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# Respondent Report of the Knowledge Transfer Study, 2012

**European Knowledge Transfer Indicators Survey**

**Code of Practice Implementation Survey**

**Interviews with universities and other public research organisations**

April 2013

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Report produced by Empirica GmbH, Fachhochschule Nordwestschweiz and UNU-MERIT for the European Commission, DG Research and Innovation.

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# Executive Summary

This report presents the results of three linked studies: a survey on the knowledge transfer activities of 498 European public research organisations (universities and research institutes), a survey of 322 research organisations on their intellectual property policies and practices, and interviews with a total of 100 universities and other PROs on the points of key importance for being successful in the area of knowledge and technology transfer.

License income is highly concentrated, with the top 10% of universities and research institutes earning approximately 85% of all license income. The vast majority, 88.8%, of €346 million in reported license income is also from biomedical inventions.

Almost two-thirds of universities and research institutes report that their licensed technology resulted in at least one commercially successful product or process in the previous three years.

Universities obtain more invention disclosures, start ups, license agreements and research agreement per 1,000 staff than research institutes, but the latter outperform universities for patent applications, patent grants, and license income.

In 2010, European universities and research organisations outperformed their American colleagues for the amount of research expenditures required to produce one patent grant, start up and license agreement, but American universities and research organisations are better at producing invention disclosures, patent applications and license income. On average, license income in Europe equals 1.5% of the research expenditures by universities and research institutes, whereas in the United States license income equals 4% of research expenditures.

The number of knowledge transfer office staff has a substantial, positive effect on knowledge transfer outputs, including license income, after controlling for the size of the public research organisation, the policy for intellectual property ownership, and other factors. This provides a strong argument for supporting well-funded knowledge transfer offices.

Less than a third of knowledge transfer offices publish their affiliated institution's policies for intellectual property, licensing, and start-ups. In addition, even though most offices monitor personnel changes, scientific competences, research projects, and inventions by their affiliated institution, less than half publish this information.

The most common incentive for research staff is a share of future license revenues, with the inventor receiving, on average, 40% of the income. Only monetary incentives are effective in raising the transfer performance of an institution. Other incentives such as social rewards or additional funding for research are unrelated to transfer performance and reported by less than half of the knowledge transfer offices.

The top three out of 10 objectives for knowledge transfer offices are to generate possibilities for research collaboration, and promote the diffusion of science and technology and to generate revenues for their institution.

Most knowledge transfer services are predominantly provided internally, i.e. by the KTO or other offices of the PRO. The drafting of patent applications is the exception to the rule, as this is usually sourced externally from service providers on a contract basis. However, we find that institutions which (also) draft patents 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.

Print and electronic channels and in particular the World Wide Web are the most commonly used and the most effective channels for communicating information on research, IP and knowledge transfer opportunities to the private sector.

# 1. Introduction

This report provides some of the highlights of two surveys and a series of interviews, conducted during 2012, on the knowledge transfer activities of public research organisations. Public research organisations include universities and government-funded research institutes (the latter are henceforth referred to as 'research institutes'). The surveys were conducted as part of the project "Knowledge Transfer Study 2010-2012", funded by the Research and Innovation Directorate General of the European Commission.

The study has two short-term goals: collect internationally comparable data on the knowledge transfer activities of Europe's leading public research organisations and assess the uptake by knowledge transfer offices of the European Commission's Code of Practice for knowledge transfer activities. The longer term goal is to provide Knowledge Transfer Offices that serve public research organisations with information and analyses that they can use to improve their services.

Section 2 provides the results of the second European Knowledge Transfer Indicators Survey (EKTIS)[1]. This is the largest survey to date on the knowledge transfer activities of European public research organisations, with results for up to 498 organisations in 32 European countries. The survey collected data on the characteristics of knowledge transfer offices and on nine outcome measures. After standardizing for research expenditures, European performance on six indicators is compared to that of the Association of University Technology Managers (AUTM) 2011 survey of American universities and research institutes.

Section 3 gives some of the highlights of a second survey on the intellectual property management practices of knowledge transfer offices. The survey compares actual practices with those proposed by the European Commission's 2008 "Code of Practice for universities and other public research organisations concerning the management of intellectual property in knowledge transfer activities" (see annex). In addition, it documents the key points from interviews conducted with 100 universities and other public research organisations in Europe.

[1] The first survey was carried out in 2011. Results for the EKTIS 2011 survey are available at: http://knowledge-transfer-study.eu/home/

# 2. EKTIS survey

## 2.1 Introduction and Methodology

In the spring and summer of 2012, UNU-MERIT surveyed the Knowledge Transfer Offices of European public research organisations in order to obtain information on their knowledge transfer activities in 2011. The survey targeted the knowledge transfer offices of Europe's leading public research organisations. To be eligible for inclusion in the survey, the public research organisation had to be one of the top universities or institutes in terms of research expenditures or research staff in its country. Leading organizations were identified and surveyed in each of the 27 member states of the European Union and in the 12 Associated States.[2]

In total, 805 knowledge transfer offices were surveyed, ranging from 1 in small countries with only one or a few public research organisations to over 100 in the UK, France and Germany. With 442 replies, the response rate was 56%. This is similar to the 2011 Association of University Technology Managers survey in the United States, which obtained a response rate of 60%. Not all responses, however, were eligible: 49 respondents reported no knowledge transfer activities. This left 393 valid responses for analysis. Results for an additional 68 public research organisations were obtained from the Higher Education Funding Council for England (HEFCE) for the UK, 4 for Denmark from the Danish Agency for Science, Technology and Innovation (DASTI)[3] and 33 for Portugal from the Portuguese national network for KTOs (UTEN). Figure 1 gives the number of valid responses by country.

The survey results provide the largest and most geographically diverse dataset to date on the knowledge transfer activities of European public research organisations, with valid responses from 27 of the 27 member states of the European Union and from 9 of the 12 Associated States.

This section provides some of the main results on the characteristics of the responding knowledge transfer offices and on the knowledge transfer performance of their affiliated public research organisations. Results are provided for six key and three supplementary knowledge transfer activities in 201. The six key indicators are collected in most national surveys, including the AUTM survey for the United States and Canada. They include three measures of activities that do not necessarily result in knowledge transfer: the number of invention disclosures, the number of priority patent applications, and the number of technically-unique patent grants.[4] The second set of key indicators consists of measures that involve knowledge transfer to firms: the

[2] These include the four EFTA members (Iceland, Liechtenstein, Norway and Switzerland) plus Albania, Bosnia-Herzegovina, Croatia, Israel, Macedonia, Montenegro, Serbia, and Turkey.

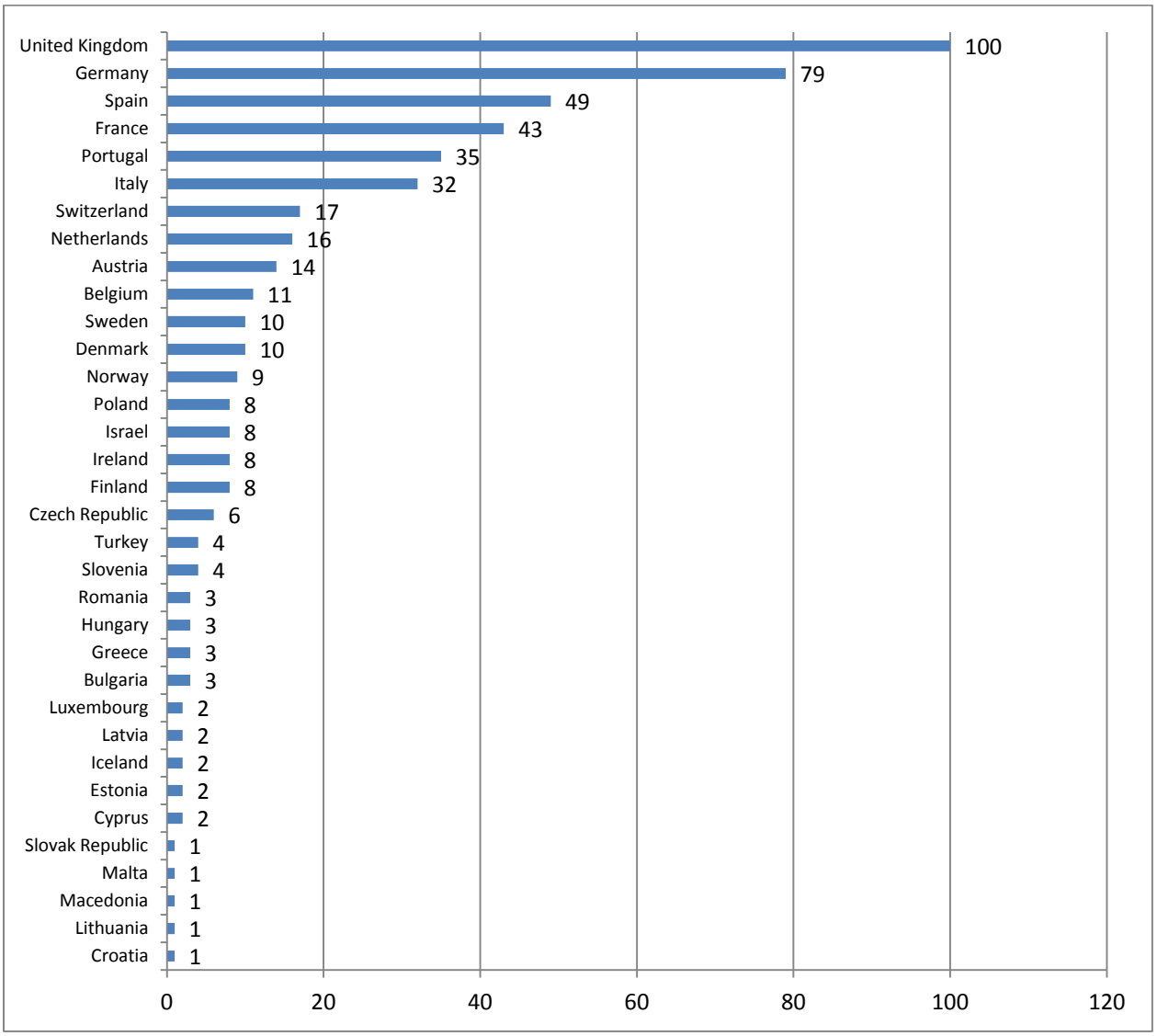
[3] Public Research Commercialisation Survey Denmark 2011: http://en.fi.dk/publications/2012/public-research-commercialisation-survey-denmark-2011/

[4] The limitation to technically unique patents prevents double counting of the same invention in more than one jurisdiction.

number of start-ups[5], the number of licenses or option agreements with companies, and the amount of license income earned.

The three supplementary indicators are not collected in many national surveys. They include the number of R&D agreements between the affiliated institution and companies, the number of USPTO patent grants, and the number of successful start ups (the start up developed a product/process that is in use or sold on the market since 2005). In addition, the survey collected data on the types of licensees and license revenue by research area.

**Figure 1. Number of valid responses by country, 2011**




Source: MERIT, European Knowledge Transfer Indicator Survey 2012.

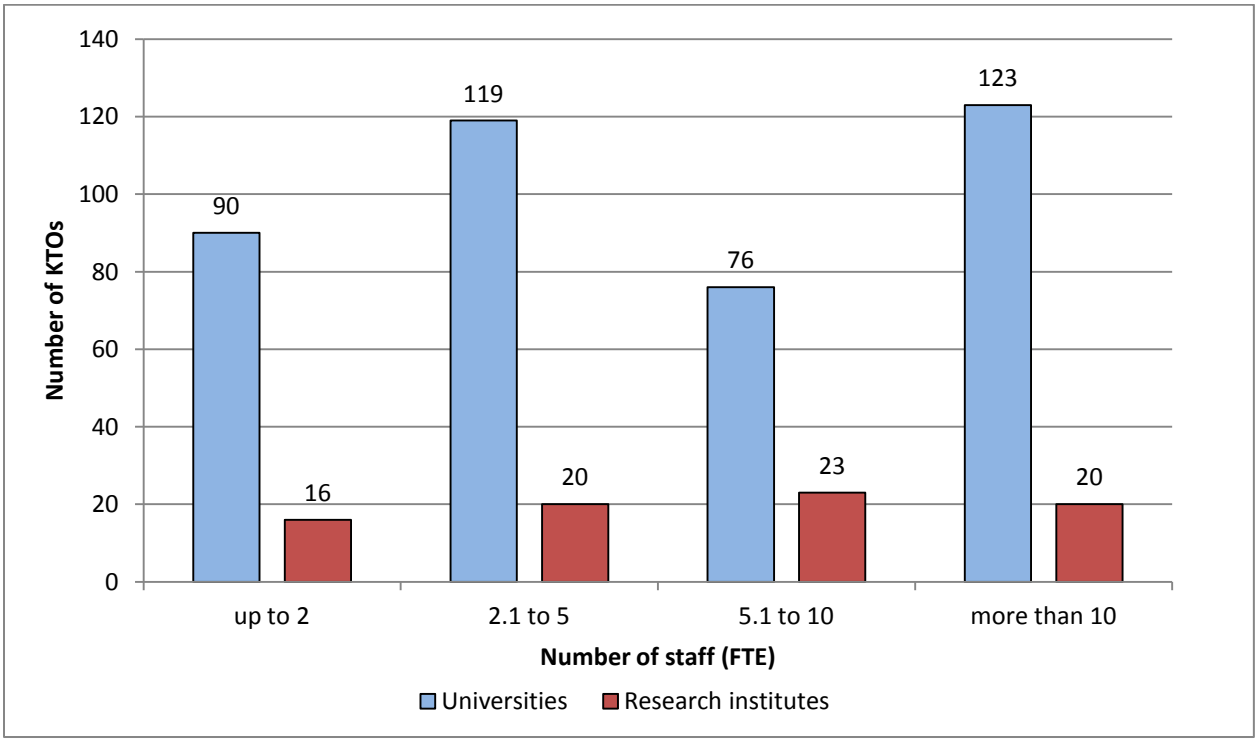
[5] A start-up is defined in the questionnaire as a company **specifically** established to exploit technology or know-how created by your institution.

## 2.2 Characteristics of European Knowledge Transfer Offices

Most of the 498 Knowledge Transfer Offices (KTOs) represent universities, were established after 2000, and have less than 10 office staff employees.

- 83.7% of the KTOs represent universities (of which 10% have a hospital) and 16.3% represent research institutes.
- 17.2% of KTOs were established before 1990, 22.1% between 1990 and 1999, and 60.7% after 2000.
- 22.1% of the KTOs representing universities have two or fewer staff, while 30.1% have 10 or more staff, mostly UK KTOs. Figure 2 gives the size distribution of KTOs.
- The average date of establishment is 1991 for KTOs representing universities and 1993 for KTOs representing research institutes.
- 75.2% of KTOs have at least one staff member with a university qualification in engineering or natural sciences and 58.1% of KTOs have at least one staff member with a university qualification in management or business studies.
- 82.2% of KTOs use external experts in legal matters. Other frequently asked external expertise is to evaluate the commercial potential of invention disclosures (58.5%) and preparing contracts (39.2%).

**Figure 2. Number of employees per Knowledge Transfer Office, 2011**




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

At most public research organisations the ownership of intellectual property is held by the institution itself (23.1%) or shared between the institution and other parties (51.5%).

Data on research personnel are available for 476 public research organisations. The total number of reported research personnel is 848,121 full-time equivalents (FTE), of which 728,109 work at universities and 120,011 work at research institutes. Table 1 shows the distribution of research personnel. Average research personnel at universities in 2011 was 1,807 FTE and 1,644 FTE at other research organisations.

**Table 1. Distribution of research personnel, 2011**

| | Universities | | Other research organisations | | Total | |
|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage |
| Up to 499 | 83 | 20.6% | 14 | 19.2% | 97 | 20.4% |
| 500-1249 | 130 | 32.3% | 34 | 46.6% | 164 | 34.5% |
| 1250-2499 | 106 | 26.3% | 2 | 2.7% | 108 | 22.7% |
| 2500 or more | 84 | 20.8% | 23 | 31.5% | 107 | 22.5% |
| Total | 403 | 100.0% | 73 | 100.0% | 476 | 100.0% |

Source: MERIT, European Knowledge Transfer Indicator Survey 2012. Note: Based on answers for question 13.2. Results provided for the full sample, including ASTP, DASTI (DK), HEFCE (UK) and UTEN (PT) respondents.

Data on research expenditures are only available for 369 public research organizations. The total reported research expenditures amounted to approximately €37 billion, of which €32 billion was spent by universities and €5 billion by research institutes. Average research expenditures were €100 million at universities and €92 million at research institutes. Table 2 gives the distribution of research expenditures.

**Table 2. Distribution of research expenditures (in million Euros), 2011**

| | Universities | | Other research organisations | | Total | |
|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage |
| up to 5 m | 53 | 16.9% | 5 | 9.1% | 58 | 15.7% |
| 5 m - 14 m | 62 | 19.7% | 7 | 12.7% | 69 | 18.7% |
| 15 m-39 m | 58 | 18.5% | 11 | 20.0% | 69 | 18.7% |
| 40 m-79 m | 55 | 17.5% | 11 | 20.0% | 66 | 17.9% |
| 80 m -159 m | 39 | 12.4% | 14 | 25.5% | 53 | 14.4% |
| 160 m or more | 47 | 15.0% | 7 | 12.7% | 54 | 14.6% |
| Total | 314 | 100.0% | 55 | 100.0% | 369 | 100.0% |

Source: MERIT, European Knowledge Transfer Indicator Survey 2012. Note: Based on answers for question 13.3. Results provided for the full sample, including ASTP, DASTI (DK), HEFCE (UK) and UTEN (PT) respondents.

## 2.3 Results for Knowledge Transfer Activities

Tables 3 and 4 summarize the results for the six key and three supplementary knowledge transfer indicators. The mean number of each type of outcome is not a performance measure, since the mean will vary depending on the number of researchers or research expenditures at each public research organisation. Standardised performance measures accounting for size differences are given in Section 2.4.

A small percentage of universities and research institutes account for a large share of each outcome. This is partly due to a significant share of organisations reporting zero outcomes. The least common output is USPTO patent grants, with 59.8% of universities and 44.1% of research institutes reporting no USPTO patents. The second least common output is start-ups, whith none reported by 39.8% of universities and 33.8% of research institutes.

The second cause is due to the concentration of outcomes in a small number of universities and research institutes. The last column in Table 3 and Table 4 gives the percentage of the total number of outcomes that are reported by the top 10% of the universities and research institutes. For example, 337 universities report a total of 2,543 patent grants in 2011. The top performing 34 universities (10% of 337 reporting results) account for 1,684 of these patent grants, or 66.2% of the total.

**Table 3. Summary of key and supplementary indicators for universities, 2011**

| | Valid responses[1] | Mean | Total reported | Percent zero[2] | Percent by top 10%[3] |
|---|---|---|---|---|---|
| Invention disclosures | 379 | 29.8 | 11,298 | 9.0% | 46.4% |
| Patent applications | 382 | 14.7 | 5,618 | 17.8% | 53.5% |
| Patent grants | 337 | 7.5 | 2,543 | 32.0% | 66.2% |
| Start-ups established | 347 | 2.8 | 988 | 39.8% | 54.9% |
| Licenses executed | 326 | 13.2 | 4,294 | 26.4% | 65.6% |
| License income[4] | 288 | 870 | 250,652 | 30.6% | 85.7% |
| R&D agreements | 251 | 152.3 | 38,215 | 4.0% | 53.9% |
| USPTO patent grants | 254 | 1.8 | 447 | 59.8% | 72.0% |
| Successful start-ups | 285 | 4.4 | 1,258 | 29.8% | 50.6% |

Source: MERIT, European Knowledge Transfer Indicator Survey 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, 9.0% of 379 universities reported zero invention disclosures in 2011.
3: Percent of the total reported by the top 10% of the respondents. For example, 38 universities (10% of 379 reporting results) accounted for 46.4% of the 11,298 invention disclosures reported by universities.
4: License income given in thousand Euros.
5: Results include ASTP, DASTI (DK), HEFCE (UK) and UTEN (PT) respondents.

**Table 4. Summary of key and supplementary indicators for research institutes, 2011**

| | Valid responses[1] | Mean | Total reported | Percent zero[2] | Percent by top 10%[3] |
|---|---|---|---|---|---|
| Invention disclosures | 69 | 37.0 | 2,556 | 8.7% | 40.5% |
| Patent applications | 68 | 14.8 | 1,003 | 7.4% | 42.8% |
| Patent grants | 62 | 8.7 | 539 | 11.3% | 59.2% |
| Start-ups established | 68 | 2.2 | 147 | 33.8% | 42.9% |
| Licenses executed | 65 | 11.3 | 736 | 12.3% | 46.6% |
| License income[4] | 58 | 2,761 | 160,180 | 20.7% | 91.6% |
| R&D agreements | 50 | 136.8 | 6,839 | 4.0% | 50.4% |
| USPTO patent grants | 59 | 1.7 | 102 | 44.1% | 50.0% |
| Successful start-ups | 57 | 2.6 | 147 | 31.6% | 32.7% |

Source: MERIT, European Knowledge Transfer Indicator Survey 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, 8.7% of 69 research institutes reported zero invention disclosures in 2011.
3: Percent of the total reported by the top 10% of the respondents. For example, 7 research institutes (10% of 69 reporting results) accounted for 40.5% of the 2,556 invention disclosures reported by research institutes.
4: License income given in thousand Euros.
5: Results include ASTP, DASTI (DK), HEFCE (UK) and UTEN (PT) respondents.

### 2.3.1 Licensing

Total reported license income amounted to €411 million. Approximately €251 million (61.0%) was earned by universities and approximately €160 million (39.0%) by research institutes. Average license income was €870,320 at universities and €2,761,741 at research institutes. As shown in Table 5, the distribution of license income is highly skewed. For all universities, 30.6% reported zero license income and 64% in total reported less than €100,000 license income. Other research organisations perform better. They gain more license income on average (€2,761,741) compared to universities (€870,320).

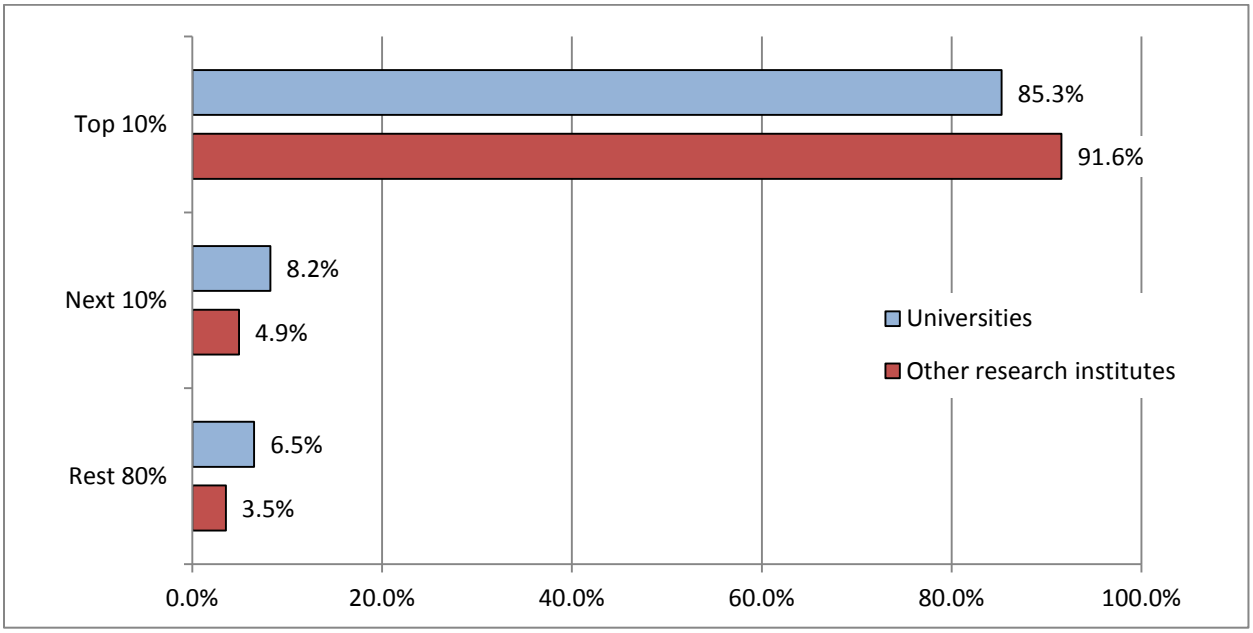
**Table 5. Distribution of licence income, 2011**

| | Universities | | Research institutes | | Total | |
|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage |
| Zero | 88 | 30.6% | 12 | 20.7% | 100 | 28.9% |
| €1 - € 19,999 | 42 | 14.6% | 7 | 12.1% | 49 | 14.2% |
| €20,000 - €99,999 | 54 | 18.8% | 9 | 15.5% | 63 | 18.2% |
| €100,000 - €249,999 | 27 | 9.4% | 10 | 17.2% | 37 | 10.7% |
| €250,000 - €499,999 | 23 | 8.0% | 6 | 10.3% | 29 | 8.4% |
| €500,000- €1,999,999 | 36 | 12.5% | 8 | 13.8% | 44 | 12.7% |
| €2,000,000 or more | 18 | 6.3% | 6 | 10.3% | 24 | 6.9% |
| Total | 288 | 100.0% | 58 | 100.0% | 346 | 100.0% |

Source: MERIT, European Knowledge Transfer Indicator Survey 2012. Note: Based on answers for question 10.3. Results provided for the full sample, including UTEN (PT), HEFCE (UK) and DASTI (DK) respondents.

Most of the license income is earned by a small percentage of public research organisations. As shown in Figure 3, the top 10% (28) of universities earn 85.3% of the total license income earned by all universities in the sample. The top 10% (6) of research institutes earn 91.6% of the total license income earned by these institutes. Total license income only accounted for 1.0% of research expenditures by universities, 3.3% of research expenditures by other research organisations, and 1.3% of all research expenditures by PROs.

**Figure 3. Percentage of total licence income earned by top performers, 2011**




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

The total number of reported licenses that earned income were 2,979 in 2011 of which 2,638 are reported by universities and 341 by other research organisations. The average number of licenses that earned income at universities was 13.5 and the median was 3. The average number of licenses that earned income at other research organisations was 7.4 and the median was 3. As shown in Exhibit 3-25, most PROs report zero licenses that earned income 2011, the second largest category are PROs that reported 3 to 5 licenses that earned income in 2011.

**Table 6. Distribution of the number of licenses that earned income, 2011**

| | Universities | | Other research organisations | | Total | |
|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage |
| Zero | 68 | 34.9% | 9 | 19.6% | 77 | 32.0% |
| 1-2 | 33 | 16.9% | 8 | 17.4% | 41 | 17.0% |
| 3-5 | 42 | 21.5% | 12 | 26.1% | 54 | 22.4% |
| 6-10 | 23 | 11.8% | 9 | 19.6% | 32 | 13.3% |
| 11-25 | 13 | 6.7% | 7 | 15.2% | 20 | 8.3% |
| >25 | 16 | 8.2% | 1 | 2.2% | 17 | 7.1% |
| Total | 195 | 100.0% | 46 | 100.0% | 241 | 100.0% |

Source: MERIT, European Knowledge Transfer Indicator Survey 2012. Note: Based on answers for question 10.4. Results include ASTP respondents.

### *Distribution of licences 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. Table 7 gives the results for the distribution of licenses by the type of licensee. For both universities and other research organisations the smallest share of their licenses are issued to start ups: 22.1% at universities and 12.2% at other research organisations. The largest share of licenses at universities are issued to small firms (40.3%) and 37.6% are issued to large firms. A similar distribution is found at other research organisations, where the largest share, 47.6% of licenses, are issued to small firms and 40.2% to large firms.

**Table 7. Distribution of licences by type of licensee, 2011**

| | Universities | | Research institutes | | Total | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| Start up firms | 281 | 22.1% | 55 | 12.2% | 336 | 19.5% |
| Other firms with < 250 employees | 514 | 40.3% | 214 | 47.6% | 728 | 42.2% |
| Firms with 250+ employees | 479 | 37.6% | 181 | 40.2% | 660 | 38.3% |
| Total | 1,274 | 100.0% | 450 | 100.0% | 1724 | 100.0% |

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

### *Share of license revenue by research field*

Respondents were asked if their affiliated institution applied for at least one patent from each of five research fields. This provides an indicator for the production of knowledge with a *potential* to earn license revenue. License revenue can also be earned without a patent, for instance through assigning know-how, copyright, or other forms of intellectual property, but at least one patent application in a research field suggests the production of commercially valuable inventions in this research area. Second, respondents were asked to estimate the distribution of license revenue by research field.

Table 8 gives the percent of public research organisations that report at least one patent application from each of five research fields. Out of the 415 public research organisations which answered this question, 63.4% 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 (61.7%) as well as other research organisations (68.4%). The second most frequent research area (ignoring the 'other' category) is the nanotechnology field (47.0%). Low or zero carbon energy technology was the least common subject area reported, with only 22.2% of all public research organisations reporting at least one patent application in this field.

**Table 8. Share of public research organisations applying for at least one patent by research field, 2011**

| | Universities | Research organizations | Total |
|---|---|---|---|
| Biomedical | 61.7% | 68.4% | 63.4% |
| ICT: Computers, communication equipment and software | 38.6% | 43.0% | 39.8% |
| Nanotechnology and new materials | 45.1% | 53.2% | 47.0% |
| Low or zero carbon energy technologies | 22.4% | 20.3% | 22.2% |
| Other subject areas not listed above | 51.6% | 46.8% | 51.1% |
| Total | 100.0% | 100.0% | 100.0% |

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

The distribution of patent application activity by research field, as shown in Table 8, does not translate into similar shares for license income. As shown in Table 9, licenses for biomedical knowledge account for *almost all* license income: 80.5% of income reported by universities and 95.6% of income reported by research institutes. Low and zero carbon energy technologies account for only 2.3% of the total license income. The dominance of the biomedical field suggests that public research organisations without health, biotechnology, or pharmaceutical research are likely to earn significantly less license income than those that conduct research in these fields.

**Table 9. Share of licence revenue by research area (mean), 2010**

| | Universities | Research institutes | Total |
|---|---|---|---|
| Biomedical | 80.5% | 95.6% | 87.1% |
| Computers, communication equipment and software (ICT) | 7.4% | 1.4% | 4.8% |
| Nanotechnology and new materials | 1.3% | 0.2% | 0.9% |
| Low/zero carbon energy technologies | 4.0% | 0.1% | 2.3% |
| Other subject areas not listed above | 6.8% | 2.6% | 5.0% |
| Total | 100.0% | 100.0% | 100.0% |

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

***Commercially profitable outcomes of licensing***

More than half (53.0%) of respondents reported that licensed technology or knowledge had resulted in at least one commercially profitable product or process in the previous three years. There is some difference by the type of public research organisation, with successful outcomes reported for 50.5% of universities and 64.6% of research institutes.

## 2.4 Standardised performance Indicators

On average, large public research organisations have more research staff and funding and therefore produce more knowledge outputs and earn more license revenue than small public research organisations. In order to compare results across countries or over time it is necessary to control for the size effect by producing standardised indicators. Two methods are used in this report: standardization per 1,000 research staff and standardization per unit of research expenditure. The research expenditure data are adjusted for purchasing power parities (PPP) in different countries. All results are limited to organisations that provided data on both the number of outputs and the standardization measure (either the number of research staff or research expenditures).

For comparisons within Europe, the indicators based on research staff are preferable because a higher number of respondents were able to provide data on research staff than on research expenditures. However, no data on the number of research staff are available for the AUTM results for the United States. Consequently, this report provides standardised performance indicators by research expenditures in order to be able to compare European and American performance.

### 2.4.1 Performance per 1,000 research staff

Table 10 gives standardised performance measures for 2011 per 1,000 research personnel. For example, universities produced on average 16.1 invention disclosures per 1,000 full-time equivalent (FTE) research staff in 2011. Universities earned, on average, €500,000 of license income per 1,000 researchers in 2011.

**Table 10. Performance per 1,000 research staff, 2010**

| | Universities | Research institutes | Total | *Total valid responses*[1] |
|---|---|---|---|---|
| Invention disclosures | 16.1 | 23.3 | 17.1 | *437* |
| Patent applications | 8.1 | 9.2 | 8.2 | *441* |
| Patent grants | 4.6 | 4.4 | 4.6 | *393* |
| USTPO patent grants[2] | 1.1 | 1.0 | 1.1 | *309* |
| Start-ups established | 1.6 | 1.3 | 1.6 | *404* |
| Successful start-ups | 2.7 | 1.7 | 2.6 | *337* |
| License agreements | 7.2 | 6.9 | 7.2 | *381* |
| License income (million €) | 0.5 | 1.7 | 0.7 | *339* |
| Research agreements | 83.7 | 79.2 | 83.0 | *294* |

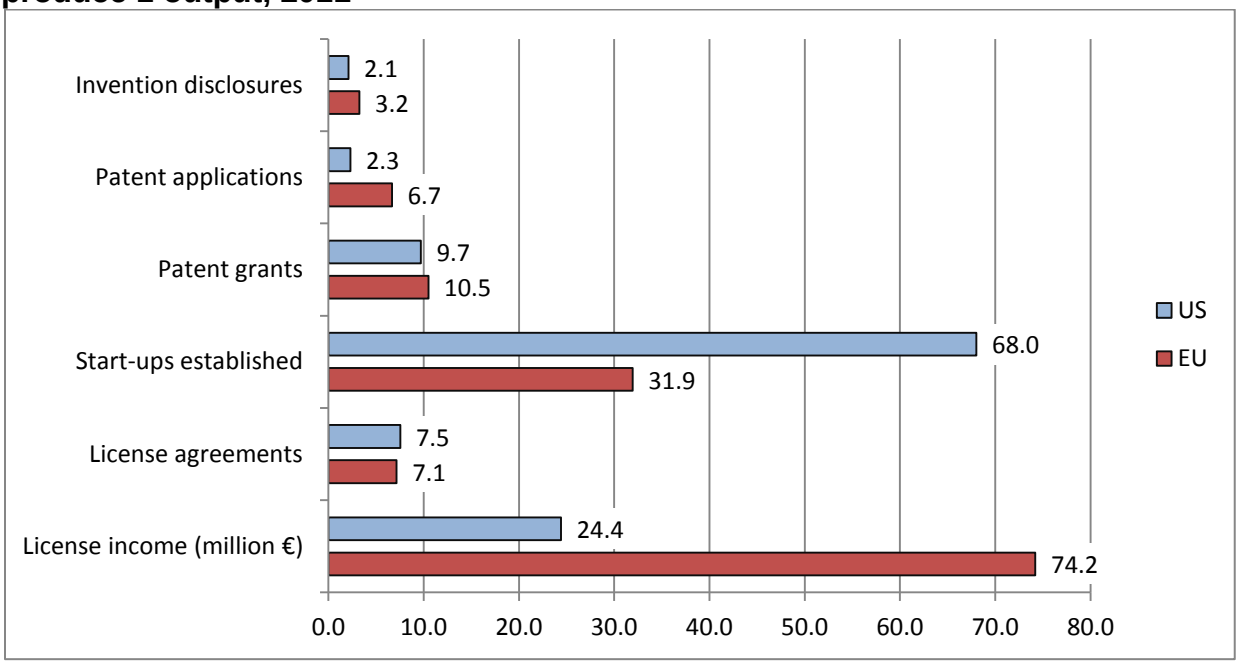
Source: MERIT, European Knowledge Transfer Indicator Survey 2012.
Notes:1: Limited to respondents that gave both outcome results (e.g. invention disclosures and research staff).
2: Data from the UK HEFCE survey, does not include this indicator.
3: Total number of reported research staff: Universities, n=417, other research organisations, n=81, total, n=498.
4: Results include ASTP, DASTI (DK), HEFCE (UK) and UTEN (PT) respondents.

Universities outperform other research organisations on patent grants, the number of start-ups, successful start ups, license agreements and research agreements. Other research organisations, however, have 1.5 more invention disclosures, 1.1 more patent applications and 3.6 times more license income per 1000 researchers. The latter results should not be surprising as many university researchers will have other responsibilities such as teaching in addition to research.

### 2.4.2 Performance comparisons with the United States

Figure 4 compares the 2011 performance of up to 350 European public research organizations with the 2011 performance of 186 American public research organisations, as surveyed by AUTM. The results give the cost, in million Euros, to produce 1 outcome. For example, European public research organisations spend, on average, €3.2 million to produce 1 invention disclosure, while American public research organisations spend €2.1 million for the same outcome. Consequently, American public research organisations are more efficient, producing one invention disclosure at lower cost. American public research organisations also perform better than European public research organisations for patent applications, patent grants and license income. Conversely, European performance exceeds that of the US for the number of start-ups and the number of license agreements.

**Figure 4. Performance by research expenditures of EU and US million Euros to produce 1 output, 2011**



## 2.5 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 section provides an analysis of the performance over time for these 320 KTOs that responded to both the EKTIS 2011 and EKTIS 2012.

Table 11 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 €810,000 per 1,000 researchers in 2010 and €823,000 in 2011.

**Table 11. Performance per 1,000 research staff, panel data 2010 and 2011**

| | 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.

Table 10 shows that public research organisations 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 public research organisations in 2011 performed worse on patent grants, successful start-ups, and research agreements. The largest percentage and absolute decrease is for research agreements.

## 2.6 Conclusions

Most European Knowledge Transfer Offices (KTOs) are young, with 60.7% established after 2000. Furthermore, 50.3% have five or less employees (in full-time equivalents). These results suggest that many European KTOs are still developing experience and capabilities with managing the intellectual property produced by their affiliated university or research institute. Many KTOs could also be struggling with a lack of sufficient staff. Both of these factors could result in lower performance than expected, in terms of the number of patent applications, patent grants, start-ups, licenses, and license income.

At most PROs the ownership of IP is in the hands of the institution itself exclusively (23.1%) or in some kind of combination between the institution and other parties (51.5%).

The majority of licenses are issued to SMEs or large firms, 80.5% combined. The reaming 19.5% 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 larger firms.

Biomedical intellectual property is the largest generator of license revenue, accounting for 87.1% of the total reported license revenue for 2011, followed by 'other subject areas' at 5.0% and by ICT (4.8%). This suggests that the presence of a strong health, biotechnology or medical faculty at a university or research institute is likely to be a major factor in earning license revenue.

License income is highly concentrated, with the top 10% of universities accounting for 85.3% of all such income. This could partly be due to a lack of experience or staff at other universities, but additional factors could be equally or more important, such as large differences in the size of public research organisations (larger organisations are likely to produce more intellectual property and therefore earn more license income) or the presence of a hospital or biomedical research faculty.

License income provides only a small financial revenue stream to European public research organisations. Limited to respondents that reported both license income and research expenditures, total license income only accounted for 1.0% of research expenditures by universities, 3.3% of research expenditures by research institutes, and 1.3% of all research expenditures by European public research organisations. Similarly in the United States, license income only accounted for 4.1% of total research expenditures. On this basis, license income is unlikely to account for a significant share of research expenditures. This suggests that the main function of a Knowledge Transfer Office should lie 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 (83.7 per 1,000 researchers) versus

patent grants (4.6 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 public research organisations to firms, but also in the opposite direction.

Standardised performance measures for 2011 per 1,000 research personnel have shown that universities outperform other research organisations on patent grants, start-ups established, successful start-ups, license agreements and research agreements.

A comparison of performance between American and European public research organisations shows that the US outperforms Europe on invention disclosures, patent applications, patent grants and license income. Europe outperforms the US on the number of start-ups established and on the number of license agreements.

Standardised performance measures for the panel data set per 1,000 research personnel have shown that public research organisations in Europe performed better in 2011 compared to 2010 on invention disclosures, patent applications, USPTO patent grants, start-ups, license agreements and license income. 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.

# 3. Code of Practice implementation and impact (WP3)

## 3.1 Introduction and Methodology

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 reports on the implementation and impact of the European Commission's Code of Practice (CoP, see the annex) for a sample of 322 European public research organisations and universities performing research (PROs).

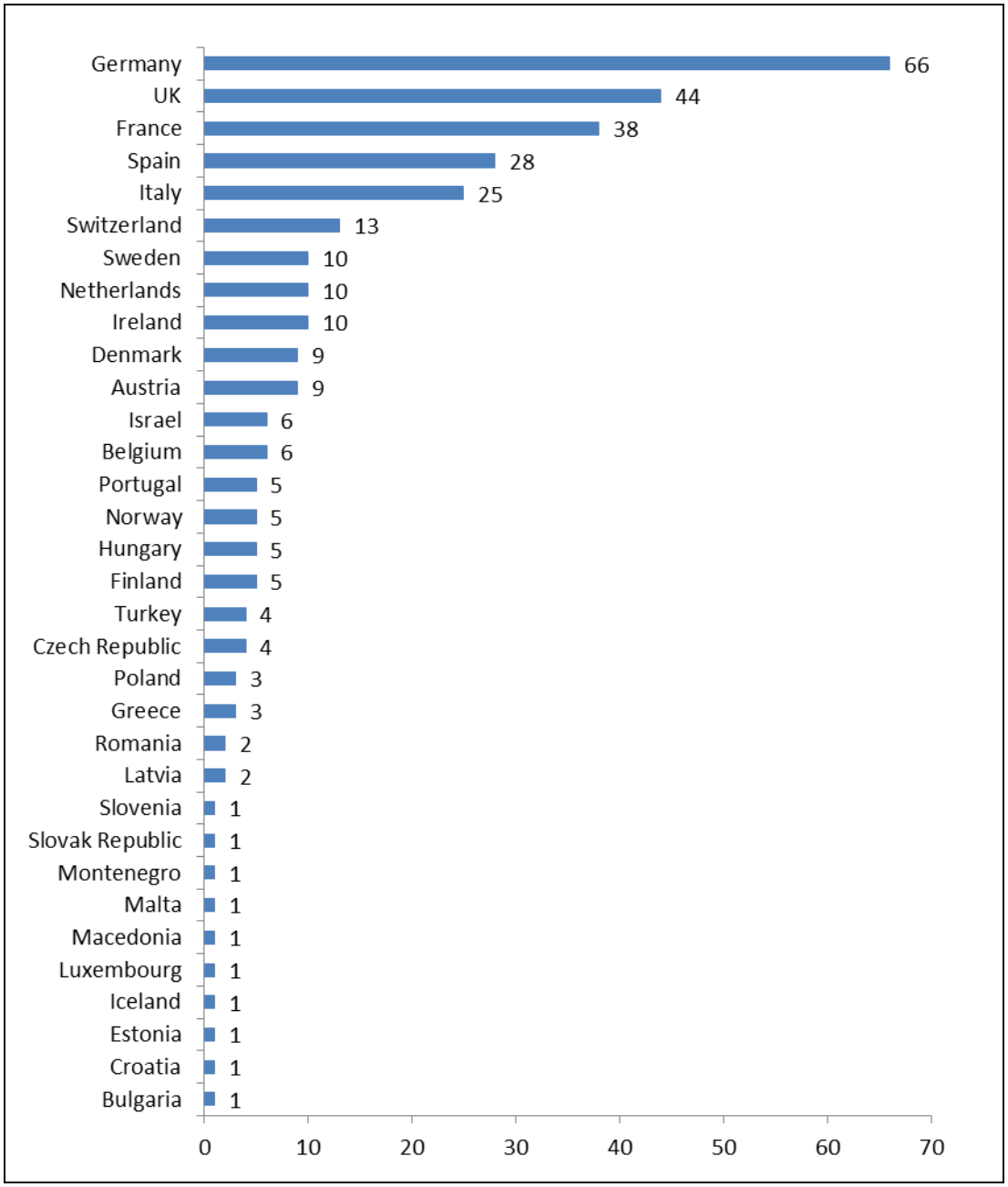
The results are based on two surveys, the pilot survey conducted in 2011 and the PRO CoP survey conducted in 2012. The samples drawn in 2011 and 2012 were both nested with the earlier surveys conducted by UNU-MERIT. The respondents were the same persons, usually staff of KTOs or research support offices.

- 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 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 Figure 5). Response rates vary by country from 0 to 100% (usually countries with only 1 institute in the sample which either responded or not). 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.

**Figure 5. Usable responses to the PRO CoP survey 2011 and 2012, by country**




Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.

## 3.2 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 (see annex) 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) are all realised by only few responding institutions (see Table 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.

**Table 12. Existence and publication of policies**

| | Universities | | | Other research organisations | | |
|---|---|---|---|---|---|---|
| | N[1] | Answer = Yes | in % | N[1] | Answer = Yes | in % |
| Institution has a written **IP policy** | 223 | 150 | 67.3 | 48 | 33 | 68.8 |
| Institution has published the IP policy | 223 | 60 | 26.9 | 48 | 12 | 25.0 |
| Institution has a written **licence policy** | 214 | 54 | 25.2 | 46 | 15 | 32.6 |
| Institution has published the licence policy | 214 | 14 | 6.5 | 46 | 3 | 6.5 |
| Institution has a written **start-up policy** | 219 | 87 | 39.7 | 47 | 25 | 53.2 |
| Institution has published the start-up policy | 219 | 34 | 15.5 | 47 | 10 | 21.3 |

Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.
1: Number of KTOs answering the question.

(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.

The most common channels for communicating information of research, IP and knowledge transfer opportunities to the private sector are web sites. Workshops and other similar events and press statements come second and third.

**Table 13. Use of channels for communicating information on research, IP and knowledge transfer opportunities to the private sector**

| | Universities | | | Other research organisations | | |
|---|---|---|---|---|---|---|
| | N[1] | Answer = Yes | in % | N[1] | Answer = Yes | in % |
| Press statements | 224 | 86 | 38.4 | 48 | 17 | 35.4 |
| Printed magazines | 224 | 35 | 15.6 | 48 | 9 | 18.8 |
| Electronic or printed newsletters | 224 | 60 | 26.8 | 48 | 15 | 31.3 |
| Web sites | 224 | 162 | 72.3 | 48 | 29 | 60.4 |
| Workshops, seminars, conferences organised for private sector audiences | 224 | 96 | 42.9 | 48 | 17 | 35.4 |
| Booths at trade fairs or organised events | 224 | 37 | 16.5 | 48 | 12 | 25.0 |
| Open days, information days etc. | 224 | 38 | 17.0 | 48 | 10 | 20.8 |
| Business roundtables | 224 | 16 | 7.1 | 48 | 4 | 8.3 |
| Industry advisory boards | 224 | 13 | 5.8 | 48 | 2 | 4.2 |
| Direct mailing (flyers, e-mails etc.) | 155 | 21 | 13.5 | 31 | 3 | 9.7 |
| Personal contacts of KTO staff | 155 | 64 | 41.3 | 31 | 10 | 32.3 |
| External intermediaries and consultants | 155 | 10 | 6.5 | 31 | 3 | 9.7 |
| Other channels | 224 | 14 | 6.3 | 48 | 6 | 12.5 |

Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.
1: Number of KTOs answering the question.

(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 a lot more frequent than other incentives, even if the CoP stipulates that monetary incentives should not be the only ones. 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 (see Table 14). Inventors obtain on average 40% of the revenues from knowledge and technology transfers (see Table 15).

**Table 14. Provision of incentives for researchers and students to protect and exploit IP**

| | Universities | | | Other research organisations | | |
|---|---|---|---|---|---|---|
| | N[1] | Answer = Yes | in % | N[1] | Answer = Yes | in % |
| Percentage of the revenues | 213 | 174 | 81.7 | 47 | 41 | 87.2 |
| Lump-sum payments | 213 | 48 | 22.5 | 47 | 18 | 38.3 |
| Salary upgrades | 214 | 13 | 6.1 | 47 | 4 | 8.5 |
| Additional funds for R&D | 214 | 72 | 33.6 | 47 | 16 | 34.0 |
| Inclusion in promotion& career decisions | 214 | 53 | 24.8 | 47 | 15 | 31.9 |
| Social rewards (e.g. awards, publicity) | 214 | 117 | 54.7 | 47 | 23 | 48.9 |

Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.
1: Number of KTOs answering the question.

**Table 15. Average shares of revenues from IP by recipient**

| | Universities | | Other research organisations | |
|---|---|---|---|---|
| | N[1] | in % | N[1] | in % |
| Department(s), institute(s) or other institutional subunits | 176 | 20.2 | 41 | 15.9 |
| Institution | 176 | 30.3 | 41 | 36.7 |
| Inventor(s), researcher(s) from the institution | 176 | 40.7 | 41 | 38.7 |
| KTO or other intermediaries | 147 | 7.5 | 38 | 7.1 |
| Other beneficiaries | 176 | 2.6 | 41 | 2.1 |
| Total | | 100.0 | | 100.0 |

Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.
1: Number of KTOs answering the question.

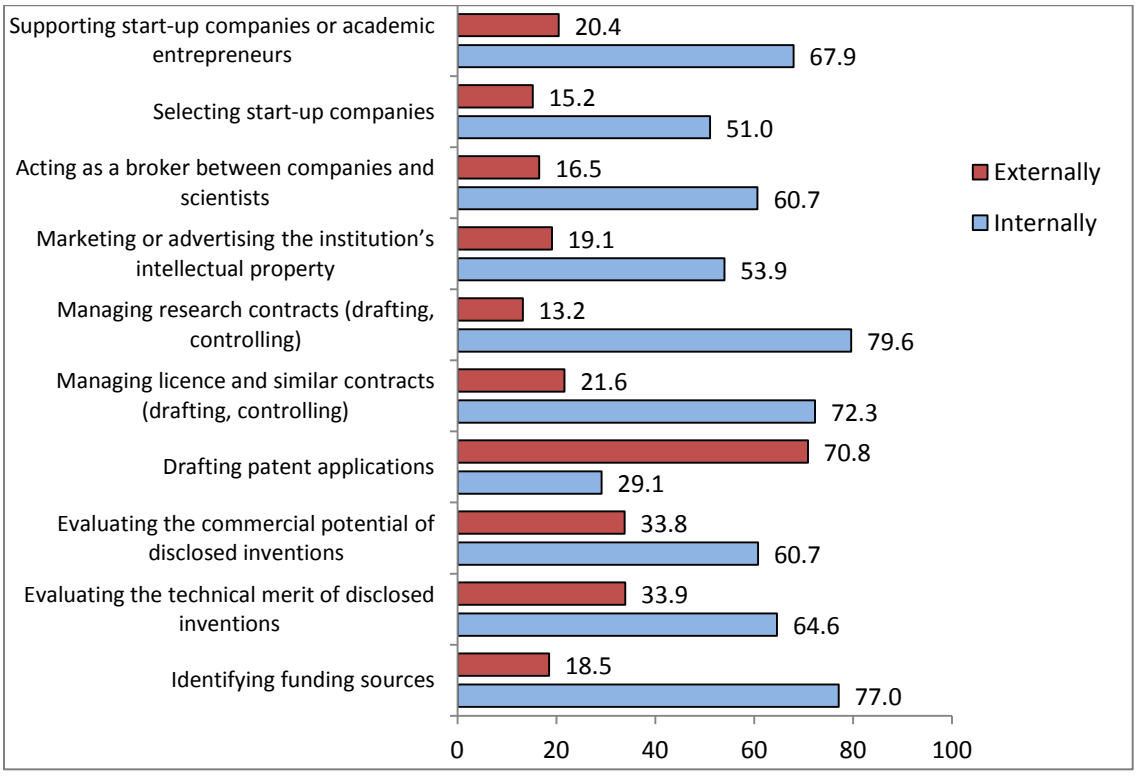
(4) The large majority of 85% of the surveyed knowledge transfer offices (KTOs) are part of the institution for which they responded. 9% are (parts of) private for-profit organisations and 4% are (parts of) public not for-profit organisations outside the PRO. Access to and provision of professional KTT services is generally widespread and most KTOs have some staff with a technical background and formal qualification in science or engineering (CoP 10).

Asked who provides the IP- and knowledge and technology transfer-related services at their institution, the responding offices (or similar) at the institution themselves or external service providers (like consultants, patent attorneys, exploitation agencies and the like), the response pattern reveals four types of services (see Figure 6):

- 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.

**Figure 6. Services provided internally by the PRO or by external service providers (in % of PROs)**

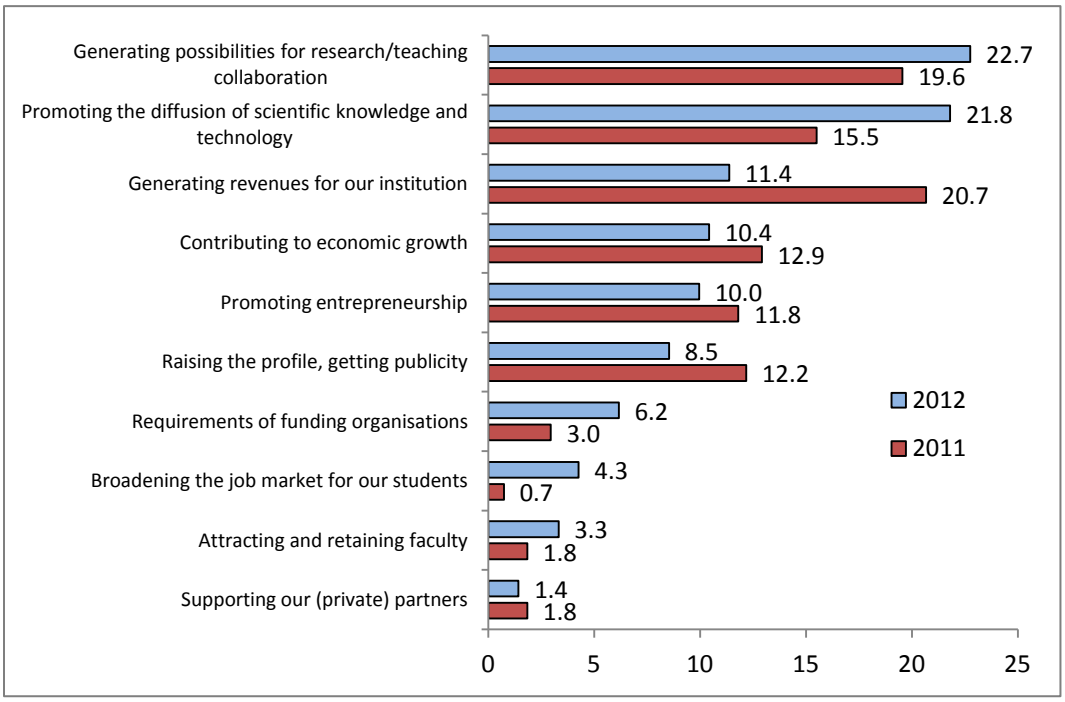



Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.

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) 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. 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.[6] It seems that the forced prioritisation in 2011 worked in favour of including monetary returns as an objective (see Figure 7) 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.

**Figure 7. Important objectives for IP and exploitation policies for institutions by survey year (in % of times mentioned, N=217)**




Source: FHNW, PRO Code of Practice Surveys 2011 & 2012.

[6] See on this Belenzon, S., & Schankerman, M. (2009). University Knowledge Transfer: Private Ownership, Incentives, and Local Development Objectives. *Journal of Law & Economics, 52*, 111-144.

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

(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).

## 3.3 Relationship between policies and performance

In order to analyse the relationship between institutional policies and practices and knowledge transfer performance, the data from the different surveys, the UNU-MERIT EKTIS surveys described in chapter 2 and the FHNW PRO CoP surveys described in this chapter, was pooled. Selected policy variables were then 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:[7]

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

[7] The following is a short non-technical summary of the regression results. Tables on the regressions can be found in the final report which can be accessed through the project website: http://www.knowledge-transfer-study.eu/home/

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.

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

A total of 100 universities and other PROs from a set of 28 different countries were interviewed on the points of key importance for being successful in the area of knowledge and technology transfer. A few key points resulted from these interviews:

*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 specialise 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 publicise 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.

# Annex I: Code of Practice

**Code of Practice for universities and other public research organisations concerning the management of intellectual property in knowledge transfer activities** (Annex I to COMMISSION RECOMMENDATION C(2008)1329, see full text at: http://ec.europa.eu/invest-in-research/pdf/ip_recommendation_en.pdf).

This Code of Practice consists of three main sets of principles.

The **principles for an internal intellectual property** (hereinafter "IP") **policy** constitute the basic set of principles which public research organisations should implement in order to effectively manage the intellectual property resulting from their – own or collaborative – activities in the field of research and development.

The **principles for a knowledge transfer** (hereinafter "KT") **policy** complement those relating to IP policy by focusing more specifically on the active transfer and exploitation of such intellectual property, regardless of whether or not it is protected by IP rights.

The **principles for collaborative and contract research** are meant to concern all kinds of research activities conducted or funded jointly by a public research organisation and the private sector, including in particular collaborative research (where all parties carry out R&D tasks) and contract research (where R&D is contracted out to a public research organisation by a private company).

**1. PRINCIPLES FOR AN INTERNAL INTELLECTUAL PROPERTY POLICY**

1. **Develop an IP policy** as part of the long-term 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.

## 2. PRINCIPLES FOR A 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[8] 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.

[8] With regard to R&D results having several possible application fields, exclusive licences granted without any limitation to a specific field of use should be avoided. Moreover, as a rule, the PRO should reserve adequate rights to facilitate dissemination and further research.

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.

## 3. PRINCIPLES REGARDING COLLABORATIVE AND CONTRACT RESEARCH[9]

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[4] 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**[10] 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.

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[9] When a PRO engages in contract or collaborative research with an industrial partner, the Commission will automatically (i.e. without any notification requirement) consider that no indirect State aid is granted to the industrial partner through the PRO if the conditions set out in the *Community Framework for State Aid for R&D&I* (OJ No C323 of 30.12.2006 – in particular points 3.2.1 and 3.2.2 thereof) are fulfilled.

[10] Access rights refer to rights granted by the parties to each other, as opposed to licences to third parties. They should determine which parties can use which pieces of foreground/background, for research purposes and/or for exploitation purposes, and on what conditions.