures and actions of PROs, as well as internal policies and strategies of the interviewed companies. Most frequently the following changes were mentioned (see selected examples in the text box):

1. Increased strategic planning of approaches, content and partners in knowledge and technology transfers. Several companies stress that they select their public research partners more consciously and based on expertise, that the management of IP and contracts has moved more into the company focus and that their approach to sourcing knowledge has become more professional. A few mention concepts like 'open innovation' and that they have started to implement or test them. A growing necessity for companies

[34] Since 2000 several European countries have moved from a professors' privilege regime, e.g. Denmark (2000), Austria, Germany and Norway (all 2002), and Finland (2007), or from governmental ownership, Poland and Slovakia (2000), Slovenia and Hungary (2006), to an institutional ownership regime (Geuna & Rossi, 2011; OECD, 2003).

to consider and understand the more fundamental problems related to their business and the perception that successful innovation cannot be generated by internal R&D only lets them turn more often to academic partners.

2. Increasing interest and openness of PROs for transfers and collaboration. The interview partners remarked on both, positive changes leading to more and more efficient interaction, as well as negative changes and reductions. In particular, for funding reasons and to comply with stakeholders' preferences PROs were perceived to show more interest in transfers and collaboration; practical implications have gained a more important role in the design of new research and results are more often evaluated in regard to their commercial relevance; universities have become more orientated towards the private business sector. This goes along with an increasing focus on IPR and commercialisation which reduces the openness and willingness of academics to engage in informal exchange (see below).

3. Increase of formal and decrease of informal interaction. In some cases the interviewees pointed to an increase of formal, contract-based cooperation whereas at the same time informal cooperation has become more and more difficult. From the view of our interviewees scientists at universities have become more cautious and aware of the potential commercial value of their work and they are subject to stricter regulations and procedures when they engage with industry.

4. More negotiations, stronger IPR focus. The most debated aspect was the growing interest of universities and other PROs in Europe in the protection and commercialisation of their Intellectual Property. This was brought up in one way or another in at least 40% of the interviews. This has led to longer and more complicated negotiations, higher costs, e.g. separate provisions for the IP on top of an R&D contract, and less access to IP generated with PRO participation. It was considered by many interview partners as the most significant and growing barrier to commercializing public sector research results and a trend that was making Europe more similar to the US (see p. 230 on the US).
From the interviews it is unclear whether this trend is still on-going or whether countermeasures such as the CoP have started to change practice. Some of the quotes indicate an abating trend.

5. Growing experience in PROs and companies with transfers and different forms of collaboration. Another, in this case clearly positive, trend was mentioned by the interview partners referring to both sides, the university/PRO side as well as the business side: Thanks to continued interaction mutual awareness of needs and constraints, regulations and implementation practice, academic and economic requirements and the like has been growing and contributed to making transfers easier.

Quotes on dynamics related to incentives and barriers

1. Increased strategic planning of approaches, content and partners in knowledge and technology transfers

"I believe that the exchange of ideas has become a lot more deliberate and intensive. You don't only issue a contract to solve a technical problem, but more and more intensively concentrate on more fundamental questions, for instance how the energy system of the future and its drivers will develop." (Interview OtherInd1, translation by the authors)

2. Increasing interest and openness of PROs for transfers and collaboration

"[U]niversities are interested in increasing collaboration with companies, either because they are pushed by the government or because the

> *researchers understand that this is a way of having their paid research or increasing the probability of their research to reach the market." (Interview BiotechPharma4)*
>
> ***3. Increase of formal and decrease of informal interaction***
>
> *"I would say that the informal contacts have become more complicated or less easy to access because almost everybody is obsessed by this requirement of protecting any idea through patents and making money out of ideas. So, people from universities are generally speaking more cautious then they were before, so there is a certain trend in my point of view in a negative direction." (Interview BiotechPharma3)*
>
> ***4. More negotiations, stronger IPR focus***
>
> *"Universities closely watch that any invention is paid for on top. You can say that projects have become more expensive. The conclusion of a contract is constrained by this [the IP] regulation that needs to be discussed – if there is an invention, it is ok if not. The time needed to get to the signing of a contract has been prolonged." (Interview AutoParts6, translation by the authors)*
>
> ***5. Growing experience in PROs and companies with transfers and different forms of collaboration***
>
> *"More and more we settle on rational solutions such as giving all the IPR that is related to a product and stemming from a bilateral project funded by the company to the latter. It makes sense that the institutes own the IP for the methods and their further development and use. As a matter of fact they also need to develop and extend their portfolio. […] In the meantime more rationally a distinction is made between a product focus and a methods focus." (Interview AutoParts2, translation by the authors)*

Relationship between transfer practices and the CoP

While the first section of CoP principles 1-7 primarily addresses the internal IP policy of universities and other public research organisations, the principles 8-14 in section 2 on knowledge transfer policy and 15-18 in section 3 on collaborative and contract research render themselves better to being confronted with the experiences of business enterprises. We see a few issues here (see the quotes supporting the following considerations in Table 6-23 in the annex):

1. Strong focus of transfer policies on revenues (CoP 9). Frequently universities and other public research organisations were blamed for their strong focus on revenues and prioritising maximum monetary returns from their IP. This focus raises the costs of university-industry cooperation – not only for companies but for PROs as well and thus for society; it reduces university-industry cooperation and knowledge transfer and thus the socio-economic benefits of public research. The blame for this is not only put on the PROs and their implementation of IP regulations, but also on governments and funders as well. Since the measurement and comparison of IP and transfer indicators across PROs is seen as a logical contribution to conditioning their behaviour (see also the quotes on p. 238).

2. Professionalization of knowledge transfer services (CoP 10). The professionalization of KTT services was brought up in the interviews with negative and positive connotations. As already mentioned above, interviewees stressed the better quality of KTT services in the US – and in fewer instances also in the UK – and pointed to a general backlog in Europe, above all in smaller and less research-oriented PROs (see also the quotes on p. 230f.).

However, several interviewees also mentioned positive examples of PROs with well-functioning KTOs.

3. Licensing policy (CoP 11). In relationship to the licensing policy and practice in PROs there is a general understanding among the interviewed companies that under certain circumstances licences need to be exclusive and patent assignments needs to be possible. One of the issues picked up by the interviewees referred to the difference between licences for products and methods: whereas for the former usually ownership or at least an exclusive licence is needed to secure the competitive advantage, for the latter non-exclusive licences are perfectly acceptable. Depending on the technology a limitation on obtaining exclusive IPR can become a strong argument against engaging in a joint project. Another complaint in this context refers to the inability of PROs to properly evaluate the real value of their IPR leading to excessive licence fee requests.

4. Monitoring and publication of IP, KTT and research activities (CoP 14). Several companies listed positive examples of information offers from PROs, governmental agencies or others on the competencies and technologies offered by the public research sector. However, some commented also on the difficulties of gaining an overview and lamented the lack of transparency.

5. Compatible rules for collaborative and contract R&D (CoP 15). From the view of several interviewees, incompatible and irreconcilable rules and practices in this area usually lead to the exclusion of the particular organisation in the design of the collaborative research project or failure of the conclusion of the research contract. It was also pointed out that the increasing availability of model contracts (such as the Lambert toolkit in the UK) and strong need for research funds in PROs has created a pressure to either ignore or change problematic rules. Still, in some cases interviewees agreed to the statement that commercialisation failed because the partners were not able to strike an agreement regarding access to IPR or compensation. It was suggested that the further development (and wide publication) of standards might be helpful.

6. Early clarification of IP issues (CoP 16). There is no disagreement among the interviewed companies that IP-related issues are best clarified as early as possible and ideally before the start of a project. However, it seems that the question is not so much whether contracts include IP clauses, but rather to what extent these clauses can be exhaustive given the complexity of the matter. Certainly, IP issues make contract negotiations lengthier and more complex (see the quotes on p. 238) and the parties resort to option agreements, exemption clauses or re-negotiations.

7. Ownership of IP in collaborative and contract R&D (CoP 17). In the case of contract R&D none of the interviewed companies has pointed towards major problems. The default rule is that the companies own the generated IP. In collaborative R&D the interviewees also see the common practice mostly in line with the principles suggested in article 17 of the Code of Practice. However, some companies complained that the relevant laws, rules of public funders, or university bylaws are not consistent, clear, practical for all cases and that they leave substantial room to interpretation (with the mentioned consequence of protracted and complicated negotiations).

8. Access rights to IP (CoP 18). Access rights refer to the rights that participants of a research project grant to each other. They need to be seen in connection with the ownership (CoP17) and licensing practice (CoP11). If companies do not obtain full ownership, as is often in collaborative research, then they need to get access and secure freedom-to-operate. What is being considered as a “fair deal” depends in practice on many different criteria, e.g. exclusiveness, compensation, importance of the result/technology, funding and other involvement in the research etc. which are decided on a case-by-case basis. The interviewees don’t point to a general inability of reaching such fair deals, but there is a strong reservation in regard to the time and effort consumed in negotiations for reaching a common understanding of what is fair in a particular case. According to the interviews access to background IP is rarely an issue.

In some more internal areas the interviews did not provide any further insight: Used set of exploitation mechanisms and partners (CoP 8), spin-off policy (CoP 12), and sharing of KTT returns between organisation, department and researcher (CoP 13) are therefore not further discussed.

4.6.8 Summary and conclusions

In this task we interviewed 49 companies from four selected sectors plus another 11 from the remaining sectors of the European Industrial R&D Investment Scoreboard. On average in 2009, the 60 interviewed companies had a large ratio of R&D expenditure to total sales (R&D-intensity of 12.1% compared to 3.6% for the population) and they invested 83 mEUR in R&D. Roughly half of the companies had internal R&D activities at global level, i.e. in Europe and at least two further world regions.

All but one company cooperated with PROs in their home countries, 80% with partners in other European countries and nearly 60% with partners in North America. Companies used both, formal and informal mechanisms. Communication in personal networks, at conferences etc., the recruitment of academics and graduates and the reading and evaluation of scientific publications were the most common *informal* mechanisms. Collaborative and contract R&D were the most common *formal* mechanisms: only three companies (all in the software industry) were not engaged in one or the other. The use of several formal mechanisms is closely related to company size.

We differentiated between nine types of incentives for and barriers to KTT: competence-related, technical, informational, financial, organizational, legal, sociocultural, spatial and other. Competence-related incentives are by far the most important driver to take part in KTT (mentioned by 9 out of 10 companies). Organizational and sociocultural are the most frequently mentioned barriers across the board. In regard to academic patents technical incentives/barriers related to the outcome of research; the quality and the relevance of the technology were also stressed. Distinct incentives and barriers were mentioned for Europe, the US and Asian countries. Furthermore, incentives and barriers are related to certain characteristics of the companies, above all their size, R&D-intensity, the geographical extension of their internal R&D and the degree of central R&D coordination. We note in particular, that not only SMEs with less than 250 employees, but also medium-sized companies with up to 1000 employees encounter financial barriers.

For different reasons it is a challenging task to evaluate the impact of the European Commission’s Code of Practice: 1) the code was issued only three years ago and we would not expect an immediate effect; 2) there are other, not necessarily fully consistent initiatives and policies on IP management and KTT at national or regional levels; 3) the collected data refers only to the current situation and comparable data from the period before the publication of the CoP is not available. Still, we compared the interviewees’ experiences with IP management and KTT practices in PROs with the CoP (predominantly principles 8-18 which address KT policies and collaborative and contract research) and looked at the trends and changes to get an understanding of the likely significance of the CoP for KTT. The results can be summarised in four key points (see the text box below on supporting quotes):

1. *Limited contribution of PROs to innovation.* Though universities and other public research organisations may undertake considerable efforts to turn their research into socio-economic benefits and use a broad set of exploitation mechanisms and partners, the perception of the interviewed companies is overshadowed by problems of setting-up,

executing efficiently and concluding successfully joint projects. All in all, the contribution of PROs to innovation is seen as limited.

2. *The current rules, practices and incentives don't serve the purpose of converting knowledge into socio-economic benefits very well.* First and foremost, many interview partners strongly opposed the view that giving PROs strong ownership positions for the IP generated with their involvement, focussing then on exploitation via licensing activities, and establishing an incentive scheme in which PROs and their scientists give the monetary returns for research results/IP first priority is really beneficial to better converting knowledge into socio-economic benefits. According to their opinion this can cause in the worst case:

- False conceptions of the importance of PROs in innovation and bureaucratic behaviour in university administrations and KTOs, leading to long lasting contract negotiations, unrealistic price expectations for patents or licences, stalled project proposals and, in the end, less joint research and less valorisation of scientific knowledge and creation of socio-economic benefits.
- A reduced willingness of scientists to engage in an open and uncensored informal exchange of information with private enterprises and waste of time in internal discussions and negotiations with their administrations.
- Less interest of private enterprises in cooperating with European scientists, increased search for expertise and technology from other sources or world areas, strategies to bypass IP regulations and university bylaws.

3. *The expected revenues are a strong driving force for PROs to dedicate resources to KTT, but other incentives work in the same direction.* PROs look more to industry as a source of research funding and they show more interest in collaborating with private enterprises, to

- see the implementation of their research results and technologies,
- demonstrate their role in society and justify their public funding,
- generate new research problems and questions of practical relevance,
- better prepare their students for life after university and many more reasons.

Thanks to the continued and intensified cooperation, PROs – both administrations/KTOs and scientists – and companies have developed a better mutual understanding of needs, constraints, regulations and requirements. This would constitute a good basis for intensifying the cooperation. Negotiations and haggling over IP ownership, access rights, and licence fees repeatedly constitute a burden and stumbling block.

4. No "one-size-fits-all" approach. In a number of cases the interviewees from different industries lamented the fact that regulations, practice and KTO staff are biased to considerable extent by the extraordinary conditions and opportunities in the biotechnology and pharmaceuticals industry. They are unfamiliar with the situation in other industries and unable to adjust their approaches to exploitation and interaction with industry. This lengthens negotiations and complicates or even impedes commercialisation projects.

Quotes illustrating the points of the summary

1. Limited contribution of PROs to innovation.

"First, the university technology transfer offices overestimate the value of their inventions or potential inventions. They simply don't understand that an invention based on basic research is of relatively little value as compared to the whole development and commercialization process that a company would have to go through, without even knowing, if the market in the end will accept the new products or the new process. So, universities overestimate. Of course, there are certain exceptions where the discovery of genetic engineering, for instance, turned out to be very valuable and the universities would have a substantial share on this. However, there are extremely few examples. Normally, universities think that they are far too important in this process. " (Interview BiotechPharma3)

2. The current rules, practices and incentives don't serve the purpose of converting knowledge into socio-economic benefits very well.

"I have one strong opinion: First, universities should not try to become patent trusts and live from a strong royalty of patents. I think this is a very wrong view of the way the industry works. I actually think that universities are going to lose a significant amount of money when doing that. Because managing a patent activity may generate revenues, but generates a great number of costs. This is a bit the current direction, trying to grow universities into IP management. I think it is a very wrong view from governments." (Interview Software2)

"[W]e waste enormous resources of discussing up and down the road all sort of details that in many cases have no relevance in a bigger perspective. Whether a university will earn or not let's say 100 thousand EUR on a deal, doesn't matter at all in the big picture. What matters is if the knowledge is getting out in society and working and creating jobs and investments, that is what matters. But universities are often measured on the licensing income and the number of patent applications and patents. This is not the key issue, the key issue is jobs and value. That message should also be passed to the European Commission including the programs and projects funded by the EC, that we want to create value not patents." (Interview BiotechPharma3)

"[S]ometimes we had major difficulties in securing the rights for the company and so we had to give up many times our participation in larger EU grants. This is a pity for everyone. It was because of bureaucratic hurdles. […] I believe we are one of the companies who are not trying to squeeze others, we acknowledge the inventorship, but clearly if it is our technology we would like the right to commercialise it and giving the proper royalties to the university. But if it wants to own the technology and sell it even to a competitor, then clearly we have to walk away." (Interview BiotechPharma6)

3. The expected revenues are a strong driving force for PROs to dedicate resources to KTT, but other incentives work in the same direction.

"So, it is enough money to want to get out of bed for the academic, and as you know, funding changes behaviour of academics […] There is generally a more positive attitude, there is still… the last thing the industry wants, are for the academics to think about the commercialisation of everything they do, but I think that if you have anybody's public funding, you should at least consider, up front, the impact of the research you are undertaking. And on

the research councils forms now, on common grant application forms, the first question is: "does this have potential for exploitation, if so have you considered the exploitation plan?" So certainly in [anon.] the attitude is definitely changing." (Interview BiotechPharma12)

"However, they see the practical benefit of working with a company. They know that in their budget for the next year there will be CHF 50,000 more, or not; then, they can pay for two doctoral students or not. This then puts the thing with IP-rights into perspective, i.e. who should have them. When we speak with a patent valorisation agency, they don't see the two PhD students who are paid and they don't see an immediate personal benefit. They only see: 'Stanford 4 billion US-$ and University of XYZ nothing! But we are also clever – what is true – and therefore, we must do more in the area of IP and therefore our requests.'" (Interview BiotechPharma1, translation by the authors)

4. No "one-size-fits-all" approach.

"Entrenched positions, an inability to differentiate the drivers from different sectors, what I mean by that, say you have someone who is writing software you can get the software package written and probably licensed you can probably license it in 6 months and make a small buck and then frankly it is superseded by something else, that is different to building airplanes or indeed developing a drug. And so it's just educating people. Now poor people in technology transfer have to work across all the disciplines, you know, they do not have particular expertise in just one sector." (Interview BiotechPharma12)

5 CURRENT AND EMERGING KT ISSUES: WORKSHOP RESULTS (WP4)

5.1 Methodological considerations

Chapter 5 includes a synthesis of findings from the workshops conducted in the framework of the Knowledge Transfer Study in 2011, 2012 and 2013. Exhibit 5-1 lists the workshops and related organisational information.

Exhibit 5-1: Knowledge Transfer Study workshops conducted 2011-2013

No.	Region	City	Date	Countries involved	Co-located event	Co-operation partner	Partici-pants
1	German	Berlin	10/2/11	Germany	n.a.	Federal Ministry of Education and Research	59
2	Alpine	Vienna	8/3/11	Austria, Switzerland, Liechtenstein	n.a.	Austrian Ministry of Science and Research	87
3	Benelux	Maastricht	10/5/11	Belgium, Netherlands, Luxembourg	n.a.	United Nations University	39
4	Nordic	Gothenburg	1/6/11	Denmark, Sweden, Finland, Norway, Iceland	CIP Forum 2011	Swedish Ministry of Enterprise, Energy and Communication	65
5	British Isles	Dublin	15/7/11	Ireland, UK, Malta	n.a.	NovaUCD	33
6	Baltic	Tallinn	6/9/11	Estonia, Latvia, Lithuania	Baltic Dynamics Conference 2011	Baltic Dynamics Conference 2011	42
7	Italian	Rome	30/9/11	Italy	ProTon Europe Annual Conference 2011	ProTon Europe, Netval, Italian Ministry of Economic Development	40
8	Polish	Warsaw	3/11/11	Poland	n.a.	Polish Ministry for Science and Education	77
9	French	Paris	8/11/11	France	n.a.	French Ministry of Higher Education and Research	64
10	Iberian	Porto	14/11/11	Portugal, Spain	n.a.	University Technology Enterprise Network Portugal	69
11	East-Central Europe	Prague	25/4/12	Czech Republic,	n.a.	Technology Centre ASCR /	44

				Slovakia, Hungary, Slovenia		Czech Ministry of Education, Youth and Sports	
12	Northern Balkans	Sofia	1/6/12	Bulgaria, Romania, Croatia	n.a.	n.a.	20
13	Western Balkans	Tirana	13/6/12	Albania, Bosnia-Herzegovina, FYR of Macedonia, Montenegro, Serbia	WBC-INCO.net steering committee meeting	WBC-INCO.net	37
14	East-Mediterranean	Nicosia	3/9/12	Cyrus, Greece, Israel	EASTWEST Conference 2012	EASTWEST Conference 2012	26
15	Concluding workshop	Brussels	12/3/13	ERAC WG-KT members	ERAC WG-KT meeting	n.a.	21

n.a. = not available

Number: Altogether 15 workshops were conducted in 2011, 2012 and 2013; ten in 2011, four in 2012, and a concluding workshop in March 2013.

Objectives: The objective of the workshops is to monitor the implementation of the EC's Recommendation on IP in KT in European countries, to find out about new and emerging issues in KT in the countries, and to provide a forum for discussion about current KT issues in the countries.

Country coverage: The workshops covered 38 European countries, i.e. there were dedicated presentations about KT in 38 countries by national representatives of these countries.

Programme: The workshop programme followed a defined scheme, seeking to align workshop results to the objectives of the KTS and to ensure high-quality events. The morning sessions of the workshops were mostly dedicated to the KT situation in the countries involved. In the afternoon there were either parallel sessions on specific KT issues or case studies and a panel discussion. In five occasions (Tallinn, Rome, Porto, Tirana, Nicosia) the KTS had joint sessions with other events and thus had to shorten the usual sequence.

ERAC WG-KT co-operation: For all workshops, co-operation with the national representatives of the European Research Area Working Group on Knowledge Transfer (ERAC WG-KT) was sought and in almost all cases engaged in. Locations and country groupings were discussed and agreed with the ERAC WG-KT members as well as with the European Commission. The sequence of workshops followed "ease of co-operation", beginning with countries with very active ERAC WG-KT members and where KTS study team members were located.

Participants: For each workshop, 50-75 participants were sought, representing KT experts from universities, public research organisations, KT intermediaries, governmental organisations, commercial enterprises, business associations, and law firms. Most of these stakeholder groups (except law firms) were represented in every workshop; the majority of participants came from universities. Altogether 723 people were involved in the workshops, making an average of 48 participants.[35]

Invitees: Invitees and their e-mail addresses were identified from the WP2 survey database, with the help from the ERAC WG-KT members, and from the study team's networks. Most of the attendees came by personal invitation, while some were possibly attracted by postings in the newsletters of the Technology Innovation International organisation as well as the IPR Helpdesk.

Assessment: After the workshops, the participants were offered the opportunity to assess the workshops. They received a standardised evaluation sheet by e-mail or they could access an online evaluation sheet at the workshop's website. The study team received only few responses per workshop, all of them assessing the workshops overall as very good or good.

Summaries: For each workshop a summary was produced. In order to involve the wider KT community in the countries involved in assessing the workshops' results, all invitees of the workshops received the summary and were offered the opportunity to comment on the summary using a dedicated discussion tool on the workshops' websites. Though no-one has yet made use of this opportunity, several invitees welcomed being informed about the workshops' results. The summaries of the first six workshops are available at the following web-links:

- Germany: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/DE/KTS_WS_DE_2011-02-10_Summary_v1.1.pdf.
- Alpine: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/AT-CH-LI/KTS_WS_AT-CH-LI_2011-03-08_Summary_v1.2.pdf.
- Benelux: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Benelux/KTS_WS_Benelux_2011-05-10_Summary_v1.0.pdf.
- Nordic: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Nordic/KTS_WS_Nordic_2011-06-01_Summary_v1.3.pdf.
- British Isles: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/IE-UK-MT/KTS_WS_IE-MT-UK_2011-07-13_Summary_v1.4.pdf.
- Baltic: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Baltic/KTS_WS_Baltic_2011-09-06_Summary_v1.0.pdf.
- East-Central Europe: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/European/KTS_WS_East-Central-Europe_2012-04-25_Summary_v1.1.pdf.
- Northern Balkan: http://knowledge-transfer-

[35] Speakers of joint sessions with co-located events were counted as workshop participants.

study.eu/fileadmin/KTS/workshop/NorthernBalkans/KTS_WS_Sofia_2012-06-01_Summary_v1.1.pdf.

- Western Balkan: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/WesternBalkans/KTS_WS_Western-Balkan_2012-06-13_Summary_v1.0.pdf.
- East Mediterranean: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/EastMediterranean/KTS_WS_East_Mediterranean_2012-09-03_Summary_v1.0.pdf.
- Concluding workshop: http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Final_2013-03-12_Summary_v1.0.pdf (forthcoming).

Methodological status: Considering the information gathered, the workshops can be considered as a method of collecting qualitative data on current KT practices and issues in the countries involved. Workshop speakers were asked to approve the draft summaries, and all participants were invited to comment on the draft summaries. The workshops provided important insights, adding to the information gathered in the surveys of WP1-3 and taken from literature. Each workshop had its own flavour, created by the number and professional background of the participants, the issues at stake in the countries involved, and the venue. Results from the workshops cannot of course be seen as representative of the European KTO community, however defined, because participants were invited personally and could self-select their attendance. It should also be noted that the audience was mainly from universities' and public research institutes' KTOs.

5.2 Analysis of workshop results

5.2.1 Overview of subjects discussed

The vast majority of the numerous KT issues discussed in the workshops can be categorised as issues of strategy, operations, organisation, measurement, and funding. The following discussion and analysis uses these categories of issue and sets the workshop results in the context of information from other sources. Exhibit 4-2 provides an overview of the issues discussed in the 14 workshops and an assessment of their importance in the discussion.

Exhibit 5-2: KT issues discussed in the workshops

Legend: + + + = issue defined in the programme or brought in by study team + + = issue raised and discussed more extended + = issue touched but not deepened **Issue**	**Germany, Berlin, 10/2/11**	**Alpine, Vienna, 8/3/11**	**Benelux, Maastricht, 10/5/11**	**Nordic, Gothenburg 1/6/11**	**British Isles, Dublin, 15/7/11**	**Baltic, Tallinn, 6/9/11**	**Italy, Rome, 30/9/11**	**Poland, Warsaw, 3/1/.11**	**France, Paris, 8/1/11**	**Iberian, Porto, 14/11/11**	**East-Central Europe, 25/4/2012**	**Northern Balkan, Sofia, 1/6/2012**	**Western Balkan, Tirana 15/6/12**	**East-Mediterranean, Nicosia 1/9/12**
Strategy														
Level of strategy development	+++	+++	+	+++	+	+	+	+	+	+	+++	+	+	+++
Legal framework for KT	+	+	+	+	+	++	+	+	+++	+	+	++		
KT programmes/initiatives	+	++	+		+				+++	+++				
KT governance												+	++	+
Easy access to PRO's IP					+++									+++
KT standardisation							+++							
Women in KT		+++												
Prevention of IP loss	++													
Operations														
PRO's IP capacity & skills	++	+	++	+	++	+	+	+++	+	+++	+	+++	++	+
Firm's IP capacity & skills	+	+++	+		+			+		+			+	
Model contracts	+++		++	+++	++									
Commercialisation support					+++	+++					+			+
Developing IP awareness	+				+	+	+		+		+	+	+	+
IP in European projects	+++													
IP in different sectors									+++					
Taking shares in firms		++									+			
European patent			++											
Organisation														
(De-)centralisation of KT	+	++	++						+++	+	+			
KT through people						++	+	+		+				
New KT models				+++		+			++					
Measurement														
KT surveys							+++			++				+++
KT indicators				+++						++				+++
Funding														
Proof-of-concept funding			+	+	+	+	+							
State aid rules' ambiguity	++	+	+	+	+	+	+							
Venture capital funding											+			++

The following synthesis of workshop results is based on the summaries that were produced after the workshops. The authors of the synthesis have strived to select and summarise presentations and discussions from the workshops as objectively as possible to reflect what was presented and discussed, while achieving the desired level of conciseness.

5.2.2 KT strategy

Level and directions of strategy development

Many workshops had a subtitle indicating that strategic issues would be targeted in the workshop's presentations and discussions. Strategic issues were thus mentioned in many workshops, while the intensity of the highlighting of such issues differed. Particularly extended discussions took place at the workshops in Berlin and Vienna.

At the **German** workshop, there was apparent agreement among those attendees who contributed to the discussion that German universities generally find it difficult to develop an IP strategy. The German member of the ERAC WG-KT, Klaus Uckel, said that he has not yet seen a really mature IP strategy at a German university. A large part of attendees agreed that such strategies are important. One expert said that "knowledge transfer is the only means for universities to hold the bearing true in the waves of political influences". Another one said that KT can also be a location factor for universities in competing for students and researchers. However, one of the experts questioned the importance of KT, saying that the prime task of universities is to educate students and to foster international contacts. This opinion was opposed by pointing to the value KT has for student education, too, and by mentioning other countries where KT is a self-evident part of universities' strategies. In any case every university needs to develop its own strategy, that suits its profile, and a KT strategy is only as good as how it is put into practice. One expert noted that it is of key importance that upper university management supports knowledge transfer. This view was supported with the statement that KT needs to be anchored in top management even when top management changes, since all new managers seek to "set their own scent marks". However, as another expert said, the knowledge transfer issue competes with many other new issues universities currently have to deal with, e.g. the development of bachelor and master programmes and scholarship programmes. Thus, it is difficult to convince others about the importance of knowledge transfer.

At the **Alpine** workshop, Prof. Franz Stelzer from the TU Graz stated that KT is not yet fully established at Austrian universities. At his university there is currently an opinion swing backwards to being more sceptical about KT. However, since universities are not companies, reservations are normal and acceptable. One of the participants raised a question about what IP strategies Austrian universities pursue. In the following Prof. Märk elaborated on developments in recent years. The University Law of 2002 (implemented in 2004) was kind of a big bang for IPP in Austria. Following the law, IPP structures had to be built up gradually. The law generated much anger from professors against the university management which had to implement the law. Some rectors opposed the law. Prof. Stelzer warned other countries not to expect that structures for IPP at universities can be established within three years. Prof. Marxt added that it may take 5-10 years or even 15 years until strategies and infrastructures are established and returns can be yielded.

At the **French** workshop, recommendations were made regarding the role of SMEs in KT activities and how these could be further developed. These recommendations have strategic implications: Firstly, any KT activity should be long-term. Secondly, a diverse tool-kit is needed to develop a strategic interface between academic research and entrepreneurial activities. Thirdly, companies must develop a mind-set and processes that bring together public and private sector thinking. Fourthly, genuine partnerships need to be created that bring together supply-push and demand-pull dynamics from the public and private sector. The presenter of these ideas also called for a European approach and debate about KT strategy development.

At the East-Mediterranean workshop it was noted that successful KT can take many **strategic paths**. The best way is through responding to market demand. This has been proved to be successful for example at the Massachusetts Institute of Technology (MIT) in Boston US, but it cannot be used as a model for imitation since the underlying conditions are very different from those in less favoured regions of the EU. Successful countries in KT are those where the demand from industry is very clear and research responds to this. Alternatively, there is also an informal route for KT whereby "enlightened" individuals, e.g. high-profile university researchers, use informal links to industry. This often happens when there is no rigid structure in place that would hinder these links. However, such "enlightened" individuals are exceptional cases. Policy making can encourage informal routes – mainly by eliminating disincentives. Policy based interventions may diminish the risks and costs of KT and thus encourage investment.

At the East-Central European workshop it was pointed out that one first needs to **define the scope of KT**. The entities involved include the European Commission, national and regional governments, PROs, SMEs and multi-national enterprises. If the parties involved only agree in certain parts what KT is, their relationship is likely to be subject to misunderstandings. For example, SMEs may not want licenses – it would then be wrong to force license agreements while a research co-operation would be the better option. Hence, PROs should be aware of the "full package" of KT (e.g. patenting, licensing, spin-outing, contract, collaborative research) when seeking to commercialise their knowledge. KTOs should develop a proper procedure for collaboration with business: It should have clear answers to several questions: What steps are needed for successful co-operation? What support is needed? What are the objectives? It is important that a KTO recognises that it has customers at both ends, i.e. in research and business, and it needs to meet the needs of both. In turn, both the researchers and the company need to be willing to co-operate on the path to the market.

At the East-Central European workshop it was also suggested that the university needs to have an "**integral agenda**" to KT. If a university misses an important component of the agenda, it will not succeed. The university should seek to empower the system, not the organisation, and regional economic strength is needed in order to support the whole system. Thus, rather than creating income for the university, it should empower the ecosystem and also support systems in place outside of the central organisation. For example, the approach of the Kennispark in the Netherlands implies starting and growing firms locally, developing strong industrial links such as an SME portal, joint research ventures and building clusters.

Legal framework for KT

In her welcoming speech at the **Alpine** workshop in Vienna, the Austrian Federal Minster for Science and Research, Dr. Beatrix Karl, elaborated that Austria has fulfilled the European Commission's KT Recommendation to a large extent. In particular, in performance agreements (Leistungsvereinbarungen) with universities, the ministry ensures that Austrian universities develop reliable and sustainable KT strategies.

At the **Baltic** workshop, conflicting legislation in Latvia was discussed as a special problem. All IP generated in the course of state funded research at universities and PROs belongs to the state, and a state scientific institute has rights to use IP created as a result of state-funded scientific activity. At the same time an inventor or his or her successor in title, as an employee of the university or PRO, owns the patent rights. Consequently no incentive at all exists to file any patents or try to maintain these, because there is always the danger that the state might claim the IP. Therefore, one of the few solutions for a researcher to valorise research findings in Latvia is to leave the university and declare an innovation to be resulting from extra-university activity. Another strategy that can be pursued to circumvent the contradictory patenting law is to pursue fast market entry and fast market exit. Because of this situation, Latvian universities generate revenue mainly from industry-funded research. There is evidence of spill-overs from such industry-funded research showing that KT exists even if it does not show up in statistics.

Also at the **Baltic** workshop, Prof. Aleksei Kelli stated that high quality research results are the basis of any successful KT activity. Whether it is better that KT happens under a professor's privilege or an institutional ownership regime depends also on the maturity of the TTO system. In case the TTO does not have a good infrastructure and is not professionally managed, the professor's privilege may be the better choice. If Estonia switched to a professor's privilege regime, it would not make much difference to the country's KT performance.

KT programmes and initiatives

In several workshops, national programmes for promoting KT were presented and discussed more intensely. Primary examples were the workshops in Vienna, Dublin and Paris but also the workshop in Porto.

In his presentation at the **Alpine** workshop, Prof. Stelzer from the TU Graz pointed out the effects of the uni:invent programme, initiated by the Federal Ministry for Science and Research, which lasted from 2004 to 2009 and supported the development of KT infrastructures at Austrian universities. The increase of invention disclosures at the TU Graz was largely due to uni:invent but also to information events related to KT. However, he also pointed out the consequences of the programme's end: available funds broke away and KT activities had to be cut back. International experience shows that it takes 10-15 years until sustainable valorisation structures are established at universities.

At the **British Isles** workshop, Richard Stokes elaborated on KT programmes in Ireland. In 2007 Enterprise Ireland launched the Technology Transfer Strengthening Initiative (TTSI). The TTSI provided KT funding including patents of more than € 6 million annually (approximately 1% of state research expenditure), capital investment in incubator centres of more than € 53 million, and it funds some TTO staff in seven universities and two institutes of technology. TTO staff in higher education institutes (HEIs) work closely with EI commercialisation specialists to find licence opportunities; EI business partners work with HEIs to screen and develop spin-out opportunities. The TTSI boosted KT in Ireland: From 2005 to 2010, invention disclosures increased from 135 to 431, patent applications increased from 83 to 101 (with an interim high of 202 in 2008), licences, options and assignments increased from 12 to 93, and the number of spin-outs increased from 5 to 31. From 2006 to 2010, Ireland also increased its KT performance in terms of spin-outs established, licenses executed and inventions disclosed per 100 million US dollar. Richard Stokes concluded that Ireland performed as well as if not better than the US and other EU regions. At the same workshop, Anton Bartolo elaborated on the current importance of state and EU programme funding for developing KT and IP protection in Malta.

At the **French** workshop, the recently introduced KT programmes were presented. The most important policy initiative to strengthen KT and innovation in France was the creation of societies for accelerated technology transfer (Sociétés d'Accélération du Transfert de Technologie - SATT) in 2010-2011. SATTs have a double mission: first, they are to strengthen R&D valorisation services at the local level. Second, they fund proof of concept and maturation studies, in close cooperation with competitive clusters. Further important KT initiatives described in the French workshop include the funding of "competitive clusters" of companies, research laboratories and higher education establishments in a given territory; France Brevet, an agency set up in 2011 with a budget of €100 million in order to ensure better use of public and private research through an improved flow of patents; and an initiative for student entrepreneurship. However, since the introduction is very recent, no experiences were presented or discussed. The suggestion was made that SATTs should in the long run develop into a single point of contact for all knowledge transfer activities. There were also concerns with regard to the opacity of the research and KT support system in France; there may need to be a clear vision of how the different instruments interoperate.

At the **Iberian** workshop, the OTRI programme (Oficina de Transferencia de Resultados de Investigación) was mentioned as a very important initiative to foster KT in Spain OTRI was launched in 1989. Today there are 65 offices and 450 knowledge transfer professionals across Spain, helping advance KT due to the provision of a formal structure. OTRI deploys senior, experienced staff with real industry experience, while most universities in Spain have a knowledge transfer office but 45% of their staff are junior or temporary.

The example of **Hungary** provides valuable lessons about the implementation of policies for enhancing KT operations. As a result of the Innovation Act in Hungary in 2004, knowledge transfer offices were set up, mainly at universities, and state funding was made available for founding KTOs. Grants were available from 2006 until 2011. However, as these KTOs received state funding until 2011 and were thus not included in universities' budgets it is now very difficult for universities to continue funding them. It is also not possible for KTOs to finance themselves, as it is very difficult for KTOs to even make revenue for the university. Therefore, alternative resources for KTO funding need to be found. Another consequence of the Innovation Act and the resulting five years of funding is that five years has proved an insufficient timeframe for KTOs to establish solid grounding or develop strong ties with industry. This funding window also means that most KTOs were set up at the same time and so there was a sudden demand for trained professionals in KT. Unfortunately the market was not prepared for such a demand and there was not enough trained staff available. The KTO system is now fragmented so that in each office there is a lack of critical mass of research findings that could be commercialised.

A major activity to overcome KT barriers in the **Czech Republic** is the project EF-TRANS (Efficient Transfer of Research and Development Outputs in Production and their Subsequent Utilisation). The main objectives of the EF-TRANS are: to improve the cooperation between research institutions and universities with industry in order to facilitate the commercialisation of R&D results; to enhance the utilisation and legal protection of intellectual property; and to motivate students, employees of universities and research institutions and to instruct them on which steps to take in this process. The EF-TRANS project analysed the legal environment and the KT situation in the Czech Republic and abroad. The project's methodologies are currently undergoing revision, after which they will be finalised and ready for use by PROs.

KT governance

Closely related to KT programmes and initiatives is the issue of KT governance – the question of effectively managing KT issues in public administrations. The issue of KT governance was not addressed as explicitly in the workshops of 2011 which covered the wealthier central, Western and Northern parts of Europe. "Good government" in KT appears to be a much more important issue in the South-East of Europe.

In terms of common mistakes and lessons to be learnt from **Slovenia** and wider European examples, at the East-Central European workshop it was stated that one should not invest in KTOs if available staff is not trained - otherwise money invested will be wasted. Second, it is not worthwhile to invest in patents for their own sake, without proper assessments, proper quality assurance and proper plans for commercialisation.

Governments should look at the whole commercialisation process and its results in terms of licences, contract and collaborative research contracts not just patent numbers. For this reason many patent funds may be ineffective; they increase the amount of patenting without commercialisation. Funding should be put in place for commercialisation rather than limited to patenting. There may be too many KTOs in Slovenia. Researchers need to be contacted personally; decrees from above meant to foster KT are not effective. Patent attorneys are left out of the KT equation at present; they should be educated and included.

Another example of a need for better KT governance may be **Croatia**. There is a need for enhanced political commitment to support the innovation process and to focus R&D funding in the academic community. Furthermore, smart specialisation of regions and a reinforcement of cooperation between science and business are necessary. Finally, investment in technology infrastructure and targeted financial instruments to encourage SMEs to invest in R&D would help Croatia's research institutions to develop further. All in all, policy makers should consider TT as a complex process and system that needs to be supported from multiple sides. This should be taken into account when formulating and carrying out policies, and policies should interlink.

At the East-Mediterranean workshop it was stated that KT in **Greece** has taken place despite rather than because of policy intervention.

In the Western Balkan workshop it was pointed out that the model of governance of the R&D and innovation system in **Serbia** is a major obstacle to the networking of the R&D sector with the rest of society. Key policy documents such as an innovation strategy and a policy for restructuring the R&D system are missing. There are also insufficient incentives for commercialisation of R&D results as well as legal requirements for career advancement in the R&D sector which promote research but not development activities.

An extreme case of hindered KT governance is **Bosnia-Herzegovina**, as described in the Western Balkans workshop. The R&D system in Bosnia-Herzegovina is hindered by decentralised and complex state structures; there are seven ministries responsible for R&D policy. The overlapping between these ministries weakens the system, which is further restricted by limited nature of government provided financial resources.

Prevention of IP loss

In several workshops it was stated that the Recommendation on intellectual property management in knowledge transfer activities is creating a common awareness for the professional and fair treatment of intellectual property. It also constitutes a high-level common declaration of EU-wide best practices which have a signal effect on third-party countries. It proved to be effective, for example, in a joint agreement with the Republic of Korea on Eureka cooperation. At the time of the German workshop, the Korean government was about to exempt Eureka cooperation projects from a law stipulating that technological IP in defined fields developed with Korean participation must not be disclosed to other countries – a law which is against the Recommendation's Code of Practice.

At the workshop for **Germany**, the prevention of loss of IP to industry and countries outside Europe, i.e. the uncompensated transfer of knowledge, was discussed. The importance of a solid IP policy and of common values in KT among German and European universities and PROs was stressed. One of the attendees of the German workshop argued that it may not be that necessary for German universities to develop a strong IP policy, not as necessary as in other countries. This view was however contested. The German ERAC WG-KT representative, Klaus Uckel, said that any university department may find an "IP nugget" leading to a struggle about related IP. Industry would "play hardball" in such cases, particularly in international contexts. In Germany apparently many university representatives pursue the Humboldtian approach that all generated knowledge should be freely available to the world for the benefit of all. This approach may however lead to IP getting lost to other stakeholders exploiting it for their own benefit. Many universities outside Europe may know their IP policy very well and take it very serious.

Klaus Uckel stressed the importance of common values about KT among researchers in order to have a strong position versus other stakeholders, notably industry and Asian countries. A solid IP policy may help when taking a strong position in IP negotiations. For example, a group of university professors involved in cooperative pharmacological research within the European Innovative Medicine Initiative had protested that industry would "plunder" their research findings. However, apparently the universities where these professors were employed did not have a viable IP policy. Thus industry tried to dictate the business conditions. Another example is an assumed trick of international stakeholders to say that they will not accept strong positions in IP because other cooperation partners from the same country would not have such equally strong positions. If German universities had common IP values, foreign cooperation partners could not pit them against each other.

The German workshop was the only one in the 2011 workshops where the issue of inadequately compensated IP transfer was discussed. The vigour with which the issue was presented and discussed in Berlin stands in stark contrast to not mentioning this issue in the other workshops. This may be interpreted in at least two different ways: There may possibly be a need to further promote the importance of the issue of not losing IP; or the issue of IP loss may not be that important in Europe.

Easy access to IP generated by universities and PROs

At the **British Isles** workshop Neil Bowering from the University of Glasgow presented the University's model of "Easy Access IP". This model has already been widely discussed in Europe and beyond. The University of Glasgow pursues the aim to transfer as much IP into usage as it can, to the benefit of its partners, the community, the society and the economy. The University believes that all IP has inherent value, but only a small proportion has significant commercial value for the University. For that small proportion of IP the University will seek to exploit it with commercial partners. For all other IP the University will seek to transfer it for free to partners who can demonstrate how it will benefit the community, society or economy. Since launching the approach in November 2010 up to the workshop in July 2011, the University did six related deals; six more were ready to go.

The rationale behind this approach is that the current process – assess disclosures, file patents and try to license these to companies – is very inefficient. It turns a university into a product development organisation, which quickly becomes an expensive business. It also creates expectations as to what the University gets back, and the University is always being criticised for overvaluing technology and for being difficult to negotiate with. What is worse, knowledge exchange is not happening at the rate that it should be. The University concluded that the process of commercialising the top 5-10% of the IP by way of spin-outs and high-value licences is "relatively" straightforward and does generate returns. The rest is given away for free. Though companies can access IP for free, the University applies four conditions: The company needs to demonstrate potential benefit to the economy, it needs to guarantee the University's right to do research, it has three years to do something (or anything) with the IP, and it needs to acknowledge the University's contribution.

In the workshop discussion, several participants contested the Easy Access model. One argument against it is that results of publicly funded research is given away for free, which may be legally problematic because of state aid issues. Thus some types of research may not be applicable to this model. Another issue is the response of academics; Neil Bowering said they turned out to be generally positive towards the model. However, one of the participants said that universities should seriously consider this model because it helps focus on the big deals. The University of Glasgow considered the concept of demanding a share of returns if a company using Easy Access IP actually makes money with it, but the University dropped the idea again. One of the realisations the University had meanwhile is that even if IP is given away for free and the time spent negotiating agreements is reduced; the amount of time to build the relationship with the company and the actual knowledge exchange process is still considerable. Often this is supported by either company or other public sector finance.

Beyond what was discussed at the workshop, there is a controversial discussion going on in Europe about the University of Glasgow's approach. Defending the approach against reproaches that publicly owned IP should not be given away for free, some argue that "by making the licensing process simple and commercially attractive, the initiative is surely a step in the right direction"[36] However, others say that what the approach describes as groundbreaking is what universities have been doing for hundreds of years so that "the primary benefit (...) is the publicity generated for the University of Glasgow".[37]

In a parallel session of the **Alpine** workshop the new regulations (since fall 2010) on IP ownership and valorisation in the Swiss Regulation on the Research and Innovation Promotion Law (Art. 10y 2, Verordnung zum Forschungs- und Innovationsförderungsgesetz, V-FIFG) were debated. In practice, the new regulations stipulate that IP generated in projects co-funded by the Swiss Commission for Technology and Innovation (CTI), the major federal funding agency for applied collaborative R&D, is automatically owned by the practical partners, i.e. the collaborating business enterprise or NPO. The general opinion among the workshop participants was that, alongside some advantages for SMEs, the new Swiss V-FIFG solution could also be disadvantageous for several reasons:

1. If the private sector partner always owns the IP of funded projects, a patchwork of IP owners might result, undermining core competences and follow-up projects of the research institution.
2. Usually not a full 100% of the costs are funded in R&D projects, but only a share.
3. In particular, in large firms IPRs are often not obtained for valorising inventions but for blocking competitors.

The change has been very recent and experiences are still missing on how this affects research and commercialisation practice.

KT standardisation

The issue of KT certification was discussed more deeply in the **Italian** workshop. It was stated that good standards for KT need to be established because currently there is no common understanding of what a KTO does. Standards should be considered as opportunities, not constraints. There are efforts on European level to establish KT standards, or rather, "a codification of what is required to do the job properly", notably in the EUKTS project.[38] In this respect, EU-wide standards may help convince university rectors about the importance of KT and the KT profession. However, it may be difficult to establish such standards even on the university level and the regional level. At the Italian workshop there was also some reservation expressed against KT standardisation,

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36 See Healy (2011).

37 See Hockaday/Naylor (2011).

38 See http://www.eukts.eu/about.html.

considering a long conversation about KT certification in the US. A crucial question may be what is tested in KT certification.

Beyond what was discussed in the workshops, there are currently parallel efforts in Europe to develop standards for KT and certificate KT professionals. Beside the EUKTS initiative, there is a global scheme introduced by the Alliance for Technology Transfer Professionals (ATTP, which is a global organisation of ASTP in Europe and AUTM in the US) and, more recently, Certified Licensing Professionals Inc. (CLP). At an EUKTS workshop in December 2011, it was stated that there is not enough scope for three parallel activities in Europe and that efforts should be joined.

Women in KT

The issue of representation of women in knowledge transfer activities was a topic of a parallel session at the **Alpine** workshop.[39] The issue was adopted on request of the then Austrian Federal Minister for Science and Research, Dr Beatrix Karl, as the Alpine workshop coincided with the International Women's Day. The participants of the parallel session agreed that it would not be possible to address and solve the underrepresentation of women in R&D and related professions by launching further, isolated "women projects". They stressed the systemic nature of the challenges. Creating equal opportunities for women in research, if taken seriously, requires far-reaching changes in framework conditions. It was observed that Nordic countries were much more advanced in this respect than Austria, for instance, in how they addressed the problems specified above. However, the women participating in the parallel session were rather sceptical about whether it would be possible to "copy-paste" the Nordic approach in Austria in the near future, as the existing mind-set would be a strong barrier to such a social transformation process.

5.2.3 KT operations

Universities' and PRO's IP capacity and skills

The KT and IP management capacity of universities and PROs were frequently mentioned at the workshops. Some of the most elaborate statements were given in the **Benelux** workshop. Frédéric Pierard, a Belgian representative of the ERAC WG-KT, stressed that his TTO has an open and creative approach to negotiation with enterprises associated with a clear position of enforcement of its IP rights and the negotiated agreements. His TTO also has a multidisciplinary approach to deal with industry, assembling a team of three advisors from the TTO: a legal advisor, a business developer and a scientific advisor. This approach has proved to be very successful. Public-private partnerships (PPPs) can be very effective in supporting collaboration between universities and the private sector. For example, the Institute for Medical Immunology of the Université Libre de Bruxelles was created in 2004 as a pilot for a new PPP approach to research programmes in Wallonia. This type of partnership is very beneficial as trust is built between the researchers of the University and scientists from industry through a close collaboration on a long-term basis.

Also at the **Benelux** workshop, Koen Verhoef, who worked with three different KTOs in the UK and the Netherlands, found that the situation is the same everywhere: the offices spend around 75% of their time on "research support": They make sure that their organisations comply with contractual obligations, they identify IP going into collaborative research, and they negotiate all kinds of research contracts, for example material transfer agreements, collaborative research agreements, and confidential disclosure agreements.

[39] See also the elaborations in the First Implementation Report, section 3.4.

Only the remaining 25% of their time is spent on "hardcore" commercial activities such as scouting, screening, building business cases, patenting, licensing and spin-off formation. As research support is much more deadline-driven than the commercial activities – and also viewed as of immediate importance to research progress by the scientists involved –, it is no surprise that offices tend to use their limited resources for research support rather than for commercialisation. In line with this observation, research from UNU-MERIT indicates that the single most important success factor for effective knowledge transfer is the number of KTO staff involved, relative to the size of the research base.

At the **Polish** workshop Michel Morant, ProTon Europe Chair of the Board, presented about the interplay of universities, governments and enterprises in KT – which in literature is often referred to as the "triple helix".[40] In this interplay, the responsibility for universities is to have a clear IP policy and to have a clear statement of the importance of KT as a third mission. This policy needs to have clear rules about what happens if, for example, they are violated. Also clear guidance on what is acceptable – such as a regulation whether at all and if under which circumstances a full time professor can or cannot be a CEO. The responsibility of the government lies in the provision of a clear IP system with laws describing what is allowed. Furthermore, the funding of good research and providing support to IP management and protection at universities and also in SMEs are governmental responsibilities. Another particular task is the availability of proof of concept funding, as this is difficult to get funding for from the private sector. However, what is most important is to allow some freedom for the university to organise themselves. If they are able to have a framework to work to but some flexibility to suit it to their needs, they are more likely to be able to stick to it. Thirdly, enterprises should be clear about what innovation policy they want to pursue and be involved in collaborative research programmes accordingly.

At the **Iberian** workshop, the Portuguese practice of arranging professional internships at US TTOs was presented by way of testimonies from interns. The Portuguese University Technology Enterprise Network arranges such internships and even pays for it; the professionals participating in these internships find them very valuable for improving their skills. This practice may be interesting for other European countries, too.

In the Northern Balkan workshop, an example of developing KT capacities in **Romania** was stated. At the regional level, money from the Structural Funds is often wasted because researchers and businesses do not cooperate on the regional level. In order to tackle these problems, the Romanian Association for Technology Transfer and Innovation created a partnership. The partnership includes the Ministry of Education, Research, Innovation and Sport, the National Patent Office and the Association for Business Environment. They started offering KT training at the regional level, joining people from universities, technology transfer and local administrations. This is the best way to develop local KT strategies. There is now a network of centres dealing with KT that interact. Furthermore, with the assistance of the Enterprise Europe Network, business development centres in the cross-border area of Bulgaria and Romania were established, which is not the most developed area in both countries. These centres also serve KT objectives.

Commercial enterprises' IP capacity and skills

At four workshops, the ones in Berlin, Vienna Maastricht and Dublin, the – in some respects limited – readiness of commercial enterprises to co-operate with universities and PROs was discussed.

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40 See for example Etzkowitz (2008).

At the **German** workshop it was mentioned that industry's capacity to cooperate with universities and to adopt research findings from PROs is limited. It was pointed out that small and medium-sized enterprises require special efforts in cooperating and transferring knowledge. It is often not attractive to engage in contract research, as employment contracts of professors do not reward this type of activity. Another speaker said that even in large enterprises the readiness to adopt knowledge from PROs is decreasing.

At a parallel session of the **Alpine** workshop, KT with SMEs were focused. The participants agreed that both types of institutions, public sector research as well as private businesses, have to benefit from KT and that it is essentially an undertaking based on partnerships. Commercial and research goals need to be mutually exclusive. Public research organisations also benefit when their research is put into practice and exploited commercially (e.g. positive effects on their reputation) and they receive input for new R&D from this. The identification of knowledge/technology needs in SMEs and appropriate KT services focussed first of all on the barriers: communication barriers between science and business, risks of R&D investments, funding of the critical phase between the academic proof of concept and innovation were stressed by the participants. In order to match technology offers from science and demand from companies electronic platforms may be complementary (e.g. the Enterprise Europe Network EEN, http://www.enterprise-europe-network.ec.europa.eu), but KT is essentially a people business and governed by trust. Brokers and match-makers can help by reducing communication barriers and it is indeed a task of the private sector e.g. industry associations, chambers of commerce, or cluster organisations, to support SMEs in the process. Additional ("backpack") funding for KT activities as a percentage of the genuine research funding might be foreseen. As a result, the IP should generally be owned by the research institution and licenses or transfers should be decided on a case-by-case basis. SMEs might need advice or consulting in the process in order to obtain effective IP solutions.

In the discussion of the **Benelux** workshop, Marian Suelmann from the plant breeding company Rijk Zwaan stated that it is difficult to enforce plant breeders' rights. Some plants such as lettuce are easy to copy, and court cases can take years. Rijk Zwaan has around 500 plant breeders' rights including applications for such rights and a few patents and several applications pending. The company may also license patents from universities and PROs. TTOs often want to see quick returns, but it may take many years until there are returns. In contract negotiations Rijk Zwaan often needs to explain the specific situation of the plant breeders industry. Also at the Maastricht workshop, Stephanie van Wermeskerken from the Philips said that collaborative research is prone to issues between the partners. For Philips collaborative research only makes sense if the company can share results and if research is far from the market and if commercialisation of research findings is uncertain. In such joint research, an issue is that often technology transfer offices want to agree on commercialising results and related returns upfront at the beginning of the co-operation. This is too early. For Philips such endeavours are only undertaken if the company wants to share results publicly anyhow, and thus access to IP for all partners is desirable. Trust is needed to agree on commercialisation and returns, and this trust first has to be built.

At the **British Isles** workshop, TTO manager Margaret Woods stated that industry often says that universities are slow in negotiating. However, negotiations could be concluded much quicker if universities could negotiate with decision makers in industry right away, which is often not the case.

These discussions highlighted the fact that KT constraints and impediments also exist on the parts of the enterprises sought to adopt inventions from universities and PROs.

Model contracts

In recent years the issue of model contracts has been discussed intensely on national as well as European level. In 2009, DG Research and Innovation set up a working group on knowledge transfer which also produced an expert paper on "options for a European-wide model agreement for contract research / collaborative research". The author, Tanja Schöpke from the Fraunhofer Society, concluded the following: "One can argue whether model agreements are a blessing or a curse, but most stakeholders involved in research collaborations agree that model agreements serve at least as helpful guideline and reference provided they reflect and balance the different interests of the stakeholders. Stakeholders are therefore in principle in favour of developing a European-wide model agreement for contract and collaborative research."[41]

The issue of model contracts was mentioned and discussed several times at KTS workshops. At two workshops, the ones in Berlin and Gothenburg, there were parallel sessions about issues related to model contracts and contract design between universities and PROs on the one hand and commercial enterprises on the other. At the British Isles workshop in Dublin, experiences with the "Lambert toolkit" were presented.

German workshop

The participants of a parallel session on model contracts largely agreed that model contracts can be a useful instrument, if the target community actually made use of them (provided they know about them!) and that efforts should be made to further improve them and make them better known. In essence, the working group (including the practitioners) encouraged the BMWi "to keep going" with this initiative. Prof. Goddar confirmed that in principle, model contracts were more useful and valuable if one of the contracting parties is less experienced. However, according to his evidence their actual use among key target communities, in particular SMEs and their counterparts in research (small non-university research organisations), was not yet optimal. Therefore, it would be important to involve representatives of these communities more in the development of these contracts.

Issues and challenges to be addressed include the following:

- Awareness raising: The participants unanimously agreed that awareness raising was needed for the model contracts developed by the BMWi working group. They are not yet sufficiently known among the target communities in research and industry.
- Seminars: Awareness raising measures should go beyond informing stakeholders about the existence of the contracts. Workshops could be held on how a model contract should be applied (e.g. how to choose the right model and modules, how to select or adapt clauses, how to negotiate the contract, issues to be considered).
- Guidelines: Participants agreed that it was important to offer explanatory guidelines with comments and background information (for instance legal references) about specific clauses of the model contracts – a kind of "annotated model contract". This would significantly facilitate users in making choices or adaptations.
- Flexibility of the model contracts: A central issue in the discussion was how to ensure that model contracts are flexible enough to suit different contexts. On the one hand, there is a risk that significant changes in the wording and structure introduced by legally less experienced contracting parties may damage the legal consistency and certainty of the contract, thus making the whole idea of a (professional) model contract obsolete. On the other hand, it is obvious that no single contract can fit all

[41] Schöpke (2010), p. 219.

purposes. In order to address this dilemma, two suggestions were made. First, offering different options and a database of contract clauses; second, using annexes.

In essence, the participants agreed that a model contract should consist of three main elements: (1) the main contract document (basic structure, modules), (2) different options for specific clauses for the various parts of the contract, (3) comments and explanatory guidelines.

The working group also discussed whether there was potential to develop a European model contract. The legal experts present felt that this was possible and this avenue should also be followed, but most participants regarded it as a longer-term objective. For the time being, there was still work to be done at national levels.

It was suggested that exploration of whether establishing an alternative dispute resolution scheme specifically for the settlement of conflicts in R&D cooperation and contract research might be helpful. Specifically, the establishment of a “Schiedsstelle” (an institution for out-of-court arbitration) was proposed. The objective would be to avoid high risks for both contracting parties stemming from expensive and long-time disputes in court. Specifically for SMEs and small research organisations, contract enforcement can cause significant financial risks if legal action becomes necessary.

In addition, the following specific issues came up during the discussion: compliance with state aid; granting the right to use licences at market conditions; and a “technology mapping” database that could be developed in order to better link demand and supply.

Nordic workshop

At the Nordic workshop, working group 3 dealt with “contract management as a prerequisite for effective knowledge transfer - aligning practices in academia and industry”. The objective of this working group was to identify and discuss differences in roles and practices in the field of contract management between academic and industrial partners, possible "best practices" in this field as well as innovative future actions that may align contract management practices between academia and industry. The working group came up with four innovative points about contract management for the future:

- There should be increased efforts related to improving communication between stakeholders in academia and industry, inter alia to clarify basic differences in roles and interests as well as establishing and reinforcing "common ground" between them. This point is arguably not novel, but is still regarded as being of utmost importance for the development of future "best practices" in KT between these sectors of society.
- Specific support actions should be conducted on national levels to improve contract management skills, e.g. workshops for exchanging knowledge and experience with practitioners from different spheres.
- Stakeholders’ analyses about contract management should be conducted to create a knowledge base for future actions.
- European-wide model contracts for collaborative projects should be created.

Beyond what was discussed at the Nordic workshop, Kaare Jarl, Danish member of the ERAC WG-KT, referred to the results of a CREST cross-border expert-group in an individual statement. He said that there was a joint understanding that it would not be realistic to construct a "one-size-fits-all-model-contract-toolkit" given the numerous differences among member states in university law, national funding scheme requirements, and budgetary provisions. Also, it would not be realistic to expect for example the British or the Germans to replace their national model contracts with a joint European standard.[42]

British Isles workshop

At the British Isles workshop, the Lambert toolkit was presented; it is a series of model research collaboration agreements including five model research collaboration agreements (one to one) and four model consortium agreements (multi-party). It was designed by representatives from universities and industry in order to overcome lack of clarity over IP ownership and related high legal costs of IP protection, the long stretches of time needed to conclude agreements, and limited resources especially in SMEs. The toolkit recommends different approaches and a spectrum of solutions also to set expectations in negotiation, ease the process and not solve every issue. It is not meant to cover every scenario but to cover common scenarios and to lead to a workable and reasonable compromise. Keys to having the right agreement are the following: understanding the issues, understanding the model agreements, internal and external communication, reaching real agreement on the principles first, choosing the right model agreement, and amending it where necessary. Model contracts may be particularly helpful when the negotiating parties are not familiar with IP law.

Commercialisation support by intermediaries

At the **British Isles** workshop and the **Baltic** workshop, the commercialisation support services of the Commercial Edge were presented and discussed by Andy Todd. There was high interest in such services. Following these workshops, representatives from Ireland and Estonia began a more detailed discussion and preparations for the launch of such a service in their country.

Commercial Edge is a university-business partnership fostering innovation by forging relationships between the business, academic and investment communities. Commercial Edge was created in mid 2010 by Commercial Catalyst Ltd, a business service company that helps organisations deliver exceptional financial results through improvements in sales performance. Commercial Edge was pioneered by the universities of Teesside, Sunderland and Northumbria. It brings to bear industry experts to uncover leading edge funded research opportunities.

According to Andy Todd, in the traditional approach of seeking to commercialise research findings, 1 in 170,000 findings has a chance of financial success. This is because universities are normally unable to provide sufficient commercial skills to create value from IP. The traditional approach is that a researcher patents his finding on his own and seeks to make money from it. Commercial Edge supports the researcher during research by helping identify commercial opportunities of research, directing research towards commercialisable results and providing funds for contract research or collaborative research. Commercial edge does not go in for third-party funding. Commercial Edge only closes deals promising high value.

The related process begins with a workshop convening Commercial Edge professionals and university representatives, one-to-one assessment sessions between Commercial Edge professionals and researchers, and an objective review of the university's potential. Subsequently, an umbrella agreement is signed and "pump prime funding" provided, followed by signing up individual interim agreements for "SpinIOs" (a combination of a spin-out and a spin-in company). When commercialisable results have been created, start-up deals are closed, a company may be formed, and projects and profits may be created. Profits from the companies' operations as well as capital gains from exits are

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[42] See CREST OMC Expert Group on Intellectual Property (2006).

used to fund the overall portfolio of Commercial Edge ventures. This creates a valuable addition of alternative to grant funding.

Intermediaries may however also be established by public law such as the regional *Verwertungsagenturen* (valorisation agencies) in Germany, as mentioned in the **German** workshop, and the *Societies for Accelerated Technology Transfer* (SATT) as currently introduced in France and presented in the **French** workshop.

Developing IP awareness

At the **Nordic** workshop it turned out that even in an advanced country like Denmark, challenges that still remain include changing scientists' mindsets, earlier involvement of industry via collaboration and fostering entrepreneurial skills among graduates. Responses to these challenges are sought to include stronger engagement from research management and active use of incentives, aligning expectations between industry and academia and an improved education in entrepreneurship and IP. The representatives from other Nordic countries generally confirmed that the situation in their country is similar.

At the **Baltic** workshop, Violeta Kauneliene from Lithuania stated that Kaunas University is by far the most successful Lithuanian University as regards industry-funded research. However, even this university holds only a few patents and has no income from licenses yet. Difficulties encountered in the implementation of the recommendations are mainly related to lacking an IPR mindset – the mindset in Lithuania is still influenced by the Soviet system. Lithuania is at the beginning of a learning curve about IP rights with a current lack of practice in disclosing research results, a lack of confidence on the part of researchers that disclosures are dealt with adequately, and conflicts of interests.

IP in European projects

One of the parallel sessions of the **German** workshop was dedicated towards IP protection in European projects. The participants of the working group identified the following challenges and topics with respect to EU research participation by universities in Germany:

- The inherent tension between the requirement to acquire third party funding and participate in research projects with industry and the reluctance of researchers to participate in projects in which academia is considered a "weak" partner.
- The specific challenges encountered by the different IPR regimes in the Joint Technology Initiatives (JTIs) which are different to the IPR rules in the Framework Programme and seem to cater to the needs of industry first.
- A general need for more university focused IPR advice and recipes for daily management of projects.
- From a ministerial point of view: how to encourage exploitation of IP, understood more broadly than the mere economic exploitation of IP: would an obligation to exploit, anchored in the funding rules, encourage more exploitation?

Participants agreed that there is generally a low level of awareness in the governing bodies of universities for the potential of EU projects to generate patents, although the workshop had also provided good examples of the contrary. EU research projects are not considered complementarily to national efforts but as a competitor. Although researchers are interested in participating in EU funded research, they are not always supported by the university steering board with regard to the administrative management of such projects. Experience from individual participants seemed to suggest that although some EU project officers are hired at universities, they are often few in number and on short term contracts that expire after two years. A long lasting body of experience cannot accumulate.

When interacting with industry partners, universities have a "status" problem. The challenge is to negotiate on the same level. Existing bilateral instruments from American companies are insufficient because of fundamentally different IP regimes between US and Europe. The model Consortium Agreement DESCA is used widely in universities, which are content with the flexibility offered. For the JTIs, extra legal support for drafting consortium agreements was provided by the national contact point. This support needs to continue in the upcoming Framework Programme. Participants expressed the wish to have JTI rules that are aligned with the current Annex II rules. It was felt that these would have been sufficient to achieve the goals of the JTIs.

Participants discussed the merits of setting costs aside for patenting, prior to the start of a research project. This seemed convenient when at first considering the relative lack of awareness among researchers about the issue of patenting. A crucial role falls upon the coordinator who needs to have awareness of exploitation. However, it was also felt that such a cost item might lead to patenting at all costs, without considering quality issues of the patent. If conceived more broadly, exploitation of IP would also entail spin-offs, publications, follow-up projects. Participants felt that incentives could be provided to create spin-offs or to set-up a follow-up project to continue exploitation of market-distant results from a predecessor project. Financial support could, for example, be provided to pay for consultancy services of a spin-off project or to pay for the legal vetting of a Consortium Agreement in a market deployment project.

IP management in different industry sectors

At the **French** workshop, IP issues in different sectors of the economy were discussed in parallel working groups. This was the only workshop where this issue was dealt with in-depth. The sectors of software, health and life sciences as well as agronomy were focused.

It was pointed out that KT and IP management in the domain of ***software*** research and industry differ significantly from other research fields. First, the software industry is not focused on a single market. Potential clients belong to many different economic branches. In addition, actors and organisations implicated in the process of knowledge transfer and pre-commercial development are diverse, including for example data base providers and wholesale companies. Therefore the organisation of knowledge transfer activities differs from case to case and cannot be modelled on a unique example. For this reason any public funding aiming at enhancing and increasing knowledge transfer activities in this domain requires comprehensive knowledge of all actors and activities concerned. The second characteristic which might set the software domain apart from other economic sectors concerns the type of property rights involved. Unlike in other sectors, patents are seldom used in the software industry. Most often, what is being transferred or what can be sold is not a patent, but software itself. Many software products are the result of long years of research and development in which many diverse actors have become involved. The transfer of this type of product is therefore highly specific. The installation and adaption of software for a certain purpose often requires a high level of expertise and profound knowledge of the product. In addition, property rights issues are becoming more difficult due to the fact that most software products today include at least a certain share of open source applications.

In ***health and life sciences***, because they deal with living creatures, face particular constraints on the legal and ethical dimension of their research. In addition, a wide variety of outputs (diagnostics, medicines, molecules) and tools further complicate research. As a result, the maturation process between a first idea, invention, innovation and diffusion can be very long and cost-intensive. It was widely recognised that risk of failure regarding knowledge creation and exploitation of results is particularly high in the life-sciences. Once an idea matures, outside expertise is required. Experts for the legal and regulatory as well as the business aspects of life-science research need to be involved to bring an idea to fruition. Today, the innovation capacity of pharmaceutical companies may be limited to the buying of small companies with promising results. Discussions in the group led to the conclusion that key success factors for KT in life sciences are a focus on the clinical relevance of ideas and a continuous proximity to the researcher and the laboratory which first brought an idea to life. This approach of a clinical needs driven innovation and transfer policy was put into contrast to a currently dominating approach of technology-push.

In the field of ***agronomy***, the main issues were found to be open data and regulations. Six sectors of agronomy can be distinguished. (1) Vegetal agricultural production constitutes an international issue and is dominated by an oligopoly, while Europe only holds 20% of IP. Three main pillars govern agricultural production: primary production, protection, and seeding. In the field of seeding, intellectual property is governed by two systems: patents, and plant variety rights, which are a major international issue. (2) Animal production has specific characteristics since there is no protection system on animals. In this sector, patents are hence less crucial than in the vegetal production sector, but technological change is nevertheless important. (3) Feeding and nutrition is confronted with technological change. Current public policies may not always be adequate because there is a strong gap between public interest and industrial interest. (4) Clean technologies are progressing in the field of soil or waste management for instance. (5) White biotechnologies are closely linked to green chemicals. In this field, there is a growing international tendency to patenting. (6) Engineering and services are related to environment and agriculture. This field is more concerned with technologies and know-how than patents. The USA are the leader in the field of agronomy IP; they consider IP as a geostrategic issue. However, Europe clearly has a major role to play and at the French workshop there were calls that European research should be more integrated. The working group concluded that biological, genetic, animal and vegetal resources need to be preserved and their access needs to be guaranteed. Open data access should be enhanced in order to promote know-how proliferation.

Taking shares in firms

The issue of universities and PROs taking shares in firms was discussed more deeply at the workshop in Vienna.

In exploiting IPR the University of Innsbruck benefits from its researchers' contact with companies as well as from its transfer centre. Revenues from licences could have been increased steadily during the last eight years. Additionally, the University is seeking shares in companies: shares in spin-offs from the university and strategic shares in other companies. The returns from these activities are more long-term but also prospectively higher than patenting and licensing. In 2008 the University founded a holding for formally pursuing the taking of shares, a 100% subsidiary of the university with the legal form of a GmbH (Limited Liability Company). Up to now the University has only taken shares in limited liability companies. For the University of Innsbruck, taking shares meant entering new grounds. It implied a paradigm shift, and some at the University have not yet accomplished this shift. In the discussion, Michael Krebs from the Institute for Molecular Biotechnology, a former start-up entrepreneur, was sceptical about universities taking shares in companies. He said that investors do not like university shares because universities tend to be sluggish, and the administrative costs – for example for taking part in board meetings – are high compared to the shares taken. After several investment rounds the universities' share will be very low, and investors will dictate investment conditions. Silke Meyns said that ETH transfer considers its shares in spin-offs as support to these companies, not as a source for returns. ETH transfer takes shares only when immediate reimbursement for patenting costs would be too difficult for the company.

European patent

The single European patent intends to provide a consistent patent right across Europe, thus fulfilling a key principle of the Internal Market.[43] Before the single European patent was legally approved towards the end of 2012, it was mentioned as a pressing issue in one KTS workshop in 2011. Asked about their most important wishes to policy makers about KT, three participants in the panel discussion at the **Benelux** workshop mentioned the European patent. They also acknowledged that this issue was developing into the right direction.

Developing KT operations in countries with modest and moderate KT policies

Due to the composition of countries participating in the 2012 workshops of the KTS, presentations and discussions often revolved about issues of developing KT operations from a low level.

At the Western Balkan workshop, a speaker from Hungary was invited to present about how to develop knowledge transfer and IP management and countries where KT currently does not play a significant role. It was suggested that an efficient TTO is another effective means of supporting KT. For a TTO to be successful it should respond quickly to both research and business communities; employ professional staff with broad interests; utilise fast and effective preparatory work to support decisions; minimise the administrative work of scientific staff; provide proper, unbiased valuation of inventions; act as a "One-stop-shop" operation; and build long term relationships with business partners.

In **Slovakia** the circumstances for TT within universities are not satisfactory and that apart from the large projects with funding from EU structural funds not much was in place. There have been some smaller funding projects to allow universities to set up their own TT offices and start TT related activities. However, these projects are now at the end and although some progress has been made in universities founding TT offices, they are only in the early stages of development.

5.2.4 KT organisation and approaches

De-centralisation versus centralisation of KT

There is the question of the organisational level where specific KT tasks should be implemented in a national KT system. While the issue was touched in several workshops, more distinct statements were provided at the workshops in Vienna and Paris.

At the **Alpine** workshop, the discussion of Prof. Beat Hotz-Hart from the University of Zurich evolved largely around central versus decentralised organisation of KT. An organisation named Unitectra attracted particular attention. Unitectra is the technology transfer organisation of the universities of Bern, Zurich and – since September 2010 –

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[43] Recent developments include the following: "The EC proposed to launch enhanced cooperation in the area of unitary patent protection on 14 December 2010. (...) The European Parliament gave its consent on 15 February and on 10 March 2011, the Competitiveness Council authorised the launch of enhanced cooperation with the participation of 25 Member States. The implementation of the authorising Council decision requires the adoption of two regulations; one on the creation of unitary patent protection and a second on the applicable translation arrangements. On 13 April 2011, the Commission adopted the proposals for the implementing regulations." See http://ec.europa.eu/internal_market/indprop/patent/index_en.htm.

Basel, organised as a non-profit limited company entirely owned by these universities. The question was raised whether the formation of such central organisations is a trend. According to Prof. Hotz-Hart there is little room for further centralisation in KT in Switzerland mainly because universities compete with each other and are seeking their own distinction, and as soon as central organisations diluted that distinction they would not want to participate.

Currently there is a discussion in **Austria** about centralising some KT functions. It was highlighted that in a centralised KT landscape it is difficult for universities and public research organisations to maintain individual KT strategies and functions. Silke Meyns stressed the importance of allowing different types of universities to pursue different types of KT strategies and activities. In Switzerland, decentralised structures allowing universities to define their own approach co-exist with overarching structures: for example ETH transfer as full "in-house" TT office versus Unitectra AG providing services for the universities of Zurich, Berne and Basel, with each university having its own internal rules and Unitectra's staff located on each campus.

At the **British Isles** workshop, Richard Stokes from Ireland stated that a KT Task Force suggested establishing a national office for IP generated in the higher education system which would be a single point of contact for entrepreneurs. Richard Stokes found that a decentralised model supported by strengthened IP management skills and stronger linkages between TTOs, as proposed by AD Little/Forfas, may be more realistic.

At the **Baltic** workshop there was a call for more decentralised KT systems, mentioning the UK and Lithuania as negative examples of a centralised system. One should stop talking about institutions but start talking about systems because linking the stakeholders is important.

At the **French** workshop, Gabriel Clerc from the TU Lausanne elaborated on the issue of centralisation and decentralisation. He said that the crucial issue is how to best serve the needs of the researchers. Usually best and closest services for them can be provided locally at the university, but this may depend on the size of the organisation. With regard to "lessons" learned for other countries, Clerc underlined the unique situation of Switzerland as a highly decentralised state. He pleaded for a high degree of autonomy of universities, which should be empowered to negotiate and sign IPR agreements without having to refer back to a higher instance of either regional or central government. Personally he said he is convinced that the less centralised and the closer to the universities and research institutions any transfer desks are, the better they will work. He cited the State of California as an example, where an attempt to centralise KT institutions had not been successful.

At the **Iberian** workshop, it was suggested that TTO organisation is also a question of the TTO's mission. If patents are viewed as a commodity which has to be sold this is a purely commercial view and so the TTO could be external to the university of PRO. On the other hand, if TTOs act as matchmaking organisations for a matching industry with university innovations, the TTO has to be very close to the university and therefore internal.

At the East-Central European workshop there was a discussion about **centralisation versus decentralisation of KT**. In Slovenia there may too many TTOs and so efforts should be made towards local co-operations. Some KT tasks could be allocated to central KTOs, but there still need to be contact points at the universities. It was explained that the only KT things which need to be done within the university are those requiring trust. For example, for the eight employees of the Centre for Technology Transfer (CTT) of the Slovenian Jožef Stefan Institute it is impossible to know what is going on in R&D in the whole institute. So they decided to appoint KT representatives in each department – to chat with, not to formally report to the CTT.

KT through people

The importance of "KT through people" was stressed in particular in workshops for Eastern European countries where KT is less developed as in Western Europe. At the **Baltic** workshop, Gailė Sakalaitė from Lithuania stated that "it is all in the people". Thus scientists and industry representatives should learn to speak the same language. Some money would be needed for educating scientists about entrepreneurship and business reality. Understanding each other, networking, and collaboration are key. Documentation of existing KT practices, including procedures to found spin-offs, as well as development of contracting competencies would be very helpful. Business people should know what is happening at universities, they should be involved as mentors of scientists, they should become involved in teaching entrepreneurship at universities, and there should be personnel exchange programmes between industry and science.

At the **Polish** workshop, Dariusz Trzmielak, member of the board of the Technology Centre of University of Łódź, stated that in Poland there is currently a lack of willingness to cooperate between business and scientists. He pleaded for more incentives for professionals to come back to universities once they have been in industry. There are too few programmes and grants available for this purpose, which would be required in the absence of market mechanisms.

New KT models

"New KT models" were the subject of a parallel session in the **Nordic** workshop. For session moderator Tapio Koivu, the key issue for improved IP protection is the understanding that IP protection is about creating value. For value creation, the initial question is for whom universities and PROs create value – for themselves, for society, for business, for the nation? The working group attendants suggested that the main value from public research is for society, in the form of new knowledge. However, there is also monetary value that can be realised for universities and governments as well as businesses.

According to Tapio Koivu, enterprises are increasingly asking for "strong IP" in the form of IP portfolios and "patent families" because single IP may not carry sufficient commercial value. However, cases of actually combining IP and creating patent families are rare. The bottom line for strong IP is the quality of research, since the IP cannot be better than the research, and the relevance of research for practical applications. A basic precondition for generating IP that can be bundled is a critical mass of researchers and research within a university or PRO. This may require specialisation of universities' research profiles. However, universities may be reluctant to even discuss this issue because it touches freedom of research. Top-down approaches to create critical mass may not work, and there may not be sufficient funds available.

The next step would be to actually collaborate in research and IP creation within an entity. In fact, it was stated that more collaborative research within universities and PROs is necessary. Furthermore, universities and PROs may also purchase IP from big companies to supplement their IP portfolio, the sort of IP these companies do not need – which has for example taken place with Nokia in Finland. However, in the workshop it was not discussed whether such practice can be exemplary for many universities and what the costs and benefits are related to the teaching and research missions of universities.

One of the participants said that IP protection should not always be about patenting. For each invention one should decide what should best be done with it. In fact, patenting can waste a lot of money when a technology is sought to be "pushed" but not demanded, so one should well consider whether and also when to patent. Standardisation can also be a suitable way to make use of an invention. "Entrepreneur-in-residence" programmes can help valorise research findings. The entrepreneur may look for commercialisable IP within a certain university of PRO. Research projects can be required to review what IP exists before the project begins. Another opportunity is to auction IP, as Denmark does.

5.2.5 KT measurement

KT surveys

Results of the KTS surveys were presented at the workshops in Rome and Porto. In Rome there was also a presentation of ProTon survey results. The Iberian workshop was the only one where the multitude of different surveys was addressed.

At the **Iberian** workshop, Prof. Aurora Teixeira from the University of Porto stated that collecting standard data as it is currently practiced in many surveys does not help the TTOs. A more appropriate survey should be employed rather than lots of different surveys which essentially cover the same. It would be preferable if one comprehensive survey was used where TTOs are contacted in person and time is set aside for asking them appropriate questions. The situation at present is that often TTOs are just sent a survey which they do not have time to complete. KTS study team members pointed out that often these surveys collect the most comparable and collectable data which is why they are formed as they are. Prof. Teixeira suggested that the reason for the current concentration of surveys on collectable and comparable data is because they are imported from the US and so created for the American market. Another TTO manager said that often TTOs are not sure if they are giving the right answers due to the terminology of questions. The TTO member suggested that standardisation is required in order to allow for more accurate collection of data. In this context, Fernando Conesa from the University of Applied Sciences of Valencia pointed to a glossary of terms that was worked out with ProTon. He said that more effort from the Commission in supporting such initiatives would be beneficial.

KT indicators

KT metrics is an important issue because indicators may guide policy making and incentives provided for KT offices. KT indicators may, on the negative side, even "create perverse incentives and may actually result in a drop in effective knowledge transfer".[44] At the **Nordic** workshop there was a parallel session about the further development of KT indicators. The working group criticised the common practice of data collection about KT performance. It was stressed that currently there is too much focus on patents. Counting the number of patents does not reveal the success of academic research or of knowledge transfer. It was also stressed that it would be desirable to have impact measures. A patent may have a huge impact on society or none at all, yet both are treated as the same countable elements of the PRO's success. However, the group also agreed that currently no good measures of results exist. Furthermore, too little attention is paid to research collaborations, including collaborations with companies, with research organisations, and with public sector organisations.

An important aspect may be the sustainability of KT efforts, for instance the survival of spin-offs and start-ups, their development of turnover, employment and other indicators. This led to the question what describes the success of a TTO, i.e. what are its ultimate goals. For example, successful knowledge transfer may as well be know-how transfer which does not include necessarily the generation of income from royalties. It was deemed vital to consider "customer satisfaction" a source of measurement. Customer

[44] Bekkers (2010), p. 10.

complaints may in some cases mean that the TTO actually did a good job in pursuing the interests of the university rather than giving away IPR too easily.[45]

In summary, the working group agreed on four learning points: first, impact is the ultimate objective – and therefore indicators should reflect this. Results need to be communicated and new products and services offered. Second, the co-creation of knowledge – between the academic sector and industry as well as other sectors – should be reflected much more, whether in the form of co-publication indicators or other conceivable metrics. Third, mind the institutional difference. No two universities are structurally or environmentally the same and therefore they face hugely different circumstances. This should be borne in mind both when defining indicators and when comparing results. Fourth, the EU in their measurement and benchmarking efforts should (therefore) look at country level rather than at institutional level.

Beyond what was discussed at the Nordic workshop, Kaare Jarl, Danish ERAC WG-KT representative, commented on the workshop summary that he does not agree with the statement that there is too much focus on patents as a KT indicator. In his view, "patents are merely one among several indicators that we use to form a full picture. (...) In the real world we need to build on top of the present indicators to be able to provide data for decision-making tomorrow".

At the **British Isles** workshop there was a call for better indicators for KT performance. Input-output measures are appropriate for Irish TTOs which were recently established and results have been very positive. Over time we will need to consider economic and societal impacts of KT, as in the UK and the US, but expectations will have to be managed.

At the **Iberian** workshop, Prof. Aurora Teixeira from the University of Porto stated that different metrics may be required, reflecting that knowledge transfer should be for people and about people. The current results do not reflect this.

5.2.6 KT funding

Proof-of-concept funding

The issue of proof-of-concept funding turned out to be a recurrent subject in many workshops. While it was rarely discussed in detail (an exception being the Nordic workshop), it was often mentioned.

At the **Nordic** workshop there was a discussion about technology push versus technology pull which revolved around the proof-of-concept issue which was said to be increasingly important. One working group participant reported that a large enterprise recently approached his university to conduct proof-of-concept research. Proof-of-concept research is a special type of research, and it is usually difficult to receive funding for it. The next Framework Programme of the European Commission may put more emphasis on such research, and consortium agreements may have to be modified in order to facilitate trials. Proof-of-concept research would support valorisation of research and prevent failure of spin-offs which are built around immature technology. While failure needs to be tolerated, it should be fast and cheap, as Tapio Koivu said.

State aid rule ambiguity

The issue of state aid rules set by the European Commission was mentioned at many KTS workshops. Apparently there is widespread uncertainty about what practices are allowed and not allowed under the present state aid rule. Workshop participants thus welcomed

[45] However, in other cases it may be that universities negotiating tough may harm their own long-term interests in possibly further co-operating with the company.

the current revision of the state aid rules by the European Commission. On 20 December 2011, the European Commission launched a "Consultation on the Review of the EU state aid rules for research, development and innovation (R&D&I)".[46] This public consultation follows the publication of a mid-term review on the application of the current Community Framework for State aid for R&D&I in August 2011.[47]

The state aid issue was discussed more deeply at the **German** workshop.[48] Some attendants of this workshop argued that the legal framework for state aid would endanger universities' KT activities. There are many different interpretations of the government aid framework around, causing insecurity at the universities. It would be necessary to establish clarity in this respect. The German member of the ERAC WG-KT opposed these arguments with the statement that, from a legal perspective, KT offers particularly good opportunities for government aid – the framework for governmental aid would even suggest support for KT. Otherwise, the European Council could not have endorsed the KT Recommendation. Competition law would actually force the federal states to include KT as an objective in their university laws.

At the **Benelux** workshop, Lorenz Kaiser form the Fraunhofer Society stated that current state aid rules are unfavourable because they leave high uncertainty about allowed and not allowed terms in R&D and co-operative research. Policy makers should also consider that TTOs must be adequately staffed and funded if they are to successfully protect IP.

Venture capital funding

A lack of venture capital was mentioned and discussed several times in the 2012 workshops of the Knowledge Transfer Study. This may be due to the case that the 2012 workshops covered countries where VC availability is particularly difficult.

At the East-Central European workshop, the amount of business angels and **venture companies** in Slovakia was discussed. There have not been any real ventures in the past year; in general funds are available but there are no real venture funds. There are several VC related initiatives run by different organisations and concrete programmes are expected to be launched.

At the East-Mediterranean workshop is was stated that there is a **lack of venture capital** and seed capital available for Cypriot entities. This lack may be due to a moderate approach to technology in Cyprus. VC tends to be invested into radical types of technology developments, whereas incremental technologies do not promise sufficient profit. If you cannot find VC in a country then one would not be able to find it abroad. An initiative from the government to encourage more radical technology development would thus be useful. However, this statement was contradicted by another participant who said that there are a lot of well-developed, state-of-the art inventions in Cyprus that could attract seed funding, whereas at the same time the type of technology would not be the only criterion taken into consideration by venture capitalists.

At the East-Central European workshop it was also stated that finance is important. At the Kennispark Twente there are 20 funds in place which invested more than 28 million Euro into companies in 2011. The focus of the funds is on building industrial links. There are many events which allow people to meet. The idea behind is that the more opportunities provided the more likely it is that the right people will meet.

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[46] See http://ec.europa.eu/competition/consultations/2012_stateaid_rdi/index_en.html.

[47] See European Commission (2011).

[48] In fact this issue was mentioned so often that at some point of time it was decided that everyone who would further mention it would have to pay a penalty fee.

5.3 Main findings and conclusions from workshops

In summary, the KTS workshops in 2011 and 2012 produced the following main findings. Overall the workshops confirmed that there is increasing recognition of the importance of KT and IP management in Europe at both political level and the level of universities and other PROs. There is a wide variety of KT issues virulent in Europe. Some of the key outcomes include the following:

- *KT importance*: The EC's Recommendation on IP management in KT was found to have contributed to proliferating recognition of the importance of KT in Europe. Political decision makers have used and continue to use the Recommendation in their drive to convince universities and PROs of the importance of KT. Occasionally there were requests for further EC initiatives providing more detailed guidance for KT strategy and operations development. The EC's Recommendation was not found to be an explicit driver in this respect in large parts of South-Eastern Europe.
- *IP strategy*: Strategy development is an issue in many countries. Strategic objectives range from the prevention of IP loss to industry and countries outside Europe on the one hand to "easy access IP" on the other hand.
- *KT governance*: The development of good KT governance was found to be an issue in many South-Eastern European countries. A deeper understanding of strategy development for KT and IP management needs to be developed, including e.g. issues to be covered and acknowledgement of the complexity of KT.
- *IP capacity and skills*: There is a need to ensure sufficient and sustainable funding and achieve professionalisation in KT offices. However, launching national KT support programmes may not have the desired impact when they do not address shortage of KT professionals and when they end after a few years. Even more basic, in the South-East of Europe there is also a need to strengthen the R&D base from which opportunities for KT may arise.
- *Model contracts*: Contracts between universities and enterprises are an important mechanism in KT. Currently, there is a need apparent to further improve and proliferate model contracts and to improve contracting skills.
- *KT organisation*: Workshop discussions have not yielded clear consensus on what KT functions should be allocated to what levels within a country. The crucial issue was recognised to be how to best serve the needs of the researchers as the producers of new knowledge. Best and closest services for them may be provided locally at the university, but this may depend on the size of the organisation – small universities with small KTOs may not be able to provide adequate services. In the South-East European workshops it was stated that small countries in particular may benefit from central KT functions carried out by an organisation serving several PROs – or, vice versa, it is neither efficient nor effective for every PRO to try to build up an own KTO. KTOs should in any case be able to focus on directly communicating with the researchers at their PROs, which is their essential task.
- *KT intermediation*: Deal making between universities and PROs on the one hand and commercial enterprises on the other hand were found to be a difficult issue. Solutions included the establishment of intermediaries, in Germany and France. Models of intermediary presented were both commercial and non-profit.
- *A need for more specific discussion*: The KTS workshops in 2011 appear to have been valuable to the KT community attending, who were informed about the KT situation in the country, in the region beyond the country and in Europe and able to discuss related issues. Several times participants said that now that an initial workshop had taken place, it would be valuable to go deeper into specific subjects.

Further recurrent issues discussed in the workshops include the ambiguity of state aid rules, a lack of proof-of-concept funding, a problematic legal framework for IP ownership in some countries, and the need to address a tendency to see KT as only patents, licenses, and spin-offs and to neglect “KT through people”.

6 OVERALL CONCLUSIONS AND POLICY ISSUES

6.1 Introduction to conclusions and policy issues

Sources for conclusions

This chapter draws conclusions from research conducted in the framework of the Knowledge Transfer Study 2010-12 (KTS) and elaborates on policy issues. It refers to current problems of knowledge transfer in Europe and to possible solutions to these problems, resulting from the work done. The issues result from the following sources:

- The surveys of universities and other public research organisations (PROs) conducted by the KTS in 2011 and 2012.
- The enterprise surveys conducted by the KTS in 2011.
- The KT policy survey conducted by the KTS in 2012, supplemented by a preceding survey in 2010.
- 14 workshops with KT experts from 38 European countries contribute "anecdotal evidence" on a wide set of ideas, opinions and experiences at country level.

Empirical findings from these surveys and workshops are described in detail in this report.

Where useful, the conclusions are supplemented by further evidence from third-party literature which is not yet quoted in the previous chapters of this report.

Structure of this chapter

This chapter is structured along the recommendations made by the European Commission to the Member States in April 2008 (Commission Recommendation C (2008) 1329). It uses the clustering of the single items of the Recommendations, leading to seven items instead of eleven, which was also used in the European Knowledge Transfer Policy Survey 2012 (WP1). Within each item, the chapter addresses the following questions:

1. Where was the issue brought up? What do we know about its scope?

2. What possible solutions have been identified? What supporting evidence, opposing arguments, and contextual knowledge do we have with regard to the possible solutions?

3. If questions 1 and 2 cannot be answered concisely with the KT study results, which will be the rule rather than the exception: What further research activities and discussions can be suggested to shed further light on the issue and possible solutions? This might typically include:

- For research activities: questions to be addressed, type of research (e.g. compiling and reviewing existing literature, new empirical research), approach (e.g. exploratory case studies, others).
- For discussions: questions to be addressed, geographical scope (national, EU-wide) and moderator, mode (e.g. ERAC, some form of workshop, internet-based moderated expert network, consultation process e.g. with working papers).

The chapter also raises questions and points out where more knowledge is necessary for raising the efficiency and effectiveness of KT policy in Europe.

Common challenges of knowledge transfer

Before drawing conclusions and formulating policy implications, it is useful to answer a key question about knowledge transfer: Why is knowledge transfer such a difficult and often unsuccessful activity? Based on research for this study and on the growing amount of related literature, the following general challenges of knowledge transfer can be distilled. [49] The list does not claim to be complete but to cover the most important issues.

Challenges related to PROs:

- **Competing objectives within PROs**: Knowledge transfer is sometimes referred to as the "third mission" of universities beside teaching and research. Universities are currently facing numerous challenges such as adjusting to governmental regulations about degrees and curricula as well as sustaining or improving the university's position in competing about students and research funds. KT may thus often be third priority behind research and teaching and not necessarily viewed as supporting the other two objectives.[50] Even in PROs where KT currently enjoys high recognition, this may change with shifting PRO management. The challenge is to establish KT as a fully recognised objective of PROs that also contributes to excellence in research and teaching, sustainably backed by the university's management.
- **Incongruence of KT costs and benefits**: Costs and benefits of the knowledge transferred may frequently be with different organisations on different geographical levels. While the university may have to bear the costs of transferring the knowledge, e.g. in funding KTOs, patenting and supporting spin-offs, benefits may be highest for the regional economy or the society at large. While income generation may be a primary objective of PROs in KT operations, only some will achieve a position of covering KT expenses with income from KT. This is even the case in the US. The challenge for PROs is to develop a KT strategy, KT operations and forms of KT organisation which address this issue.
- **Academic rationales in favour of publishing**: Academic culture may generally not be tuned towards valorisation of research findings or not even towards engaging in research that might lead to potentially commercialisable outcomes. Following established incentive schemes, academic researchers may be more interested in publishing their findings in academic journals. They may thus obstruct or at least not support commercialisation. The challenge is to set incentive towards engaging researchers in relevant research, invention disclosure and in valorisation, to instruct researchers and students about IP, and to establish more or less systematic "technology scouting" within PROs.
- **Conflicts of interest**: Engaging researchers in strong links with commercial enterprises may lead to conflicts of interest, i.e. researchers may (partly) abandon their neutrality in favour of commercial interests. Neutral, open and unbiased research is however a basic characteristic of academic work which serves wider social and also economic goals. The challenge is to establish and enforce rules not obstructing researchers' interaction with commercial enterprises while ensuring academic neutrality.

Challenges related to the nature of the goods and markets concerned:

- **Imperfect information about commercial potential**: When a research finding is disclosed, PROs have to assess its valorisation potential and how to deal with it. When the PRO sees such potential they may protect IP and offer it to commercial enterprises. However, information about the commercial potential of an invention is imperfect, so enterprises may not necessarily be ready to pay the "price" for the IP. The challenge is to establish viable procedures for assessing the commercial potential of research findings.

[49] See e.g. Siegel/Veugelers/Wright (2007), section II.(ii) about "Problems in commercialization of university IP".

[50] This issue was for example mentioned in the German KTS workshop.

- **Lack of market transparency**: Knowledge transfer may suffer from an intransparent market: There are numerous "suppliers" of inventions at a large number of universities and other PROs on the one hand, and numerous enterprises as potential customers on the other hand. Capacities for becoming acquainted with each other are limited on both sides. PROs may have to focus on a selected number of relationships. The challenge for PROs is to establish KT networks and links with enterprises for mutual benefit.
- **Lack of KT professionals**: Knowledge transfer is a complex business. It requires knowledge and skills in at least three fields – technology, business and law. Experts with such expertise are not easily available, particularly not for KTOs of PROs which may not be able to pay salaries as high as in commercial enterprises. The KTO profession is still developing in Europe and it is not a widely known and acknowledged profession. KTOs may thus end up with experts who are not sufficiently qualified. The challenge is to develop a viable KT profession in Europe.

Challenges related to cooperation with commercial enterprises:

- **Cultural differences between PROs and companies**: There are cultural differences between sellers, i.e. universities and other PROs, and customers, i.e. commercial enterprises. The objectives pursued, the personal characters involved and the language used by the different parties may be different, making negotiations difficult. The challenge is to manage conflicting expectations and behaviour on both sides.
- **Not-invented-here phenomenon**: Enterprises may not necessarily be ready to adopt a technology that was invented elsewhere. First, successful implementation of the invention may depend on personal knowledge which is with the inventor who remains at the PRO. Second, scientists within the enterprise may oppose the adoption of an outside invention, badmouthing it because it may harm their own esteem. The challenge is to establish trustful relationships between PROs and enterprises that lead to successful transfer of knowledge.
- **Lacking IP expertise in enterprises**: While PROs are often blamed for not developing powerful KT, there may also be deficits in professional management of IP on the part of commercial enterprises. This may particularly be the case in SMEs.[51] There is thus also a challenge to develop KT absorption capacities and skills in commercial enterprises.

This list shows that knowledge transfer is a complex phenomenon that may consequently require a complex approach. Referring to the European Commission's Recommendation about intellectual property management in knowledge transfer of 2008, the following section suggests items for an approach towards successful knowledge transfer.

[51] This issue was mentioned for example in the British Isles workshop of the KTS.

6.2 Conclusions related to the themes of the EC's KT Recommendation from 2008

6.2.1 Supporting PROs' KT strategy development

> *Reference:*
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> **KT Recommendation (2008), point 1: "**Ensure that all public research organisations define knowledge transfer as a strategic mission."

Green and White Papers on KT and IP Management

On the conceptual level, involving universities' and other PROs' strategies, statutes and procedures, the KTS found that the EC's Recommendation on IP management in KT contributed to proliferating acknowledgement of the importance of KT in Europe. This is one of the findings from the KTS workshops.[52] Political decision makers apparently have been using and are still using the Recommendation to convince universities and PROs about the importance of KT. However, there might be a need for going a step further. While the importance of KT and KT strategies is more or less widely acknowledged, details need to be developed: This includes knowledge about what items such a KT strategy should consider – e.g. technologies emphasised, mode of commercialisation emphasised, regional collaboration –, what alternative strategies exist and how to make them live in everyday practice.[53] The importance of KT strategy development and implementation was also acknowledged by the respondents to the ERA Public Consultation in 2011.[54] Beyond general guidelines and principles, each PRO needs to develop its own approach towards KT, suiting its specific profile, objectives and regional environment.[55] There is no single successful approach towards KT.[56]

Thus, beyond the Recommendation from 2008, there might now be a need for further, more detailed alternative concepts for developing KT strategies – and also policies and procedures – in order to root KT more deeply and more widespread in universities' and other PROs' identity and practice.[57] Such a publication could be something like a "White Paper on KT and IP Management in PROs in Europe".[58] It could also be or be preceded by a Commission staff working paper.

There is still considerable uncertainty about the consequences of different regulations of IP ownership and access as well as KT strategies. A Green Paper could start a Europe-wide consultation process among different stakeholders in governments, universities and other PROs, business associations and companies and mobilise considerable resources

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52 See for example the introductory statement by the German representative of the ERAC WG-KT, p. 2 of the workshop summary at http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/DE/KTS_WS_DE_2011-02-10_Summary_v1.1.pdf.

53 A related statement was for example made by a presenter in the French workshop. / As a member of the ERAC WG-KT from a large Member State said, he does not know of any really sophisticated KT and IP management strategy at any university in his country.

54 For results see European Commission (2012), section 3.4.

55 See e.g. Siegel/Veugelers/Wright (2007) about the importance of strategy development in universities.

56 See Bramwell/Hepburn/Wolfe (2012), particularly p. 52 and 55.

57 A representative from a German state ministry explicitly mentioned this idea at a national technology transfer working group meeting in November 2011.

58 „Commission White Papers are documents containing proposals for Community action in a specific area. In some cases they follow a Green Paper published to launch a consultation process at European level. When a White Paper is favourably received by the Council, it can lead to an action programme for the Union in the area concerned." (Definition of Europa Glossary.)

and discussion. It would be an appropriate measure to ensure that the European way of knowledge transfer does not simply become a copy of the US Bayh-Dole model inheriting its weaknesses but at least in some environments lacking its strengths.

The EC's role could be to coordinate the production of such Green and White Papers, in co-operation with the European Research Area Committee's working group on knowledge transfer (ERAC WG-KT) or other expert groups and drawing from their work.

6.2.2 Supporting PROs' IP policy and procedure development

Reference:

KT Recommendation (2008), point 2: "Encourage public research organisations to establish and publicise policies and procedures for the management of intellectual property in line with the Code of Practice."

Exploring and supporting the development of non-monetary knowledge transfer incentives

The KTS Code of Practice (CoP) survey 2011 among universities and other PROs showed that monetary incentives for becoming involved in IP protection and exploitation are pervasive among the responding European PROs. Other incentives, like social rewards, inclusion in tenure decisions, or additional funds for R&D, are less common, in particular in countries with more developed research systems.

CoP 4 makes a strong statement on the provision of non-monetary incentives.[59] The study team thus assumes that the value and positive effect of non-monetary incentives on IP protection and valorisation have been tested and proven in prior studies, though the study team has not yet reviewed this issue systematically.[60] Provided that the value of non-monetary incentives is proven, their further design and development would benefit from the special assistance of the EC in particular areas:

- Identifying and evaluating examples for non-monetary incentives in different countries, types of organisations and academic disciplines in regard to their positive and negative effects and side-effects as well as their specific implementation context.
- Creating case studies on these examples and disseminating them widely among European PROs and the stakeholders of research and KT.
- Supporting innovative human resources models in PROs which try to integrate IP and KT performance into promotion and career decisions.
- Promoting the creation of awards and prizes which honour KT success by private enterprises, business associations, research councils, governments and other organisations, also on European level.

Better addressing SME requirements

Requirements and constraints for IP ownership and access as well as KT preferences and practices vary by industry, business model, and company size, among other characteristics, as shown in KTS interviews conducted with private enterprises and in

[59] Wording of CoP 4: "Provide appropriate incentives to ensure that all relevant staff play an active role in the implementation of the IP policy. Such incentives should not only be of a financial nature but should also promote career progression, by considering intellectual property and knowledge transfer aspects in appraisal procedures, in addition to academic criteria."

[60] See Bekkers (2010) for an "evaluation of incentives and policies that affect research institutions' knowledge transfer activities" for DG RTD.

previous research (Cohen, Nelson, & Walsh, 2002; Laursen & Salter, 2004; Santoro & Chakrabarti, 2002). Incentives for and barriers to working with PROs differ systematically between different types of companies. For instance, firms with up to 1,000 employees more often mentioned financial and informational barriers to work with PROs, generally a lack of internal resources to identify and fund R&D partners and services from PROs, whereas larger companies pointed more often to legal barriers (e.g. related to IP ownership and access, export laws, labour market regulations or the like). Small and medium-sized enterprises – with fewer than 250 employees, but also larger companies with fewer than 1,000 employees – have less resources to work with PROs directly, for example in contract research, but also to evaluate existing support mechanisms at national and sub-national levels and direct KT offers of PROs. Future activities in the areas of assessing good KT practice, building a KT knowledge base, exchanging information on IP and KT issues among PROs should consider this and raise awareness that there is no "one-size-fits-all" model for IP and KT.

PROs and their KT practices can generally improve in assessing and addressing the needs of SMEs and less science-driven industries. The crucial question is how PROs and SMEs can easier interact with each other and what measures facilitate cost-effective relationships between them. It is beyond the scope of this study to answer this question comprehensively. Therefore, we would suggest as a first step a review of the existing literature and data on innovation, technology transfer, R&D cooperation, university-industry linkages and the like with a particular focus on results obtained on the situation of SMEs.

Based on more in-depth insights about PRO-SME relationships, policy makers at EU and national level could develop specific offers and support schemes and put additional effort into reaching out to SMEs.

6.2.3 Improving knowledge transfer capacities and skills

Reference:

KT Recommendation (2008), point 3: "Support the development of knowledge transfer capacity and skills in public research organisations, as well as measures to raise the awareness and skills of students – in particular in the area of science and technology – regarding intellectual property, knowledge transfer and entrepreneurship."

"More KT about KT"

In the KTS surveys and workshops, KT capacity and skills development as well as the KT profession in Europe were found to be young and developing. For example, the KTO survey found that most European KTOs are young and small: 61% were established after 1999 and 52% have fewer than five employees.[61] KT professionals (or would-be professionals) will not everywhere have access to a sufficient knowledge base and experiences.

At the KT capacity and skills level there is thus a need for "more KT about KT", i.e. a need for spreading information about good KT strategies, policies and practices to decision makers in public policy, universities and PROs, intermediaries and also commercial enterprises. On the basis of the survey findings and workshops, the following is suggested:

- Further **workshops** are meaningful, in particular targeted towards specific issues in specific countries, as well as towards less developed countries. Considering the

[61] See section 3.3.1.

mainly positive workshop evaluation results, the workshops were apparently valuable for the KT community to become informed about the KT situation in the country, in the region beyond the country and in Europe as a whole and to discuss related issues. Several times participants stressed the importance of looking in more depth at specific subjects. Such issues include many of those explained in this document: KTO collaboration, KT incentives, KT standardisation and certification, KT internships and visiting fellow programmes, benefits and risks of deal-making support by intermediaries, international R&D collaboration, addressing SMEs' requirements, expanding women's participation in KT, and legal framework conditions for KT.

- Impressions gained in workshops support the idea that more in-depth descriptions of good practice in KT would be helpful for many KT actors in Europe.[62] A **KT good practice manual** could be drafted, based on experiences in many countries and describing good practice for countries in different development stages and in different languages. Such a manual could include an extensive link list to service and capital providers.
- The benefits of a **KT Europe Network** should be evaluated. This could include a website portal similar to the Enterprise Europe Network. Such a platform could offer semantic search functions in order to be really user-friendly and helpful. This could constitute a Europe-wide communication and networking mechanism to learn from other KTOs about successful techniques to commercialise IP.[63] However, such networks could also be seen as natural tasks of KT professional organisations. If the European Commission considered introducing such a network, professional organisations should be consulted.

The EC should facilitate such "KT about KT" for instance by means of organising or funding workshops, producing good practice and supporting the development of a KT Europe Network.

European model contracts for KT

Model contracts – a term also frequently used is "sample agreements" – may support KT and IP management in PROs. They may be used in joint research with commercial enterprises, spin-off creation and licensing. The European Knowledge Transfer Policy Survey 2012 found that model contracts are in use in 16 of the 39 European countries covered and planned in further six. Some examples were discussed more detailed or at least mentioned in the KTS workshops. While there was some controversial discussion about model contracts in the workshops, and while there are arguments against European model contracts, successful national examples such as the "Lambert agreements" in the UK may justify the development of model contracts on a European level. Those countries that did not yet develop model contracts for their PROs and which may not have sufficient resources for developing their own model contracts may benefit from European-wide templates. Other countries may want to review their model contracts against the European templates, while a third group may have well-elaborated model contracts and see no need for revisions.

KT standardisation and certification

Good standards for KT and the developing KT profession may need to be established because currently there is no common understanding in Europe of what KTOs and KTO

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[62] For example, some of the case studies presented at the workshops in Berlin, Rome and Paris were among the presentations downloaded most frequently from the KTS website.

[63] At the Dublin workshop, speaker Margaret Woods suggested this concretely.

professionals do.[64] To the knowledge of the KTS team there are parallel efforts in Europe to develop standards for KT and certificates for KT professionals. A major initiative supported by DG RTD up to 2011 was the EUKTS initiative.[65] Besides EUKTS, there is a global scheme introduced by the Alliance for Technology Transfer Professionals (ATTP, which is a global organisation of ASTP in Europe and AUTM in the US) and, more recently, Certified Licensing Professionals Inc. (CLP). At an EUKTS workshop in December 2011, it was stated that there may not be enough scope for three parallel activities in Europe and that efforts should be joined. Furthermore, at the Italian KTS workshop there was some reservation expressed against KT standardisation, considering a long conversation about appropriate KT certification in the US.

Considering this situation, before the EC supports certification of KT professionals or KTOs or recommends certification to Member States or subsidiary organisations, a number of questions should be answered in a structured manner:

- Where does KT certification exist and what experiences were collected?
- What type of certification appears to be most beneficial and why?
- What are possible downsides of KT certification?
- What stakeholders should be involved in KT certification in what way?

These questions should be addressed by reviewing existing literature, dedicated empirical research and discussions of the concerned stakeholders.

Exploring and raising formal KTO collaboration

The KTS CoP survey 2011 found that the size of a knowledge transfer office (KTO) is an influential variable for the development level of IP and KT practices in PROs and their performance.[66] At the same time, cross-institutional collaboration seems to be still at a rather low level: only 20% of the respondents stated that they pool IP in general or patents in particular across organisations in the PRO CoP survey, though further evidence on such collaborations is certainly necessary. An example for pooling resources and joining KTOs across PROs was discussed at the Alpine workshop: the Swiss Unitectra that is owned by two universities and mandated by three further universities, three university hospitals and two non-university PROs. This bottom-up collaboration between PROs should not be confused with institutions created top-down by governments such as the patent valorisation agencies (*Patentverwertungsagenturen*) in Germany and the Societies for Accelerated Technology Transfer (SATTs) in France.[67]

Following from these findings, it might be advisable to extend interaction between KTOs to formal arrangements which are established, for instance, with the intention of pooling resources for dividing labour and specialisation benefits across KTOs. In other words, KTO interaction should not be limited to the informal level, to networking and the exchange of information and good practice in transfers.

By identifying, analysing and presenting cases of IP and KT collaborations at different levels, the European Commission should contribute to growing awareness of the

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64 See the summary of a related discussion at the Italian workshop, http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Italy/KTS_WS_Italy_2011-09-30_Summary_v1.0.pdf, pp. 2-3.

65 See http://www.eukts.eu, last accessed 15/11/2012.

66 See section 4.2.

67 See the summaries of the workshops in Germany (http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/DE/KTS_WS_DE_2011-02-10_Summary_v1.1.pdf, p. 10) and France (http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/France/KTS_WS_France_2011-11-08_Summary_v1.1.pdf) for more details.

conditions, strengths and weaknesses of formal collaboration in IP management and KT. This would in the best case give birth to new organisation models which improve the use of resources for IP and KT services. However, the extent to which any pooling and formal collaboration is possible will depend very much on national regulations and practices, the position of KTOs within or outside of PROs and their set of tasks and activities. It is therefore necessary to assess the situation in every country separately and evaluate the experiences gained in different settings. The EC should stimulate such assessments and discussions within and across Europe.

Internships and expert visit programmes

Internships and expert visit programmes may support KT. There are several examples in Europ.e The Portuguese example of arranging professional internships at US TTOs may be interesting for other European countries. In Portugal, the University Technology Enterprise Network (UTEN) arranges and finances such internships; at the Iberian workshop we obtained positive comments from KTO professionals on the value of these internships for improving transfer skills.[68]

Another example is the Knowledge Transfer Partnership Programme in the UK. It involves three parties: a company partner (which may be from a broad spectrum of sectors and of any size), a PRO or college (public or privately funded), and so-called "KTP Associates". Each partnership employs one or more high calibre Associates, transferring the knowledge the company is seeking into the business via a strategic project.[69]

Certainly, more experienced European PROs could also share their knowledge by having interns from weaker PROs and lagging countries. Related programmes should be developed. However, smaller PROs and KTOs will not be in a position to let their staff members go away for a longer period of time. Instead of outgoing internships, incoming expert visits from experienced (possibly retired) transfer managers for short-term visits would be an alternative. It is hard to imagine negative aspects of such exchange schemes, except that they might not produce any material effects if competencies cannot be transferred easily between organisations or countries. However, an exploration of the Portuguese experiences and ideally similar programmes could be a first step of finding out more. Then, pilot projects in different countries would be suitable to find out what works best in different contexts.

The EC should collect further knowledge on the exchange of KTO staff and experts between organisations, possibly set up a funding scheme in coordination with the Member States and call for participation from European PROs and KTOs.

Enhance staff mobility between science and industry

In order to increase understanding about the cultural differences between PROs and enterprises, mobility of staff between the two spheres should be further enhanced.[70] The EC is already actively promoting such mobility across Europe, e.g. through the Framework Programme "Marie Curie Industry–Academia Strategic Partnership" scheme.[71] The EC also supports related national and regional initiatives. The EC may further promote the importance of such schemes on national and regional level in Member States and Associated States.

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68 See chapter 4 of the summary of Porto workshop, http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/Iberian/KTS_WS_Iberian_2011-11-14_Summary_v1.3.pdf.

69 See http://www.ktponline.org.uk/background/.

70 See also the results of the ERA public consultation in European Commission (2012), section 3.4, and Siegel/Veugelers/Wright (2007), p. 657.

71 See http://ec.europa.eu/research/mariecurieactions/about-mca/actions/iapp/index_en.htm.

Fostering the representation of women in KT

The KT Recommendation does not make any specific statements about women in research and KT, but the issue was taken up as a parallel session in the Alpine workshop.[72] In terms of research and inventions, Europe shows a deficit in diversity. Only 8% of all patent applications at the European Patient Office are filed by women. This percentage varies throughout the various countries. As stated in the Communication on the Europe 2020 Strategy, the only way to deal with current and foreseeable social, economic and ecological challenges is innovation. However, Europe stays way behind its innovation capabilities with regard to underrepresentation of women in the innovation process. The creative and economic loss of highly educated, ambitious women in terms of knowledge transfer can hardly be put into figures, but is easily conceivable.

Following the discussions in the Alpine workshop session and further available material,[73] it may be worthwhile for the EC to deal with this subject in its efforts to promote knowledge transfer. Future policies could continue to promote special training for the development of a female spirit of invention, such as building up entrepreneurial skills and confidence.

Deal making support

Whenever the capacities and skills of KTOs to valorise research findings are not sufficient, intermediary organisations could offer support. Such intermediaries have been established by public law such as the regional patent valorisation agencies (*Patentver-wertungsagenturen*) in Germany and *France Brevet* currently being introduced in France. Intermediaries may also be commercial.[74] Organisations such as the Commercial Edge Initiative which was presented and discussed at the KTS workshops in Dublin and Tallinn offer solutions for universities and PROs with a distinct interest in contract research and co-operative research as well as commercialising results of research findings.[75]

Establishing on-demand deal making support services in larger parts of Europe could be part of a solution to the issue of KTO's capacities and skills as well as bridging academic and business cultures. Such support organisations could offer services related to R&D and technology assessment and provide links with industry. In particular, support may be advisable when a university or other PRO seeks to license IP, which tends to be a form of KT which enterprises do not prefer. However, intermediaries may also add further organisational objectives and they certainly add further partners to which trust needs to be established; they thus may also complicate negotiations. Considering these possible downsides of intermediaries, it would be prudent at this stage to analyse the different aspects around such intermediaries before piloting and testing them in different national and organisational contexts.

The EC should support theses analyses and ensure an exchange of the collected experiences.

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[72] See section 4.3 in http://knowledge-transfer-study.eu/fileadmin/KTS/workshop/AT-CH-LI/KTS_WS_AT-CH-LI_2011-03-08_Summary_v1.2.pdf.

[73] A more detailed overview about female underrepresentation in research and KT in Europe is included in the KTS First Implementation Report, section 3.4.

[74] At the Nordic workshop, a representative from Iceland mentioned a successful example of involving a commercial valorisation agency for licensing a university's patent.

[75] See http://www.thecommercialedge.co.uk/ as an example of a for-profit intermediary which was presented at the KTS workshops in Dublin and Tallinn.

6.2.4 Promoting broad dissemination of knowledge while protecting IP

Reference:

KT Recommendation (2008), point 4: "Promote the broad dissemination of knowledge created with public funds, by taking steps to encourage open access to research results, while enabling, where appropriate, the related intellectual property to be protected."

Assessing the value of a wider publication of IP and KT policies and successes

The development of IP and KT policies in universities and other PROs advances: in the KTS PRO CoP surveys sizable shares of respondents stated that they have an IP policy (80%), licensing policy (40%), and start-up policy (58%) or that such policies are planned – for IP policy 10%, licensing policy and start-up policy 18% each.[76] In addition, the awareness of the importance of monitoring institutional performance and progress is growing. However, the publication of this information lags behind, as the PRO CoP survey also showed. There are several questions on which further scientific research would need to be conducted and good practice examples should be made public:

- What are the best communication channels and media for bringing different types of content from PROs closer to the private sector?
- What content should be published to the benefit of the PRO? Could, for instance, the publishing of licensing policies possibly harm PROs in their efforts of getting fair deals for their organisations?
- How does the type of content, such as regulations and bylaws, research capacities, research results or available technologies, influence the choice of channel and medium?

The EC should support related studies and the dissemination of their findings.

6.2.5 Facilitating cross-border research and KT

Reference:

KT Recommendation (2008), point 5: "Cooperate and take steps to improve the coherence of their respective ownership regimes as regards intellectual property rights in such a way as to facilitate crossborder collaborations and knowledge transfer in the field of research and development."

KT Recommendation (2008), point 8: "Ensure equitable and fair treatment of participants from Member States and third countries in international research projects regarding the ownership of and access to intellectual property rights, to the mutual benefit of all partners involved."

Globalisation of research collaboration and knowledge transfer

The KTS enterprise interviews suggest that European companies, if geographically expanding their internal R&D, in many cases expand R&D to Asian countries, above all to China and India. This is not a new trend (Bruche, 2009; Ernst, 2006). In the KTS sample of interviewed companies, growth in Asia did not correspond to a reduction of R&D at other sites. European countries are also the target of R&D-motivated foreign direct investments from non-European companies, traditionally from the US, but more and more also from Asian and other catching-up economies.

[76] See sections 4.2.3, 4.2.6, and 4.2.7.

Consequently this geographical expansion of internal company R&D also leads to an expansion of the network of academic partners. The CoP mentions non-European partners only once with a negative connotation (CoP 11).[77] The question is whether this is doing justice to the rather complex matter of costs and benefits of KT, and there are several related questions: To what extent do European PROs actually collaborate with enterprises whose headquarters are located outside of Europe? What are the consequences of these collaborations and the presence of non-European corporate R&D investment for academic research? This area requires further investigation and research focusing on the opportunities as well as the threats of the globalisation of research collaboration and assess the practice in other world areas. The EC should contribute to clarifying these questions.

6.2.6 Introducing or adapting national KT guidelines and legislation

Reference:

KT Recommendation (2008), point 6: "Use the principles outlined in this Recommendation as a basis for introducing or adapting national guidelines and legislation."

KT Recommendation (2008), point 7: "Take steps to ensure the widest possible implementation of the Code of Practice, whether directly or through the rules laid down by national and regional research funding bodies."

KT Recommendation (2008), point 10: "Examine and make use of the best practices set out in Annex II, taking into account the national context."

Improving legal framework conditions for KT

As regards the legal framework for KT, over the last quarter of a century many European countries have followed the US Bayh-Dole model and decreed that the IP generated by publicly funded research in PROs is by default owned by the institution. The harmonisation if IP ownership may bring several benefits, such as easier collaborative research and the reduction of information and other transaction costs (European Commission, 2004, p. 2; Van Eecke, Kelly, Bolger, & Truyens, 2009, pp. 38-39). In addition, it creates an additional incentive for PROs to dedicate time and effort to commercialisation activities.

However, there is growing empirical evidence that neither in the USA nor in Europe the high-level expectations of these legal changes could be met (Geuna & Rossi, 2010; Ledebur, Buenstorf, & Hummel, 2009; Mowery & Sampat, 2005; Valentin & Jensen, 2007). Along the same lines, the KTS interviews with R&D-intensive companies suggest that institutional ownership and a focus on the protection and commercial exploitation of IP might have negative consequences for converting knowledge into socio-economic benefits: the interviewees suggested that it complicates and lengthens contract negotiations, reduces the willingness of scientists to engage in an open and uncensored informal exchange of information with private enterprises, and creates incentives to develop strategies which circumvent IP regulations and university bylaws or look for partners elsewhere. Combining these findings and experiences, it would be valuable to monitor and evaluate the existing IP ownership regulations and their outcomes:

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[77] CoP 11: "Develop and publicise a licensing policy, in order to harmonise practices within the public research organisation and ensure fairness in all deals. In particular, transfers of ownership of intellectual property owned by the public research organisation and the granting of exclusive licences should be carefully assessed, especially with respect to non-European third parties. Licences for exploitation purposes should involve adequate compensation, financial or otherwise."

- What is the impact of a strong focus on institutional IP ownership versus a weaker focus on institutional IP ownership?
- How do other set-ups, such as "professor's privilege" (Italy, Sweden) perform in comparison to institutional ownership?
- What other paths to commercialisation have proven effective in what context, e.g. University of Glasgow's "Easy Access" model? What are their drawbacks?

De-bureaucratisation of KT processes

The companies interviewed by the KTS in 2011 mentioned several barriers to more effective and efficient knowledge transfer related to bureaucratic processes: organisational barriers such as varying and complex rules on R&D, IP or licence contracts, cumbersome application procedures and complex rules for funded projects, long timeframes of project applications and decisions and the like. These comments referred to procedures at different levels, with sub-national, national or European scope.

A constant review of the existing funding and project regulations in Europe, creating the possibility for "fast track" applications and evaluations under certain conditions, and providing more qualified support in the process could be solutions to this.

Putting state aid rules clearer

The issue of state aid rules set by the European Commission was mentioned at many KTS workshops in 2011. Apparently there was widespread uncertainty about what practices are allowed and not allowed under the present state aid rule. Workshop participants thus welcomed the current the European Commission's current initiatives to revise state aid rules.

In late 2011, the European Commission launched a "Consultation on the Review of the EU state aid rules for research, development and innovation (R&D&I)" which was closed in February 2012. On the basis of the replies received to a related published questionnaire, the Commission will prepare a first draft of a revised R&D&I Framework which is to be published for consultation.[78] More broadly, the Commission launched a state aid reform programme in May 2012, seeking to "foster growth in a strengthened, dynamic and competitive internal market"; "focus enforcement on cases with the biggest impact on the internal market" and "streamlined rules and faster decisions".[79]

This forthcoming revision should aim at reducing uncertainty related to state aid rules in KT.

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[78] See http://ec.europa.eu/competition/consultations/2012_stateaid_rdi/index_en.html. See also the mid-term review on the application of the current Community Framework for State aid for R&D&I in August 2011 in European Commission (2011).

[79] Quoted from http://ec.europa.eu/competition/state_aid/modernisation/index_en.html.

6.2.7 Improved monitoring of policy measures and KT performance

> *Reference:*
>
> **KT Recommendation (2008), point 11: "**Inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact."

Improving the KT data basis

Public KT policy, e.g. legislation, funding and information proliferation, should be evidence-based to be effective and efficient. An important part of this evidence base is statistical data about KT performance and KTO objectives. It would also help PROs benchmark their own KT practices. However, currently there is a multitude of KTO surveys being carried out in Europe on an annual basis. Some countries such as the UK and Denmark carry out national surveys; professional organisations such as ProTon Europe and ASTP also carry out surveys in some countries. There is already a European questionnaire template for KTO surveys; the KTS WP2 survey uses it. The Knowledge Transfer Study was thus able to combine the ProTon and UK results with our own survey results.

There are three problems of current European KTO surveys: First, the multiple existing surveys do not cover all leading European KTOs – there are large gaps in survey coverage. Second, due to insufficient cooperation and concerns over confidentiality, no one has been able to combine all surveys into one data set. A single data set would be very useful for both research and for the construction of indicators. Third, answering to several surveys may put KTOs under pressure and distract them from their usual business. Thus there is a need for unifying surveys.

There are a few options for improving the data:

a) Encourage cooperation between the different professional organisations – at the time of writing this statement, ASTP and ProTon are in fact negotiating about a possible merger –, plus HEFCE in the UK, so that data can be pooled, plus find alternative methods of obtaining data for non-members of these organisations. The latter would require a third player (such as the Knowledge Transfer Study consortium) to collect non-member data. This is essentially the method that the KTS has been following.

b) The EC funds national statistical offices to conduct national surveys. The data can be provided to Eurostat for pooling. This model is used for the Community Innovation Survey, but it has a few problems, such as slow data delivery and some countries refusing to submit their microdata.

c) The EC funds professional associations to survey KTOs that are not part of their membership.

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ANNEX I: MATERIAL FOR WP1

List of country rapporteurs

Country	Name	Qualification to respond
Albania	Edmond Agolli	Member of ERAC WG-KT
Austria	Barbara Weitgruber	Department head in Federal Ministry of Science and Research
Belgium (Flanders)	Stijn Eeckhaut	Member of ERAC WG-KT
Belgium (Wallonia + Brussels)	Frédéric Pierard	Member of ERAC WG-KT
Bosnia-Herzegovina (inquired)	Sabina Silajdzic	Assistant Professor, School of Economics and Business, University of Sarajevo / presenter about KT in Bosnia-Herzegovina at Western Balkan KTS Workshop
Bulgaria	Georgi Todorov	Member of ERAC WG-KT
Croatia	Dalibor Marijanovic	Member of ERAC WG-KT
Czech Republic	Jana Kratěnová / Jan Burianek	Members of ERAC WG-KT
Cyprus	Savvas Zannetos	Planning Officer, Planning Bureau, Republic of Cyprus
Denmark	Kåre Jarl	Member of ERAC WG-KT
Estonia	Taivo Raud	Member of ERAC WG-KT
Finland	Liisa Ewart	Member of ERAC WG-KT
France	Dominique Larrouy (and colleagues)	Members of ERAC WG-KT
Germany	Vivien Baganz / Klaus Uckel	Members of ERAC WG-KT
Greece	Eleni Tsipouri	Assistant Professor, University of Athens, Department of International Economics and Development / Presenter about KT in Greece at East-Mediterranean KTS Workshop
Hungary (inquired)	Agnes Ratz-Ludanyi	Members of ERAC WG-KT
Iceland	Fridrika Hardardottir	Adviser, Ministry of Education, Science and Culture, Department of Science and Higher Education
Ireland	Conor Sheehan	Member of ERAC WG-KT
Israel	Shaul Freireich	Member of ERAC WG-KT
Italy (response from MED received, from MIUR inquired)	Francesco Cocozzella / Aldo Covello	Ministry of Economic Development, Department for Enterprise and Internationalization / Ministry of Education, University and Research
Latvia	Janis Stabulniks	Member of ERAC WG-KT
Liechtenstein (inquired)	Christian Marxt	Prof. for Technology and Entrepreneurship, University of Liechtenstein, presenter about KT in Liechtenstein at Alpine KTS Workshop in Vienna
Lithuania	Kristina Babelyte-Labanauske	Member of ERAC WG-KT
Luxembourg	Léon Diederich	Member of ERAC WG-KT
FYR of Macedonia	Ljubomir Kekenovski	Deputy Member of ERAC WG-KT / presenter about KT in

		FYR Macedonia at Western Balkan KTS Workshop
Malta	Christine Perici	Member of ERAC WG-KT
Montenegro	(by empirica)	Assessment based on presentation by Milica Petrovic, Montenegrin Industrial Property Office, at Western Balkan KTS Workshop
Netherlands	Jeffry Matakupan	Member of ERAC WG-KT
Norway	Erik Øverland	Member of ERAC WG-KT
Poland	Marcin Kardas	Ministry of Science and Higher Education, Department of Strategy
Portugal	Emir Sirage	Member of ERAC WG-KT
Romania	George Bala	Member of ERAC WG-KT
Serbia	Djuro Kutlaca	Prof., "Mihajlo Pupin" Institute, Science and Technology Policy Research Centre / presenter about KT in Serbia at Western Balkan KTS Workshop
Slovakia	Jan Turna	Presenter about KT in Slovakia at East-Central European KTS Workshop
Slovenia (inquired)	Tomaz Boh	Member of ERAC WG-KT
Spain	Almudena Agüero	Technical Adviser, Spanish Ministry for Economy and Competitiveness, Deputy Direction of International and European Relations
Sweden	Viktoria Mattsson	Member of ERAC WG-KT
Switzerland	Andrea Aeberhard	Member of ERAC WG-KT
Turkey (inquired)	Oguz Yapar	Member of ERAC WG-KT
United Kingdom	Rebecca Villis	Member of ERAC WG-KT

Standard questionnaire for the European Knowledge Transfer Policy Survey 2012

Survey on National Knowledge Transfer and Intellectual Property Policies ("Policy Survey")

Questionnaire 2012

May 2012

On behalf of the European Commission, Directorate General Research and Innovation, empirica Communication and Technology Research (Bonn, Germany) is conducting the "Knowledge Transfer Study 2010-2012" (www.knowledge-transfer-study.eu). In the framework of this study, empirica is carrying out a survey monitoring how national policies meet the provisions of the "Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations" [C(2008)1329, 10 April 2008].

Responding to this survey fulfils the Recommendation's requirement that Member States should "inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact", as stipulated in item 11 of the Recommendation. Associated States are also kindly requested to fill in the questionnaire.

The current survey is a follow-on activity of a previous survey that was conducted in 2010. We would like to learn what developments have taken place since then. Furthermore, in order to be able to better assess and quantify the current state of national knowledge transfer policies, we included questions with tickboxes, asking you to indicate whether a certain item exists, does not exist or is planned in your country.

We would be very pleased if you could send the requested information for your country **by 15 July 2012 to stefan.lilischkis@empirica.com and to patrick.mccutcheon@ec.europa.eu**. If anything is unclear about the background and objectives of the Study or about the questions to be answered, please do not hesitate to contact Stefan Lilischkis at empirica.

In answering the questions, please distinguish between existing and planned activities and please describe the objectives, forms and contents of the policies as well as, if possible, their outcomes or impacts. Please attach any related documents or mention links to related websites, even if they are in your national language.

Thank you very much for your support.

Stefan Lilischkis

Knowledge Transfer Study Manager

European Commission
RESEARCH & INNOVATION

About the Knowledge Transfer Study 2010-2012

The "Knowledge Transfer Study" (monitoring study regarding the implementation of the Commission Recommendation and Code of Practice on the management of intellectual property in knowledge transfer activities in Member States and Associated Countries) is based on a Contract between the European Commission, Research and Innovation Directorate General, and empirica GmbH, the Maastricht Economic Research Institute on Innovation and Technology, and the School of Business of the University of Applied Sciences North-Western Switzerland.

A Knowledge transfer as a strategic mission of public research organisations

BACKGROUND

This question relates to point 1 of the Recommendation that Member States should "e*nsure that all public research organisations define knowledge transfer as a strategic mission*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

13. "Knowledge transfer between universities and industry is made a permanent political and operational priority for all public research funding bodies within a Member State, at both national and regional level.

14. The subject clearly falls within the responsibility of a ministry, which is charged with coordinating knowledge transfer promotion initiatives with other ministries.

15. Each ministry and regional government body that carries out knowledge transfer activities designates an official responsible for monitoring their impact. They meet regularly in order to exchange information and discuss ways to improve knowledge transfer."

QUESTIONS:

Since 2010, have national or regional governments in your country carried out or planned any **new measures** to ensure that knowledge transfer is a strategic mission of universities and other public research organisations? This could for example include legislation, guidelines, targeted incentives, and national or regional roundtables.

If yes, please describe the new or planned measures. In particular, please describe whether any use has been made in the new policies of the **facilitating practices** mentioned in Annex II of the Recommendation (see boxed text above) related to making knowledge transfer a strategic mission.

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Knowledge transfer as a strategic mission – tickboxes

(Please answer the questions for all related policies in your country, whether they were introduced after 2010 or before! If the answer is not clearly "yes", "no" or "planned", please explain.)

Existing or planned measure			
Legal measures supporting KT strategy development:	**Yes**	**No**	**Planned**
A.1) In our country, universities and other public research organisations are **legally required** to define knowledge transfer as a strategic mission.	☐	☐	☐
A.2) In our country, universities and other public research organisations are **legally required** to formulate a knowledge transfer strategy.	☐	☐	☐
A.3) In our country, the **funding** of universities and other public research organisations depends partly on having a knowledge transfer strategy.	☐	☐	☐
Please include further explanations as appropriate, for example if legal measures differ between types of PROs or between the nation state and regions:			
Non-legal measures supporting KT strategy development:	**Yes**	**No**	**Planned**
A.4) In our country, national and regional governments **support** universities and other public research organisations in developing knowledge transfer strategies (for example by providing advice).	☐	☐	☐
A.5) In our country, national and regional governments **encourage** universities and other public research organisations to develop knowledge transfer strategies (for example in political action plans, as members in PRO boards or in regular dialogues).	☐	☐	☐
Please include further explanations as appropriate:			
Facilitating practices:	**Yes**	**No**	**Planned**
A.6) In our country, knowledge transfer between universities and industry is a permanent political and operational **priority** for public research funding bodies, at both national and regional level.	☐	☐	☐
A.7) In our country, knowledge transfer clearly falls within the **responsibility of a ministry**, which is charged with coordinating knowledge transfer promotion initiatives with other ministries.	☐	☐	☐
A.8) In our country, ministries and regional government bodies governing knowledge transfer activities designate an **official responsible** for monitoring their impact.	☐	☐	☐
A.9) In our country, knowledge transfer officials from national and regional governments **meet regularly** in order to exchange information and discuss ways to improve knowledge transfer.	☐	☐	☐
Please include further explanations as appropriate:			

B Policies and procedures for managing intellectual property

BACKGROUND

This question relates to point 2 of the Recommendation that Member States should "*encourage public research organisations to establish and publicise policies and procedures for the management of intellectual property in line with the Code of Practice set out in Annex I*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

16. "The proper management of intellectual property resulting from public funding is promoted, requiring that it be carried out according to established principles taking into account the legitimate interests of industry (e.g. temporary confidentiality constraints).

17. Research policy promotes reliance on the private sector to help identify technological needs and to foster private investment in research and encourage the exploitation of publicly-funded research results."

QUESTIONS:

Since 2010, have national or regional governments in your country taken or planned any **new measures** to encourage universities and other public research organisations to establish and publicise policies and procedures for the management of intellectual property?

If yes, please describe the new measures taken or planned.

Please describe to what extent the Commission's "**Code of Practice**" for intellectual property management in knowledge transfer influenced these new policies. For instance: have any measures been specifically launched with a view to the Code of Practice? (See annex of this questionnaire for the Code of Practice.)

Please also describe whether any use has been made of the **facilitating practices** outlined in Annex II of the Commission Recommendation in this context. (See boxed text above.)

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Policies and procedures for managing Intellectual Property – tickboxes

(Please answer the questions for all related policies in your country, whether they were introduced after 2010 or before! If the answer is not clearly "yes", "no" or "planned", please explain.)

Existing or planned measure			
Legal measures for IP policies and procedures:	**Yes**	**No**	**Planned**
B.1) In our country, universities and other public research organisations are legally required to **establish** policies and procedures for intellectual property rights management.	☐	☐	☐
B.2) In our country, universities and other public research organisations are legally required to **publicise** policies and procedures for intellectual property rights management.	☐	☐	☐
Further explanations as appropriate, for example if legal measures differ between types of PROs or between the nation state and regions:			
Non-legal support for IP policies and procedures:	**Yes**	**No**	**Planned**
B.3) In our country there is a governmental **action plan** to support the development of intellectual property policies and procedures at universities and other public research organisations.	☐	☐	☐
B.4) In our country there is an official **guide** (e.g. a manual) for intellectual property management in universities and other public research organisations.	☐	☐	☐
Please include further explanations as appropriate:			
Facilitating practices related to IP policies and procedures:	**Yes**	**No**	**Planned**
B.5) In our country, national and regional governments promote the management of intellectual property resulting from **public funding.**	☐	☐	☐
B.6) In our country, national and regional governments require that the management of intellectual property resulting from public funding is carried out according to **established principles**.	☐	☐	☐
If B.6 = yes: B.7) In our country, established principles about the management of intellectual property resulting from public funding take into account the legitimate **interests of industry** (e.g. temporary confidentiality constraints).	☐	☐	☐
B.8) In our country, research policy promotes **reliance on the private sector** to help identify technological needs, to foster private investment in research, and to encourage the exploitation of publicly-funded research results.	☐	☐	☐
Please include further explanations as appropriate:			

C Knowledge transfer capacities and skills regarding IP and entrepreneurship

BACKGROUND

This question relates to point 3 of the Recommendation that Member States should "*support the development of knowledge transfer capacity and skills in public research organisations, as well as measures to raise the awareness and skills of students – in particular in the area of science and technology – regarding intellectual property, knowledge transfer and entrepreneurship*".

The list of related **facilitating practices** in Annex II of the Recommendation includes the following:

18. *"Sufficient resources and incentives are available to public research organisations and their staff to engage in knowledge transfer activities.*
19. *Measures are taken to ensure the availability and facilitate the recruitment of trained staff (such as technology transfer officers) by public research organisations.*
20. *A set of model contracts is made available, as well as a decision-making tool helping the most appropriate model contract to be selected, depending on a number of parameters.*
21. *Before establishing new mechanisms to promote knowledge transfer (such as mobility or funding schemes), relevant stakeholder groups, including SMEs and large industry as well as public research organisations, are consulted.*
22. *The pooling of resources between public research organisations at local or regional level is promoted where these do not have the critical mass of research spending to justify having their own knowledge transfer office or intellectual property manager.*
23. *Programmes supporting research spin-offs are launched, incorporating entrepreneurship training and featuring strong interaction of public research organisations with local incubators, financiers, business support agencies, etc.*
24. *Government funding is made available to support knowledge transfer and business engagement at public research organisations, including through hiring experts."*

QUESTIONS:

Since 2010, have national or regional governments in your country developed **new measures** supporting the development of knowledge transfer capacity and skills in universities and public research organisations?

If so, please describe. In particular, please describe whether any use has been made in the new policies of the **facilitating practices** mentioned in Annex II of the Recommendation (see box-text above).

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Knowledge transfer capacities and skills – tickboxes

(Please answer the questions for all related policies in your country, whether they were introduced after 2010 or before! If the answer is not clearly "yes", "no" or "planned", please explain.)

Existing or planned measure			
Items specifying the Recommendation:	**Yes**	**No**	**Planned**
C.1) National and regional governments in our country support the **development of knowledge transfer capacity and skills** in universities and other public research organisations.	☐	☐	☐
C.2) National and regional governments in our country support measures to raise the **awareness and skills of students** – in particular in the area of science and technology – regarding intellectual property, knowledge transfer and entrepreneurship.	☐	☐	☐
Please include further explanations as appropriate:			
Facilitating practices related to KT capacities and skills:	**Yes**	**No**	**Planned**
C.3) In our country, there are measures to ensure that **staff trained in intellectual property management** (such as technology transfer officers) is available to universities and other public research organisations.	☐	☐	☐
C.4) In our country, **model contracts** for knowledge transfer activities (such as contract research and collaborative research) are available as well as a decision-making tool which helps the most appropriate model contract to be selected.	☐	☐	☐
C.5) When the national government recently established a new measure to promote knowledge transfer, it consulted relevant **stakeholder groups**.	☐	☐	☐
If "yes", please mention the new mechanism you are referring to and the stakeholders involved:			
C.6) In our country, the government promotes the **pooling of resources** between universities and other public research organisations at local or regional level.	☐	☐	☐
C.7) In our country, governmental programmes supporting **spin-off companies** from universities and other public research organisations are in place.	☐	☐	☐
C.8) In our country, **government funding** is made available to support knowledge transfer at universities and other public research organisations (for example for hiring intellectual property management experts).	☐	☐	☐
Please include further explanations as appropriate:			

D Cross-border research and knowledge transfer co-operation

BACKGROUND

This question relates to point 5 of the Recommendation that Member States should "*cooperate and take steps to improve the coherence of their respective ownership regimes as regards intellectual property rights in such a way as to facilitate cross-border collaborations and knowledge transfer in the field of research and development*";

and to point 8 that they should "*ensure equitable and fair treatment of participants from Member States and third countries in international research projects regarding the ownership of and access to intellectual property rights, to the mutual benefit of all partners involved*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

15. *"In order to promote transnational knowledge transfer and facilitate cooperation with parties from other countries, the owner of intellectual property from publicly-funded research is defined by clear rules and this information, together with any funding conditions which may affect the transfer of knowledge, is made easily available. Institutional ownership – as opposed to the "professor's privilege" regime – is considered the default legal regime for intellectual property ownership at public research organisations in most EU Member States.*
16. *When signing international research cooperation agreements, the terms and conditions relating to projects funded under both countries' schemes provide all participants with similar rights, especially as regards access to intellectual property rights and related use restrictions."*

QUESTIONS:

Since 2010, have national and regional governments in your country carried out **new measures** facilitating cross-border collaborations and knowledge transfer in the field of research and development? This includes, in particular, measures...

- to harmonise the country's intellectual property regime with other states;
- to ensure fair and equitable treatment of research participants from other states regarding ownership of and access to intellectual property rights.

If so, please describe new or planned measures and provisions. In particular, please describe whether any use has been made in the new policies of the **facilitating practices** mentioned in Annex II of the Recommendation (see boxed text above).

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Cross-border cooperation – tickboxes

(Please answer the questions for all related policies in your country, whether they were introduced after 2010 or before! If the answer is not clearly "yes", "no" or "planned", please explain.)

Existing or planned measure			
Items specifying the Recommendation:	**Yes**	**No**	**Planned**
D.1) Our country co-operates with other countries to improve the **coherence** of intellectual property ownership regimes.	☐	☐	☐
D.2) In our country there are legal provisions in place ensuring **equitable and fair treatment** of participants from Member States and third countries in international research projects regarding the ownership of and access to intellectual property rights.	☐	☐	☐
Please include further explanations as appropriate:			
Facilitating practices related to cross-border co-operation:	**Yes**	**No**	**Planned**
D.3) In our country the owner of intellectual property from publicly-funded research is defined by **clear and easily available rules**.	☐	☐	☐
D.4) Considering international research projects, the terms and conditions in our country's research schemes aim at providing participants from all countries with **similar intellectual property rights**.	☐	☐	☐
Please include further explanations as appropriate:			
Item related to the Innovation Union:	**Yes**	**No**	**Planned**
D.5) In our country there are governmental programmes to **strengthen knowledge transfer offices** in universities and other public research organisations **through trans-national collaboration**.	☐	☐	☐
Please include further explanations as appropriate:			

E Knowledge dissemination

BACKGROUND

This question relates to point 4 of the Recommendation that Member States should "*promote the broad dissemination of knowledge created with public funds, by taking steps to encourage open access to research results, while enabling, where appropriate, the related intellectual property to be protected*".

The list of **facilitating practices** in Annex II of the Recommendation includes the following:

15. *"Open access is implemented by public research funding bodies with regard to peer-reviewed scientific publications resulting from publicly-funded research.*
16. *Open access to research data is promoted, in line with the OECD Principles and Guidelines for Access to Research Data from Public Funding, taking into account restrictions linked to commercial exploitation.*
17. *Archival facilities for research results (such as internet-based repositories) are developed with public funding in connection with open access policies."*

QUESTIONS:

Since 2010, have national or regional governments in your country launched **new measures** promoting the broad dissemination of knowledge created with public funds? If yes, were steps taken to promote open access to research results, while enabling, where appropriate, the related intellectual property to be protected? If yes, please describe. In particular, please describe whether any use has been made in the new policies of the **facilitating practices** mentioned in Annex II of the Recommendation (see boxed text above).

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Knowledge dissemination – tickboxes

(Please answer these questions for all related policies in your country, whether they were introduced after 2010 or before!)

Existing or planned measure	**Yes**	**No**	**Planned**
E.1) In our country, public research funding bodies have generally implemented open access to peer-reviewed **scientific publications** resulting from publicly funded research.	☐	☐	☐
Please include further explanations as appropriate, for example if legal measures differ between research funding bodies:			
E.2) In our country, open access to research data from public funding is promoted, taking into account restrictions linked to **commercial exploitation**.	☐	☐	☐
Please include further explanations as appropriate:			
E.3) In our country, there are governmental programmes funding the development of **archival facilities** for research results in connection with open access policies.	☐	☐	☐
Please include further explanations as appropriate:			

F Monitoring

BACKGROUND
This question relates to point 11 of the Recommendation that Member States should "*inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact*".   The list of **facilitating practices** in Annex II of the Recommendation includes the following: *18. "The necessary mechanisms are put in place to monitor and review progress made by national public research organisations in knowledge transfer activities, e.g. through annual reports of the individual public research organisations. This information, together with best practices, is also made available to other Member States."*

QUESTIONS:

Since 2010, did national or regional governments in your country take any **new measures** to monitor and review progress made by universities and other public research organisations in knowledge transfer activities?

If so, please describe. Please mention in what periods of time the monitoring takes place. Please also mention whether the results of the monitoring are published or used internally for policy making purposes only.

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Monitoring – tickbox

(Please answer the questions for all related policies in your country, whether they were introduced after 2010 or before! If the answer is not clearly "yes", "no" or "planned", please explain.)

Existing or planned measure	**Yes**	**No**	**Planned**
F.1) In our country there is a **national scheme** to monitor and review knowledge transfer activities of universities and other public research organisations.	☐	☐	☐
If F.1 = yes: F.2) In our country, the results of the national monitoring scheme are **made available to other Member States** (for example by publishing them in English).	☐	☐	☐
Please include further explanations as appropriate:			

G Implementation of the Code of Practice

BACKGROUND

This question relates to point 7 of the Recommendation that Member States should "*take steps to ensure the widest possible implementation of the Code of Practice, whether directly or through the rules laid down by national and regional research funding bodies*".

The Code of Practice is attached to the Commission Recommendation (see also annex to this questionnaire). It includes provisions for professionalising intellectual property management in public research organisations and universities as well as collaborative and contract research.

QUESTIONS:

Since 2010, have national or regional governments in your country used the Code of Practice for policy activities on universities' and other public research organisations'...

(i) ... knowledge transfer policy in general (Code of Practice items 8-14);

(ii) ... internal intellectual property policy in particular (Code of Practice items 1-7);

(iii) ... collaborative and contract research (Code of Practice items 15-18).

If yes, please describe. Policy activities may for example include new legislation, guidelines and programmes.

Please fill in your answers here:

Please send any related documents or links to websites, even if they are in your national language.

Implementation of the Code of Practice – tickboxes

(Please answer the questions for all related policies in your country, whether they were introduced after 2010 or before! If the answer is not clearly "yes", "no" or "planned", please explain.)

Existing or planned measure	**Yes**	**No**	**Planned**
G.1) In our country, national guidelines for managing intellectual property in knowledge transfer activities **existed before** the European Commission's Code of Practice was issued in 2008.	☐	☐	☐
If question G.1 = Yes: G.2) In our country, the government **revised** existing national guidelines for intellectual property management in knowledge transfer activities in light of the Code of Practice.	☐	☐	☐
If question G.1 = Yes: G.3) In our country, guidelines for knowledge transfer, intellectual property management as well as collaborative and contract research generally **comply** with the Code of Practice.	☐	☐	☐
If question G.1 = No: G.4) The national government in our country **adopted the Code of Practice** as its official guideline for managing intellectual property in knowledge transfer.	☐	☐	☐
If "yes" for question G1 or G4: G.5) In our country, the national government actively sought to **make the Code of Practice or existing guidelines known** to key stakeholders (for example to universities, other public research organisations, companies).	☐	☐	☐
Please include further explanations as appropriate:			

Annex: Code of Practice

for universities and other public research organisations concerning the management of intellectual property in knowledge transfer activities

No.	*Universities' and other PROs' internal IP policy*
1	Develop an **IP policy** as part of the longterm strategy and mission of the public research organisation, and publicise it internally and externally, while establishing a single responsible contact point.
2	That policy should provide **clear rules** for staff and students regarding in particular the disclosure of new ideas with potential commercial interest, the ownership of research results, record keeping, the management of conflicts of interest and engagement with third parties.
3	Promote the **identification, exploitation and**, where appropriate, **protection of intellectual property**, in line with the strategy and mission of the public research organisation and with a view to maximising socio-economic benefits. To this end, different strategies may be adopted – possibly differentiated in the respective scientific/technical areas –, for instance the "public domain" approach or the "open innovation" approach.
4	Provide appropriate **incentives** to ensure that all relevant staff play an active role in the implementation of the IP policy. Such incentives should not only be of a financial nature but should also promote career progression, by considering intellectual property and knowledge transfer aspects in appraisal procedures, in addition to academic criteria.
5	Consider the creation of coherent **portfolios of intellectual property** by the public research organisation – e.g. in specific technological areas – and, where appropriate, the setting-up of patent/**IP pools including intellectual property of other public research organisations**. This could ease exploitation, through critical mass and reduced transaction costs for third parties.
6	Raise **awareness and basic skills** regarding intellectual property and knowledge transfer through training actions for students as well as research staff, and ensure that the staff responsible for the management of IP/KT have the required skills and receive adequate training.
7	Develop and publicise a **publication/dissemination policy** promoting the broad dissemination of research and development results (e.g. through open access publication), while accepting possible delay where the protection of intellectual property is envisaged, although this should be kept to a minimum.
	Universities' and other PROs' knowledge transfer policy
8	In order to promote the use of publicly-funded research results and maximise their socio-economic impact, **consider all types of possible exploitation mechanisms** (such as licensing or spin-off creation) **and all possible exploitation partners** (such as spin-offs or existing companies, other public research organisations, investors, or innovation support services or agencies), and select the most appropriate ones.
9	While proactive IP/KT policy may generate additional **revenues** for the public research organisation, this should **not** be considered the **prime objective**.
10	Ensure that the public research organisation has access to or possesses **professional knowledge transfer services** including legal, financial, commercial as well as intellectual property protection and enforcement advisors, in addition to staff with technical background.
11	Develop and publicise a **licensing policy**, in order to harmonise practices within the public research organisation and ensure fairness in all deals. In particular, transfers of ownership of intellectual property owned by the public research organisation and the granting of exclusive licences should be carefully assessed, especially with respect to non-European third parties. Licences for exploitation purposes should involve adequate compensation, financial or otherwise.
12	Develop and publicise a policy for the creation of **spin-offs**, allowing and encouraging the

	public research organisation's staff to engage in the creation of spinoffs where appropriate, and clarifying long-term relations between spin-offs and the public research organisation.
13	Establish clear principles regarding the **sharing of financial returns** from knowledge transfer revenues between the public research organisation, the department and the inventors.
14	**Monitor** intellectual property protection and knowledge transfer activities and related achievements, and **publicise** these regularly. The research results of the public research organisation, any related expertise and intellectual property rights should be made more visible to the private sector, in order to promote their exploitation.
	Collaborative and contract research
15	**The rules governing collaborative and contract research activities should be compatible with the mission of each party.** They should take into account the level of private funding and be in accordance with the objectives of the research activities, in particular to maximise the commercial and socio-economic impact of the research, to support the public research organisation's objective to attract private research funding, to maintain an intellectual property position that allows further academic and collaborative research, and avoid impeding the dissemination of the R&D results.
16	**IP-related issues should be clarified at management level and as early as possible** in the research project, ideally before it starts. IP-related issues include allocation of the ownership of intellectual property which is generated in the framework of the project (hereinafter "**foreground**"), identification of the intellectual property which is possessed by the parties before starting the project (hereinafter "**background**") and which is necessary for project execution or exploitation purposes, access rights to foreground and background for these purposes, and the sharing of revenues.
17	In a collaborative research project, **ownership of the foreground should stay with the party that has generated it, but can be allocated to the different parties on the basis of a contractual agreement concluded in advance**, adequately reflecting the parties' respective interests, tasks and financial or other contributions to the project. In the case of contract research the foreground generated by the public research organisation is owned by the private-sector party. The ownership of background should not be affected by the project.
18	**Access rights should be clarified by the parties as early as possible** in the research project, ideally before it starts. Where necessary for the purpose of conducting the research project, or for the exploitation of foreground of a party, access rights to other parties' foreground and background should be available, under conditions which should adequately reflect the parties' respective interests, tasks, and financial and other contributions to the project.

Exhibit: European countries' scores for KT policy measures in 2012

No.	Item	AL	AT	BE	BA	BG	HR	CZ	CY	DK	EE	FI	FR	DE	EL	IS	IE	IL	IT	LV	LI	LT	LU	HU	MT	MK	MN	NL	NO	PL	PT	RO	SK	SI	RS	ES	SE	CH	TR	UK
A	***KT as a strategic mission***																																							
A.1	Universities/PROs legally required to define KT as a strategic mission	.	x	x	.	.	.	.	.	x	x	x	x	x	.	.	.	.	.	.	.	.	x	x	.	x	o	x	x	x	.	x	.	.	x	x	.	x	.	.
A.2	Universities/PROs legally required to formulate KT strategy	.	x	x	.	.	.	x	.	.	.	.	x	o	.	o	.	.	.	.	.	.	.	x	.	.	.	x	x	x	.	x	.	.	.	.	.	.	.	.
A.3	Funding of universities/PROs depends partly on having KT strategy	.	x	x	.	.	.	.	.	.	x	x	.	o	.	.	x	.	.	.	.	.	.	x	.	.	.	o	.	.	.	x	.	.	.	.	x	x	.	x
A.4	Governments support universities/PROs in developing KT strategies	x	x	x	.	.	x	x	x	.	.	x	x	x	.	x	x	.	.	x	.	x	x	x	.	.	o	x	x	x	x	x	x	x	.	x	.	x	.	x
A.5	Governments encourage universities/PROs to develop KT strategies	.	x	x	.	x	x	x	x	o	x	x	x	x	.	x	x	x	x	x	x	x	x	x	x	x	o	x	x	x	x	x	x	x	.	x	x	x	x	x
A.6	KT is permanent priority for policy and funding bodies	x	x	x	o	o	x	x	.	x	x	x	x	x	x	o	x	x	x	.	x	.	x	o	x	x	x	x	x	x	x	x	o	x	x	o	x	x	x	x
A.7	KT clearly falls within the responsibility of a ministry	x	x	o	.	x	x	.	.	x	x	.	x	.	x	.	.	o	.	.	x	.	x	.	.	.	x	.	.	x	x	.	.	x	x	x	.		x	x
A.8	Ministries and regional government bodies designate an official responsible for monitoring impact of KT activities	x	x	o	o	.	.	x	.	x	x	.	x	.	.	.	x	.	.	.	.	.	.	o	.	o	.	o	o	x	x	.	.	.	.	.	.	x	.	x
A.9	KT officials from governments meet regularly to discuss ways to improve KT	.	x	o	.	.	x	x	.	x	x	.	x	x	.	.	.	.	.	.		x	x	x	.	x	o	.	o	x	x	x	o	.	x	.	x	x	.	x
B	***Policies and procedures for IPM***																																							
B.1	Universities/PROs legally required to establish policies & procedures for IPR management	.	x	x	.	.	o	x	.	x	.	.	.	o	.	.	.	.	.	.	.	.	.	x	.	o	.	x	.	x	.	.	.	.	.	x	.	x	.	.
B.2	Universities/PROs legally required to publicise policies & procedures for IPR management	.	x	.	.	.	o	.	.	.	.	.	.		.	.	.	.	.	.	.	x	.	x	.	o	o	.	.	x	.	.	.	.	.	.	.	o	.	.
B.3	Governmental action plan to support the development of IP policies and procedures at universities/PROs	x	x	x	o	o	.	.	.	.	x	x	x	.	.	x	x	x	.	.	.	.	.	x	.	o	x	x	.	x	o	x	o	o	x	x	.	.	.	x
B.4	Official guide for IP management in universities/PROs	.	o	.	.	x	.	x	.	.	.	.	x	x	x	x	x	x	.	.	.	x	.	x	.	x	.	x	o	x	x	.	o	o	.	.	.	.	.	x
B.5	Governments promote management of IP resulting from public funding	x	x	x	o	x	x	x	x		o	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	.	x	x	x	x	x	x
B.6	Governments require that the management of IP resulting from public funding is carried out according to established principles	o	x	x	.	.	x	x	.	x	.	x	.	x	.	o	x	x	x	x	.	x	x	x	o	x	x	x	x	x	.	.	.	.	x	.	.	.	x	.
B.7	Established principles about managing IP resulting from public funding take into account the legitimate interests of industry	.	x	x			x	x		x		x		x			x	.	x	.		x	x	.		o	o	x	x	x					x					
B.8	Research policy promotes reliance on the private sector to encourage exploitation of publicly-funded research results	o	x	x	o	x	x	.	.	x	o	x	x	x	.	x	x	x	x	o	x		x	x	x	x	o	.	x	x	o	x	o	x	x	o	.	x	x	x
C	***KT capacities and skills regarding IP and entrepreneurship***																																							
C.1	Governments support development of KT capacity & skills in universities/PROs	x	x	x	.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	x	x	o	x	x	x	x	x	x	x	x
C.2	Governments support measures to raise awareness and skills of students regarding IP, KT and entrepreneurship	x	x	x	.	x	x	x	x	x	x	x	.	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	o	x	x	o	o	x	x	o	x	x	x	x
C.3	Measures to ensure that staff trained in IP management is available to universities/PROs	.	x	x	.	x	x	x	.	x	x	.		x	.	x	x	x	x	.	.	x	x	x	x	o	o	x	x	x	x	x	o	x	x	x	x	x	x	x
C.4	Model contracts for KT activities are available as well as a related decision-making tool	.	x	x	.	.	.	x	.	x	.	.	.	x	.	x	.	x	.	.	.	o	x	x	x	.	o	o	x	o	x	o	o	.	x	x	.	.	.	x
C.5	When the national government recently established a new measure to promote KT, it consulted relevant stakeholder groups	o	x	x	.	.	x	x	o	x		x	x	x	x	.	x		x	.	.	x	.	o	.	o	.	x	x			o	o	.	x	x	x	x	x	x

Exhibit continued from previous page.

No.	Item	AL	AT	BE	BA	BG	HR	CZ	CY	DK	EE	FI	FR	DE	EL	IS	IE	IL	IT	LV	LI	LT	LU	HU	MT	MK	MN	NL	NO	PL	PT	RO	SK	SI	RS	ES	SE	CH	TR	UK
C.6	Government promotes pooling of resources between universities/PROs at local or regional level	x	x	x	.	.	x	x	.	.	.	x	x	x	.	.	x	.	.	.	.	x	x	.	.	x	.	x	.	x		x	.	x	o	o	.	x	.	x
C.7	Governmental programmes supporting spin-off companies from universities/PROs	.	x	x	.	x	x	.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	.	x	x	x	x	x	o	.	x	x	x	x	x	x
C.8	Government funding made available to support KT at universities/PROs	.	x	x	x	x	x	x	x	x	x	x	.	x	x	x	x	x	x	.	.	o	x	x	.		o	x	x	x		x	o	x	o	x	x	x	x	x
D	***Cross-border research and KT co-operation***																																							
D.1	Our country co-operates with other countries to improve the coherence of IP ownership regimes	.	x	x	x	x	x	.	x	x	x	x	.	x		x	.	x	x	.	.	x	x	x	.	x	x	x	o	x	x	o	x	.	x	x	.	.	x	x
D.2	Legal provisions ensuring equitable and fair treatment of participants in international research projects regarding ownership of and access to IPR	x	o	x	x	.	x	x	x	x	x	x	x	x		x	.	x	x	.	.	x	x	x	x	x	x	x	.	x	x	x	x	x	x	.	.	.	x	.
D.3	The owner of IP from publicly-funded research is defined by clear and easily available rules	o	x	x	.	.	o	x	x	x	x	x	x	x	.	x	x	x	.	x	x	x	x	x	x	x	x	x	o	x	x	o	.	x	x	x	.	x	x	x
D.4	Terms and conditions in our country's research schemes aim at providing participants from all countries with similar IPRs	o	x	x	.	.	x	x	x	x	x	x	x	x		x	x	x	x	.	.	x		x	x	x	x		x	x		o	o	x	x	x	.	.	x	x
D.5	Governmental programmes to strengthen KTOs in universities/PROs through trans-national collaboration	o	o	x	.	.	x	.	.	.	x	.	.	.	x	x	.	x	.	.	.	.	.	o	.	o	.	x	x	x		.	o	.	x	x	.	.	.	x
E	***Knowledge dissemination***																																							
E.1	Public research funding bodies have generally implemented open access to peer-reviewed scientific publications resulting from publicly funded research	x	x	.	x	.	.	.	x	o	x	x	x	x	.	x	.	x	.	x	.	x	o	.	x	x	.	x	x	o		.	.	x	x	x	x	.	.	x
E.2	Open access to research data from public funding is promoted, taking into account restrictions linked to commercial exploitation	.	x	x	.	.	x	.	x	.	x	x	x	x	.	x	x	x	x	x	x	x	x	.	x	x	x	x	x	x		x	o	x	x	x	x	x	x	x
E.3	Governmental programmes funding the development of archival facilities for research results in connection with open access policies	.	x	x	.	x	x	.	.	.	x	x	x	x	.	x	.	.	x	.	.	x	x	o	.	x	.	.	.			.	o	x	x	o	x	.	.	x
F	***Monitoring***																																							
F.1	National scheme to monitor and review KT activities of universities/PROs	.	x	x	.	x	.	x	.	x	x	.	.	.	.	.	x	.	x	.	.	.	x	o	.	.	.	o	.	x	x	o	.	.	o	o	.	o	o	x
F.2	Results of national monitoring scheme are made available to other Member States	.	o	.	.	x		x		x	o	.	.	o			x		o	.	.	.	.	.		.	.			o	x	o				o		o	.	x
G	***Implementation of the CoP***																																							
G.1	National guidelines for managing IP in KT activities existed before the EC's Code of Practice was issued in 2008	.	x	x	.	.	.	.		x	.	x	x	x		x	x	x	x	.	.	.	x	x	.	x	.	.	.	.	x	.	.	.	.	.	.	x	x	x
G.2	Government revised existing national guidelines for IP management in KT activities in light of Code of Practice		x	.		o				.		.	.	.		.	x	.	.				.	.		x	o				.							.	x	x
G.3	Guidelines for KT, IP management as well as collaborative and contract research generally comply with the Code of Practice		x	x		x				x		x	x	x		x	x	x	x				x	x		o	o				x							.	x	x
G.4	National government adopted Code of Practice as its official guideline for managing IP in KT		.		.	.		.		.	.	.		x			.			.	.	o			.	o	.	.	o	x	.	o	.	.	o	.	.	.		
G.5	National government actively sought to make Code of Practice or existing guidelines known to key stakeholders		x		.	.				x		x	x	x		.	x	.	o		.	x	x	x		o	o	x			o				o		x	.	x	x

x = yes	o = planned	. = no	(empty) = no answer

ANNEX II: MATERIAL FOR WP2

Annex A: Methodology

Considering the several available data sources which compile lists and rankings universities and government research institutes, using a range of relevant indicators, we made use of selected sources to build the database. Table A1 lists these sources, including geographic coverage, year of data collection, number of institutions and the focus of the source. Some of these sources cover institutions worldwide, while others concentrate on Europe. Moreover, there are a few sources that focus on specific countries. Table A1 also includes data sources that provided contact information.

The procedure was to first look into these sources separately, as each had specific indictors and then merge the different sources into one database. When merging, there had been substantial overlap, but the exercise allowed us to retrieve relevant information related to the several institutions.

Table A1. Information sources for identifying leading research PROs and contact information

Source	Geographic Coverage	Year	Number of institutions	Focus
ARWU – Academic Ranking of World Universities	World	2010	500	Nobel Laureates, Fields Medalists, Highly Cited Researchers, papers published in Nature or Science, papers indexed by Science Citation Index-Expanded (SCIE) and Social Science Citation Index (SSCI)
QS	World	2010	500	World Top 500 Universities in Size, Focus and Research Activities
U Multirank	World		101 in EU	Multi-dimension global university ranking (Teaching, Learning, Research, Knowledge Transfer, International orientation, regional engagement)
Time Higher Education (THE)	World		500	Focus on quality, of higher education, research impact in terms of citations, and staff to student rations as main indicators. (Institutions must teach undergraduates and has to work in at least 2 of the 5 principal areas (science, biomedicine, technology, social sciences and the arts and humanities))
"World List of Universities " published by the Association of Universities (IAU)	World		8,600	List for contact information
Brain Track	World		10,000	List for contact information for universities and colleges
EARMA – European Association of Research Managers and Administrators	Europe and US			Members - Universities and Research Institutes
Ranking Web of World Universities	1000 Europe and US	2010	500 in EU	Size (S)- Number of pages recovered from four engines: Google, Yahoo, Live Search and Exalead. Visibility (V) - The total number of unique external links received (inlinks) by a site Rich Files (R) – in terms of their relevance to academic and publication activities: Adobe Acrobat (.pdf), Adobe PostScript (.ps), Microsoft Word (.doc) and Microsoft Powerpoint (.ppt). Scholar (Sc). Google Scholar provides the number of papers and citations for each academic domain.
Leiden Ranking	Europe	2004-2008 2004-		Citations / Publications / Impact (Citation per publication)

Table A1. Information sources for identifying leading research PROs and contact information

Source	Geographic Coverage	Year	Number of institutions	Focus
		2009		
ASTP	Europe	2007-2008	300	Members
EARTOResearch and Technology Organisations in the European Area	Europe		115	Members - Research and Technology Organisations
ERAWATCH	Europe			Members - Universities and Research Institutes
EUROHOR	Europe		42	Members - European association of the heads of research funding organisations (RFO) and research performing organisations - (RPO)
Ranking Web of World Research Centers	Europe	2010	300	
The CHE Excellence Ranking	Europe	2010	180	Research abilities and teaching capacities in surveyed fields of the finest higher education institutions in Europe
The CHE University Ranking	Germany	2009	83	
Humboldt Rankings	Germany		166	Academic cooperation between excellent scientists and scholars from abroad and from Germany
AWSAustria	Austria	2009	22	Innovation and Technology - universities
swiTT report 2008 Swiss Technology Transfer Report	Austria	2008	17	Participants - Universities and Higher education institutes
RAE – Research Assessment Exercise 2008	UK			Universities and Institutes
Universities UK 2010	UK	2010	27	Funding grants

Table A1. Information sources for identifying leading research PROs and contact information

Source	Geographic Coverage	Year	Number of institutions	Focus
HEFCE	UK		130	Universities and Institutes
Third European Report on S&T indicators, 2003	Large and smaller EU Member States (AT, BE, DE, DK, ES, FI, FR, GR, IE, IT, NL, PT, SE, UK)	1993-1999	280	Top 20 and most important and actively publishing research institutions in large and smaller EU Member States
	Top-10 most actively co-publishing institutions in EU-15	1996-1999	10	By number of co-publications
	Most actively co-publishing institutions by Member State (Universities and Research Centers)	1996-1999	14 universities 13 Specialized universities 13 Research Centers	By number of co-publications
	Top performers by EU Member States	1993 – 1997 (publication period) 1996-1999 (citation period)	14 (in terms of publications) 14 (in terms of citations) 15 (in terms of impact)	Publications, citations and impact
	European universities with highest citation impact scores (BE, DE, DK, FI, FR, NL, SE, UK)	1993-1999	22 universities	Universities that achieve citation impact scores that rank above the world average

Annex B: Item non-response rates

2010				Percentage non-response
QID				
Q1_GENERAL				
Q1_TECHNICAL				
Q1_HOSPITAL				
Q1_GOVERNMENT				
Q1_RESEARCH				
Q1_NONE				
Q2_RESPTWO	60			0.00%
Q2_NUMBOFINST	43	337	30	30.23%
Q3_RESPTHREE	66			1.95%
Q3_PERC_PATENT	50	331	36	28.00%
Q4_OFFICEYEAR	63			0.98%
Q4_KTSERV_FTE	6			3.91%
Q4_KTACT_FTE	78			5.86%
Q5_INSTITUTION	6			1.95%
Q5_COMPANIES				
Q5_INVENTOR				
Q5_OTHER				
CALANDER_FISCAL	65			1.63%
FISCDATE	28	279	28	0.00%
Q6_INV_DISCLOSURES	17			5.54%
Q6_PAT_APPL	15			4.89%
Q6_TECH_UNIQUE	49			15.96%
Q6_USTPO	131	242	76	29.34%
Q7_BIO_INV	30			9.77%
Q7_BIO_PAT_A				
Q7_BIO_PAT_G				
Q7_COMP_INV				
Q7_COMP_PAT_A				
Q7_COMP_PAT_G				
Q7_NANO_INV				
Q7_NANO_PAT_A				

Q7_NANO_PAT_G				
Q7_CARBON_INV				
Q7_CARBON_PAT_A				
Q7_CARBON_PAT_G				
Q7_OTHER_INV				
Q7_OTHER_PAT_A				
Q7_OTHER_PAT_G				
Q7_MOST_FREQ	105			14.66%
Q8_1_STARTUPS	29			9.45%
Q8_2_TRACK_SUCCES	93			10.75%
Q8_3_DEV_PROD_PROC	115	196	78	1.30%
Q9_1_NUMB_LICEN	32			10.42%
Q9_2_1_NUMB_STARTUP	31	275		11.27%
Q9_2_2_NUMB_LESS_250				
Q9_2_3_NUMB_MORE250				
Q9.3.LICENSE_INCOME	89			28.99%
Q10_PERC_BIO	162	102	218	33.22%
Q10_PERC_COMP				
Q10_PERC_NANO				
Q10_PERC_CARBON				
Q10_PERC_OTHER				
Q11_1_COMMPROFIT	74			4.56%
Q11_2_FAILURE	89			9.45%
Q12_NUMB_AGRM	93			30.29%
Q12_NUMB_RESEARCHERS	12			3.91%
Q12_RESEARCH_EXP	92			29.97%
Q12_PRIV_FUNDS	167	215		49.77%
PERMRESULTS	66			1.95%

2011				Percentage non-response	Number of non-respondents	Eligible
QID						
Q1_GENERAL				0.0%	0	454
Q1_TECHNICAL						
Q1_HOSPITAL						
Q1_GOVERNMENT						
Q1_RESEARCH						
Q1_NONE						
Q2_RESPTWO	108			9.3%	**40**	430
Q2_NUMBOFINST	68	438	60	11.8%	**8**	430
Q3_RESPTHREE	108			9.3%	**40**	430
Q3_PERC_PATENT	80	68		15.0%	**12**	430
Q4_OFFICEYEAR	91			5.3%	**23**	430
Q4_KTSERV_FTE	11			2.2%	**11**	498
Q4_KTACT_FTE	102			7.9%	**34**	430
Q4.3_ENG_OR_T_SCIENCES	10			2.3%	**10**	430
Q4.3_BIOMEDICAL						
Q4.3_LAW						
Q4.3_FINANCE						
Q4.3_MANAGEMENT_BUSINESS						
Q4.3_NONE						
Q5_INSTITUTION	5			1.2%	**5**	430
Q5_COMPANIES						
Q5_INVENTOR						
Q5_OTHER						
CALANDER_FISCAL	36			7.2%	**36**	498
FISCDATE	90	0		0.0%	**0**	90
Q7.1_INV_DISCLOSURES	30			7.0%	**30**	478
Q7.2_PAT_APPL	28			6.5%	**28**	478
Q7.3_TECH_UNIQUE	79			18.4%	**79**	478
Q7.4_USTPO	185			22.6%	**97**	410
Q8_PATAPPL_BIO	15			3.5%	**15**	430
Q8_PATAPPL_COM						
Q8_PATAPPL_NANO						
Q8_PATAPPL_CARBON						
Q8_PATAPPL_OTHER						
Q8_MOST_FREQ	231			37.9%	**163**	430
Q9.1_START_UPS	83			17.4%	**83**	478

Q9.2_DEV_PROD_PROC	156		16.6%	**68**	410
Q10_1_NUMB_LICEN	107		18.2%	**87**	478
Q10_2_1_NUMB_STARTUP	24	371	6.5%	**24**	478
Q10_2_2_NUMB_LESS_250					
Q10_2_3_NUMB_MORE_250					
Q10.3.LICENSE_INCOME	152		27.6%	**132**	478
Q10.4_LIC_EARNED_INC	255		40.7%	**167**	410
Q11_PERC_BIO	203		31.4%	**135**	430
Q11_PERC_COMP					
Q11_PERC_NANO					
Q11_PERC_CARBON					
Q11_PERC_OTHER					
Q12_COMMPROFIT	130		14.4%	**62**	430
Q13.1_NUMB_AGRM	197		37.0%	**177**	478
Q13.2_NUMB_RESEARCHERS[1]	22		4.4%	**22**	498
Q13.3_RESEARCH_EXP	129		22.8%	**109**	478
Q13.4_PRIV_FUNDS[2]	261	369	52.3%	**193**	369
PERMRESULTS	27		6.3%	**27**	430
Hefce			68		
Answers to EKTIS survey[3]			430		
Of which ES incomplete			20		
Total			498		

1: This percentage is calculated after adding the number of staff for PROs which did not answer this question but where information on this indicator was readily available on their home website or annual report.
2: Limited to respondents answering a positive amount of research expenditures.
3: Answers to UTEN survey for Portugal are also included in this number as similar questions as in the EKTIS survey were asked in the UTEN survey.

Annex C: KNOWLEDGE TRANSFER SURVEY 2010 QID …

1. Is your office responsible for some or all of the patenting, licensing, or other knowledge transfer activities of the following institutions? *(Check **all** that apply.)*

- ☐ General university (both humanities and sciences)
- ☐ Technical university (mostly science and technology)
- ☐ Hospital (linked to a university or independent)
- ☐ Government or non-profit research institute
- ☐ Research park or incubator affiliated with a university, hospital, or research institute
- ☐ None of the above (*go to question 11)*

2. Is your office responsible for the knowledge transfer activities of two or more *independent* institutions? *(For instance two or more separate universities. A hospital or research park affiliated with a university is not a separate institution)*

- ☐ Yes If yes, how many separate institutions does your office serve? ____________
- ☐ No

3. Is your office responsible for all patenting and licensing by the institution(s) checked in question 1? *(Hereafter referred to as 'your institution'.)*

- ☐ Yes *(go to question 4)*
- ☐ Approximately what percentage of all patent applications by your institution was handled by your office in 2010? ________________ %

4. Office staff

In what year was your office established? ____________

In 2010, how many office employees (in Full-Time Equivalents) were responsible for knowledge transfer services (include professional, administrative and support staff)? ____________ FTE

How many of your office's employees were professionals directly involved in knowledge transfer activities? ___________ FTE

5. Who has first rights to the intellectual property created at your institution? *(Check all that apply if ownership can vary.)*

- ☐ The institution
- ☐ Companies that fund research conducted by your institution
- ☐ The inventor within your institution
- ☐ Other

The remaining questions ask for 2010 data on your institution. Please note if your answers refer to a calendar or fiscal year.

☐ Calendar year (January 1st to December 31st)

☐ Fiscal year 2009-2010 starting ____________ day __________________________ month

Please insert '0' where relevant, or 'NA' if the answer is not available.

6. Invention disclosures and patenting in 2010

How many invention disclosures *(inventions subject to an evaluation by technology experts)* were reported by your institution to your office? ____________

How many new patent applications (priority filings) did you file for your institution? ____________

How many **technically unique** patents were granted to your institution?

*A **technically unique** patent grant is for one invention only. Count a patent for the same invention in two or more countries as **one** technically unique patent.* ____________

How many USPTO (United States Patent and Trademark Office) patents were granted to your institution? ____________

7. Were any of your 2010 invention disclosures, patent applications, and patent grants in any of the following subject areas? *Please check all that apply*

		Invention disclosures	Patent applications	Patent grants
A	Biomedical (include diagnostics, medical devices, pharmaceuticals, etc) for human and animal health	☐	☐	☐
B	Computers, communication equipment and software	☐	☐	☐
C	Nanotechnology and new materials	☐	☐	☐
D	Low or zero carbon energy technologies	☐	☐	☐
E	Other subject areas not listed above	☐	☐	☐

Areas A to D do not cover many subject areas. Please use 'other' as needed.

Which was the most frequent subject area for patent applications?________ (insert letter)

8. *(A company **specifically** established to exploit technology or know-how created by your institution. Exclude student-established companies.)*

8.1 How many start-ups were formed in 2010? ___________

8.2 Does your office track the success of your institution's start-ups over time?

☐ Yes – all of them ☐ Yes – some of them
☐ No

If the answer to 8.2 is no, go to question 9. Otherwise:

8.3 How many of your start-ups, established in the last five years, have developed your institution's licensed technology or knowledge into products or processes that are sold in the market? _________

9. Licensing activities in 2010 *(Here 'your institution' refers to the institution(s) checked in question 1 for which your office handles knowledge transfer activities)*

9.1 How many licenses (include assignments) or option agreements were made between your institution and companies? ___________

9.2 How many of these licenses and option agreements were granted to:

Start-up companies ___________

Other firms with less than 250 employees ___________

Other firms with more than 250 employees ___________

9.3 What was the **total** amount of license income earned by your institution from its intellectual property (patents, software, material transfer agreements, confidentiality agreements, etc)? __________€

***Include** license issue fees, annual fees, option fees, etc., plus milestone, termination & cash-in payments. **Exclude** license income forwarded to other companies and patent reimbursement fees.*

10. Approximately what share of your total 2010 license revenue was from licensed technology in each of the following subject areas?

Biomedical	________%
Computers, communication equipment and software	________%
Nanotechnology and new materials	________%
Low or zero carbon energy technologies	________%
Other subject areas not listed above	________%
	100%

11.	**In the last three years, has any of your institution's licensed technology or knowledge resulted in:**		
		Yes	**No or don't know**
11.1	Commercially profitable products or processes?	☐	☐
11.2	A failure to commercialize, such that work to develop the license into commercial products or processes was abandoned by the licensee?	☐	☐

12.	**Research activities in 2010**
How many research and development agreements were made between your institution and companies? *(Exclude consultancy contracts and cases where a firm funds a research chair or research of no expected commercial value to the firm)*	________________
What is the total number of research personnel at your institution *(include researchers, technicians and administrative support)*?	__________FTEs
What were the total research expenditures of your institution?	________________ €
Approximately what percentage of your institution's total research expenditures was funded by private companies?	_________%

In order to protect confidentiality, only aggregated results of this survey will be disclosed, unless you agree otherwise:

I give permission to disclose results for my institution ☐ Yes ☐ No

Comments

KNOWLEDGE TRANSFER SURVEY 2011 QID …

1. Is your office responsible for some or all of the patenting, licensing, or other knowledge transfer activities of the following institutions? *(Check **all** that apply.)*

- ☐ General university (both humanities and sciences)
- ☐ Technical university (mostly science and technology)
- ☐ Hospital (linked to a university or an independent hospital)
- ☐ Government or non-profit research institute
- ☐ Research park or incubator affiliated with a university, hospital, or research institute
- ☐ None of the above *(Please go to the comments on page 4)*

2. Is your office responsible for the knowledge transfer activities of two or more *independent* institutions? *(For instance two or more separate universities. A hospital or research park affiliated with a university is not a separate institution.)*

- ☐ Yes If yes, how many separate institutions does your office serve? ___________
- ☐ No

3. Is your office responsible for all patenting and licensing by the institution(s) checked in question 1? *(Hereafter referred to as 'your institution'.)*

- ☐ Yes *(go to question 4)*
- ☐ No Approximately what percentage of all patent applications by your institution was handled by your office in 2011? ___________%

4. Office staff

4.1 In what year was your office established? ___________

4.2 In 2011, how many office employees (in Full-Time Equivalents) were responsible for knowledge transfer services (include professional, administrative and support staff)? ___________FTE

4.2a How many of your office's employees were professionals directly involved in knowledge transfer activities? __________ FTE

4.3 In 2011, did any of your office staff have university qualifications in: *Check all that apply*

- Engineering or natural sciences ☐
- Biomedical ☐
- Law ☐
- Finance ☐
- Management or business administration ☐
- None of the above ☐

5. Does your office use external experts to assist with the following tasks?
*(Check **all** that apply.)*

- ☐ Evaluating the commercial potential of invention disclosures
- ☐ Patent applications and other legal matters involving intellectual property rights
- ☐ Preparing contracts for research agreements, licensing, etc
- ☐ Marketing or advertising your intellectual property
- ☐ None of the above

6. Who has the rights to the intellectual property created at your institution?
*(Check **all** that apply if ownership can vary)*

- ☐ The institution
- ☐ Companies that fund research conducted by your institution
- ☐ The inventor within your institution
- ☐ Other

The remaining questions ask for 2011 data on your 'institution'. This includes all institutions for which your office manages knowledge transfer activities.

First, please note if your answers refer to a calendar or fiscal year.

- ☐ Calendar year (January 1st to December 31st)
- ☐ Fiscal year 2010-2011 starting ______________ day _____________________________ month

Please insert '0' where relevant, or 'NA' if the answer is not available.

7. Invention disclosures and patenting in 2011

7.1 How many invention disclosures *(inventions subject to an evaluation by technology experts)* were reported by your institution to your office? ____________

7.2 How many new patent applications (priority filings) did you file for your institution? ____________

7.3 How many **technically unique** patents were granted to your institution?
*A **technically unique** patent grant is for one invention only. Count a patent for the same invention in two or more countries as **one** technically unique patent.* ____________

7.4 How many USPTO (United States Patent and Trademark Office) patents were granted to your institution? ____________

8. Were any of your 2011 patent applications in the following subject areas?

(*Please check* ***all*** *that apply.)*

A	Biomedical (diagnostics, medical devices, pharmaceuticals, etc) for human & animal health	☐
B	Computers, communication equipment and software	☐
C	Nanotechnology and new materials	☐
D	Low or zero carbon energy technologies	☐
E	Other subject areas not listed above	☐

Which of the above was the **most frequent subject area** for patent applications?_____ (insert letter)

9. Start-up companies *(A company* ***specifically*** *established to exploit technology or know-how created by your institution. Exclude student-established companies.)*

9.1 How many start-ups were formed in 2011? __________

9.2 How many of your start-ups, established in the last five years, have developed your institution's licensed technology or knowledge into products or processes that are sold in the market? __________

10. Licensing activities and income in 2011

10.1 How many licenses (include assignments) or option agreements were made between your institution and companies? __________

10.2 How many of these licenses and option agreements were granted to:

Start-up companies __________

Other firms with less than 250 employees __________

Other firms with more than 250 employees __________

10.3 What was the **total** amount of license income earned by your institution from its intellectual property (patents, software, material transfer agreements, confidentiality agreements, etc)? __________€

Include *license issue fees, annual fees, option fees, etc., plus milestone, termination & cash-in payments.* ***Exclude*** *license income forwarded to other companies and patent reimbursement fees.*

10.4 In total, how many licenses earned income in 2011? __________

Count multiple licenses for the same invention only once.

11. Approximately what share of your total 2011 license revenue was from licensed technology in each of the following subject areas?

Biomedical	_______%
Computers, communication equipment and software	_______%
Nanotechnology and new materials	_______%
Low or zero carbon energy technologies	_______%
Other subject areas not listed above	_______%
	100 %

12. In the last three years, has any of your institution's licensed technology or knowledge resulted in commercially profitable products or processes?

☐ Yes ☐ No ☐ Don't know

13. Research activities in 2011

13.1 How many research and development agreements were made between your institution and companies? *(Exclude consultancy contracts and cases where a firm funds a research chair or research of no expected commercial value to the firm)* ______________

13.2 What is the total number of research personnel at your institution *(include researchers, technicians and administrative support)*? _________FTEs

13.3 What were the total research expenditures of your institution? ____________€

13.4 Approximately what percentage of your institution's total research expenditures was funded by private companies? ____________%

In order to protect confidentiality, only aggregated results of this survey will be disclosed, unless you agree otherwise:

I give permission to disclose results for my institution ☐ Yes ☐ No

Comments (*If you only answered question 1, please give a brief description of the activities of your office*)

Annex D: Methodology KT composite indicator

The overall knowledge transfer performance of the individual countries eligible for cross country analysis (see section 3.3.5) has been summarized in a composite indicator. The methodology used for calculating this composite indicator will be explained in detail in this annex.

The knowledge transfer indicators used for calculating the composite indicator are:

1. Number of invention disclosures
2. Number of priority patent applications
3. Number of technically unique patent grants
4. The number of start-ups
5. The number of licenses or option agreements with companies
6. The amount of license income earned
7. The number of R&D agreements between the affiliated institutions and companies

Step 1: Normalising with the number of research staff

The seven indicators used are first normalized using the number of research staff, as reported by each individual PRO, as denominator.

Step 2: Identifying and replacing outliers

Outliers are identified as those relative scores which are higher than the mean plus 2 times the standard deviation which follows Chauvenet’s criterion for determining spurious observations. These outliers are replaced by the highest value observed that is smaller than the mean plus 2 times the standard deviation.

Step 3: Transforming highly skewed data

All the indicators used are unbound where values are not limited to an upper threshold. These indicators have skewed data distributions, for instance the top 10% of universities earned 86.5% of all the license income reported by universities in 2011. All the seven indicators have skewness levels above 1 (indicating a skewed data distribution) and have therefore been transformed using a square root transformation.

Step 4: Determining Maximum and Minimum scores

The maximum score for an indicator is the highest relative score as reported by an individual PRO. The minimum score for an indicator is the lowest relative score.

Step 5: Calculating re-scaled scores

Re-scaled scores of the relative scores are calculated by first subtracting the Minimum score and then dividing by the difference between the Maximum and the Minimum score. The maximum re-scaled score is thus equal to 1 and the minimum re-scaled score is equal to 0.

Step 6: Calculating the composite indicator for individual PROs

For every PRO a composite indicator is calculated as long as the PRO has reported the number of research staff and as long as it has reported at least five out the seven indicators listed above. In total 466 PROs were included in the calculations.

The composite indicator with equal weights is calculated as the unweighted average of the re-scaled scores. The composite indicator with variable weight is calculated as the weighted average of the re-scaled scores using the following weights:

	Weight	Percent
Invention disclosures	1	8%
Patent applications	1	8%
Patent grants	1	8%
Start-ups	2	15%
Number of licenses	3	23%
License income	3	23%
Research agreements	2	15%
	13	**100%**

Step 7: Calculating the composite indicator for countries

The composite indicator is only calculated for countries eligible for cross country analysis (see section 3.3.5). The composite indicator for individual countries is calculated by summing the composite indicators of the individual PROs in a country and dividing by the number of PROs that were eligible for calculation.

ANNEX III: MATERIAL FOR WP3

Welcome to the European Knowledge and Technology Transfer Practice Survey 2012!

Module A: Introduction

The survey is part of the European Knowledge Transfer Study 2010-2012 realised by empirica Communication and Technology Research, Bonn, the University of Maastricht (UNU-MERIT) and the University of Applied Sciences Northwestern Switzerland (FHNW). Participation is endorsed by the EC Directorate-General Research and Innovation.

We assure you that information you provide will be treated confidentially. The analysis and publication of the results will be anonymous and no reference will be made either to individual institutions or persons unless you explicitly agree to this. Your contribution will be acknowledged in a public list - unless you wish this not to happen - and finally, we will be pleased to provide you with a copy of the survey report, expected early 2013.

If you have any questions, please contact us by e-mail or by telephone:

Reto Mueller, +41 (0)62 286 01 85

Franz Barjak, +41 (0)62 287 78 25

Please send the filled-in questionnaire by e-mail attachment (reto.mueller@fhnw.ch) or regular mail to:

Reto Mueller
University of Applied Sciences Northwestern Switzerland
Riggenbachstrasse 16
CH-4600 Olten
Switzerland

1) For what institution do you answer the questions? "Institution" can be a university, hospital, governmental/non-profit research institute or research park/incubator (affiliated with any of the former) for which you work directly or on the basis of a contract. If you work for more than one institution, please answer the questionnaire only for the institution you indicate here.
Institution
City
Country

Module B: Intellectual Property (IP) Policy

2) Does the [$institution from question 1] have an Intellectual Property (IP) policy?

Understood as principles implemented to identify, protect and manage the IP resulting from research and development (R&D) activities in which faculty or staff from the institution is involved.

Please note that the exploitation and commercialisation of IP will be covered by later modules of the questionnaire.

- ☐ Yes
- ☐ No
- ☐ No, but this is planned

[Filter "yes" on 2]

3) Does the [$institution from question 1] have any written rules or regulations for this IP policy?

- ☐ Yes
- ☐ No
- ☐ No, but this is planned

[Filter "yes" on 3]

4) Are these written IP rules or regulations published?

- ☐ Yes, **full** content is available internally and externally to the public.
- ☐ Yes, but full content is only internally available to members of our institution.
- ☐ Not yet, but publication is planned.
- ☐ No, they are not published.

5) Does the [$institution from question 1] have clear rules for employees and/or students for the following IP-related issues?

Clear rules mean rules which are ideally set in writing and available to all possible target audiences.

	Employees	Students
The disclosure of inventions and new ideas with potential commercial interest	☐	☐
The ownership of IP	☐	☐
The management of conflicts of interest	☐	☐
The engagement with third parties (e.g. in R&D collaborations, service contracts etc.)	☐	☐
The keeping of records (e.g. lab journals)	☐	☐
None of the above	☐	☐

6) Does the [$institution from question 1] work with coherent IP portfolios (a set of related IP rights), e.g. in specific technological areas?

☐ Yes, we **have** coherent IP portfolios.
☐ Yes, we **consider** the creation of coherent IP portfolios.
☐ No

7) Does the [$institution from question 1] work with IP/patent pools with other research institutions?

☐ Yes, we **pool** patents/IP with other institutions.
☐ Yes, we **consider** the setting up of patent/IP pools with other institutions.
☐ No

8) How strongly do you agree or disagree with the following statements on the IP strategy of the [$institution from question 1]?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Securing the rights to our intellectual property (IP) is essential for our institution.	☐	☐	☐	☐	☐
In order to obtain research contracts with industry our institution often agrees to compromises regarding IPRs.	☐	☐	☐	☐	☐
We let our scientific staff decide who owns and commercialises their inventions.	☐	☐	☐	☐	☐
We encourage our scientific staff to put their inventions into the public domain without necessarily protecting the IP.	☐	☐	☐	☐	☐

Module C: Start-up policy

9) Does the [$institution from question 1] have a specific start-up policy?

Understood as principles that govern the creation of start-up firms or any involvement in such firms by the institution and its employees and/or students. We consider start-up, spin-out or spin-off as synonyms and use in the remainder of the questionnaire "start-up".

☐ Yes
☐ No
☐ No, but this is planned

[Filter “yes” on 9]

10) Does the [$institution from question 1] have any written rules or regulations for this start-up policy?

☐ Yes
☐ No
☐ No, but this is planned

[Filter "yes" on 10]

11) Are these written start-up rules or regulations published?

- ☐ Yes, **full** content is available internally and externally to the public.
- ☐ Yes, but full content is only internally available to members of our institution.
- ☐ Not yet, but publication is planned.
- ☐ No, they are not published.

12) Which special benefits do start-up companies usually receive from the [$institution from question 1] or third parties acting on its behalf?

Start-ups are defined here as companies specifically established to exploit technology or know-how created by your institution.

	Yes	No
Specific practices regarding the provision of IP owned by our institution (e.g. access rights, license fees)	☐	☐
Scientific and technological support (e.g. research agreements)	☐	☐
Incubator	☐	☐
Infrastructure support (e.g. rental of working space, access to equipment)	☐	☐
Financial support	☐	☐
Management support (e.g. by employees from our institution)	☐	☐
Mentoring, consulting, coaching or training (e.g. on commercial or financial matters)	☐	☐
Other support, please describe ______	☐	☐

13) Which compensations for the provided IP and/or services does the [$institution from question 1] usually receive from its start-up companies?

	Yes	No
Fees (e.g. license fees, service fees)	☐	☐
Share of the equity	☐	☐
Share of revenues or profits	☐	☐
Other compensations, please describe ______	☐	☐

14) How strongly do you agree or disagree with the following statements on the strategy of the [$institution from question 1] regarding start-up creation?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Our institution prefers the establishment of start-ups to giving licences to existing companies.	☐	☐	☐	☐	☐
In order to obtain support from our institution the start-up is subjected to a selection process.	☐	☐	☐	☐	☐
We prefer to have one overperforming start-up to several regular performers.	☐	☐	☐	☐	☐
The institution invests considerable time and resources in its start-ups.	☐	☐	☐	☐	☐
Our start-ups are usually spun off in an early stage.	☐	☐	☐	☐	☐
Our start-ups are often joint ventures of our institution with existing outside companies.	☐	☐	☐	☐	☐

15) Does the [$institution from question 1] provide entrepreneurial training for the following groups?

- ☐ For employees
- ☐ For students
- ☐ None

Module D: Incentives for Intellectual Property Protection or Knowledge Transfer

16) Does the [$institution from question 1] provide incentives to its employees and/or students to protect intellectual property and to exploit it?

	Yes	No	No, but this is planned
Percentage of the revenues	☐	☐	☐
Lump sum payment (e.g. inventor's bonus)	☐	☐	☐
Salary upgrade	☐	☐	☐
Additional funds for their R&D	☐	☐	☐
Inclusion in promotion and career decisions	☐	☐	☐
Social rewards (e.g. awards, publicity)	☐	☐	☐
Other incentives, please describe ______	☐	☐	☐

17) Does the [$institution from question 1] have a model for sharing revenues resulting from the exploitation of IP?

☐ Yes, we have an established model set out in writing.

☐ No, we do not have any established models (e.g. the distribution is negotiated and decided on a case-by-case basis).

18) Are expenses for IP activities (protection, management etc.) deducted from total gross revenue before it is shared?

☐ Yes, **all** expenses are deducted.

☐ Yes, **some** expenses (e.g. out-of-pocket costs for external services) are deducted.

☐ No

19) How are revenues from IP usually shared at the [$institution from question 1]?

If you have different schemes, e.g. depending on the total revenue generated by a patent, the funding institution or other, please provide average figures for the most common scheme.

	in %
Inventor(s), researcher(s) from our institution	
Department(s), institute(s) or other institutional units with which the inventors are affiliated	
Knowledge transfer office(s) or other intermediaries (direct share)	
Institution	
Other beneficiaries	
	100%

Module E: Exploitation and Commercialisation Practice

20) Please rank the following mechanisms to exploit IP generated at the [$institution from question 1] by importance.

Use ranks from 1 to 5 with 1 for the most and 5 for the least important mechanism.

Licensing of the IP to an existing company

Sale and transfer of the IP (assignments) to an existing company

Other cooperation with an existing company (e.g. joint venture, development collaboration)

Formation of a new company (e.g. spin-off, spin-out, start-up)

Providing open access to IP by putting it in the public domain, institutional repositories, open access publications etc.

21) How important are the following objectives for the IP and exploitation policies of the [$institution from question 1].

	Very important	Important	Somewhat important	Unimportant
Generating income for our institution (e.g. licence revenues, research funds)	☐	☐	☐	☐
Generating possibilities for collaboration in research and teaching for our faculty	☐	☐	☐	☐
Broadening the job market for our students	☐	☐	☐	☐
Raising the profile, getting publicity for our institution	☐	☐	☐	☐
Attracting and retaining faculty	☐	☐	☐	☐
Promoting entrepreneurship among employees/students	☐	☐	☐	☐
Supporting our (private) partners	☐	☐	☐	☐
Contributing to economic growth	☐	☐	☐	☐
Promoting the diffusion of scientific knowledge and technology	☐	☐	☐	☐
Meeting requirements of funding bodies	☐	☐	☐	☐

22) Does the [$institution from question 1] have a specific licensing policy?

Understood as principles that rule the granting of licenses or similar rights to users of IP owned by the institution.

☐ Yes
☐ No
☐ No, but this is planned

[Filter “yes” on 22]

23) Does the [$institution from question 1] have any written rules or regulations for this licensing policy?

☐ Yes
☐ No
☐ No, but this is planned

[Set Filter "yes" on 23]

24) Are these written licensing rules or regulations published?

- ☐ Yes, **full** content is available internally and externally to the public.
- ☐ Yes, but full content is only internally available to members of our institution.
- ☐ Not yet, but publication is planned.
- ☐ No, they are not published.

25) Has the [$institution from question 1] completed any of the following types of contracts since 2008?

	Yes	No
Non-exclusive license contract	☐	☐
Exclusive license contract	☐	☐
IP transfer contract	☐	☐

[Filter "yes" for any out of 25]

26) How would you characterise the most common licensing/IP transfer practice at the [$institution from question 1]?

The more common a certain type of practice or partner at your institution is, the closer should be the selected checkbox. For instance, if you have only European partners, check the leftmost box. If you have the same number of national and foreign partners, check the box in the middle.

European partner	☐	☐	☐	☐	☐	☐	☐	Non-European partner
National partner	☐	☐	☐	☐	☐	☐	☐	Foreign partner
Local/regional partner	☐	☐	☐	☐	☐	☐	☐	More distant partner
Early stage technology (e.g. proof of concept)	☐	☐	☐	☐	☐	☐	☐	Technology ready for practical or commercial use.
Transfer/assignment of IP	☐	☐	☐	☐	☐	☐	☐	License for IP
Exclusive license	☐	☐	☐	☐	☐	☐	☐	Non-exclusive license
Limited fields of use	☐	☐	☐	☐	☐	☐	☐	Unlimited fields of use
Geographically restricted use	☐	☐	☐	☐	☐	☐	☐	Geographically unrestricted use
Limited time period	☐	☐	☐	☐	☐	☐	☐	Unlimited time period

Module F: Collaborative and Contract Research with Private Sector Partners

27) What types of research and service activities with private sector partners does the [$institution from question 1] undertake?

- ☐ Collaborative research (all partners carry out R&D tasks)
- ☐ Contract research (R&D is contracted out to your institution by a private company)
- ☐ Service agreements, consulting (existing knowledge or infrastructure is used, new IP is not produced by your institution)
- ☐ Other activities, please specify: _____

[Branch a: Filter on 27) Collaborative research “yes”]

28) Do you rather agree or disagree with the following statements on the rules and practices of the [$institution from question 1] for <u>collaborative</u> research with private sector partners?

Collaborative research means all partners carry out R&D tasks.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
We accept delays of publication to facilitate IP protection.	☐	☐	☐	☐	☐
We insist on the public dissemination of the research and development results.	☐	☐	☐	☐	☐
We keep the IP rights for further internal research.	☐	☐	☐	☐	☐
We keep the IP rights for research cooperation with third parties.	☐	☐	☐	☐	☐
We aim to maximise the **socio-economic** impact of the research.	☐	☐	☐	☐	☐
We aim to maximise the **commercial** impact of the research.	☐	☐	☐	☐	☐

29) What is the general position of your institution with regard to the foreground IP generated in collaborative research with private sector partners? The more common a certain type of practice at your institution the closer should be the selected checkbox. For instance, if you always own foreground IP from collaborative research with the private sector, check the leftmost box.		
We **own** it.	☐ ☐ ☐ ☐ ☐	We do **not own** it.
We **reserve** access rights to it for our organisation.	☐ ☐ ☐ ☐ ☐	We do **not reserve** access rights to it for our organisation.
We **grant** access rights to the research partner(s) for **research** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **research** purposes.
We **grant** access rights to the research partner(s) for **exploitation** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **exploitation** purposes.
We **receive** cost covering compensation.	☐ ☐ ☐ ☐ ☐	We do **not receive** cost covering compensation..
We **participate** in the revenues generated by it.	☐ ☐ ☐ ☐ ☐	We do **not participate** in the revenues generated by it.

30) How does your institution deal with the <u>background of IP</u> (already owned by it at project start) in <u>collaborative</u> research with private sector partners?		
We **transfer** ownership to the research partner(s).	☐ ☐ ☐ ☐ ☐	We do **not transfer** ownership to the research partner(s).
We **grant** access rights to the research partner(s) for **research** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **research** purposes.
We **grant** access rights to the research partner(s) for **exploitation** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **exploitation** purposes.
We **receive** cost covering compensation.	☐ ☐ ☐ ☐ ☐	We do **not receive** cost covering compensation.
We **participate** in the revenues generated by it.	☐ ☐ ☐ ☐ ☐	We do **not participate** in the revenues generated by it.

[Branch b: Filter on 27) Contract research "yes"]

31) Do you rather agree or disagree with the following statements on the rules and practices of the [$institution from question 1] for <u>contract</u> research with private sector partners?

Contract research means R&D is contracted out to a public organisation by a private company.

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
We accept delays of publication to facilitate IP protection.	☐	☐	☐	☐	☐
We insist on the public dissemination of the research and development results.	☐	☐	☐	☐	☐
We keep IP rights for further internal research.	☐	☐	☐	☐	☐
We keep IP rights for research cooperation with third parties.	☐	☐	☐	☐	☐
We aim to maximise the **socio-economic** impact of the research.	☐	☐	☐	☐	☐
We aim to maximise the **commercial** impact of the research.	☐	☐	☐	☐	☐

32) What is the general position of your institution with regard to the <u>foreground IP</u> generated in <u>contract</u> research with private sector partners?

The more common a certain type of practice at your institution the closer should be the selected checkbox. For instance, if you always own foreground IP from contract research with the private sector, check the leftmost box.

We **own** it.	☐ ☐ ☐ ☐ ☐	We do **not own** it.
We **reserve** access rights to it for our organisation.	☐ ☐ ☐ ☐ ☐	We do **not reserve** access rights to it for our organisation.
We **grant** access rights to the research partner(s) for **research** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **research** purposes.
We **grant** access rights to the research partner(s) for **exploitation** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **exploitation** purposes.
We **receive** cost covering compensation.	☐ ☐ ☐ ☐ ☐	We do **not receive** cost covering compensation..
We **participate** in the revenues generated by it.	☐ ☐ ☐ ☐ ☐	We do **not participate** in the revenues generated by it.

33) How does your institution deal with the background of IP (already owned by it at project start) in contract research with private sector partners?		
We **transfer** ownership to the research partner(s).	☐ ☐ ☐ ☐ ☐	We **not transfer** ownership to the research partner(s).
We **grant** access rights to the research partner(s) for **research** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **research** purposes.
We **grant** access rights to the research partner(s) for **exploitation** purposes.	☐ ☐ ☐ ☐ ☐	We do **not grant** access rights to the research partner(s) for **exploitation** purposes.
We **receive** cost covering compensation.	☐ ☐ ☐ ☐ ☐	We do **not receive** cost covering compensation.
We **participate** in the revenues generated by it.	☐ ☐ ☐ ☐ ☐	We do **not participate** in the revenues generated by it.

Module G: Monitoring and Communication of Research, IP and Knowledge Transfer

34) Does the [$institution from question 1] itself monitor and publish any of the following information regularly?

We refer to descriptions and/or examples for any of these issues and not only statistics (e.g. short profiles of new professors, abstracts of research projects or patents)

	We monitor this	We monitor and publish this
Changes among research personnel, new appointments at the institution	☐	☐
Scientific competences of the institution	☐	☐
Research projects	☐	☐
Research results and inventions	☐	☐
Research instruments and equipment (newly purchased, available for external users etc.)	☐	☐
Patents or other property rights applied for or granted	☐	☐
Licenses issued or IP transferred	☐	☐
Start-Ups	☐	☐
None of the above	☐	☐

35) Please select the <u>three</u> most important channels which are created and used regularly by the [$institution from question 1] to communicate information on research, IP and knowledge transfer opportunities to the private sector?

- ☐ Press statements
- ☐ Printed magazines
- ☐ Electronic or printed newsletters
- ☐ Web sites
- ☐ Workshops, seminars, conferences organised for private sector audiences
- ☐ Booths at trade fairs or similar events
- ☐ Open days, information days etc. at our institution
- ☐ Business roundtables
- ☐ Industry advisory boards
- ☐ Direct mailing (flyers, e-mails etc.)
- ☐ Personal contacts of transfer office staff
- ☐ External technology intermediaries and consultants
- ☐ Other channel: ______
- ☐ None of the above

Module H: Knowledge and Technology Transfer Staff

36) Do any of the staff responsible for knowledge and technology transfer at the [$institution from question 1] have formal qualifications or training (e.g. academic degree, certification) in the following areas?

- ☐ Engineering or natural sciences
- ☐ Biomedical
- ☐ Law (e.g. patent attorney)
- ☐ Finance
- ☐ Management or business administration
- ☐ Other, please describe: ______

37) How often does the [$institution from question 1] provide the following activities and services internally, that is through your office and other/similar offices?

	Always	More often than not	Every other time	Not usually	Never
Identifying funding sources	☐	☐	☐	☐	☐
Evaluating the technical merit of disclosed inventions	☐	☐	☐	☐	☐
Evaluating the commercial potential of disclosed inventions	☐	☐	☐	☐	☐
Drafting patent applications	☐	☐	☐	☐	☐
Managing licence and similar contracts (drafting, controlling)	☐	☐	☐	☐	☐
Managing research contracts (drafting, controlling)	☐	☐	☐	☐	☐
Marketing or advertising the institution's intellectual property	☐	☐	☐	☐	☐
Acting as a broker between companies and scientists	☐	☐	☐	☐	☐
Selecting start-up companies	☐	☐	☐	☐	☐
Supporting start-up companies or academic entrepreneurs	☐	☐	☐	☐	☐
Other, please specify…………	☐	☐	☐	☐	☐

38) How often does the [$institution from question 1] source the following activities and services <u>externally</u>, that is from specialised providers like consultants, patent attorneys, exploitation agencies or others who are not part of your institution?

	Always	More often than not	Every other time	Not usually	Never
Identifying funding sources	☐	☐	☐	☐	☐
Evaluating the technical merit of disclosed inventions	☐	☐	☐	☐	☐
Evaluating the commercial potential of disclosed inventions	☐	☐	☐	☐	☐
Drafting patent applications	☐	☐	☐	☐	☐
Managing licence and similar contracts (drafting, controlling)	☐	☐	☐	☐	☐
Managing research contracts (drafting, controlling)	☐	☐	☐	☐	☐
Marketing or advertising the institution's intellectual property	☐	☐	☐	☐	☐
Acting as a broker between companies and scientists	☐	☐	☐	☐	☐
Selecting start-up companies	☐	☐	☐	☐	☐
Supporting start-up companies or academic entrepreneurs	☐	☐	☐	☐	☐
Other, please specify…………	☐	☐	☐	☐	☐

39) What is the organisational relationship between the [$institution from question 1] and your knowledge and technology transfer office?

- ☐ The office is part of the institution's administration.
- ☐ The office is (part of) a separate **non-profit** organisation outside the institution.
- ☐ The office is (part of) a private **for-profit** organisation mandated by the institution.
- ☐ Other, please describe: ______

40) Does the head of the knowledge and technology transfer office have working experience in the private sector/industry?

- ☐ Yes, 5 or more years
- ☐ Yes, but less than 5 years
- ☐ No

41) In order to protect confidentiality, only aggregated results of this survey will be disclosed, unless you agree otherwise:	
I give permission to disclose results for the [$institution from question 1].	☐ Yes ☐ No

42) Do you have any comments? (E.g. on the questionnaire, your institution, issues of knowledge and technology transfer etc.)

Thank you for participating in European Knowledge and Technology Transfer Practice Survey 2012!

For more information please go to:
http://www.knowledge-transfer-study.eu/index.php.

Table 6-1: Responses to WP3 survey by country

	Gross sample	non response	response	response rate in %	in % of all responses
Albania	1	1		0.0	0.0
Austria	14	5	9	64.3	2.8
Belgium	13	7	6	46.2	1.9
Bosnia-Herzegovina	3	3		0.0	0.0
Bulgaria	2	1	1	50.0	0.3
Croatia	3	2	1	33.3	0.3
Cyprus	1	1		0.0	0.0
Czech Republic	11	7	4	36.4	1.2
Denmark	15	6	9	60.0	2.8
Estonia	1		1	100.0	0.3
Finland	10	5	5	50.0	1.6
France	99	61	38	38.4	11.8
Germany	118	52	66	55.9	20.5
Greece	7	4	3	42.9	0.9
Hungary	8	3	5	62.5	1.6
Iceland	1		1	100.0	0.3
Ireland	11	1	10	90.9	3.1
Israel	14	8	6	42.9	1.9
Italy	52	27	25	48.1	7.8
Latvia	3	1	2	66.7	0.6
Lithuania	1	1		0.0	0.0
Luxembourg	1		1	100.0	0.3
Macedonia	1		1	100.0	0.3
Malta	1		1	100.0	0.3
Montenegro	1		1	100.0	0.3
Netherlands	18	8	10	55.6	3.1
Norway	11	6	5	45.5	1.6
Poland	10	7	3	30.0	0.9
Portugal	9	4	5	55.6	1.6
Romania	4	2	2	50.0	0.6
Serbia	1	1		0.0	0.0
Slovak Republic	1		1	100.0	0.3
Slovenia	2	1	1	50.0	0.3
Spain	60	32	28	46.7	8.7
Sweden	23	13	10	43.5	3.1
Switzerland	23	10	13	56.5	4.0
Turkey	26	22	4	15.4	1.2
United Kingdom	95	51	44	46.3	13.7
Total	675	353	322	47.7	100.0

Table 6-2: Existence of an IP policy by size of the KTO and size of the PRO (KTO size N=269, PRO size N=233)

		Does the institution have an intellectual property policy?		
		Yes	No	No, but this is planned
Size of the KTO (in FTE)	up to 2	67.2	19.4	13.4
	2.1 to 5	75.3	10.4	14.3
	5.1 to 10	90.0	2.0	8.0
	more than 10	94.7	4.0	1.3
	Total	81.4	9.3	9.3
Size of the PRO (research personnel)	up to 499	76.5	15.7	7.8
	500-1249	81.7	5.0	13.3
	1250-2499	86.0	3.5	10.5
	2500 or more	89.2	3.1	7.7
	Total	83.7	6.4	9.9

Table 6-3: Existence of start-up policy by size of the KTO and size of the PRO (KTO size N=264, PRO size N=228)

		Does the institution have a specific start-up policy?		
		Yes	No	No, but this is planned
Size of the KTO (in FTE)	up to 2	26.9	43.3	29.9
	2.1 to 5	69.3	18.7	12.0
	5.1 to 10	70.0	16.0	14.0
	more than 10	72.2	11.1	16.7
	Total	59.5	22.3	18.2
Size of the PRO (research personnel)	up to 499	40.0	40.0	20.0
	500-1249	51.7	25.9	22.4
	1250-2499	75.4	8.8	15.8
	2500 or more	71.4	11.1	17.5
	Total	60.5	20.6	18.9

Exhibit 6-1: Provision of incentives by geographic location of the PRO (in %, N=289)

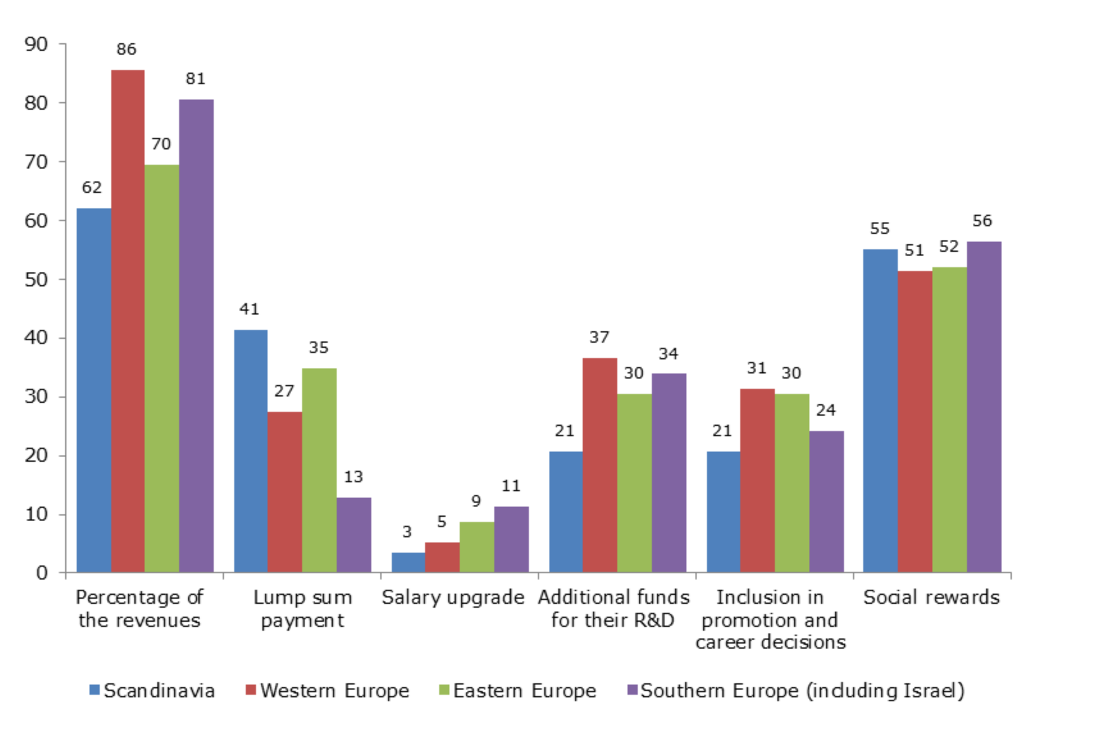


Table 6-4: Existence of a model for sharing revenues resulting from the exploitation of IP by size of the KTO and size of the PRO (KTO size N=275, PRO size N=237)

		Does the institution have a model for sharing revenues resulting from the exploitation of IP?	
		Yes, we have an established model set out in writing.	No, we do not have any established models (e.g. the distribution on a case-by-case basis)
Size of the KTO (in FTE)	up to 2	58.5	41.5
	2.1 to 5	61.7	38.3
	5.1 to 10	81.8	18.2
	more than 10	78.4	21.6
	Total	69.5	30.5
Size of the PRO (research personnel)	up to 499	50.0	50.0
	500-1249	73.8	26.2
	1250-2499	76.7	23.3
	2500 or more	82.3	17.7
	Total	71.7	28.3

Table 6-5: Share of revenues from IP and knowledge transfer by beneficiary, R&D-density of the country and type of PRO (% of the total revenue allocated to the beneficiary)

	Inventor(s)	Department(s) or institute(s)	Institution	KTO or other intermediaries	Other beneficiaries
R&D-density of the country (N=242)					

low R&D-density	47.2	17.9	32.8	2.0	0.3
medium R&D-density	44.4	20.5	29.4	6.0	0.8
high R&D-density	37.0	17.6	33.5	9.3	4.1
Total	40.7	18.8	31.7	7.4	2.5
Type of institution (N=215)					
Other institution	25.6	22.2	48.1	3.5	1.1
University	43.5	17.9	29.4	7.2	3.2
University with hospital	39.4	23.2	26.4	11.1	2.9
Total	40.1	19.6	31.6	7.2	2.8

Exhibit 6-2: Objectives for IP and exploitation policies for institutions by type of institution (arithmetic mean, N=180)

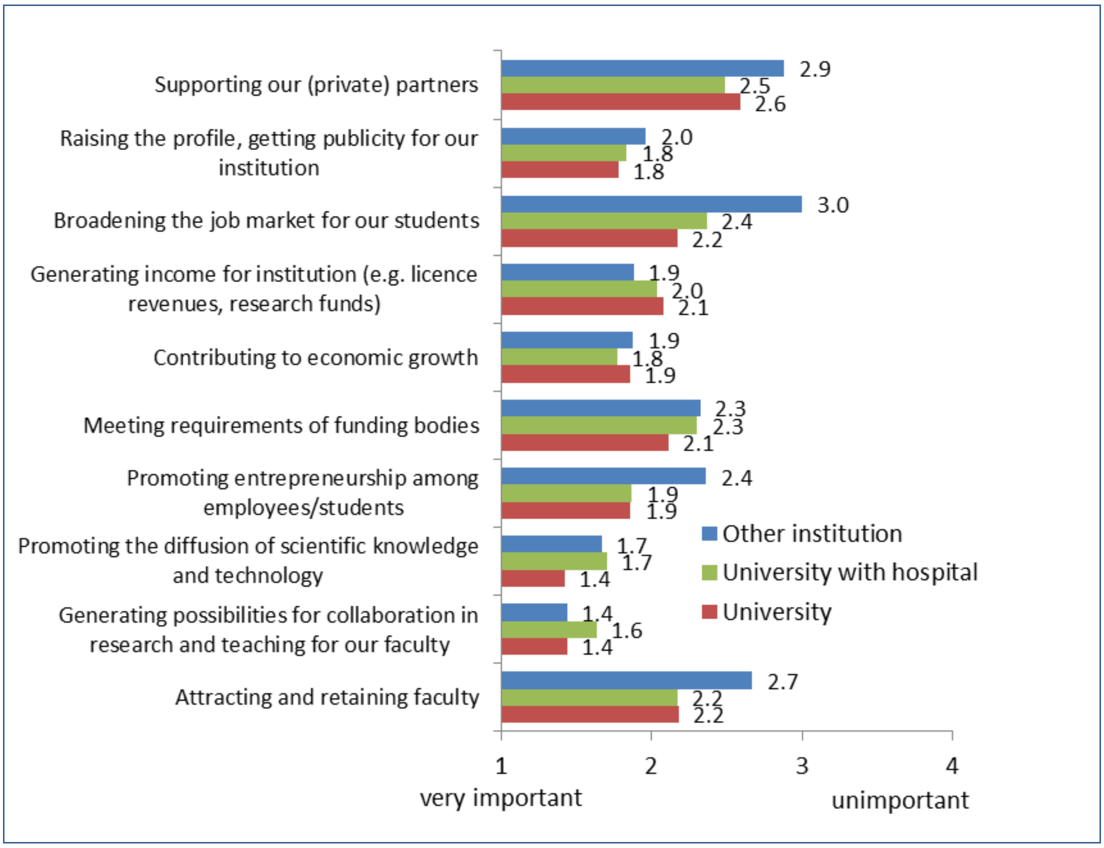


Exhibit 6-3: Formal qualification of KTO personnel by type of institution and size of the KTO (N=253)

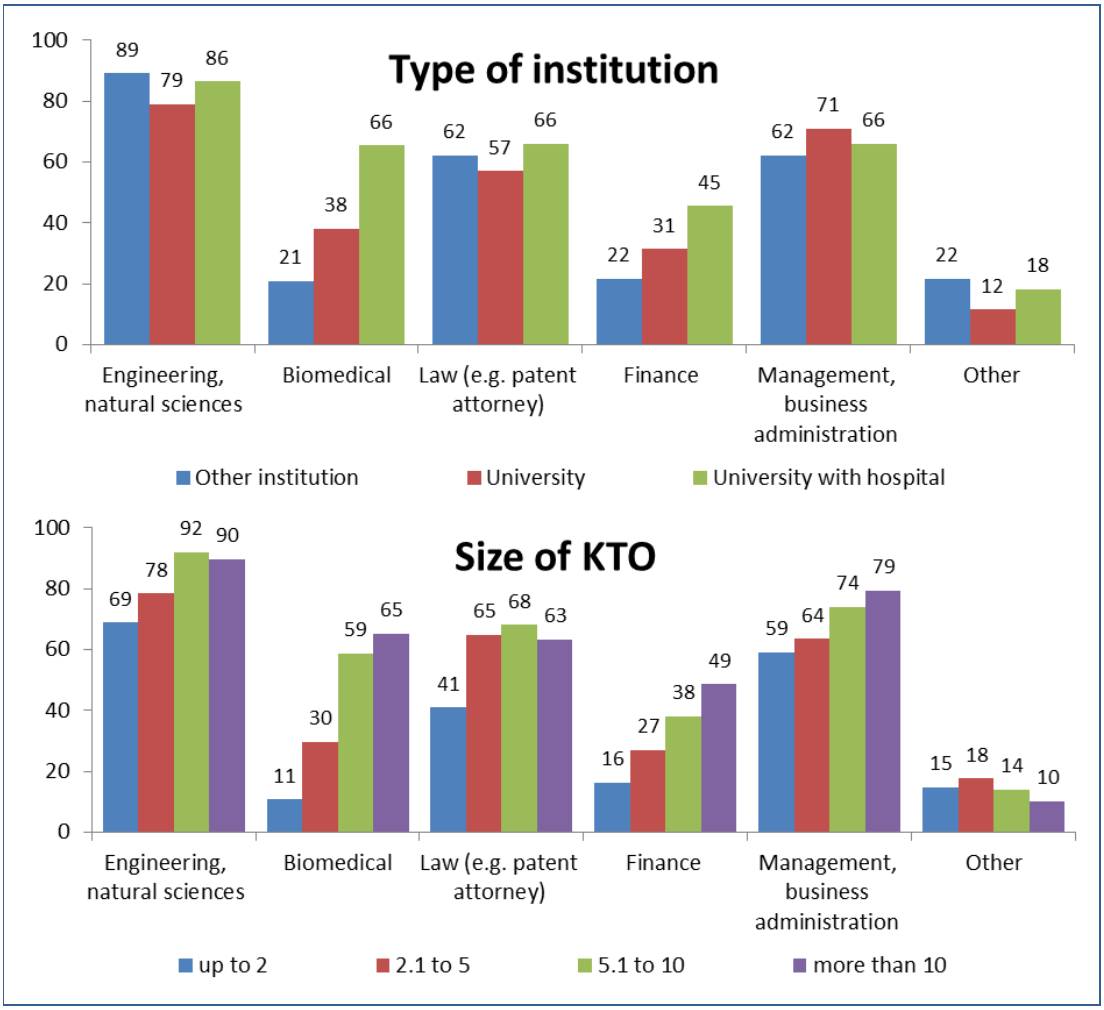


Exhibit 6-4: Activities undertaken by different start-up support models

Activities	Low selective model	Supportive model	Incubator model
	Based upon Crealys and Twente	Based upon Leuven R&D and BioM	Based upon IMEC TTP and Scientific Generics
Opportunity search and awareness creation	Rather passive, relies on entrepreneurial university	Passive; might organize a business plan competition; attracting business plans rather than ideas; relies on the reputation of the fund	Active opportunity seeking worldwide
Strategic choice how to commercialize R&D	Selection criteria are extremely low. Maximize the number of spin-outs	Among the selection criteria, growth orientation is important. But, remain lower than in private VCs	Selection criteria resemble those of the VCs
Intellectual property assessment and protection	Emphasis on commercializing technology through patents	Support in patent and license negotiation with the industry	TTO will acquire an IPR platform (not limited to one patent) at an early stage
Incubation and business plan development	Projects are offered space at the research center or university	Incubation center and Science park; Specialized support available out house at market prices	'In house' incubation and support at all stages of the spin-out process and to a high level
Funding process	Small amounts, Ranging from € 15,000 to 100,000, under the form of public grants	Public private equity fund, ranging from € 250,000 to 350,000	VC money, ranging from € 1 – 4 million
Control over the spin-out process after spin-out of the spin-out company	Project is started at a prefounding stage. All types of spin-out are selected	Spin off company is start up at a very early stage	Spin off company is start up in a late stage and with an experienced management team

Source: Clarysse, et al. (2005, p. 194)

Exhibit 6-5: General position in regard to background IP in collaborative research by type of institution (median values, N=226)

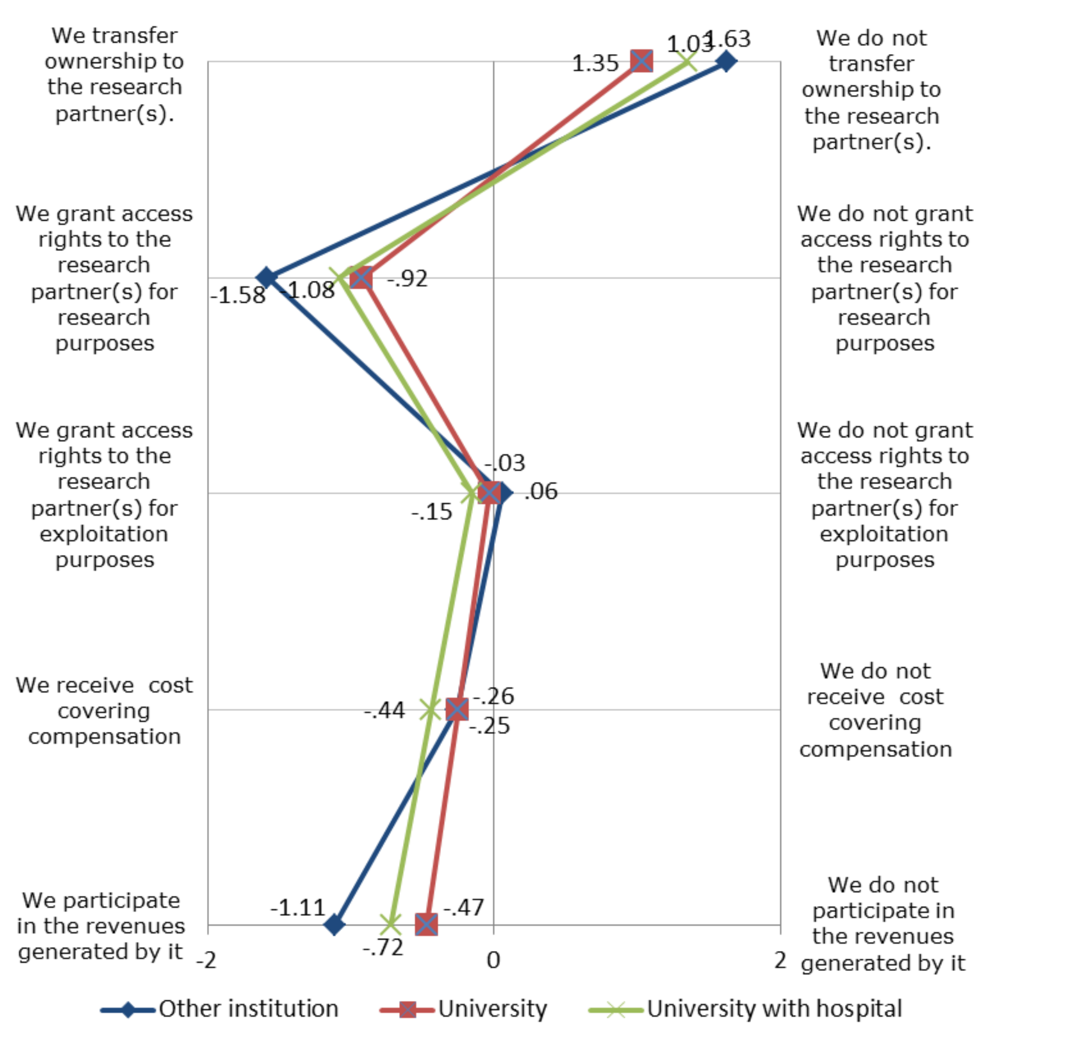


Exhibit 6-6: General position in regard to background IP in contract research by type of institution (median values, N=215)

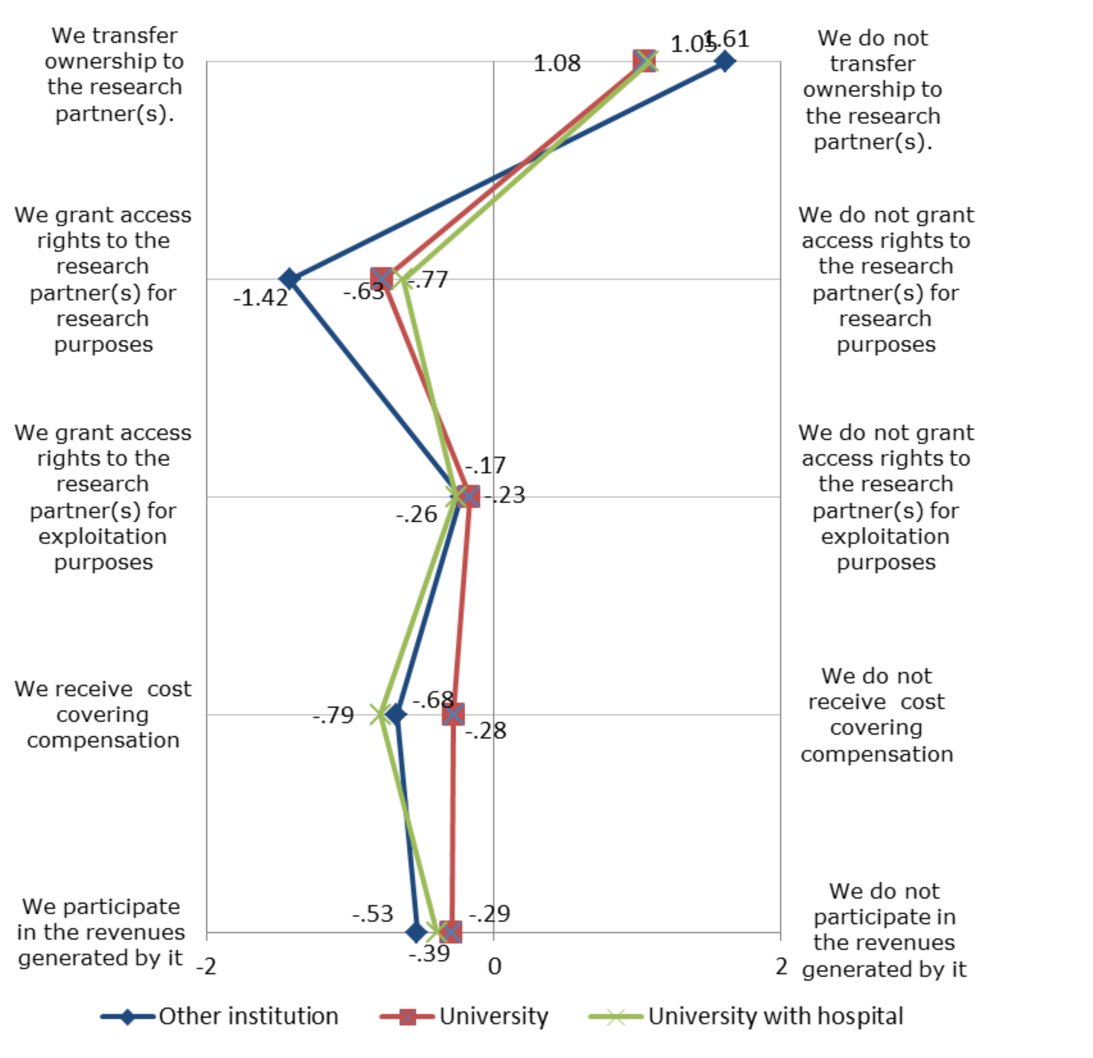


Table 6-6: Responses by type and size of institution and country (in %, N = 245)

	N[a]	University or other institution				Size of the PRO				
		Other institution	University	University with hospital	Total	up to 499	500-1249	1250-2499	2500 or more	Total
Austria	8	0	75	25	100	13	38	38	13	100
Belgium	6	0	67	33	100	17	17	0	67	100
Denmark	7	25	50	25	100	57	0	29	14	100
Finland	4	–	–	–	–	–	–	–	–	–
France	18	21	46	33	100	22	22	33	22	100
Germany	57	23	61	16	100	21	26	19	33	100
Hungary	5	0	80	20	100	20	0	80	0	100
Ireland	9	0	80	20	100	67	22	0	11	100
Israel	4-5	20	60	20	100	–	–	–	–	–

Italy	17	15	70	15	100	18	24	35	24	100
The Netherlands	8	25	25	50	100	13	0	25	63	100
Norway	4-6	0	33	67	100	–	–	–	–	–
Portugal	1	–	–	–	–	–	–	–	–	–
Spain	15	7	81	11	100	0	20	27	53	100
Sweden	9	0	89	11	100	56	22	0	22	100
Switzerland	12	33	50	17	100	33	42	8	17	100
United Kingdom	37	5	90	5	100	8	43	35	14	100
other countries	24	12	80	8	100	21	29	21	29	100
All countries	245	14	69	18	100	22	27	24	27	100

a No. of responses varies between type and size of PRO and minimum N is shown.

Table 6-7: Responses by type and size of institution and country (in %, N = 257)

	N[a]	Founding date of the KTO					Size of the KTO				
		before 1990	1990-1999	2000-2004	2005 or later	Total	up to 2	2.1 to 5	5.1 to 10	more than 10	Total
Austria	7	0	0	71	29	100	50	38	13	0	100
Belgium	6	50	17	17	17	100	0	50	0	50	100
Denmark	8	0	25	38	38	100	38	13	25	25	100
Finland	4	–	–	–	–	–	–	–	–	–	–
France	24	0	29	17	54	100	21	46	17	17	100
Germany	62	39	32	11	18	100	39	25	20	16	100
Hungary	5	0	20	20	60	100	20	20	60	0	100
Ireland	10	10	0	10	80	100	10	50	30	10	100
Israel	5	40	20	40	0	100	20	40	40	0	100
Italy	20	0	5	35	60	100	25	55	10	10	100
The Netherlands	8	13	25	13	50	100	0	13	13	75	100
Norway	6	0	0	33	67	100	17	17	33	33	100
Portugal	1	–	–	–	–	–	–	–	–	–	–
Spain	26	27	46	12	15	100	4	26	26	44	100
Sweden	9	0	33	11	56	100	22	56	11	11	100
Switzerland	11	0	18	45	36	100	42	17	25	17	100
United Kingdom	20	15	30	30	25	100	10	12	10	68	100
other countries	25	0	20	16	64	100	32	28	24	16	100
All countries	257	16	25	21	38	100	24	29	20	28	100

a No. of responses varies between founding date and size of KTO and minimum N is shown. Numbers can be considerably higher, e.g. for UK KTOs founding date was only available for 20 institutions, but size for 41 institutions.

Table 6-8: Formal qualifications of KTO staff by country (in %, N = 287)

	N	Engineering, natural sciences	Biomedical	Law	Finance	Manage-ment	Other
Austria	9	78	20	56	11	33	11
Belgium	8	100	–	67	50	83	17
Denmark	6	75	50	100	38	63	0
Finland	5	100	–	40	40	60	0
France	33	73	23	73	9	64	21
Germany	61	90	32	64	31	62	18
Hungary	3	–	–	–	–	–	–
Ireland	6	100	–	17	50	100	33
Israel	5	60	–	60	60	80	40
Italy	22	50	24	55	27	68	18
Netherlands	9	67	50	78	56	78	11
Norway	6	83	–	67	50	67	0
Portugal	5	60	40	20	40	80	20
Spain	25	88	28	52	32	56	12
Sweden	10	90	14	30	40	70	0
Switzerland	12	83	33	58	8	67	17
United Kingdom	35	83	62	51	43	80	9
other countries	27	81	33	52	26	63	7
All countries	287	80	37	58	32	67	14

Table 6-9: Services and activities provided regularly internally by country (in %)

	Identifying fun-ding sources	Evaluating the technical merit of disclosed inven-tions	Evaluating the commercial po-tential of disclosed inven-tions	Drafting patent applications	Managing licence and similar contracts	Managing rese-arch contracts	Marketing or ad-vertising the in-stitution's intel-lectual property	Acting as a bro-ker between companies and scientists	Selecting start-up companies	Supporting start-up companies or academic entre-preneurs
Austria	87.5	71.4	87.5	12.5	100.0	100.0	87.5	75.0	75.0	75.0
Belgium	–	100.0	100.0	60.0	80.0	80.0	100.0	100.0	100.0	100.0
Denmark	87.5	87.5	87.5	37.5	87.5	100.0	85.7	71.4	50.0	62.5
Finland	–	–	–	–	–	–	–	–	–	–
France	87.9	63.6	53.1	36.4	84.4	97.0	51.5	65.6	59.4	69.7
Germany	93.9	73.3	68.1	38.3	75.0	89.8	68.8	83.3	70.2	83.7
Hungary	–	–	–	–	–	–	–	–	–	–
Ireland	85.7	100.0	100.0	14.3	100.0	100.0	100.0	100.0	100.0	100.0
Israel	–	–	–	–	–	–	–	–	–	–
Italy	100.0	70.6	64.7	29.4	72.2	94.4	70.6	75.0	94.4	100.0
The Netherlands	77.8	77.8	87.5	33.3	100.0	88.9	100.0	88.9	88.9	100.0
Norway	–	–	–	–	–	–	–	–	–	–
Portugal	100.0	80.0	80.0	60.0	80.0	80.0	100.0	60.0	40.0	60.0
Spain	95.0	70.0	75.0	60.0	95.0	95.0	85.0	75.0	63.2	78.9
Sweden	100.0	88.9	88.9	55.6	55.6	66.7	37.5	55.6	44.4	88.9
Switzerland	88.9	66.7	66.7	33.3	66.7	88.9	66.7	37.5	33.3	55.6
United Kingdom	97.1	76.5	85.7	28.6	78.8	74.3	82.9	88.2	72.7	90.6
other countries	94.7	78.9	73.7	52.6	83.3	94.1	76.5	88.9	52.9	68.8
All countries	**93.0**	**75.8**	**74.4**	**40.2**	**81.8**	**89.4**	**73.9**	**77.4**	**68.2**	**82.1**

Table 6-10: Services and activities provided regularly externally by country (in %)

	Identifying funding sources	Evaluating the technical merit of disclosed inventions	Evaluating the commercial potential of disclosed inventions	Drafting patent applications	Managing licence and similar contracts	Managing research contracts	Marketing or advertising the institution's intellectual property	Acting as a broker between companies and scientists	Selecting start-up companies	Supporting start-up companies or academic entrepreneurs
Austria	42.9	85.7	85.7	85.7	14.3	14.3	42.9	14.3	28.6	42.9
Belgium	20.0	20.0	60.0	80.0	20.0	20.0	40.0	40.0	20.0	40.0
Denmark	12.5	50.0	62.5	75.0	37.5	25.0	25.0	37.5	37.5	50.0
Finland	–	–	–	–	–	–	–	–	–	–
France	21.2	48.5	48.5	75.8	21.2	12.1	39.4	31.3	37.5	40.6
Germany	33.3	73.5	75.0	83.3	50.0	23.4	60.4	43.8	37.0	43.5
Hungary	–	–	–	–	–	–	–	–	–	–
Ireland	42.9	42.9	71.4	85.7	28.6	28.6	28.6	14.3	28.6	28.6
Israel	–	–	–	–	–	–	–	–	–	–
Italy	33.3	35.7	18.8	88.2	23.1	28.6	35.7	7.7	7.7	15.4
The Netherlands	22.2	44.4	22.2	100.0	0.0	0.0	22.2	0.0	22.2	22.2
Norway	–	–	–	–	–	–	–	–	–	–
Portugal	–	–	–	–	–	–	–	–	–	–
Spain	35.0	55.0	55.0	90.0	40.0	25.0	40.0	50.0	15.0	30.0
Sweden	55.6	77.8	75.0	77.8	55.6	33.3	12.5	62.5	25.0	77.8
Switzerland	55.6	33.3	22.2	66.7	11.1	11.1	22.2	12.5	0.0	22.2
United Kingdom	17.6	27.3	30.3	82.4	17.6	6.1	11.8	6.5	15.2	28.1
other countries	29.4	56.3	70.6	70.6	41.2	35.3	41.2	35.3	37.5	43.8
All countries	**31.5**	**52.5**	**53.6**	**80.8**	**30.9**	**21.3**	**36.0**	**29.6**	**27.4**	**38.7**

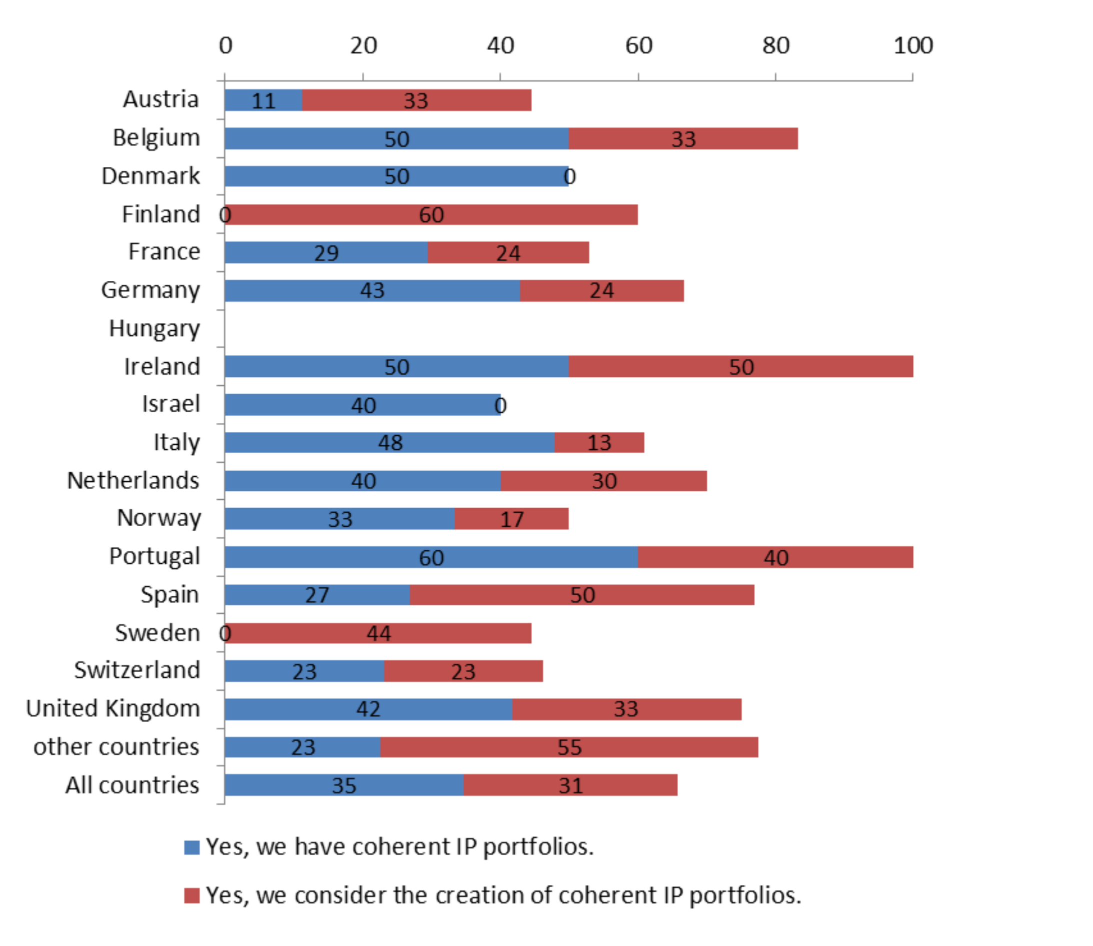
Table 6-11: Services and activities not regularly provided by country (in %)

	Identifying funding sources	Evaluating the technical merit of disclosed inventions	Evaluating the commercial potential of disclosed inventions	Drafting patent applications	Managing licence and similar contracts	Managing research contracts	Marketing or advertising the institution's intellectual property	Acting as a broker between companies and scientists	Selecting start-up companies	Supporting start-up companies or academic entrepreneurs
Austria	14.3	0.0	0.0	14.3	0.0	0.0	14.3	14.3	28.6	28.6
Belgium	–	0.0	0.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0
Denmark	12.5	12.5	12.5	12.5	0.0	0.0	14.3	28.6	50.0	37.5
Finland	–	–	–	–	–	–	–	–	–	–
France	6.1	6.1	18.8	9.1	12.5	0.0	30.3	25.0	19.4	15.6
Germany	6.3	2.3	4.4	11.1	8.7	6.4	10.9	4.3	24.4	15.2
Hungary	–	–	–	–	–	–	–	–	–	–
Ireland	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0
Israel	–	–	–	–	–	–	–	–	–	–
Italy	0.0	21.4	31.3	11.8	23.1	0.0	21.4	30.8	7.7	0.0
The Netherlands	11.1	11.1	0.0	0.0	0.0	11.1	0.0	11.1	11.1	0.0
Norway	–	–	–	–	–	–	–	–	–	–
Portugal	–	–	–	–	–	–	–	–	–	–
Spain	5.0	20.0	15.0	5.0	5.0	5.0	10.0	15.0	36.8	21.1
Sweden	0.0	11.1	12.5	11.1	22.2	33.3	62.5	37.5	37.5	11.1
Switzerland	11.1	22.2	22.2	33.3	22.2	11.1	22.2	50.0	66.7	44.4
United Kingdom	2.9	21.2	15.2	11.8	12.1	24.2	14.7	12.9	18.8	9.7
other countries	5.9	6.3	5.9	5.9	5.9	6.3	12.5	5.9	31.3	20.0
All countries	**5.5**	**10.4**	**12.1**	**11.4**	**10.3**	**8.5**	**16.8**	**16.3**	**24.8**	**15.0**

Table 6-12: Issues included in the IP policy by country (N=304, in %)

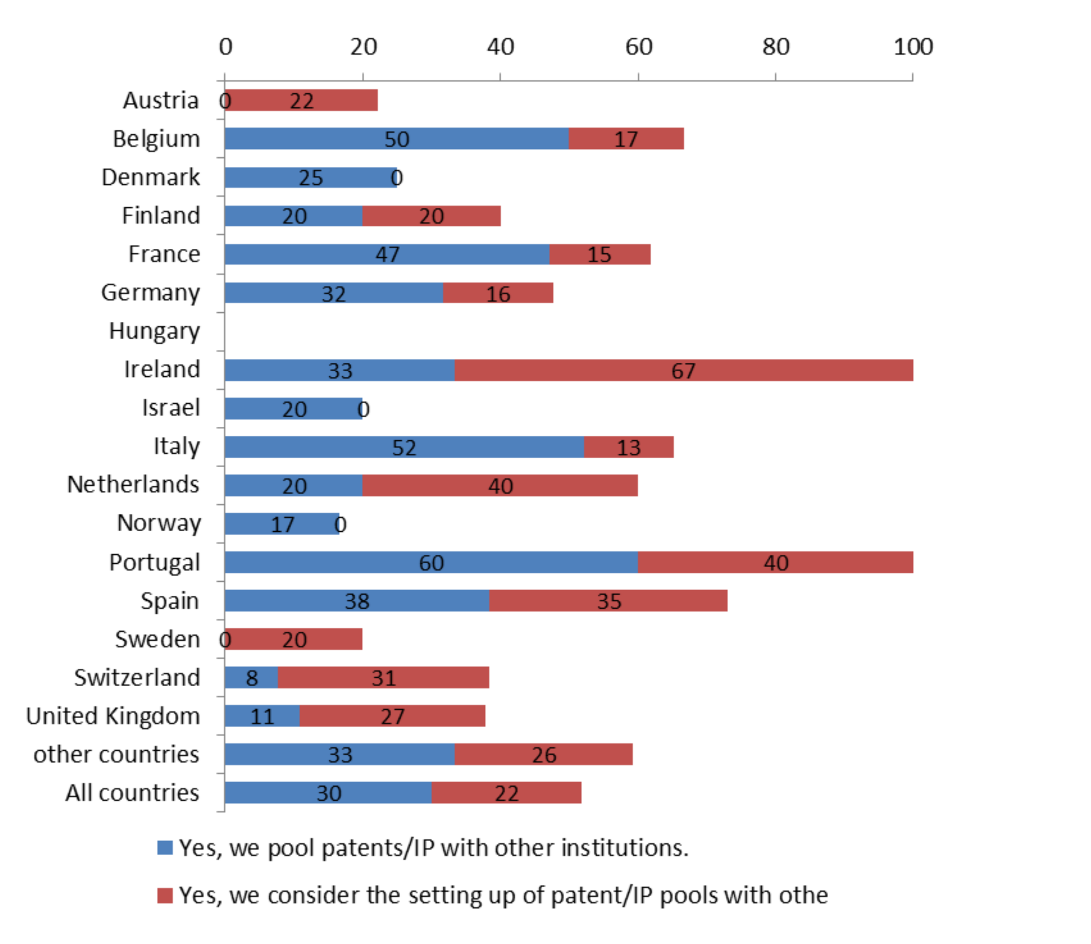
	Disclosure of inventions		Ownership of IP		Management of conflicts of interest		Engagement with third parties		Keeping of records	
	Emp	Stud	Emp	Stud	Emp	Stud	Emp	Stud	Emp	Stud
Austria	89	22	89	33	33	0	67	22	44	22
Belgium	100	33	100	50	67	33	100	33	83	33
Denmark	100	25	100	38	63	38	75	25	63	25
Finland	80	20	100	20	40	20	60	0	40	20
France	61	28	66	22	24	8	63	22	55	19
Germany	82	37	86	38	35	16	74	35	35	16
Hungary	80	–	80	–	20	–	60	–	40	–
Ireland	100	50	100	67	80	0	80	33	90	50
Israel	100	80	100	80	83	40	83	20	33	0
Italy	63	33	79	38	50	13	63	25	29	4
Netherlands	90	60	90	50	70	50	100	30	50	40
Norway	100	67	100	67	33	0	33	0	33	0
Portugal	100	100	100	100	100	100	100	100	60	80
Spain	86	30	89	33	46	7	79	19	21	7
Sweden	60	50	80	70	20	10	50	10	30	10
Switzerland	62	38	100	54	62	23	92	31	38	15
United Kingdom	86	61	93	79	77	42	84	55	70	42
other countries	68	39	68	43	46	18	54	18	32	18
All countries	79	41	85	47	49	20	73	30	45	21

Exhibit 6-7: Use of IP portfolios (in %, N=295)



Note: Difference to 100% is the answer "No, we do not use IP portfolios".

Exhibit 6-8: Use of IP/patent pools (in %, N=297)



Note: Difference to 100% is the answer "No, we do not use IP/patent pools".

Table 6-13: Share of revenues from IP and knowledge transfer by beneficiary and country (% of the total revenue allocated to the beneficiary, N= 242)

	N	Inventor(s), researcher(s)	Department(s), institute(s) or other institutional units	Institution	KTO or other intermediary	Other beneficiaries	Total[a]
Austria	9	38.1	23.1	17.4	19.1	2.2	100.0
Belgium	4-5	23.7	40.3	29.1	–	5.0	98.0
Denmark	8	25.3	25.0	49.8	0.0	0.0	100.0
Finland	2-5	46.0	20.0	30.0	–	0.0	96.0
France	26	42.1	15.6	29.7	12.6	0.6	100.5
Germany	47	29.3	16.1	42.5	4.6	8.0	100.6
Hungary	4	–	–	–	–	–	–
Ireland	10	47.8	25.3	18.0	11.0	0.0	102.2
Israel	6	43.7	6.7	29.0	24.8	0.0	104.1
Italy	13	47.3	9.6	39.6	4.5	0.0	101.0

The Netherlands	9	25.4	43.7	20.7	10.2	0.0	100.0
Norway	5	33.3	24.9	15.1	26.7	0.0	100.0
Portugal	5	63.0	6.0	29.0	2.0	0.0	100.0
Spain	25	47.6	15.2	32.6	4.3	0.9	100.7
Sweden	7	90.0	0.0	0.0	0.0	10.0	100.0
Switzerland	11	27.6	32.7	32.7	10.9	0.0	104.0
United Kingdom	28	45.8	20.0	29.3	5.6	0.0	100.8
other countries	19	41.8	17.7	35.4	3.9	1.3	100.0
All countries	242	40.7	18.8	31.6	7.6	2.3	101.0

a The difference to 100 in some countries results from a lower number of responses on the shares of KTOs and other transfer intermediaries, as this question was only asked in 2012 and not from all PROs responses could be obtained.

Table 6-14: Important or very important objectives for IP and exploitation policies of PROs by country (in %, N=216)

	N	Generating income for institution	Generating possibilities for collaboration	Broadening the job market for our students	Raising the profile, getting publicity	Attracting and retaining faculty	Promoting entrepreneurship	Supporting our (private) partners	Contributing to economic growth	Diffusion of scien-tific knowledge & technology	Meeting requirements of funding bodies
Austria	5	60	100	40	80	40	60	60	80	100	80
Belgium	4	–	–	–	–	–	–	–	–	–	–
Denmark	5	80	100	40	60	60	80	40	80	40	0
Finland	2	–	–	–	–	–	–	–	–	–	–
France	33	70	91	67	67	63	73	47	72	85	36
Germany	39	64	87	35	71	59	66	37	61	89	58
Hungary	2	–	–	–	–	–	–	–	–	–	–
Ireland	6	50	100	100	100	83	100	83	100	100	100
Israel	3	–	–	–	–	–	–	–	–	–	–
Italy	17	71	94	71	76	71	88	29	76	88	59
Netherlands	9	78	100	44	100	56	78	44	89	100	56
Norway	4	–	–	–	–	–	–	–	–	–	–
Portugal	5	40	80	100	80	100	100	60	100	100	40
Spain	20	85	95	61	85	53	80	53	80	100	80
Sweden	7	14	100	100	100	86	100	86	86	100	86
Switzerland	6	67	100	67	83	83	50	67	83	100	83
United Kingdom	33	79	97	74	88	63	74	47	85	90	81
other countries	16	88	100	69	88	75	75	50	81	100	75
All countries	212	71	94	61	79	63	76	49	78	91	66

Table 6-15: Licence/IP transfer practice of PROs by country (arithmetic means, see note below)

	N	European - Non-European partner	National - Foreign partner	Local/regional - More distant partner	Early stage - Ready for practical use	Transfer/assignment of IP - License for IP	Exclusive - Non-exclusive licence	Limited - Unlimited fields of use	restricted – unrestricted area	Limited - Unlimited time period
Austria	8	-1.6	-0.9	-0.1	-1.4	0.1	-0.8	0.3	0.1	0.5
Belgium	6	-2.0	-1.5	-0.8	-	0.3	-1.3	-1.3	-0.7	-1.0
Denmark	7	-1.0	-0.7	-0.1	-	1.0	-0.1	0.0	2.0	0.0
Finland	5	-2.0	-1.4	-0.6	-	-1.8	-1.2	-1.2	0.4	-0.2
France	27	-1.3	-1.8	-0.6	-1.0	0.7	-0.5	-1.3	0.2	-1.2
Germany	56	-1.6	-1.5	0.0	-0.9	0.7	-1.0	0.0	1.2	0.7
Hungary	4	-	-	-	-	-	-	-	-	-
Ireland	6	-1.2	-2.2	-1.5	-	-	-1.8	-1.3	1.4	-0.2
Israel	3	-	-	-	-	-	-	-	-	-
Italy	12	-1.0	-1.6	-1.2	-1.6	0.1	-0.8	-0.1	-0.5	-0.8
Netherlands	10	-1.1	0.1	1.0	-2.1	0.6	-0.5	-1.2	1.5	-1.3
Norway	4	-	-	-	-	-	-	-	-	-
Portugal	5	-0.8	-0.6	-0.8	-0.6	1.6	-0.8	0.4	0.2	0.6
Spain	25	-1.6	-2.0	-1.0	-1.2	1.4	-0.9	0.1	0.9	-0.7
Sweden	4	-	-1.6	-0.4	-	-1.2	-	-	-	-
Switzerland	11	-0.4	-1.7	-1.2	-0.4	0.8	-0.4	-1.0	1.3	-0.4
United Kingdom	28	-0.7	-1.2	-0.3	-1.2	1.3	-0.2	-0.6	1.0	-0.2
other countries	19	-1.7	-1.3	-1.2	-1.3	0.4	-0.8	-0.3	0.9	-0.1
All countries	240	-1.3	-1.5	-0.5	-1.1	0.7	-0.8	-0.4	0.8	-0.2

Note: Average rating according to commonness of practice, maximum values are:
European partner -3, Non-European partner 3
National partner -3, Foreign partner 3
Local/regional partner -3, More distant partner 3
Early stage -3, Ready for practical use 3
Transfer/assignment of IP -3, License for IP 3
Exclusive license -3, Non-exclusive license 3
Limited fields of use -3, Unlimited fields of use 3
Geographically restricted use -3, Geographically unrestricted area 3
Limited time period -3, Unlimited time period 3.

Table 6-16: PROs monitoring information regularly by country (in %)

	Austria	Belgium	Denmark	Finland	France	Germany	Hungary	Ireland	Israel	Italy	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	United Kingdom	other countries	Total
Changes among research personnel, new appointments at the institution	38	50	50	60	50	48	40	50	33	48	60	33	60	48	22	73	59	67	51
Scientific competences of the institution	25	83	63	20	29	30	20	50	0	43	40	50	40	24	33	45	49	50	38
Research projects	50	100	50	40	65	37	20	60	33	39	40	33	20	52	44	64	49	63	48
Research results and inventions	50	67	50	20	53	44	20	60	50	26	30	50	60	52	56	27	41	33	43
Research instruments and equipment (newly purchased, available for external users etc.)	63	67	75	60	38	51	60	50	50	70	60	33	40	32	22	55	63	58	52
Patents or other property rights applied for or granted	63	67	63	100	62	52	40	50	67	35	40	83	20	36	33	82	76	50	56
Licenses issued or IP transferred	88	83	75	100	62	73	60	30	83	61	40	83	60	64	33	100	78	67	69
Start-ups	63	67	38	80	41	40	40	20	50	26	0	67	40	40	78	27	51	58	43
None of the above	0	0	25	0	21	11	40	10	0	13	0	0	20	11	10	15	2	4	10

Table 6-17: PROs monitoring and publishing information regularly by country (in %)

	Austria	Belgium	Denmark	Finland	France	Germany	Hungary	Ireland	Israel	Italy	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	United Kingdom	other countries	Total
Changes among research personnel, new appointments at the institution	38	33	38	40	29	38	40	20	50	39	30	0	20	24	56	27	29	25	32
Scientific competences of the institution	50	0	25	60	56	56	80	50	67	57	60	0	60	60	56	55	39	42	50
Research projects	50	0	50	60	29	57	80	40	50	52	50	17	80	32	56	36	49	38	45
Research results and inventions	38	33	38	80	38	46	80	40	50	70	70	17	40	44	22	64	41	58	47
Research instruments and equipment (newly purchased, available for external users etc.)	13	33	13	20	35	24	40	10	33	22	10	0	0	36	33	18	20	29	24
Patents or other property rights applied for or granted	38	33	25	0	24	40	60	50	33	61	50	0	80	64	22	9	17	42	36
Licenses issued or IP transferred	13	17	13	0	24	16	40	70	17	35	50	0	40	32	11	0	15	29	23
Start-ups	25	33	38	0	38	52	20	80	17	74	90	17	60	52	11	55	37	21	44
None of the above	25	50	38	20	24	19	0	20	33	8	0	67	0	22	30	15	43	29	24

Table 6-18: Agreement with statements on rules and practices by type of research and country (arithmetic mean of rating from 1=strongly agree to 5=strongly disagree)

	We accept delays of publication to facilitate IP protection.		We insist on the public dissemination of the R&D results.		We keep IP rights for further internal research.		We keep IP rights for further research cooperation with third parties.		We aim to maximise the socio-economic impact of the research.		We aim to maximise the commercial impact of the research.	
	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract
Austria	1.9	1.7	2.6	3.3	1.4	2.1	2.9	3.6	2.4	2.4	2.5	1.7
Belgium	1.3	1.3	2.2	2.7	1.7	2.0	2.2	3.0	1.5	1.8	2.3	1.8
Denmark	2.5	1.7	1.9	3.0	2.3	2.5	2.3	3.0	1.8	2.6	3.3	2.3
Finland	2.6	2.4	2.6	3.4	1.2	2.0	2.2	3.2	1.6	2.8	2.4	2.2
France	1.9	1.9	2.3	2.4	2.1	2.2	2.7	2.7	2.1	2.1	2.6	2.2
Germany	2.2	2.1	2.5	2.7	2.2	2.1	2.4	2.7	2.6	2.9	2.6	2.5
Hungary	–	–	–	–	–	–	–	–	–	–	–	–
Ireland	1.7	1.2	2.3	2.7	1.0	2.2	2.2	3.3	2.2	2.8	2.7	2.2
Israel	–	2.0	–	2.8	–	2.8	–	2.4	–	2.6	–	2.2
Italy	2.2	2.0	2.1	2.3	2.2	2.1	2.6	2.4	1.5	2.1	2.3	2.3
Netherlands	2.1	1.9	1.9	2.7	1.5	2.6	2.2	3.1	1.9	2.2	2.0	1.9
Norway	2.0	1.8	1.8	2.6	1.8	2.6	2.7	3.2	2.2	2.8	2.2	2.8
Portugal	1.8	1.6	2.4	2.8	1.8	1.4	2.2	2.4	1.8	2.2	2.0	1.2
Spain	1.6	1.6	2.4	2.4	2.1	2.2	2.7	2.8	1.8	2.0	2.2	2.2
Sweden	2.2	2.0	2.1	2.5	3.0	3.3	3.0	3.2	2.2	2.3	2.4	3.2
Switzerland	1.6	1.8	2.0	2.5	2.1	2.0	2.5	2.9	1.6	2.2	3.3	2.5
UK	2.1	1.9	2.5	2.8	1.8	2.2	2.4	2.9	1.8	2.3	1.8	2.2
other countries	2.2	2.1	2.5	2.8	2.4	2.3	2.5	2.6	2.2	2.3	2.0	2.4
Total	2.0	1.9	2.4	2.7	2.1	2.2	2.5	2.8	2.1	2.4	2.4	2.3

Collab. = for collaborative research projects, Contract = for contract research projects.

Table 6-19: Agreement with statements on general position of the PRO with regard to foreground IP by type of research and country (arithmetic mean of rating from -2 = We own it. to 2 = We do not own it.)

	We own / do not own it.		We reserve / do not reserve access rights to it for our org.		We grant / do not grant access rights to the research partner(s) for research.		We grant/do not grant access rights to the research partner(s) for exploitation.		We receive / do not receive cost covering compensation.		We participate / do not participate in the revenues generated by it.	
	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract
Austria	-1.0	0.4	-1.1	-0.9	-1.4	-0.7	-0.6	-0.4	-0.4	-1.6	-0.9	-0.4
Belgium	-0.5	-0.2	-1.2	-1.2	-1.2	-1.3	-0.8	-0.7	-0.8	-0.7	-0.7	-0.2
Denmark	-0.5	0.1	-1.4	-0.4	-1.4	-0.4	-0.1	0.3	-0.4	-1.1	-0.3	0.6
Finland	-0.6	1.0	-1.4	-0.8	-1.4	0.2	-0.2	-0.6	-0.8	-1.6	-0.2	0.6
France	-0.4	0.1	-0.9	-1.0	-0.8	-0.6	-0.7	-0.4	-0.8	-0.8	-0.3	0.1
Germany	-0.6	0.0	-1.3	-1.0	-1.2	-0.9	-0.6	-0.6	-0.6	-0.7	-0.8	-0.3
Hungary	–	–	–	–	–	–	–	–	–	–	–	–
Ireland	-1.0	1.5	-1.3	0.3	-1.3	-0.8	-0.7	-0.7	-0.5	-1.0	-0.3	0.7
Israel	–	-0.6	–	-0.4	–	-0.8	–	-0.6	–	-0.6	–	-1.0
Italy	-0.1	0.3	-0.6	-0.4	-0.7	-0.1	-0.2	0.1	0.1	-0.1	-0.1	0.0
Netherlands	-0.7	0.7	-1.8	-1.4	-1.5	-1.2	-0.5	-1.4	-0.8	-1.3	-1.0	-0.3
Norway	-0.3	0.6	-1.0	-0.4	-1.2	-1.4	-0.3	-1.4	-0.7	-1.2	0.0	0.8
Portugal	-0.2	0.6	-0.8	-1.2	-0.2	0.6	-0.4	0.6	-0.4	-0.4	-0.2	-0.4
Spain	-0.2	0.6	-1.1	-0.6	-1.0	-1.2	-0.4	-0.3	-0.2	-0.6	-0.6	0.4
Sweden	1.0	1.3	0.2	0.2	-1.2	-0.2	-0.3	-0.2	0.2	-0.7	0.7	0.8
Switzerland	0.2	0.2	-1.1	-0.4	-1.6	-1.3	-1.3	-0.8	-0.3	-0.6	-0.5	0.0
UK	-0.4	0.7	-1.4	-1.0	-1.1	-1.2	-0.6	-1.0	-0.6	-1.0	-0.7	0.0
other countries	-0.3	0.2	-1.0	-0.8	-1.0	-0.5	-0.2	-0.1	-0.2	-0.5	-0.5	-0.2
Total	-0.4	0.4	-1.1	-0.8	-1.1	-0.8	-0.5	-0.5	-0.5	-0.8	-0.5	0.0

Collab. = for collaborative research projects, Contract = for contract research projects.

Table 6-20: Agreement with statements on general position of the PRO with regard to background IP by type of research and country (arithmetic mean of rating from -2 = We transfer ownership … to 2 = We do not transfer ownership …)

	We transfer / do not transfer ownership to the research partner(s).		We grant / do not grant access rights to the research partner(s) for research.		We grant/do not grant access rights to the research partner(s) for exploitation.		We receive / do not receive cost covering compensation.		We participate / do not participate in the revenues generated by it.	
	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract	Collab.	Contract
Austria	1.6	1.4	-1.4	-0.3	0.9	0.6	-0.4	-1.0	-0.5	-0.4
Belgium	1.7	1.5	-0.8	-1.2	-0.3	-0.2	-0.8	-0.2	-1.3	-0.3
Denmark	1.8	1.6	-1.1	-0.4	1.0	1.6	-0.4	-0.1	-0.1	0.3
Finland	1.6	0.8	-1.2	-1.6	1.4	-0.8	0.8	-0.4	0.8	0.4
France	1.2	1.1	-0.9	-0.6	-0.3	-0.2	-0.8	-0.7	-0.5	-0.2
Germany	1.0	0.8	-1.1	-1.1	-0.3	-0.4	-0.5	-0.6	-0.8	-0.7
Hungary	–	–	–	–	–	–	–	–	–	–
Ireland	1.3	2.0	-2.0	-1.0	-0.8	-0.3	-0.8	-0.8	-1.3	-0.5
Israel	–	–	–	–	–	–	–	–	–	–
Italy	1.1	0.6	-0.2	-0.1	0.4	0.3	0.4	0.0	-0.1	0.0
Netherlands	1.2	1.1	-1.4	-1.3	0.8	-0.7	0.0	-1.0	-0.7	-0.9
Norway	1.2	1.2	-1.2	-0.4	0.3	-0.4	-0.7	-0.4	0.0	0.6
Portugal	1.0	1.4	-0.6	-0.6	0.4	0.2	-0.4	-0.6	-0.4	-0.8
Spain	1.0	1.3	-0.7	-0.8	0.0	0.0	0.0	-0.1	-0.4	-0.2
Sweden	1.0	1.3	-0.7	-0.2	-0.3	-0.3	0.5	0.2	1.0	1.3
Switzerland	0.6	0.9	-1.3	-0.7	-1.0	-0.8	-0.2	-0.5	-0.8	-0.3
UK	1.3	1.3	-1.2	-1.3	-0.4	-0.9	-0.5	-0.5	-1.0	-0.6
other countries	1.0	1.0	-0.8	-0.4	0.5	0.5	0.2	-0.1	-0.7	-0.2
Total	1.1	1.1	-1.0	-0.8	0.0	-0.2	-0.3	-0.4	-0.6	-0.3

Collab. = for collaborative research projects, Contract = for contract research projects.

Table 6-21: Degree of use of CoP principles

CoP item and issue	CoP implemented	Practice opposed to CoP	Plans
CoP 1: Existence and publication of IP policy	IP policy exists already in 4 out of 5 PROs	Low level of publica-tion	Introduction plan-ned in 10% of PROs
CoP 2: IP policy provides clear rules for staff and students	Realised mostly for staff, less for students	Conflict management and record keeping uncommon	[NR]
CoP 3: Promoting identification, protection and exploitation of IP	[see CoP 7]	[see CoP 7]	[NR]
CoP 4: Providing incentives to staff to implement the IP policy	Exist in all PROs	Financial incentives dominate over effect on career progression	Future inclusion in career decisi-ons planned in 1 out of 10 PROs
CoP 5: Creation of coherent IP portfolios and patent/IP pools	[NR]	Low implementation levels: pools 28%, portfolios 32%	Introduction planned by 29% (portfolios) and 20% (pools)
CoP 6: Raising IP and KTT awareness and skills through training actions	70% provide entrepreneurial training for students	Only 51% provide training for staff	[NR]
CoP 7: Existence and publication of publication/ dissemination policy	Publication delays by 3 out of 4 PROs accepted	Open access is of low importance for transfers via KTOs	[NR]
CoP 8: Used set of exploitation mechanisms and partners	Transfer to existing companies most important, start-ups secondary	[NR]	[NR]
CoP 9: Revenues not prime objective of IP/KT policies	Generating possi-bilities for collabo-ration and promoting the diffusion of knowledge are prime objectives.	Generating revenues is moderately important (rank 6 out of 10)	[NR]
CoP 10: Professionalization of knowledge transfer ser-vices	Core services provided internally, external support sought for selected tasks; qualified staff available	[NR]	[NR]
CoP 11: Existence and publication of licensing policy	[NR]	Low levels of exist-ence and publication, exclusive licences and IP transfers are important	One fifth plans introduction of licensing policy

CoP item and issue	CoP implemented	Practice opposed to CoP	Plans
CoP 12: Existence and publication of spin-off policy	6 out of 10 PROs have a start-up policy	Low level of publication	One fifth plans introduction of start-up policy
CoP 13: Sharing of KTT returns between organisation, department and researcher	Sharing models in 2 out of 3 PROs	PRO departments don't participate in 36%	[NR]
CoP 14: Monitoring and publication of IP, KTT and research activities	High monitoring of IP, KTT and research activities	Low publication of IP, KTT and research activities	[NR]
CoP 15: Compatible rules and practices for collaborative and contract R&D	Rules and pract-ices take type of research and ob-jectives of part-ners into account	Low levels of public dissemination and keeping of IP rights	[NR]
CoP 16: Early clarification of IP issues	Usually clarified in advance	Sharing of revenues negotiated in 35-40% of PROs after project start	[NR]
CoP 17: Ownership of IP in collaborative and contract R&D	Background is usually unaffected	Foreground in contract research usually owned by 25% of the PROs	[NR]
CoP 18: Access rights to IP	Access rights usu-ally clarified early on and granted	[NR]	[NR]

[NR] No results

Table 6-22: Backlog of implementation of CoP principles by groups of PROs

CoP item and issue	Location of PRO	PRO type and size	KTO size and age
CoP 1: Existence and publication of IP policy	Less existent/ published in Western and Eastern Europe	Less existent/ published in smaller PROs	Less existent/ published among older and smaller KTOs
CoP 2: IP policy provides clear rules for staff and students	Less elaborate IP policy in Eastern and Southern Europe/countries with low R&D-density	More elaborate in larger PROs	More elaborate in larger KTOs
CoP 3: Promoting identification, protection and exploitation of IP	[NR]	[NR]	[NR]
CoP 4: Providing incentives to staff to implement the IP policy	Less financial incentives in countries with low R&D-density	Sharing revenues with inventors is more common in larger PROs.	More incentives in larger KTOs, but smaller KTOs are catching up
CoP 5: Creation of coherent IP portfolios and	[NR]	Less common in small PROs	Less common in small KTOs

CoP item and issue	Location of PRO	PRO type and size	KTO size and age
patent/IP pools			
CoP 6: Raising IP and KTT awareness and skills through training actions	Entrepreneurial training for staff & students less common among non-EU members	Entrepreneurial training less common in other PROs and small PROs (see also CoP 10)	Entrepreneurial training less common in younger and smaller KTOs (see also CoP 10)
CoP 7: Existence and publication of publication/ dissemination policy	[NR]	[NR]	[NR]
CoP 8: Used set of exploitation mechanisms and partners	[NR]	Start-ups more common among larger PROs and universities with hospitals; IP assignments more often in smaller PROs	Start-ups less common and IP assignments more common among smaller KTOs
CoP 9: Revenues not prime objective of IP/KT policies	[NR]	Non-university PROs place less importance on objectives related to students and faculty	[NR]
CoP 10: Professionalization of knowledge transfer services	[NR]	Smaller PROs resort more often to services provided externally and they have a smaller variety of technically qualified staff.	Smaller KTOs use more often services provided externally and they have a smaller variety of technically qualified staff
CoP 11: Existence and publication of licensing policy	[NR]	Exclusive licences most common in universities with hospitals, IP transfers in universities	Young and small KTOs make more use of IP transfers
CoP 12: Existence and publication of spin-off policy	[NR]	Less common in small PROs	Less common in small KTOs
CoP 13: Sharing of KTT returns between organisation, department and researcher	Sharing models less common in countries with low R&D-density	[NR]	Sharing models less common among small KTOs
CoP 14: Monitoring and publication of IP, KTT and research activities	PROs in Western Europe rely less often on personal communication and more on print/electronic media	[NR]	[NR]
CoP 15: Compatible rules and practices for collaborative and contract	[NR]	[NR]	[NR]

CoP item and issue	Location of PRO	PRO type and size	KTO size and age
R&D			
CoP 16: Early clarification of IP issues	[NR]	[NR]	[NR]
CoP 17: Ownership of IP in collaborative and contract R&D	[NR]	[NR]	[NR]
CoP 18: Access rights to IP	[NR]	[NR]	[NR]

[NR] No results

Exhibit 6-9: Semi-structured interview guide: used for the PRO interviews

Knowledge Transfer Study 2010-12

Interview with: «u_title» «Contact_1__Name»

At institution: according to survey: «Institution_survey»
according to address data: «UNIVERSITYINSTITUTION»

Position: «Contact_1__job_description»

Contact telephone as in database: «Contact_1__phone_»

Online survey: «u_wave» wave

Date: <date of interview>

Duration: <time in minutes>

Mode: <mode>

Interviewers: <name of interviewer>

Introduction

Interviewer introduces the interview with statements covering the following issues:]

The interviews provide information for the Knowledge Transfer Study 2010-12 conducted for the European Commission, DG Research & Innovation. The study was commissioned to ***monitor Intellectual Property management and knowledge transfer activities in European universities and other public research organisations***.

We need this interview to add some context to your institution's responses in the written surveys conducted within this project (if interviewee asks for surveys, mention the European Knowledge Transfer Indicators Surveys EKTIS conducted by MERIT and the Code of Practice Surveys conducted by FHNW in 2011 and 2012).

The expected duration of the interview is ***20 to 30 min.*** You can stop or interrupt the interview at any time or decide not to answer specific questions. Your response will be treated as ***fully confidential*** and all persons outside the core project team will only get access to aggregated data (including the European Commission). Can we ***record the interview*** in order to collect and understand your responses to full extent?

Thank you. Do you have any ***questions*** before we start the interview?

Then we could start.

Key questions which should be asked even under time constraints are grey shaded.

Please answer all questions for the following institution:
1st choice: **«Institution_survey»**
2nd choice (if 1st choice is empty): **«UNIVERSITYINSTITUTION»**

Module A: Knowledge Transfer Office (KTO) and its activities

First, I'd like to ask a few questions on your knowledge and technology transfer office.

1. **«u_wave»«question_instruction»**
   How is the organizational relationship between your knowledge and technology transfer office and the institution for which it works? (Included in the 2012 questionnaire draft and only to be asked to respondents of the 2011 pilot survey.)

   - ☐ The office is part of the institution's administration.
   - ☐ The office is (part of) a separate non-profit organization outside the institution.
   - ☐ The office is (part of) a private for-profit organization mandated by the institution.
   - ☐ Other, please describe:

2. **Would you describe KTT activities of the «Institution_survey» or «UNIVERSITYINSTITUTION» as rather centralised or decentralised?**
   (**Centralised:** one set of rules and regulations throughout the institution, one or few offices that are responsible for all activities, central KTT staff;
   Decentralised: different sets of rules and regulations throughout the institution, several offices that are responsible for all activities, KTT staff in faculties or departments)

3. **What does your institution do to raise the awareness of staff and students of IP and knowledge transfer regulations and services in your institution?**
   (Probes: newsletter, presentations, courses, frequent visits)

4. **«u_wave»«question_instruction»**
   Is your office entitled to a share of the revenues resulting from the exploitation of intellectual property? (Included in the 2012 questionnaire draft and only to be asked to respondents of the 2011 pilot survey.)

5. **Are other offices inside or outside of the institution responsible for knowledge and technology transfer services in the widest sense?**

   ☐ Yes ☐ No

   ➔ **Filter on yes**

   6. **How is the responsibility divided between your office and these other offices?**
      (Probes: by department/institute, by geography/location, by task)

7. **Does your institution collaborate with other universities or public research institutions in the area of IP management or knowledge transfer?**
   If yes: In which activities?
   (Probes: patenting and other IP protection, licensing out IP, start-up support)

8. According to our online survey you answered the question:

   Does the «Institution_survey» (or «UNIVERSITYINSTITUTION») work with IP/patent pools with other research institutions?

   as follows:

   «Patent_Pool_txt»

   What are the advantages of pooling/not pooling its intellectual property/patents with other institutions? What are the disadvantages?

9. **Is there any central office, committee or person that monitors and controls the activities of the different offices? Where are the key operational decisions on IP and knowledge transfer issues being made?**
   (Key operational decisions are for instance: whether patenting proceedings are started, who the partner in a transfer project is, whether a start-up is being supported institutionally)

Module B: Goals of Intellectual Property (IP) management and Knowledge and Technology Transfer (KTT)

The second part of the interview deals with the goals of intellectual property management and knowledge transfer at your institution.

10. Excellence in research and transferring knowledge and technology to practical uses are considered as **different missions** of higher education/public research institutions.

    Which one would you consider as more important at your institution, excellence in research or transferring knowledge and technology?

    How would you describe the relationship between research excellence and KTT at your institution?
    (Probes: conflicting, mutually reinforcing, no relationship)

11. You selected in the written questionnaire the following as three most important objectives for the IP and exploitation policies of the «Institution_survey» (or «UNIVERSITYINSTITUTION»):

Rating: 2011: 0= not important, 1 = very important 2012: 1 = very important, 2 = important, 3 = somewhat important, 4 = unimportant **«u_wave» applies in this particular case**	
Rating	Objective
«Revenues»	Generating revenues for our institution
«collaboration»	Generating possibilities for collaboration in research and teaching for our faculty
«Student_qualification»	Broadening the job market for our students
«Profile»	Raising the profile, getting publicity for our institution
«Attract_faculty»	Attracting and retaining faculty
«Entrepreneurship»	Promoting entrepreneurship among employees/students
«Support_to_partners»	Supporting our (private) partners
«Economic_growth»	Contributing to economic growth
«Knowledge_diffusion»	Promoting the diffusion of scientific knowledge and technology
«Funding_requirement»	Requirements of funding organisations

Who decides about the objectives of the knowledge transfer activities at your institution?
(Probes: your office, the governing bodies of the institution, the faculty, the funders of the institution, others)?
Only if the first answer was very important:

Why are revenues such an important objective?

Module D: Collaborative and Contract Research with Private Sector Partners

Further questions address research contracts and in particular the negotiations of these contracts.

12. Many companies in Europe complain that **negotiations** of research contracts and in particular of IP clauses with universities and other PRO have become longer and more complicated:
What would you tell them?
13. **What factors influence the duration of contract negotiations at your institution?**
How could the negotiations be speeded up?
14. **How does your office or the institution assess the commercial value of a research finding or invention? How would this assessment be done in an ideal situation?**
15. In our previous online survey «Institution_survey» (or «UNIVERSITYINSTITUTION») answered in regard to its licencing policy:

«Licence_policy_txt»

What are the advantages of
(select depending on answer above)

- **not having a licence policy**
- **not setting out in writing the licence policy**
- **(not) publishing the licence policy?**

What are the disadvantages?

Module E: Overall success

The final section of the interview refers to your institution's overall success in the area of KTT.

16. **Effective** knowledge and technology transfer means that knowledge or a technology are actually transferred to and used by the recipients.
Based on this definition, what are the main influences on effective knowledge and technology transfer at your institution?
17. **Efficient** knowledge and technology transfer means that your institution generates maximum returns on the resources available for KTT.
Based on this definition, what are the main influences on efficient knowledge and technology transfer at your institution?
18. **What should your institution itself change to become more effective and/or efficient?**

Exhibit 6-10: Code System for PRO interviews

Knowledge Transfer Study 2010-12

Code System for PRO interviews

Version 1 06/11/2013 16:49

General rules

1. Questions should not be included in the quotations, unless they are essential to understand the reply or they separate quotations with identical codes.
2. Quotations should separate between different arguments, thoughts, statements etc. and usually be at the level of sentences or paragraphs.
3. Entire sections can be coded if the code functions as a tag to describe the context of an argument, statement or the company as a whole and not as an analytical argument itself.

Level 2	Level 3	Comments, examples
Level 1: Stakeholders in KTT		
Internal KTO	SH_KTO_int	Internal agents of IP management and KTT at the PRO
External KTT agents	SH_KTO_ext	Other external agents and service providers of IP management and KTT for the PRO
PRO board and management	SH_board	Leaders, committees, management of the university or other PRO
Faculty	SH_faculty	Departments, institutes, scientists, inventors at the PRO
Company	SH_company	Companies or NPOs involved in research/transfer projects
Other	SH_other	Governments, industry associations, the general public and other stakeholders of universities and other PROs
Level 1: Issues related to the Knowledge Transfer Office KTO and other service providers at/for the PRO		
Centralisation of the office/KTT	KTO_central	Centralised: one set of rules and regulations throughout the institution, one or few offices that are responsible for all activities, central KTT staff;
	KTO_decentral	Decentralised: different sets of rules and regulations throughout the institution, several offices that are responsible for all activities, KTT staff in faculties or departments
Internal awareness raising activities	KTO_aware	measures to raise awareness among PRO staff for IP/KTT issues, e.g. newsletter, presentations, courses, frequent visits
Allocation of the revenues from IP/KTT	KTO_rev_share	allocation of the revenues on different stakeholders involved in KTT
Success measures	KTO_measure	any reference to measuring success of the KTO, IP/KTT activities of the PRO
Collaboration and distribution of responsibilities	KTO_div_labour	division of labour among agents involved in the IP/KTT service provision
	KTO_collaboration	Formal collaboration with other PROs in the area of IP/KTT (not general collaboration of the PRO in teaching or research!)
Level 1: PRO IPR and KTT policies and practices		
Institutional mission	PRO_mission	key mission of the institution (research or transfer)
	PRO_mission_relation	relationship between research and transfer at the institution
KTT objectives	PRO_objectives	objectives of KTT
	PRO_objectives_revenue	revenue as a core KTT objective
KTT strategy	PRO_strategy	issues related to the IP and KTT strategy of the institution, e.g. focus on start-ups, focus on IP/licensing, preference of research contracts)
KTT practice	PRO_practice	influences on effective and/or efficient KTT practice
KTT incentives	PRO_incentive	incentives for PRO staff to become involved in KTT activities

Level 2	Level 3	Comments, examples
Decision making on KTT issues	PRO_decision	allocation of decision-making power and controlling rights in regard to IPR/KTT in the PRO, influences on decision-making
Patents	PRO_patents	any referral to the institutional policy and practices in regard to patents, e.g. patenting decisions, realisation of applications
	PRO_patent_pools	issues related to patent/IP pools
Research	PRO_research	issues related to contract or collaborative research together with potential partners or clients from industry
Contract negotiations	PRO_negotiations_ model	model contracts in negotiations
	PRO_negotiations_ funding	role of funding in contract negotiations
	PRO_negotiations_ publish	finding agreements on publications in negotiations
	PRO_negotiations_ liability	issues related to liability and overall responsibility in regard to research outcomes, inventions, products
	PRO_negotiations_ ownership	issues related to ownership of IP
	PRO_negotiations_ access	issues related to access to IP, foreground (IP generated in the project) or background (IP existing at project start), exploitation or other rights to the IP
	PRO_negotiations_ compensation	compensation of inventors, researchers, departments in contract negotiations
	PRO_negotiations_ other	other issues in contract negotiations
Commercialisati on issues	PRO_commercial	issues related to commercialization, searching customers for technology, exploiting IPR, technology marketing
	PRO_licence	any referral to the institutional policy and practices in regard to licences, e.g. existence or publication of licence policy, transfer or licensing, exclusive/non-exclusive
	PRO_value	issues related to the commercial value of an invention or research finding, e.g. assessment method, agents
	PRO_start-up	issues related to start-ups
Level 1: Dynamics (changes, improvements, deteriorations)		
Time horizon of dynamics	dyn_past	changes in the past, completed
	dyn_present	changes in the present, ongoing
	dyn_future	changes in the future, not yet started but planned
Direction of dynamics	dyn_direction_positi ve	direction of change: improvement
	dyn_direction_nega tive	direction of change: change to the worse

Exhibit 6-11: Characteristics of the Institutions Interviewed

Number of KTO personnel	Number interviewed
up to 2	24
2.1 to 5	35
5.1 to 10	19
more than 10	20
Missing	2

Year KTO founded	Number interviewed
before 1990	12
1990-1999	23
2000-2004	24
2005 or later	37
Missing	4

No. of Research Personnel	Number interviewed
up to 499	21
500-1249	27
1250-2499	24
2500 or more	23
Missing	5

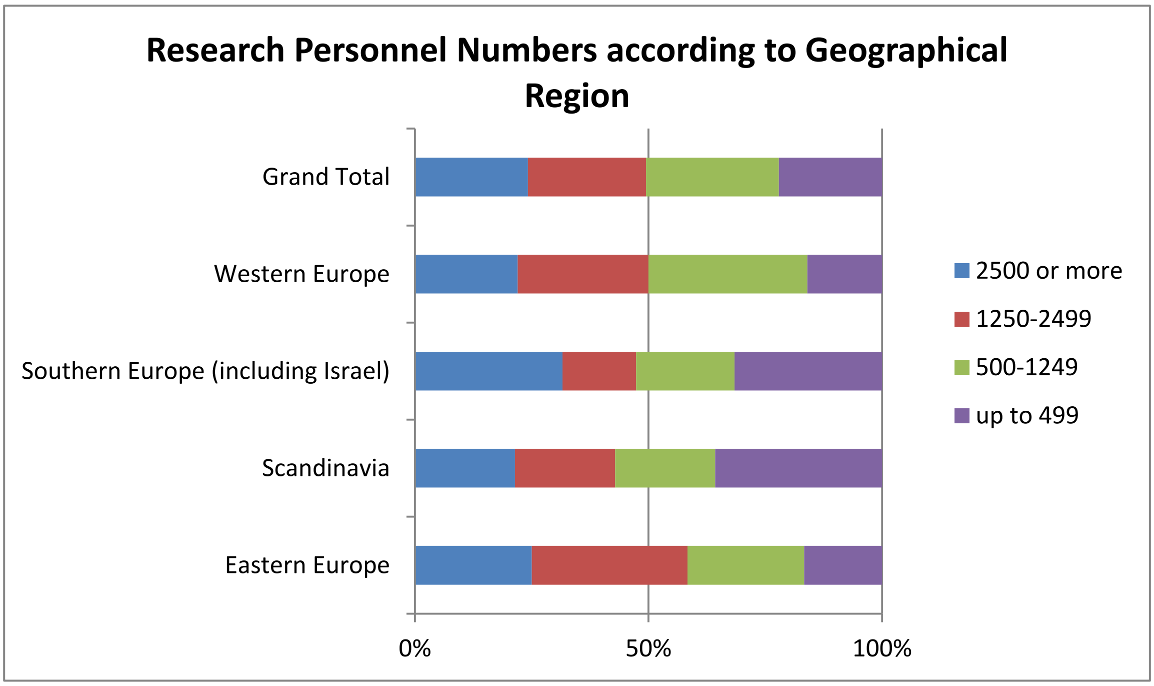


Table 6-23: Examples for policies and practices related to CoP principles (quotes from the interviews)

CoP	Quotes
Strong focus of transfer policies on revenues (CoP 9)	"One of the trends in the professionalization of the technology transfer offices is, that the incentive of the TTO is to get the maximum monetary value of the IP; if that is the case, you can have difficult and protracted discussions." (Interview BiotechPharma8) "There is the discussion how these new rules are implemented. […] The university wants to exploit the professors' inventions and considers this as a source of funding. This is the wrong approach, as according to the law, technology transfer should be promoted." (Interview AutoParts6, translation by the authors) "But universities are often measured on the licensing income and the number of patent applications and patents. This is not the key issue; the key issue is jobs and value. That message should also be passed to the European Commission including the programs and projects funded by the EC that we want to create value not patents." (Interview BiotechPharma3) "They ask us for fees as far as the foreground is concerned. This is a new attitude since one or two years. When I discussed with the legal department, they told me that as far as the foreground in European collaborative projects is concerned, we now experience with some specific universities some additional difficulties. The difficulties that we have with universities are that they have problems to understand the value of an asset. That means when we discuss with universities we have to explain to them that between idea and product there is a long way. And the cost to be paid by the industry to reach the final product is in no relation." (Interview Hardware12)
Professionalization of knowledge transfer services (CoP 10)	"The other thing is the professionalization of the technology transfer offices, which has also very significant positive effects. Rather than dealing with a small and inexperienced group, you are dealing with somebody who is doing hundreds of these transactions. The larger groups taking on responsibility for tech transfer for a region, for example, or some of the professional institutes like the EMBL that has a central office, they have the experience and understand the value, what the institute wants to get out of this and how it benefits by having success at the end of the road, that it is not a single transaction but a long term relationship…" (Interview Biotech Pharma8) "The second thing is that the people in these technology transfer offices are often not particularly competent. They may be lawyers […] with little technical and commercial knowledge. For them it is very hard to understand the perspectives of a particular technological or scientific discovery. And they want to be on the safe side, and it takes immense amounts of time to have these discussions, even if the issue itself may be relatively small." (Interview BiotechPharma3) "That is the big difference between the US and the EU. My colleague said that US universities have more knowledge about the value of the asset and what the asset can represent for my business. That means they have a better understanding of the relation between the value of the asset and the final product. It's clear that in Europe, especially in France, this is not the case." (Interview ST Hardware12)
Licensing policy (CoP 11)	"With us there are fewer product patents than methodological patents and for those an exclusive global licence or even non-exclusive licence might be sufficient and often times the more cost-

CoP	Quotes
	effective approach." (Interview BiotechPharma1) "This depends. If you are licensing a technology, then it is usually a non-exclusive licence. But exclusive for the use that you want to use it. And if it's a product, then it's an exclusive licence." (Interview BiotechPharma4) "We need IP for several reasons: first we want exclusivity for things that are core to us. But for anything that is enabling we wish to have at least a non-exclusive licence, so that we are not blocked by third parties. It is important to find early on a simple way without having protracted negotiations." (Interview BiotechPharma8) "One challenge which lets us hesitate when working with universities is that, when we license some of their technologies, we cannot be sure that our competitors don't come up with exactly the same technology. It has to do with not governing the technology and its use that lets us hesitate with this kind of in-licensing." (Interview Hardware9)
Monitoring and publication of IP, KTT and research activities (CoP 14)	"[I]t could be a little bit more pro-active. In the last two years I have never received any calls in this country or from surrounding countries. Being one of the leading [anon.] biotech companies, I would expect some phone calls every now and then. Very different story when I was working for Novartis in Switzerland, although that was 6-7 years ago. Novartis was a big target for everyone." (Interview BiotechPharma5) "I have made the experience that certain brokers that I got to know where quite limited to certain regions. […] I think this is not helpful, because then I can directly approach the university and I would find it myself. However, if a broker is well acquainted with the expertise across regions or specialized on one or few technologies, I could imagine this as promising." (Interview Hardware14, translation by the authors) „There are no real contact persons in Europe and if I go one level down, then the tech transfer organisations in [home country] are very intransparent […] every university is doing something. It is intransparent and extremely difficult to gain an overview. (Interview BiotechPharma 2, translation by the authors)
Compatible rules for collaborative and contract R&D (CoP 15)	"Most partners in universities take these standards [model contracts] as a point of reference and then there aren't any further difficulties. Difficulties only come up, if a partner does not want to adhere to the standard. This is usually resolved by not including this partner in the consortium." (Interview Hardware5, translation by the authors) "On the other hand, I realise that IP clauses are very negotiable in PROs. […] On one side they argue that certain things are not possible, because of the public funding; on the other hand there seems to be a vast room to negotiate. I have worked in different companies and depending on the size of a company you can manage to get significantly differing conditions. In my opinion, public funders would be in a position to request relatively clear and uniform rules in order to make sure that they also participate at returns. […] The fact that there are no such rules – if there are, they are at least not widely known or precise – makes it difficult to engage in collaboration, when you want to try something out or are in an initial stage." (Interview Hardware14, translation by the authors)
Early clarification of IP issues (CoP 16)	"A certain procedure has become established followed by us and accepted by the universities. We pay an additional fee for inventions. Still, there are discussions as the universities have not become used

CoP	Quotes
	to AutoParts6 handling it in this way and there is a lack of insight that it makes sense to clarify this at the beginning of a contract." (Interview AutoParts6, translation by the authors) "The ideal situation is, for example: we enter a collaboration in a certain field and we have a non-exclusive licence on the outcome with an option to negotiate an exclusive licence. That works in most cases, but some institutes have difficulties to agree to that and say: 'We'll talk about that in the future.'" (Interview Biotech Pharma8) „From the perspective of the investment risk an IP agreement needs to be signed before the research project begins. The contracts include special clauses in case of unexpected successes. It may happen that in such cases re-negotiations are necessary, but as a matter of principle an IP clause needs to be in every contract right from the start." (Interview Hardware5, translation by the authors) "This is in order, however, if we have a contractually guaranteed right, an option, to buy this IP in case we consider it important." (Interview BiotechPharma2, translation by the authors)
Ownership of IP in collaborative and contract R&D (CoP 17)	"We also have collaborations that are partly financed by individual states or regions within a country. And again, in that case, sometimes there are pre-set rules, sometimes it is pure negotiation with the partners. And again, because of the fact that the pharmaceutical sector is based on monopolistic barriers, our main interest is to keep as much solely for us the IP. So we tend to buy it, if we can. Sometimes they like to be paid in advance, or we give a payment and that's it. Sometimes they prefer to have a stream of royalties in future years, which is the second option. We have both agreements; we'd rather have the first type anyway." (Interview BiotechPharma7) "Or here [referring to big EU projects] sometimes we had major difficulties in securing the rights for the company and so we had to give up many times our participation in larger EU grants. This is a pity for everyone. It was because of bureaucratic hurdles." (Interview BiotechPharma6)
Access rights to IP (CoP 18)	"The first choice would be purchase of the IP, preferably beforehand. In case of PROs, they typically don't want to give up the patent, they want to build up a portfolio of their own. Then we try to gain full access and freedom to the field of use. In our case let's say lithography, etc. Also sometimes happens that somebody comes with a big invention. Then of course we sign a non-disclosure, etc. and take a look. That's somewhat exceptional, but if it happens we take either a licence or buy the patent." (Interview Hardware3) "That is very good because the TSB and the Commission have gone through the framework agreements, so your background IP is your background IP and what you generate is what you own. And we're happy with that." (Interview OtherInd3) "The tendency is to grant access rights in exchange for compensation, by SMEs as well as large enterprises. Since a couple of years the participating research institutes in the UK, France, Germany etc. want to see cash for their future inventions or work results. In the last FP, FP6, it was common to exchange access rights among the partners of a project without extra payments. That has changed in FP7. The discussions have increased." (Interview AutoParts6, translation by the authors) "For example in [home country] we are not allowed to purchase the IP. The IP will always belong to the university, but what we can

CoP	Quotes
	negotiate in these cases is to get an exclusive licence to use it so it is kind of more a licence agreement than a purchase." (Interview BiotechPharma13) "As a matter of principle we try to obtain the access rights for the product without having to pay large licence fees. Licence fees have to be available to customary conditions or a licence-free use for the field of activity for which we foresee use. It does not make a lot of sense, if we fund a research result obtaining after three years a usable result that we would like to use, and then the competitor can use the same without any investment. We do not want this. Therefore it is preferable to get limited exclusiveness, timewise or on field of activity in which we work." (Interview AutoParts7, translation by the authors).

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The purpose of the Knowledge Transfer Study 2010-2012 was to help set up a monitoring and reporting system to follow up and promote implementation of the Commission's 2008 Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations (PROs). The study comprised the following activities: Monitoring implementation of the Recommendation in 39 European countries; collecting information on the performance of almost 500 universities and other PROs in knowledge transfer; analysis of the implementation and impact of the Code of Practice for a sample of 322 universities and other PROs as well as 59 enterprises; conducting 15 experts workshops about current issues in knowledge transfer covering 38 European countries.

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