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Valorisation of scientific results

Patent commercialisation scoreboard: European universities and public research organisations | November 2020

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Foreword

In the wake of the economic crisis triggered by the COVID-19 pandemic, Europe's future depends more than ever on innovation and creativity. Industries which make intensive use of intellectual property rights (IPR) already represent 45% of the EU's GDP and 39% of its employment. They pay above-average salaries, generate the bulk of Europe's external trade and are more resilient in crises. In other words, IPR-intensive industries can potentially accelerate the recovery of Europe's economies, while addressing the challenges of transitioning to green energy technologies and digital transformation.

But IPR-intensive industries need sound innovation ecosystems to thrive. European research institutions are powerhouses of scientific research, regularly producing breakthrough inventions like the gene editing technology CRISPR-Cas9, which earned the 2020 Nobel prize in chemistry. But they need industry partners to commercialise their findings. The EPO has an important role to play in this respect. As the patent office for Europe, our mission is to provide high quality patent protection for innovation in up to 44 countries (of which 38 are member states of the European Patent Organisation). As the cornerstone of licensing or R&D agreements, patents play a crucial role in commercialising inventions and attracting investors.

In 2019 universities and public research organisations filed one in every ten European patent applications originating from the EPO's member states. To best support them, we need to understand whether these research organisations are able to fully realise the potential value of their IP portfolio. This report monitors the practices, successes and challenges related to commercialising European patents. It is the second study of its kind published by the EPO, following on from last year's Patent Commercialisation Scoreboard for SMEs. The study assesses whether Europe is fulfilling its innovation potential, while providing policy-makers with comprehensive and reliable evidence to support their decisions.

The study shows that public research organisations use European patents as their chief route to commercially exploiting new technologies. The good news is that they already commercially exploit one third of their inventions, while other patented inventions are still not advanced enough to bring to market. However, the study also reveals a number of barriers that significantly limit the valorisation of scientific results. It is these obstacles that have to be addressed if Europe's economy is to harness the full potential of its universities and research organisations.

António Campinos
President, European Patent Office

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List of abbreviations

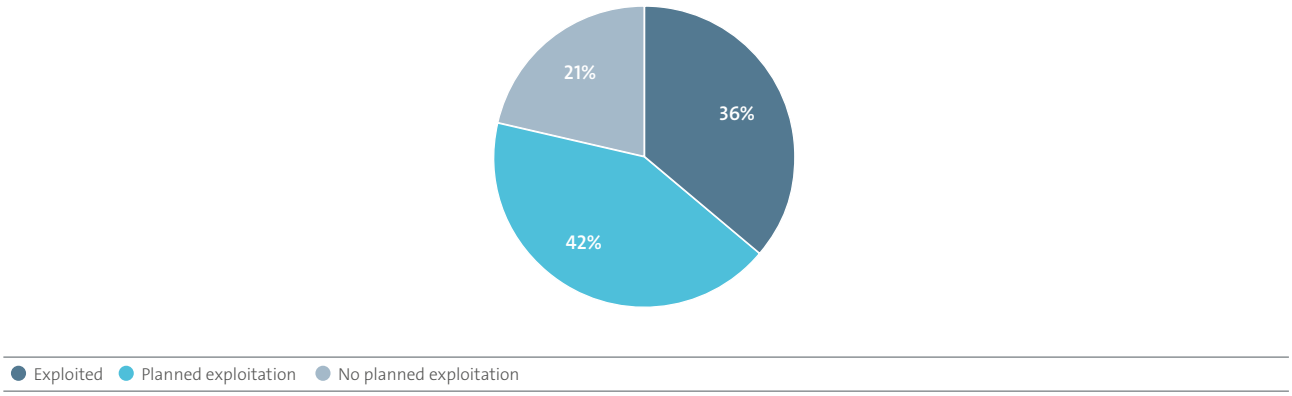
ASTP	Association of European Science and Technology Transfer Professionals
CATI	Computer-assisted telephone interviewing
EC	European Commission
EPC	European Patent Convention
EPO	European Patent Office
FTO	Freedom to operate
HBC	Healthcare, Biotechnology and Chemistry (Principal Directorate at the EPO)
ICT	Information and Communications Technology (Principal Directorate at the EPO)
M&M	Mobility and Mechatronics (Principal Directorate at the EPO)
PRO	Public research organisation (state-funded research facility or agency)
R&D	Research and development
SMEs	Small and medium-sized enterprises
TTO/TLO	Technology transfer office/technology licensing office
UNI/PROs	Universities and public research organisations
WIPO	World Intellectual Property Organization

Key findings

Universities and public research organisations (PROs) play a key role in Europe's innovation ecosystems as sources of scientific knowledge that can be transferred to industry. This scoreboard assesses the ways in which they use the European patent system for this purpose. As such, it provides policy-makers with comprehensive and reliable evidence to further exploit the economic potential of Europe's universities and PROs.

This study is based on a survey of European universities and PROs that have filed patent applications with the European Patent Office (EPO) between 2007 and 2018. It provides detailed information on their patented inventions, commercialisation patterns, and the challenges faced by research institutions in bringing them to market.

Patent commercialisation by European universities and public research organisations



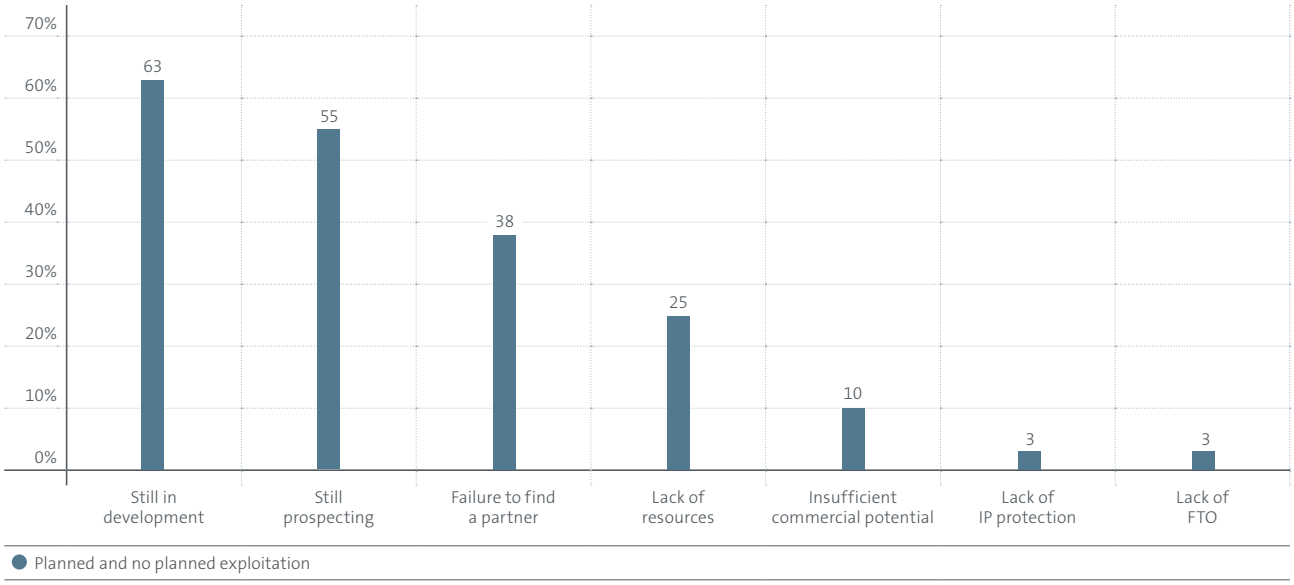
Source: European Patent Office

a. European universities and public research organisations (UNI/PROs) use the European patent system in order to commercially exploit their inventions on an international scale. This is their chief route to bring their new technologies out of laboratories, scale up for manufacturing and enter the market, thereby generating revenue for their organisations.

b. Research institutions already commercialise more than one third (36%) of the inventions for which they have filed a patent application with the EPO. Licensing is by far their preferred commercialisation channel (70% of commercialised inventions). They report setting up a spin-off company as a motive for 41% of commercialised inventions.

c. Surprisingly, commercialisation partners include SMEs and large companies in equal proportions (around 40% each). Most of the successful collaborations (74%) involve partners from the same country and only 27% partners across European borders. However, partners from other European countries play a more important role for institutions in southern and eastern European countries.

Challenges to successful exploitation



Source: European Patent Office

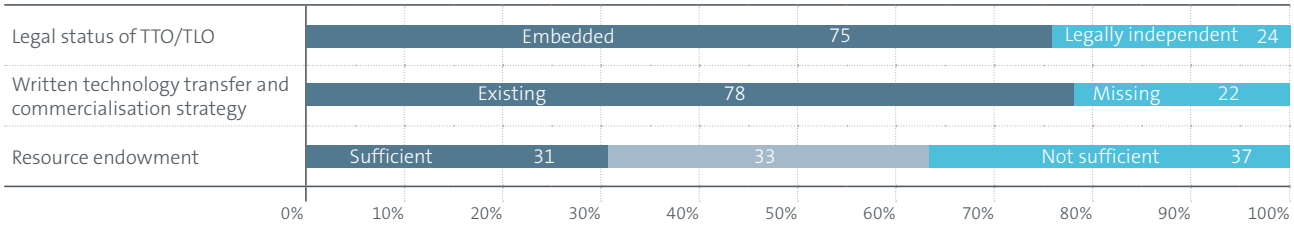
a. Commercialisation is planned but not yet achieved for 42% of the inventions for which European research institutions have filed patent applications with the EPO. In most cases this is because these inventions have not reached proof of concept, either because they are still at the R&D stage (63%) or because commercial opportunities have not yet been identified (55%).

b. Failure to find interested partners is reported as the third most important reason for failed or planned commercialisation (38%). Overall, respondents from southern and eastern Europe reported this challenge more often (66% in the case of no exploitation and 44% in the case of realised exploitation) than did respondents from northern and western Europe.

c. Currently, personal networks (92%) and prior business and research partners (71%) are the most frequently used sources for finding partners, followed by business fairs and conferences (49%). Patent databases (21%) and internet trading platforms (15%) are used less frequently and could be developed to improve chances of finding suitable partners.

d. Lack of resources is mentioned as an important reason for non-exploitation for 25% of patented inventions. Again, this difficulty is reported more by respondents from southern and eastern Europe. The main challenge for the conclusion of successful exploitation deals is the complexity of negotiations, which is considered as "important" or "very important" for 35% of patented inventions, with little variation across geographical regions.

IP practices of European TTOs/TLOs



Source: European Patent Office

a. The patents for three quarters of the inventions from European universities and PROs are managed by TTOs/TLOs which are embedded in the applicant institution. Although they vary in size, the majority of them have 10 or fewer employees (56%), and just one to three people dealing with patent commercialisation (52%).

b. The resource endowment of the TTO/TLO is regarded as sufficient for only 37% of patented inventions. Especially in southern and eastern Europe, where TTO/TLOs tend to be smaller in size, a clear lack of resources is reported (48% vs 14%).

c. For a large majority of patented inventions (78%), European TTOs/TLOs have a written technology transfer and commercialisation strategy.

1. Introduction

Universities and public research organisations (UNI/PROs) play an important role in the innovation ecosystem. They not only provide human capital through education but also generate the scientific knowledge and fundamental research that is necessary to promote innovation and economic growth. Most breakthrough innovations originate in the fundamental research carried out in universities and PROs. This includes – to cite two well-known examples - the MP3 standard for digital audio and the CRISPR- Cas9 tool for gene editing.

In 2018 alone, more than EUR 110 billion was spent on R&D by the government and higher education sectors in the European Union, a 12% increase compared with 2013, although with some diversity across EU member states (Eurostat 2020). According to a recent review by the European Commission (European Commission, 2020), this high level of investment puts Europe among the global leaders. However, in the valorisation of scientific results, especially in high-tech industries, it still lags behind, for example, the US and China. The EC therefore recommends a reinforcement of the European IP policy to foster science/industry interactions and improve knowledge valorisation.

The mission of UNI/PROs includes the transfer of knowledge and technology to industry with a view to fostering innovation in the economy. This objective has become a strategic concern for Europe and has gained in importance over the last decade. According to the EC, the exploitation of the outcomes of publicly-funded R&D in Europe is expected to make it "the most dynamic and competitive knowledge-based economy in the world" (European Commission 2008).

Patents play a pivotal role in this context. They support technology transfer from research to industry, provide a framework for collaborative research with industry partners and afford the necessary protection to enable the private investments that are typically needed to bring inventions from UNI/PROs to market. According to the latest annual survey from ASTP, Europe's association of knowledge transfer professionals, in 2017 alone, two thirds of the participating technology transfer offices (TTOs) received revenue from the licensing of IP rights, with an aggregate of over EUR 450 million (ASTP 2019). In addition, almost 500 spin-offs were created on the basis of intellectual property developed at UNI/PROs, and over 170 000 contract research, collaborative research and consultancy agreements concluded with industry. European UNI/PROs are therefore an important group of applicants at the EPO. In 2019 they filed one in every ten EP applications originating from the EPO member states, and institutions such as the French Commissariat à l'énergie atomique et aux énergies alternatives and the German Fraunhofer Gesellschaft regularly feature among the EPO's top applicants.

It is one of the EPO`s key objectives to ensure that as much knowledge as possible can permeate from UNI/PROs into the innovation ecosystem by way of the European patent system. The EPO not only delivers high-quality patents and efficient services that foster innovation, competitiveness and economic growth. Through its European Patent Academy it strives to increase awareness, providing training for researchers and technology transfer and licensing offices in European public research organisations, as well as supporting businesses to better understand how to co-operate with research partners.

The purpose of this study is to monitor the commercial exploitation of inventions for which European UNI/PROs have filed a patent application with the EPO, and to shed light on the main needs and challenges involved.

Based on a large random sample of pending and granted European patents applied for by European UNI/PROs between 2007 and 2018, followed by interviews with the applicants of those patents in the first half of 2019, this study provides a representative analysis of whether and how the patented inventions are exploited. It provides detailed characteristics of UNI/PRO inventions and their patent applications, as well as the technology transfer and licensing offices responsible for their exploitation. It offers a broad assessment of the reasons why exploitation has not yet taken place and sets out the challenges overcome in cases of successful exploitation. Particular emphasis is placed on reflecting the differences between institutions from different European regions.

The first section of this study describes the methodology and sampling applied, while the following five sections discuss the outcomes. After presenting the characteristics of inventions from European UNI/PROs and the motives for patenting them, the study examines whether, how and with whom these patented inventions are exploited. The fifth section focuses on the specific challenges faced and the channels used for exploitation. The sixth section provides an overview and describes the characteristics of the technology transfer and licensing offices in charge of the exploitation of patented UNI/PRO inventions.

Italian molecular cell biologist **Patrizia Paterlini-Bréchot** developed a filter-based technology to isolate circulating tumour cells in human blood. These cells are often present months or even years before a tumour manifests, so are an ideal "early warning" if only they can be found. Her invention can find a single tumour cell in a 10 ml blood sample of 50 billion cells. Patents for her invention were jointly filed in the names of **INSERM** (a leading French PRO) as well as **University Paris Descartes** and the **Assistance Publique – Hôpitaux de Paris**. Professor Paterlini-Bréchot also established a company, **Rarecells Diagnostics**, to commercialise her technology known as ISET. She was a finalist in the 2019 European Inventor Award – see more at *epo.org/EIA*

2. Methodology

2. Methodology

Survey

The purpose of the survey was to collect evidence on how European UNI/PROs commercially exploit the inventions for which they have filed a patent application with the EPO.[1] It is based on a large sample of European patent applications which are either still pending at the EPO or have already been granted. The fieldwork for the survey was carried out during the first half of 2019 and targeted all EPC contracting states. A total of 686 interviews were conducted.[2]

Sampling

The aim of the sampling approach was to conduct a sufficiently representative number of interviews with owners of European patent applications at European UNI/PROs. To this end, the population of patent applications was first divided into two strata according to status: pending patent applications and granted European patents. All published European applications filed after 2007, including those still pending at the EPO on 31 December 2018, were taken into consideration, as well as all European patents granted by the EPO between 2010 and 2017.

Within both groups, all the selected patent applications named UNI/PROs based in one of the 38 EPC contracting states[3] as one of the applicants in accordance with the latest available information. European UNI/PROs were identified using PATSTAT[4] and manual assessment. The final sample group contained 10 846 pending European patent applications and 7 596 granted European patents.

Table 2.1 describes the patent-based characteristics of UNI/PRO applications and compares them with all EP applications from the same application or grant years. Patent applications from UNI/PROs name on average almost four inventors and are filed by two applicants, which is significantly higher than in total EP applications (2.5 inventors and 1.1 applicants). Approximately one third of UNI/PRO European patent applications were co-applied, mostly with one additional partner. This is in contrast to all EP applications, where fewer than 7% are co-applied and in very rare cases with more than one additional person or organisation. More than three quarters of UNI/PRO patent applications were submitted through the international route, as indicated by the share of patent applications with a PCT patent family member. In comparison, only 57% of EP applications (from all sources) have PCT applications in their patent families. Interestingly, the patent family size of UNI/PRO patent applications, with 6.1 applications on average, is somewhat smaller than that of all European patent applications as a whole.

Table 2.1

Patent-based indicators of UNI/PRO patent applications

	Average number of inventors	Average number of applicants	Proportion of PCT applications	Average family size	Average number of validation countries[1]
Universities and PROs	3.9	2.0	76%	6.1	5.5
All EP	2.5	1.1	57%	6.3	5.3

1 For granted patents only

For those patent applications that have already been granted, it is possible to analyse in which EPO member states they have been validated most frequently. On average, patents granted to UNI/PROs have been validated in 5.5 member states, slightly more than the average number of countries for all EP applications (5.3). Germany (92%) and France (91%) are clearly the top destinations, followed by the United Kingdom (79%).

1 Details of the survey can be found in Annex 1.
2 The survey was carried out on behalf of the EPO by BERENT Deutschland GmbH. See Annex 2 for the full field report.
3 https://www.epo.org/about-us/foundation/member-states.html
4 Table TLS206 provides information on the type of applicant.

Each of the two groups of pending and granted EP applications was then further stratified by the two following dimensions:

1. The technology to which they relate, following the three operational sectors of the EPO: Mobility and Mechatronics (M&M), Information and Communications Technology (ICT) and Healthcare, Biotechnology and Chemistry (HBC). Because of the expected net sample (final sample), the M&M and ICT sectors were merged together in order to provide a sufficient sample size in each sub-group.

2. The geographical origin of the UNI/PRO applicant: "southern Europe and eastern Europe" and "northern Europe and western Europe".[5]

The geographical distribution of the patent population across regional groups, the technical sectors, and the status is presented in Table 2.2.

Before the drawing of the gross sample, the applications in the whole population were consolidated so that each UNI/PRO appeared as only one case in the sample, which resulted in N=1 579 unique UNI/PRO cases. Each consolidated case carried all applications assigned to it in the sample information. In the next step, up to ten applications from each UNI/PRO were drawn to be the subject of an interview.

Within individual UNI/PROs, interviews relating to more than one application were made possible. The target person could choose from the up to ten selected patent applications, which were offered in a randomised order. This was necessary because the number of unique UNI/PROs in the population was insufficient to achieve the targeted net sample of 500 interviews, and had each been limited to just one interview there would not have been a sufficient number of records entered in each stratum to represent the population in the best possible way.

Table 2.2

Geographical distribution of the European patent application population filed by European UNI/PROs by region, status and sector

	Granted (N)			Pending (N)		
	HBC	M&M + ICT	Total	HBC	M&M + ICT	Total
Southern and eastern Europe	109	48	157	250	131	381
Northern and western Europe (excl. Germany)	109	54	163	363	217	580
Germany	38	35	73	111	114	225
Total	**256**	**137**	**393**	**724**	**462**	**1186**

	HBC	M&M+ICT	Total	HBC	M&M + ICT	Total
Southern and eastern Europe	28%	12%	40%	21%	11%	32%
Northern and western Europe (excl. Germany)	28%	14%	41%	31%	18%	49%
Germany	10%	9%	19%	9%	10%	19%
Total	**65%**	**35%**	**100%**	**61%**	**395**	**100%**

If the interviewee lacked sufficient information to be able to provide answers on the randomly selected application and the UNI/PRO had a larger number of applications, the target respondent was allowed to select another application (outside of the set of ten randomly selected applications) as the object of the interview. This was done in forty interviews in total. Respondents did however have to choose an application which they had worked on during the same time period from which the population sample originated.

5 These two groups were defined according to geographical location, IP business practices and sample size balance. The "southern Europe + eastern Europe" group includes UNI/PRO applicants from Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Turkey. The "northern Europe + western Europe" group includes Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Liechtenstein, Luxembourg, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom.

Fieldwork

Data collection was conducted via telephone interviews (computer-assisted telephone interviewing - CATI) by BERENT Deutschland GmbH. To ensure high response rates, the interviews were conducted in three languages: English, French and German.

In most cases respondents were either the managing or executive director of the TTO/TLO (57%) or the IP manager (34%).

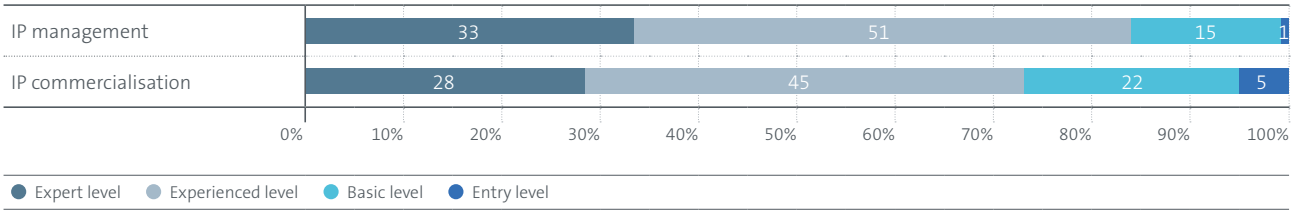
A clear majority of respondents considered themselves to be at either an experienced or expert level in patent management (83%) or at an experienced or expert level in the commercialisation of patents (73%). Figure 2.1 shows the distribution.

The interviews, which lasted an average of 23 minutes, were conducted between April and June 2019. Of the consolidated population sample of 1 579 records (unique UNI/PRO cases), 129 (8%) could not be contacted because of missing or incorrect contact details. Of the remaining 1 450 records, samples were drawn randomly to be contacted. Some 241 contacts with unique UNI/PROs were established, from which sample interviews on 686 distinct patent applications were conducted.

Many UNI/PROs provided more than one interview (Table 2.3). As the pool of persons working on the commercialisation of applications within UNI/PROs is limited to a relatively small number, the aim was to distribute the interviews not just among UNI/PROs, but also among different target persons within UNI/PROs. Thus one of the aims of the fieldwork was to interview several target persons within one UNI/PRO, especially in the case of larger institutions.

Figure 2.1

Experience level of respondents (based on 686 unweighted interviews)



Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which <1% Don't know and <1% No statement

Table 2.3

Number of interviews per unique institution

	Number of interviews per unique institution	
	N	%
1	100	41.5
2	44	18.3
3	28	11.6
4	21	8.7
5	12	5.0
6	16	6.6
7	7	2.9
8	4	1.7
9	6	2.5
11	1	0.4
14	2	0.8

The main reasons for non-responses were difficulties in finding a suitable contact person to complete the questionnaire or the person's refusal to participate in the survey. All interviews were also checked for the completeness, consistency and plausibility of the answers given.

Final sample

The distribution of the final sample of 686 interviews across the stratification dimensions is presented in Table 2.4. A total of 469 interviews were conducted for pending patent applications and 217 for granted European patents.

Table 2.4

Final net sample

	Pending (N)		Granted (N)	
	HBC	M&M + ICT	HBC	M&M + ICT
Southern and eastern Europe	102	55	68	33
Northern and western Europe	173	139	58	58
Total	**275**	**194**	**126**	**91**

During the interviews, respondents were asked to indicate whether their UNI/PRO was still in charge of the patent/application. In 5% of cases, respondents reported that the patent/application had been abandoned. To ensure that answers to questions about the exploitation of patents were fully relevant at the time of the interview, this report focuses on those patents or patent applications that had not been abandoned by the UNI/PRO. All of the results below are thus based on the remaining 95% , or 650 interviews, where the patent/application is either in ownership or co-ownership, or where it has been either sold or transferred. Of these 650, some 446 were pending patent applications, and 204 were granted patents.

To provide an industry-oriented analysis of the different technology fields, the number of technical sectors was expanded to include WIPO's five technology sectors (Schmoch, 2008): electrical engineering, instruments, chemistry and pharmaceuticals, mechanical engineering, and other fields.

In terms of data analysis, all observations in the final sample have been weighted to align them with the distribution of the population by the following dimensions: EPO technical sector, status and region. For example, Table 2.5 shows that southern and eastern Europe provided too many interviews in the field in relation to its share of the population sample. As a result, it was weighted down, and northern and western Europe (including Germany) weighted up, whereby the single weighting factors did not exceed the value of 2.19.

The results are based on a sample and are therefore subject to statistical errors. Percentages calculated for less than 50 respondents are not reported as they do not represent a wide enough cross-section of the target population to be considered statistically reliable. The margin of error of a data set with 650 interviews and for a percentage value of around 50% is +/- 3.8 percentage points.

The distribution of the weighted final sample of 650 (unweighted) owned, co-owned, sold or transferred European patent applications by geographical region [6], EPO technology sector and status is provided in Tables 2.5, 2.6 and 2.8. Table 2.7 shows the distribution for the WIPO technology sectors.

The results presented in this report are based on this weighted sample. The unweighted base number of interviews for each question is nevertheless always reported.

Table 2.5

Distribution of final sample of European patent applications by geographical area

	Southern and eastern Europe	Northern and western Europe (excl. Germany)	Germany	Total
Unweighted (N)	254	252	144	650
Share (%)	39%	39%	22%	100%
Weighted (N)	84	341	212	637
Share (%)	13%	54%	33%	100%

Table 2.6

Distribution of final sample of European patent applications by EPO technology sector

	Healthcare, biotechnology and chemistry	Mobility and Mechatronics + ICT	Total
Unweighted (N)	382	268	650
Share (%)	59%	41%	100%
Weighted (N)	331	305	636
Share (%)	52%	48%	100%

Table 2.7

Distribution of final sample of European patent applications by WIPO technology sector

	Electrical engineering	Instruments	Chemistry	Mechanical engineering and other fields	Missing	Total
Unweighted (N)	81	173	303	90	3	650
Share (%)	12%	27%	47%	14%	0%	100%
Weighted (N)	96	187	256	95	3	637
Share (%)	15%	29%	40%	15%	0%	100%

Table 2.8

Distribution of final sample of European patent applications by stratus

	Pending	Granted	Total
Unweighted (N)	446	204	650
Share (%)	69%	31%	100%
Weighted (N)	378	258	636
Share (%)	59%	41%	100%

6 The results for Germany, due to its size and influence on the results, are reported separately.

Table 2.9

Distribution of final sample of European patent applications by geographical area and EPO technology sectors

		N		%	
		Healthcare, biotechnology and chemistry	Mobility and Mechatronics + ICT	Healthcare, biotechnology and chemistry	Mobility and Mechatronics + ICT
Unweighted	Southern and eastern Europe	167	87	44	32
	Northern and western Europe (excl. Germany)	150	102	39	38
	Germany	65	79	17	29
	Total	**382**	**268**	**100**	**100**
Weighted	Southern and eastern Europe	53	31	16	10
	Northern and western Europe (excl. Germany)	191	149	58	49
	Germany	87	125	26	41
	Total	**331**	**305**	**100**	**100**

Table 2.10

Distribution of final sample of European patent applications by geographical area and WIPO technology sectors

		N*				%*			
		Electrical engineering	Instruments	Chemistry	Mechanical engineering and other fields	Electrical engineering	Instruments	Chemistry	Mechanical engineering and other fields
Unweighted	Southern and eastern Europe	19	55	140	39	23	32	46	43
	Northern and western Europe (excl. Germany)	39	72	111	28	48	42	37	31
	Germany	23	46	52	23	28	27	17	26
	Total	81	173	303	90	100	100	100	100
Weighted	Southern and eastern Europe	7	18	46	13	7	10	18	14
	Northern and western Europe (excl. Germany)	53	102	141	43	55	55	55	45
	Germany	37	67	70	39	38	36	27	41
	Total	97	187	257	95	100	100	100	100

* Excluding missing values

This Polish team at the University of Warsaw (l-r) **Jacek Jemielity, Joanna Kowalska** and **Edward Darżynkiewicz** developed a novel way to stabilise messenger RNA, by changing just one atom in a molecule of over 80 000 atoms. The resulting m-RNA is five times more stable, able to endure attack from enzymes inside the human body, and consequently is central to numerous new genetic therapies. The team were able to partner with **BioNTech** to bring their research to market, and the resulting patents were licensed to several major pharmaceutical companies; in 2018 the technology had an estimated worth of 1 billion USD. Professor Jemielity founded a spin-out **exploRNA Therapeutics** to further develop applications using stabilised m-RNA. The trio were finalists in the 2018 European Inventor Award – see more at *epo.org/EIA*

3. Characteristics of UNI/PRO patented inventions

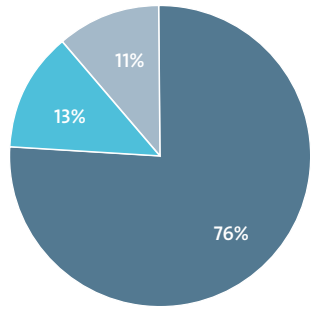
3. Characteristics of UNI/PRO patented inventions

More than three quarters of all patented inventions, i.e. novel technologies that are the subject of pending or granted European patent applications, came solely from UNI/PROs and 24% in co-operation with other organisations. Of these 24% slightly more than half were co-developed with researchers from other universities and PROs (13%) and the remaining 11% with private companies.[7]

Around 37% of the patented inventions are product-oriented and more than a quarter (26%) are purely process- or method-oriented. The remaining 37% have features of both.[8]

Figure 3.1

Co-development of patented inventions



Developed alone · Developed together with another UNI/PRO · Developed together with a private company or individual inventor

Source: European Patent Office

Basis: Number of interviews unweighted N=650, of which <1% Don't know and <1% No statement.

7 Typically, inventions and other IP rights created by students who do not have an employment contract or other contractual relationship are owned by the students and can also fall under the category of independent inventor. Some universities have general regulations in place which stipulate that if university resources are used, they maintain a stake in the IP created. However, it is not always clear if this can be enforced and it depends on national law.

8 Compared with SMEs, UNI/PROs show a significantly smaller share of purely product-oriented (-10% compared with SMEs) patents and a larger share of process- or method-oriented (+11%) ones (see "Market success for inventions; Patent commercialisation scoreboard: European SMEs", EPO 2019). A possible explanation is that, contrary to SMEs, UNI/PROs are not in direct contact with final markets and are less prone to use secrecy as a protection mechanism. Secrecy is also rare at UNI/PROs because of open science and open access missions, and increasing requirements of public funding organisations.

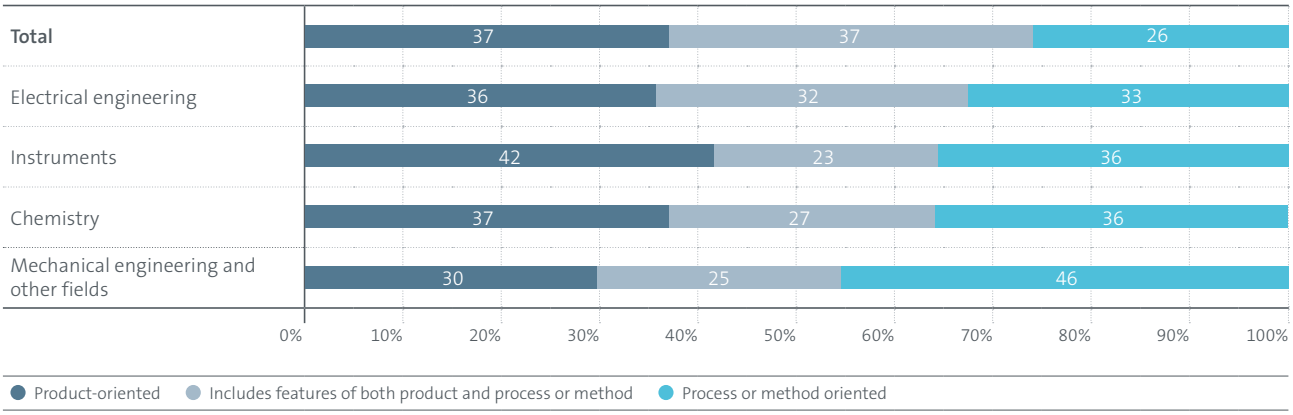
The relative proportions of patented inventions for products, processes or mixtures of the two differ across technical sectors. Instruments (42%) and chemistry (37%) show the highest shares of product-oriented inventions. Mechanical engineering and other fields is the sector with the highest share of purely process- or method-oriented inventions (46%). Electrical engineering shows the largest share of inventions that have features of both products and processes or methods (46%).

A majority of all patented inventions from UNI/PROs have not yet reached market maturity, with 13% still in the research stage and 44% in the development stage. Only 43% were reported as having reached the implementation and operation stage. By comparison, a similar survey last year on the commercialisation of patented inventions by SMEs (EPO, 2019) reported that they had almost twice as many patented inventions in the implementation and operation stage, with only 21% still in the R&D stage.

Compared with universities (38%), PROs show a much larger share (51%) of their patented inventions in the implementation and operation stage. Although the shares of patented inventions in the research stage are similar at both universities and PROs (14% and 12% respectively), almost half of universities' patented inventions (47%) are in the development stage, compared with only 36% of PRO patented inventions. Universities therefore seem to be more committed to basic research, while PROs have a stronger focus on applied research (i.e. closer to a commercial or practical purpose).

Figure 3.2

Type of patented invention

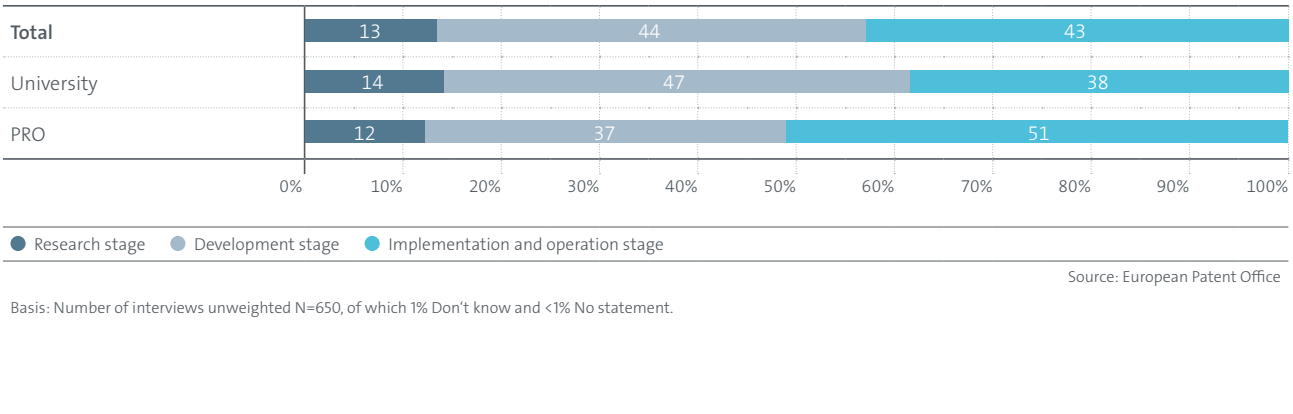


Source: European Patent Office

Basis: Number of interviews unweighted N=650, of which <1% Don't know and <1% No statement.

Figure 3.3

Stage of development



Source: European Patent Office

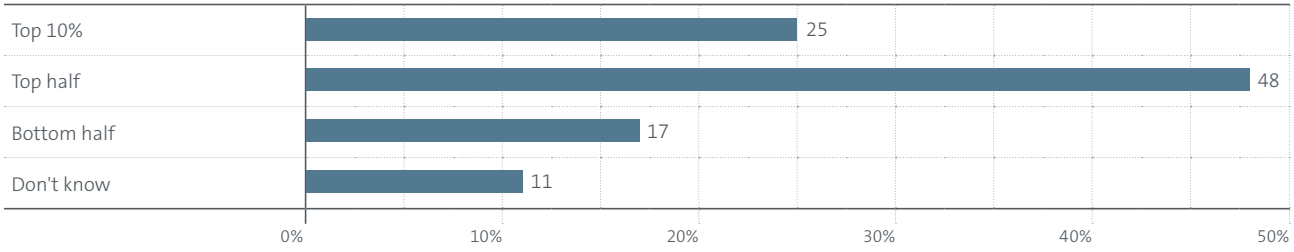
Basis: Number of interviews unweighted N=650, of which 1% Don't know and <1% No statement.

A large majority of respondents consider their patented inventions as important technical developments in the relevant industry. Around 25% of inventions are reported to belong in the top 10% in the relevant industry, and 73% in the top half of all inventions. Only 17% of inventions are ranked in the bottom half. Interestingly, a relatively large share of respondents (11%) did not know where to rank the invention, independently of whether a patent had already been granted or the application was still pending. This was mostly seen with German respondents, who provided the greatest share of "Don't know" answers (21%).[9]

"Facilitating technology sale or licensing agreements" is the most important motive for maintaining a European patent. In 80% of cases, respondents consider it as being "important" or "very important". Two other motives, namely "preventing others from imitating" and "facilitating contract research or other types of co-operation", are each considered important for two thirds of inventions. Motives such as "reputation" and "facilitating technology spin-offs" received lower ratings, but are still regarded as at least important for more than half of patented inventions. In general, all motives received relatively high importance ratings, which shows that for UNI/PROs, patents fulfill a variety of value-creating roles.[10]

Figure 3.4

Importance of patented inventions to their industry

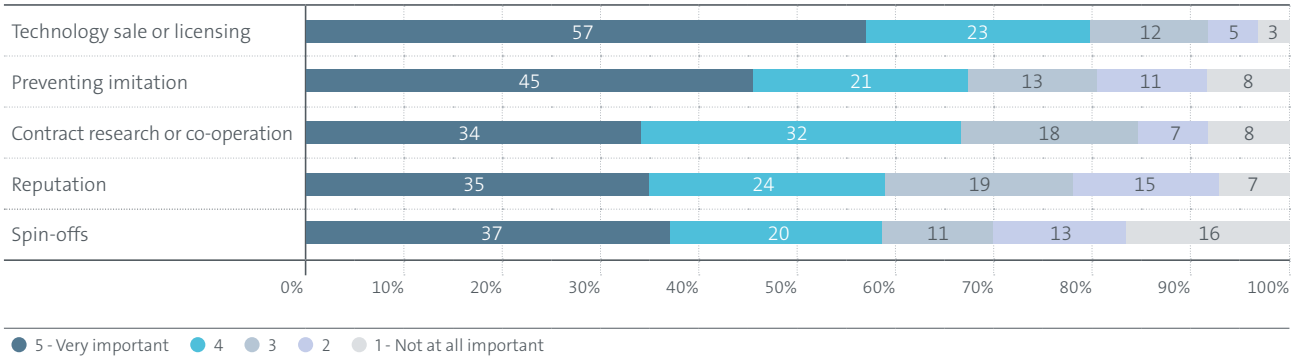


Source: European Patent Office

Basis: Number of interviews unweighted N=650, of which 1% No statement.

Figure 3.5

Motives for maintaining patent protection



Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which <1% Don't know and <1% No statement.

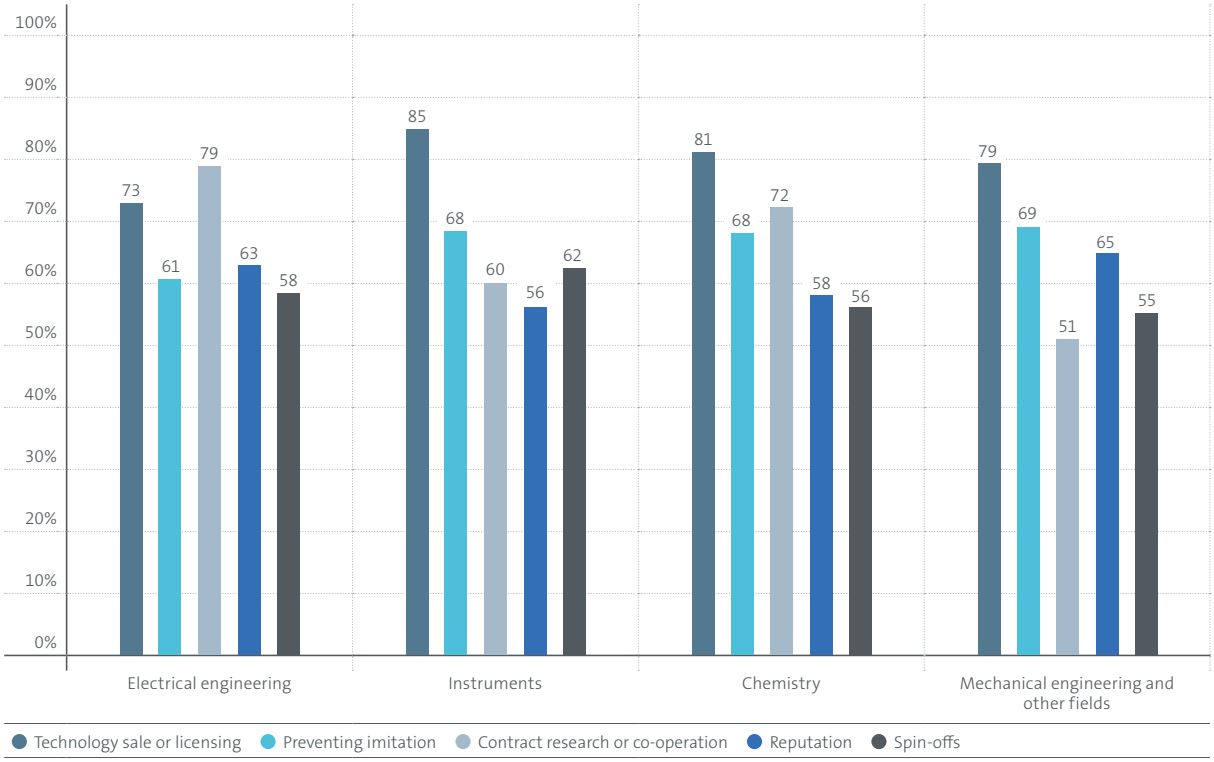
9 The share of "Don't know" answers was 6% for southern and eastern Europe and 5% for northern and western Europe (excluding Germany).

10 It is interesting to note that the importance of the motives differs between UNI/PROs and SMEs. For SMEs, preventing imitation is clearly the most important motive, followed by reputational aspects, while for UNI/PROs, transactional and revenue-enabling motives, such as the selling and licensing of technology, and commercial or third-party contracts, are more important.

Despite some differences across technology areas, overall the picture tends to be consistent. All motives received an approval rating of at least 50% across all technologies. Facilitating technology sale and licensing is the dominant motive, considered to be "important" or "very important" for around 80% of patented inventions.[11] Electrical engineering is the only exception: in this field "technology sale and licensing" is second to "contract research and co-operation". The reputational aspect is the most important motive in mechanical engineering and other fields (65%) and the least important in instruments (56%).

Figure 3.6

Motives for maintaining patent protection by technology sector



Source: European Patent Office

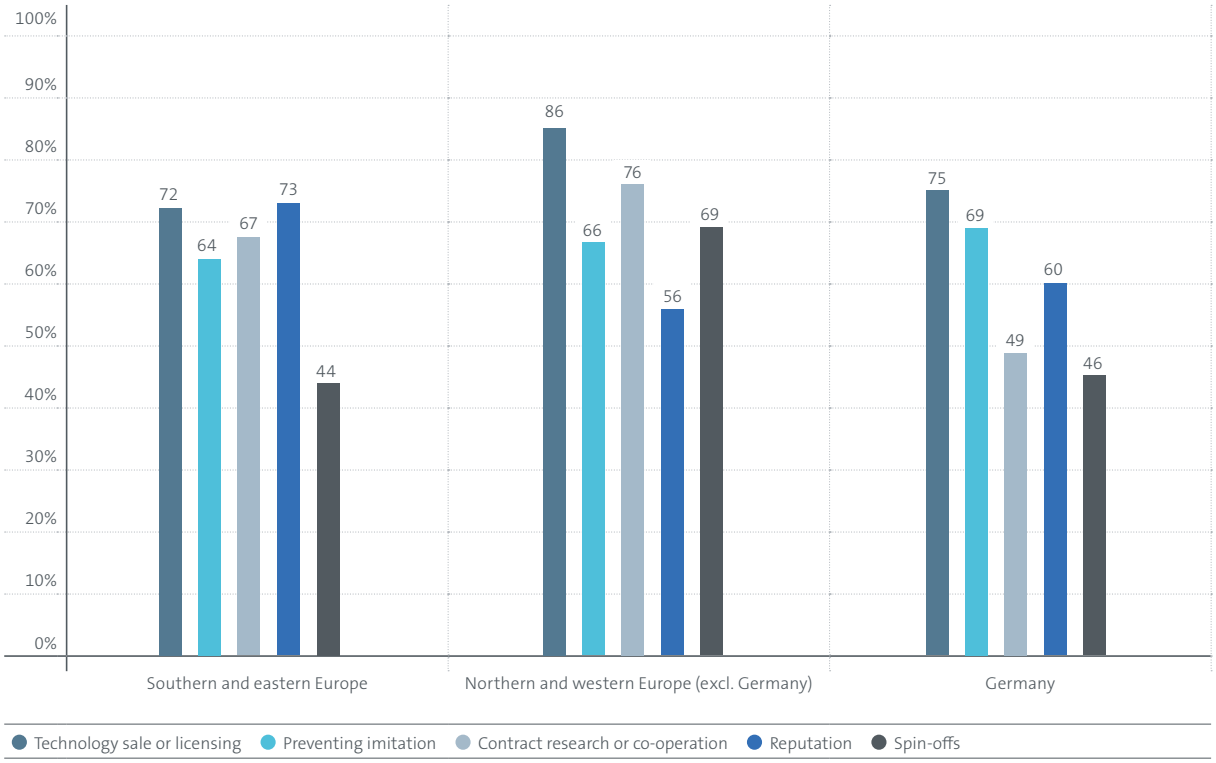
Basis: Number of interviews unweighted N=633, of which <1% Don't know and <1% No statement.

11 Each respondent had to assess all motives (see survey questions in Annex 3).

The geographical distribution shows more variation. For patented inventions from northern and western Europe (excluding Germany), facilitating technology sale or licensing, with 86%, is by far the strongest motive, followed by contract research or co-operation (76%) and facilitating spin-off creation (69%), while the reputational motive (56%) plays the least important role. This is in contrast to southern and eastern Europe, where reputational aspects, with 73%, are considered important by the highest share of respondents and facilitating spin-off creation by the lowest (44%). Interestingly, the answers of German respondents are closer to the ones from southern and eastern Europe than to those from northern and western Europe.

Figure 3.7

Motives for maintaining patent protection by region



Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which <1% Don't know and <1% No statement.

Spider silk is one of the lightest yet strongest fibres known to nature. **Thomas Scheibel** modified E. coli bacteria with gene from spiders so as to produce artificial silk through a fermentation process. He also developed means to spin the resulting material into ultra-fine fibres. Patent applications for his inventions were filed by the **Technical University Munich**, and Professor Scheibel founded a spin-out, **AMSilk**, to commercialise the technology. His materials are finding applications in textiles, sportswear, cosmetics and as a coating for medical implants and wound dressings because it is biologically compatible (i.e. low risk of rejection). He was a finalist in the 2018 European Inventor Award – see more at *epo.org/EIA*

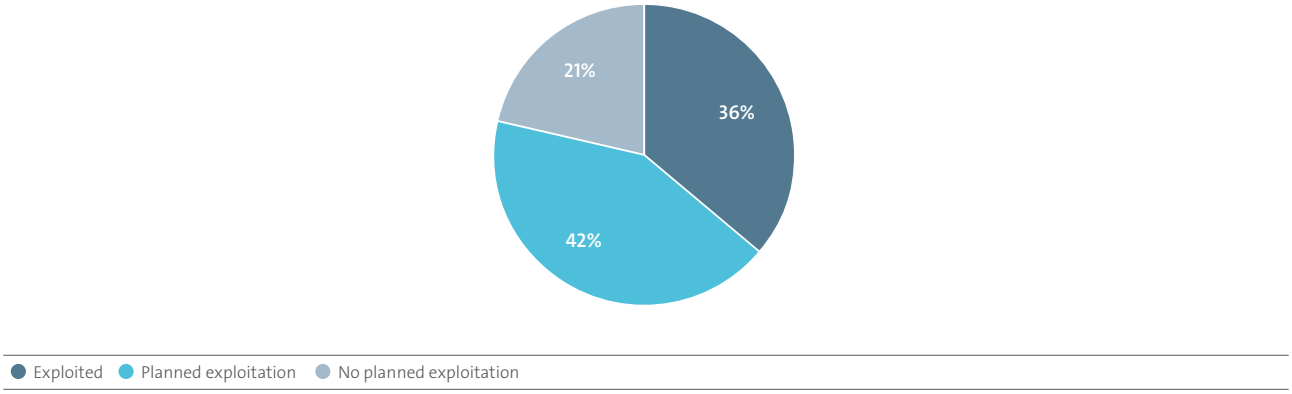
4. Exploitation of European patents and patent applications

4. Exploitation of European patents and patent applications

According to the survey results, 36% of granted or pending European patent applications filed by UNI/PROs are already actively exploited.[12] [13] Interestingly, this share is similar for granted patents and pending patent applications (38% vs 35%) as well as for universities and public research organisations (35% vs 38%). In addition, respondents indicated that they are planning to exploit another 42% of the patented inventions and bring them to the market. For the remaining 21%, no exploitation plan has been reported.

Figure 4.1

Stage of exploitation of patented inventions



Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which 1% Don't know and <1% No statement.

12 The results are based on the question whether the patented invention is currently being commercially exploited, or was exploited in the past. Examples include making, using, selling, offering for sale or licensing its appropriation or using it in contractual or collaborative research (see questionnaire in Annex 3). They are in line with the outcomes of the PatVal-EU survey of inventors of European patents that was carried out between 2003 and 2004. According to the results reported in Giuri et al (2007), 33.3% of European patents from public research institutions and 32.5% of European patents from universities were exploited through licensing or cross-licensing.

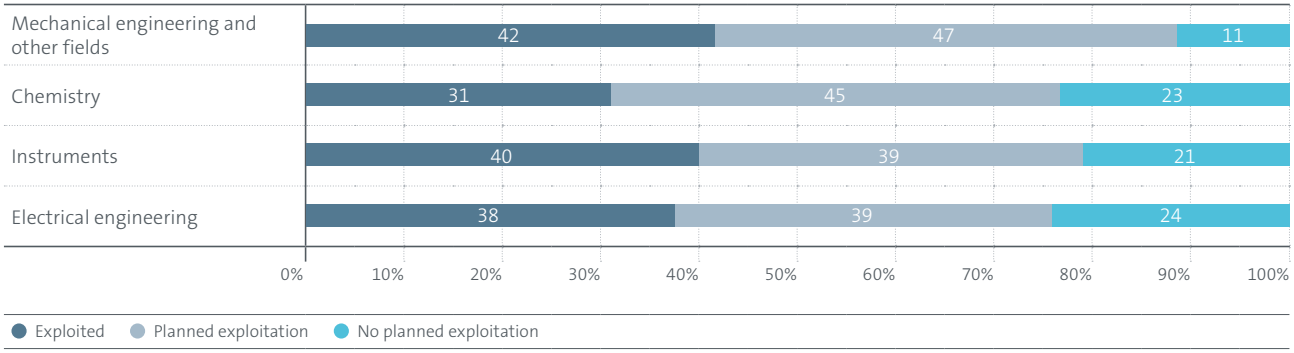
13 The share of exploited European patent applications is likely to be higher than in the case of national patents. A European patent can provide patent protection in up to 44 countries and indicates that the applicant is aiming at international markets. Therefore, European patents are more likely to be filed for inventions of higher importance (see Figure 3.4), which should also have a higher probability of being commercially exploited. For example, Martinez and Bares (2018) showed that university TTOs in Spain tend to use international patent extension only if a licensing agreement already exists or is very probable.

The exploitation rates show some variation across technology fields too. Mechanical engineering and other fields (42%) shows the highest share of exploitation, followed by instruments (40%), electrical engineering (38%) and chemistry (31%).[14] Although chemistry, which includes pharmaceutical and biotechnology inventions, has the lowest share of exploited patents or patent applications (45%), it has relatively high shares for their planned exploitation together with mechanical engineering and other fields (47%). The share of patented inventions without exploitation plans is lowest in mechanical engineering and other fields (11%) and highest in electrical engineering (24%).

Some differences can also be observed across geographical regions. Germany (39%) has the highest share of exploited inventions, followed by southern and eastern Europe (37%) and northern and western Europe (34%). However, the differences across the regions are surprisingly small. The main discrepancies concern unexploited patented inventions. Northern and western Europe in particular has a much higher share of inventions without any existing exploitation plans (30%).

Figure 4.2

Stage of exploitation of patented inventions by technology sector

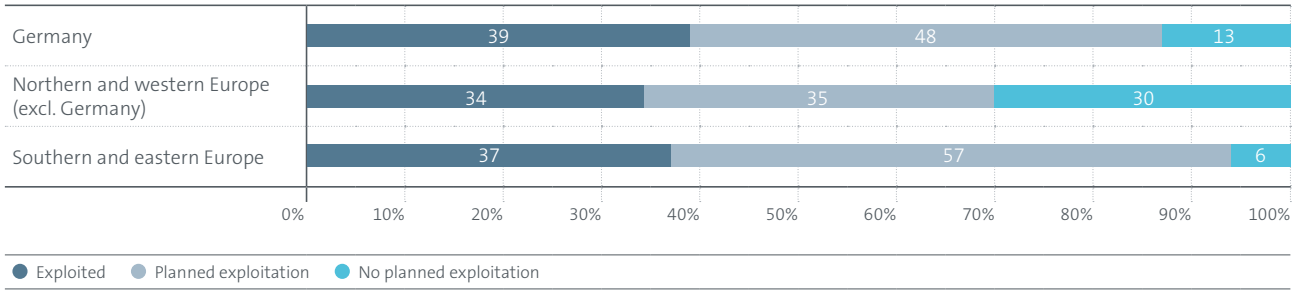


Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which 1% Don't know and <1% No statement.

Figure 4.3

Stage of exploitation of patented inventions by geographical region



Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which 1% Don't know and <1% No statement.

14 One possible explanation for the relatively low exploitation rate of patented inventions in chemistry is that products in these markets often need to undergo lengthy approval and regulatory processes before they can be brought to market.

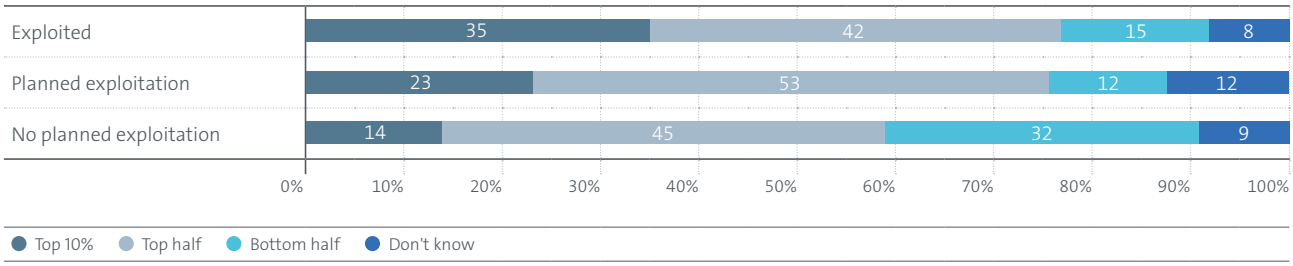
Drivers of exploitation

The following analysis takes a closer look at the drivers of exploitation. Patented inventions which are regarded as a significant breakthrough in the respective industry are more likely to be exploited or planned to be exploited. The proportion of inventions belonging to the top 10% of technical developments in the relevant industry is much higher among successfully commercialised inventions (35%) than among inventions that are not commercialised. It is significantly lower for patented inventions for which exploitation plans exist (23%) and even lower for those without plans (14%). Interestingly, the shares of patented inventions which belong to the top half are very similar for exploited patented inventions (77%) and for those for which exploitation is planned (76%). Patented inventions for which no exploitation plans exist show the highest share of inventions of below-average importance in their industry (32%).

Commercial exploitation is also strongly correlated with the development stage of the patented invention. Up to two thirds of successfully exploited patented inventions have reached the implementation and operation stage, while less than 30% are still in the development stage and only 4% have not yet passed the research stage. In contrast, the two groups of patented inventions which have not (yet) been exploited show large shares of inventions that are still in the R&D stage (75% and 63% respectively). Unsurprisingly, a similar correlation can be observed between the age of the inventions and the proportion of exploited inventions (Figure 4.6).

Figure 4.4

Stage of exploitation by importance of patented invention

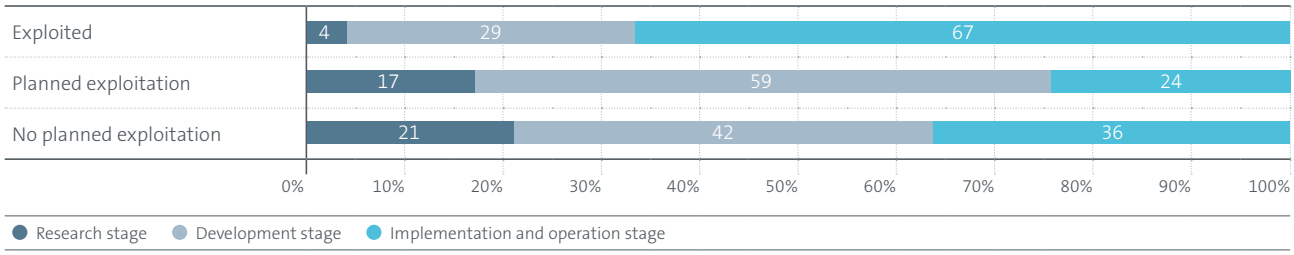


Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which 1% No statement.

Figure 4.5

Stage of exploitation by development level of patented invention

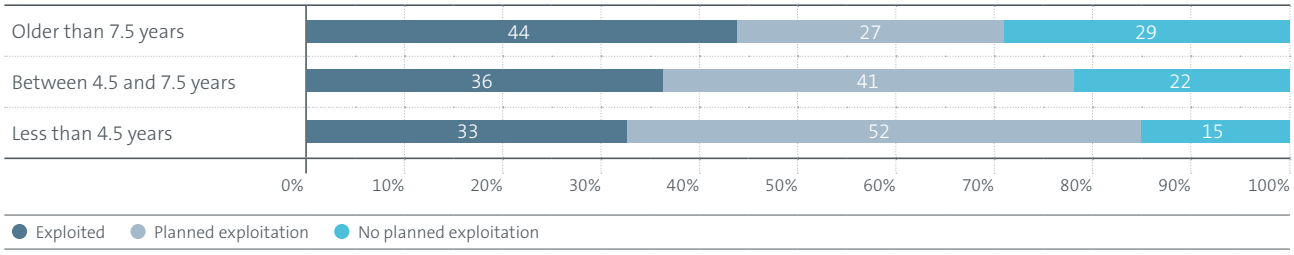


Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which 1% Don't know and <1% No statement.

Figure 4.6

Stage of exploitation by age of patented invention from its priority date



Source: European Patent Office

Basis: Number of interviews unweighted N=633, of which 1% Don't know and <1% No statement.

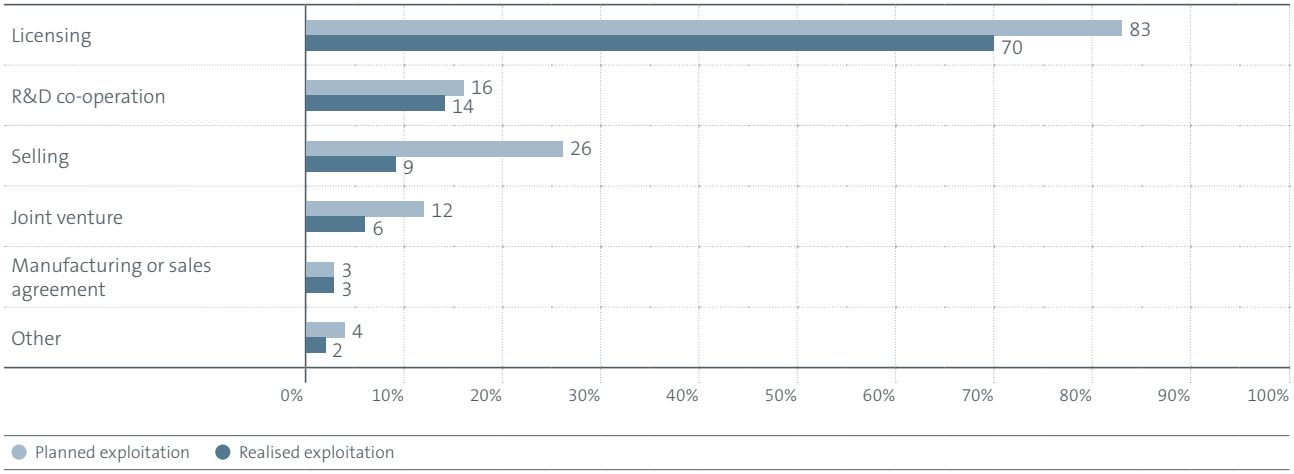
Types of exploitation and reasons for them

The following figures focus on patented inventions that are either already being exploited or for which exploitation is planned. Figure 4.7 firstly shows a breakdown by type of exploitation activity. With reported shares of 70% and 83% respectively, licensing is by far the most important exploitation channel. For realised exploitations, R&D co-operation is the second most frequently reported activity (14%), followed by selling (9%). A joint venture is used or planned for the exploitation of the invention in around 6% of cases.

The main difference between the exploitation channels used by universities and PROs is that licensing and selling are more frequently reported by universities than by PROs. In contrast, R&D co-operation and joint ventures seem to be more favoured by PROs than by universities.

Figure 4.7

Types of exploitation

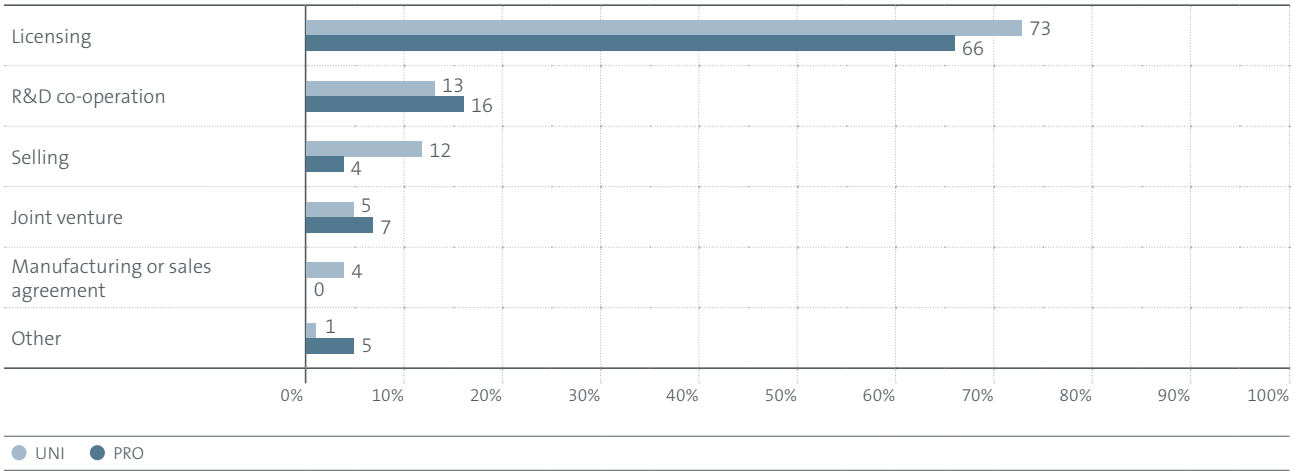


Source: European Patent Office

Basis: Number of interviews unweighted N=244, of which 2% Don't know and <1% No statement.

Figure 4.8

Types of realised exploitation by type of applicant

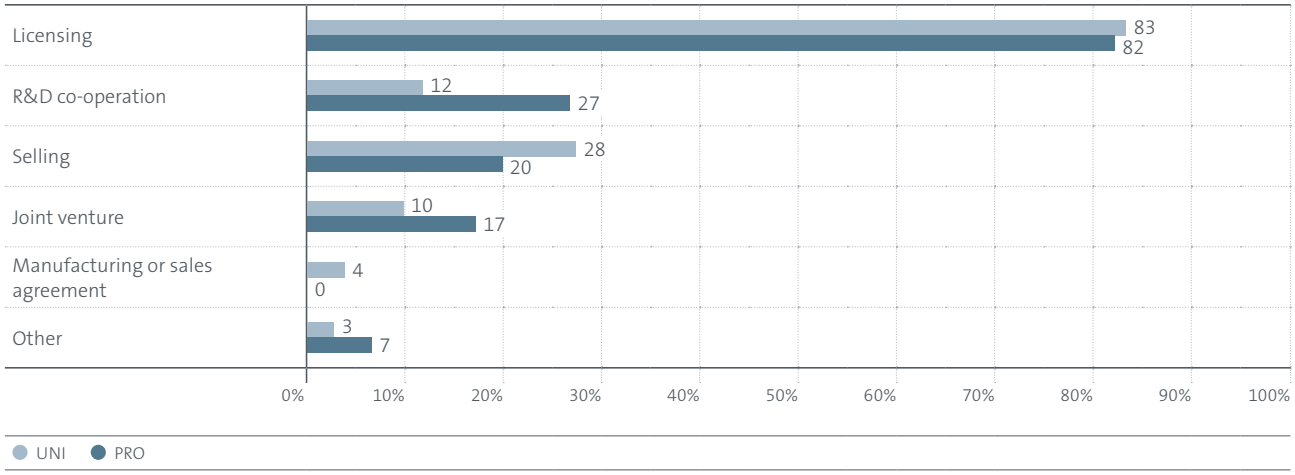


Source: European Patent Office

Basis: Number of interviews unweighted N=244, of which 2% Don't know and <1% No statement.

Figure 4.9

Types of planned exploitation by type of applicant



Source: European Patent Office

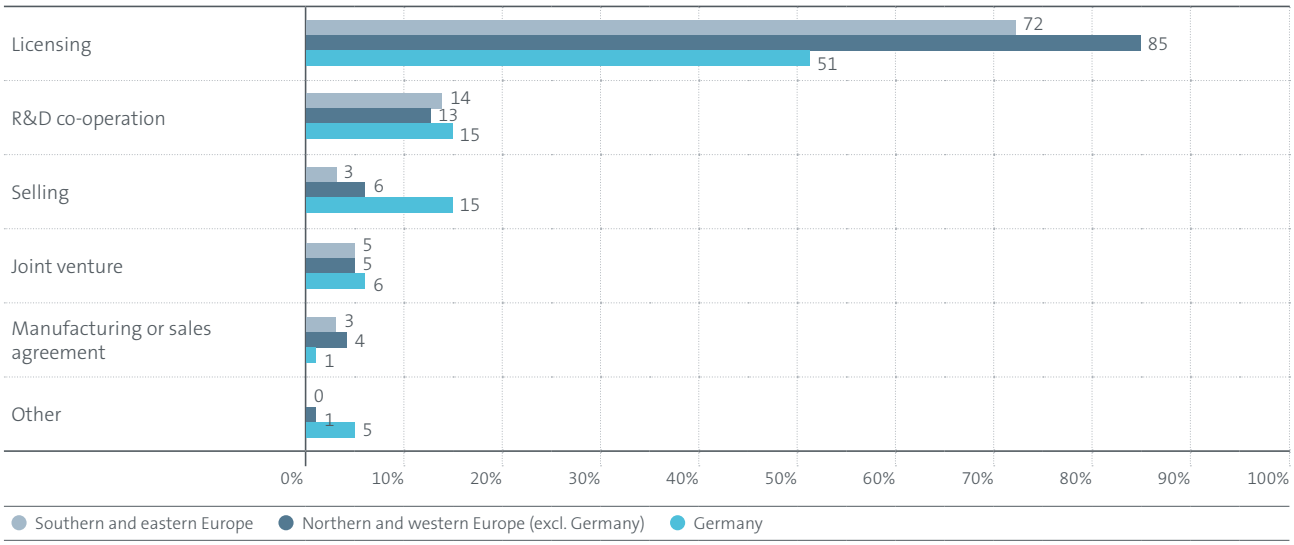
Basis: Number of interviews unweighted N=331, of which 1% Don't know and 1% No statement.

Some variations can also be observed across geographical regions. UNI/PROs from Northern and Western European countries (excluding Germany) resorted to licensing out their patented inventions more frequently (85%) than institutions from southern and eastern Europe (72%) and Germany (51%). German institutions also report disproportionately high shares (15%) of successfully sold patented inventions. R&D co-operations and joint ventures are reported in almost equal proportions across all regions.

These results differ significantly from patented inventions with planned exploitation. Licensing is equally reported across all European regions, with more than 80%. R&D co-operation is less important for German institutions, but particularly relevant for over 20% in other parts of Europe. Selling is not only a frequent option for patented inventions from German institutions, but even more so for patented inventions from southern and eastern Europe (40%). The same is true for joint ventures, which are considered for almost 20% of patented inventions from southern and eastern Europe and northern and western Europe, but only for 3% from Germany.

Figure 4.10

Types of realised exploitation by geographical region

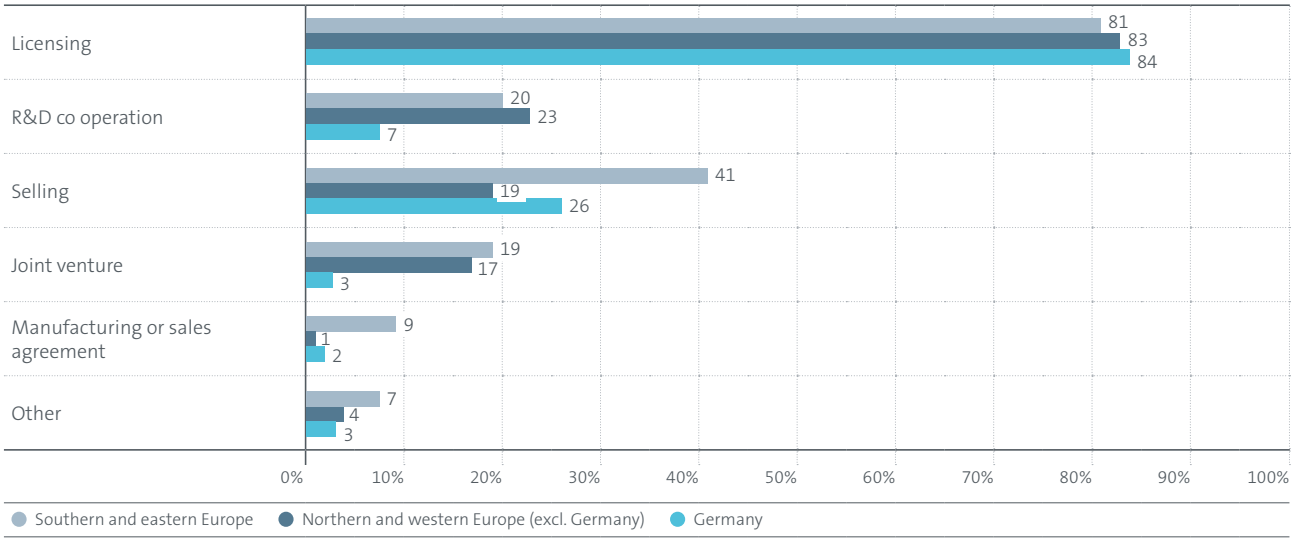


Source: European Patent Office

Basis: Number of interviews unweighted N=244, of which 2% Don't know and <1% No statement.

Figure 4.11

Types of planned exploitation by geographical region



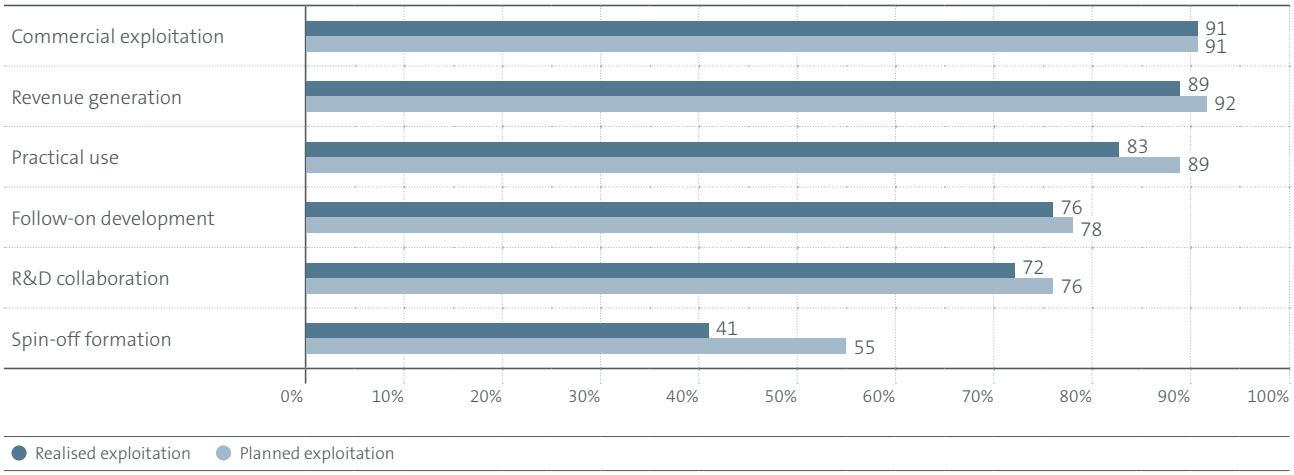
Source: European Patent Office

Basis: Number of interviews unweighted N=331, of which 1% Don't know and 1% No statement.

There are many reasons why UNI/PROs exploit their patented inventions. In the case of realised exploitation, mercantile reasons, such as enabling commercial exploitation (91%) and revenue generation (89%), are the most important ones. They are followed by technology-oriented reasons such as supporting practical use of the invention (82%), enabling follow-on development (76%) and facilitating R&D collaboration (72%). Albeit with somewhat higher shares, the picture is very similar for patented inventions with exploitation plans. Facilitating the formation of a spin-off is the least supported reason, with only 41% in the case of realised exploitation. One possible explanation for the relatively low share is that for UNI/PROs a successful spin-off is usually much more difficult to accomplish and takes more time than a technology licensing or selling deal. This may lead to a preference for the latter. Indeed, facilitating spin-off formation received more support in the case of planned exploitation (55%), which in some cases may explain why exploitation has not yet been accomplished.

Figure 4.12

Reasons for exploitation



Source: European Patent Office

Basis: Number of interviews unweighted N=217, of which <0% Don't know and <1% No statement.

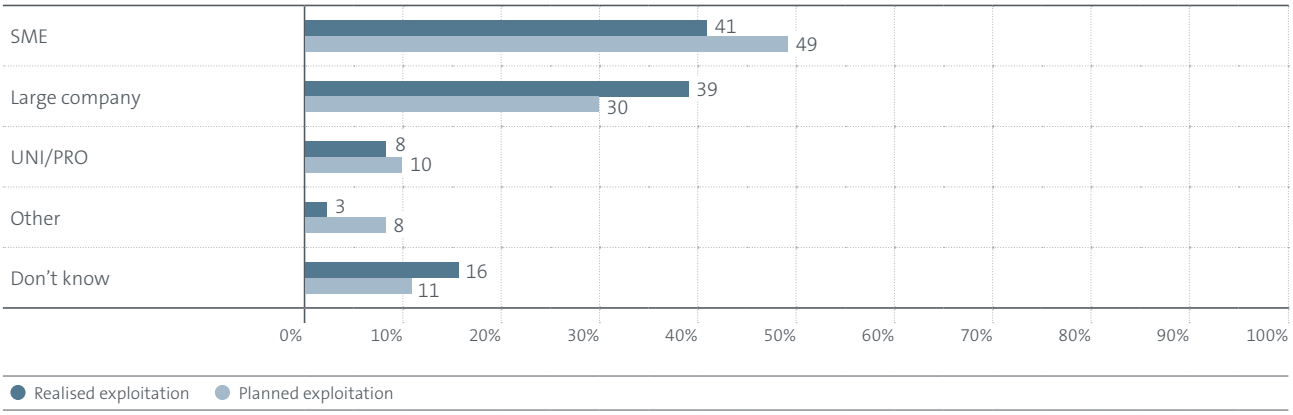
Partner profiles

SMEs are the most important partners for European UNI/PROs for exploited patented inventions (41%), followed closely by large companies (39%). In the case of patented inventions with planned exploitation, the spread between SMEs and large companies is much wider. While SMEs are considered as partners for almost half of patented inventions, large companies are mentioned for only 30%. Other UNI/PROs are reported as transaction and co-operation partners for 8% and 10% of the respective groups of patented inventions.

Figure 4.14 shows the geographical origin of exploitation partners. In almost three quarters of cases, these partners are located in the same country as the UNI/PRO that produced the invention, while a further 27% of partners are located in other European countries. Only 6% of partners are in North America, 2% in Asia, and 4% in other parts of the world.[15] The reported share of partners from the same country (43%) is much lower for patented inventions with planned exploitation than for exploited ones, whereas the share of partners from other European partners is almost the same in both cases (28%).

Figure 4.13

Type of exploitation partners

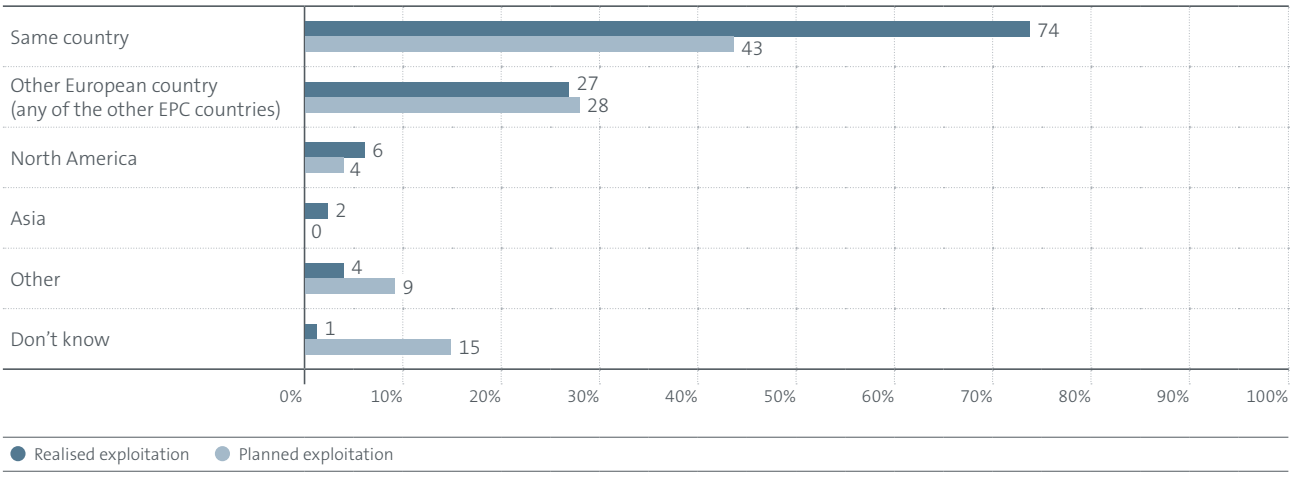


Source: European Patent Office

Basis: Number of interviews unweighted N=507, of which <1% No statement.

Figure 4.14

Origin of exploitation partners



Source: European Patent Office

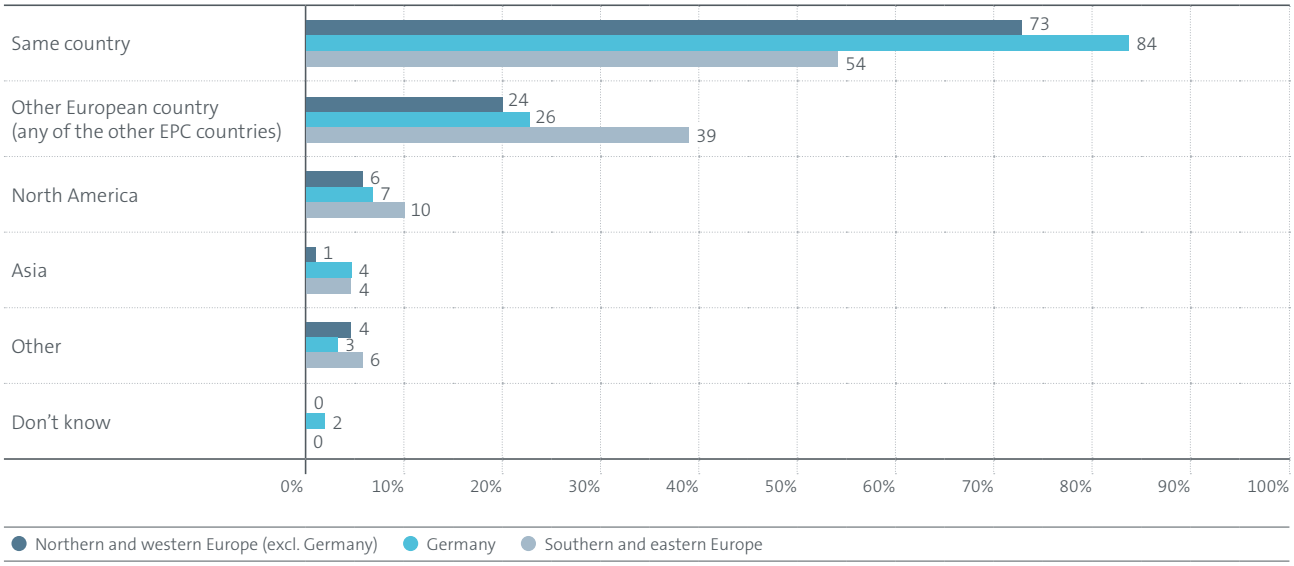
Basis: Number of interviews unweighted N=217, of which <1% Don't know and <1% No statement.

15 In comparison, SMEs tend to rely much more often on partners outside their local market for realised transactions or co-operations as well as on partners in other parts of the world, especially North America and Asia.

There is a relatively high variation in partner profiles across European regions. Compared with Germany (73%) and other northern and western European countries (84%), a much lower share (54%) of patented inventions from southern and eastern Europe is exploited with partners from the same country. Partners from other European countries are more often sought for patented inventions from southern and eastern European institutions (39%) than from Germany (26%) or other northern and western European countries (24%). One possible explanation is that southern and eastern European countries tend to have smaller local ecosystems with a lower probability of finding interested exploitation partners, especially for advanced technologies, compared to northern and western European countries.

Figure 4.15

Origin of exploitation partners for realised exploitation by region



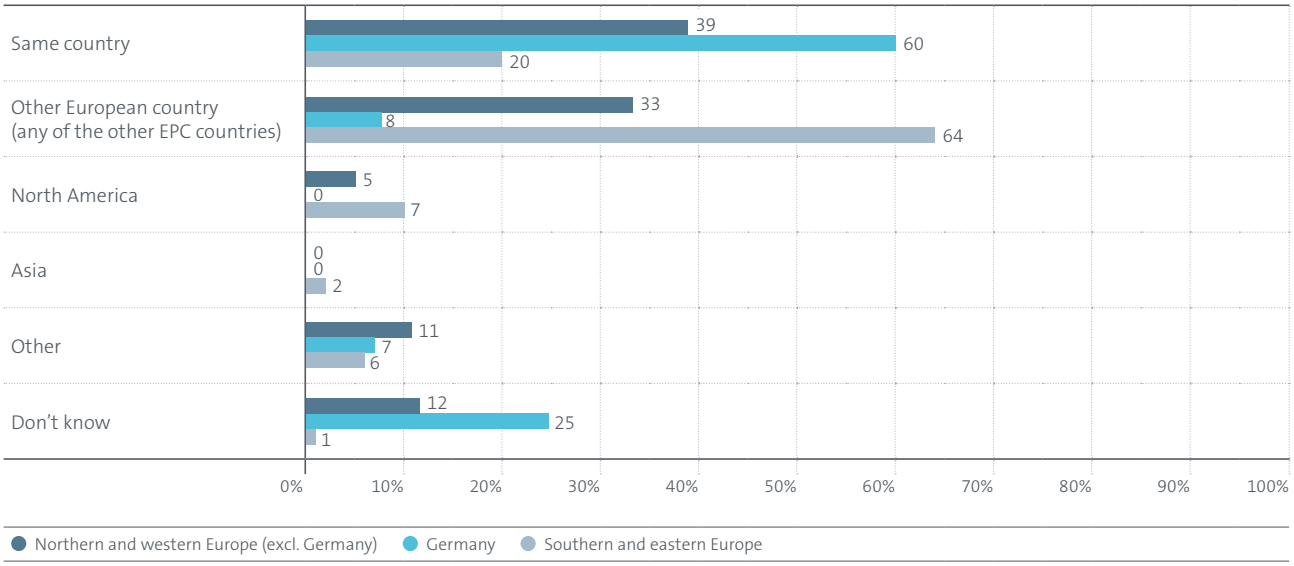
Source: European Patent Office

Basis: Number of interviews unweighted N=217, of which <1% Don't know and <1% No statement.

These differences are even more acute in the case of planned exploitation. Institutions from southern and eastern Europe are predominantly targeting partners in other European countries (64%), while local partners are considered for only 20% of patented inventions. For institutions from northern and western Europe (excluding Germany), the distribution is more even: local partners and other European partners are mentioned in 39% and 33% of cases respectively. German institutions in particular show a strong preference for local partners (60%). However, Germany is also the country with the highest share of patented inventions for which the profile of the partner for planned exploitation is not yet known (25%).

Figure 4.16

Origin of exploitation partners for planned exploitation by region



Source: European Patent Office

Basis: Number of interviews unweighted N=290, of which 2% No statement.

Starting with stem cells taken from the gut, **Hans Clevers and his team at the Hubrecht Institute** have developed technology to grow human tissue cultures in the laboratory. His "organoids" are a breakthrough for personalised medicine – a patient's own cells can be cultured to create various mini-organs (gut, liver, kidney, lung, breast etc., and tumours thereof) so as to screen in vitro for the efficacy or side effects of medicines. Patent applications were filed by the **Royal Netherlands Academy of Sciences**. Professor Clevers has co-founded several spin-out companies: U-BiSys BV in 1996 (now **Crucell**, a division of Johnson & Johnson), **Surrozen** (San Francisco), Xilis (Duke University) and **OrganoidZ** (Utrecht). He was a finalist in the 2017 European Inventor Award – see more at *epo.org/EIA*

5. Challenges of commercial exploitation

5. Challenges of commercial exploitation

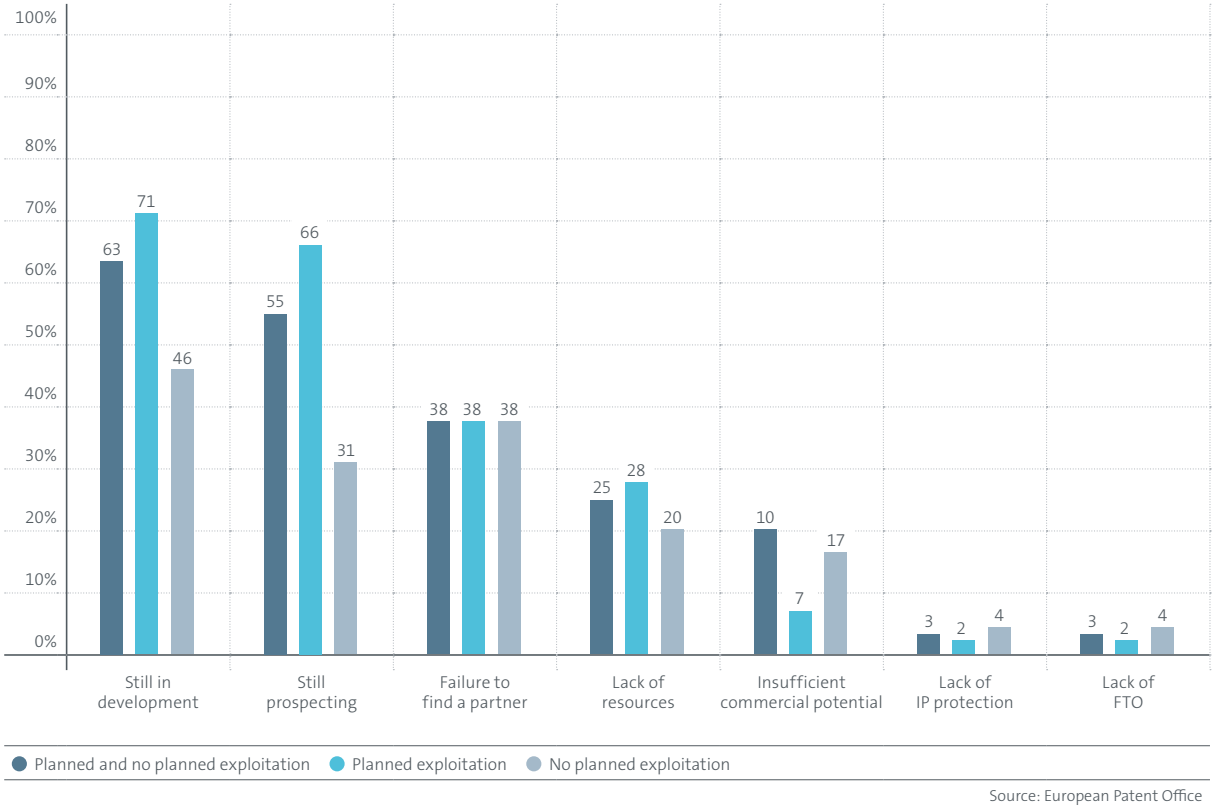
This section looks at some of the reasons why patented inventions from universities and PROs had not (yet) been exploited at the time of the survey.

As indicated in Figure 5.1, failure to get past the development stage is the main reason why patented inventions are not exploited. This reason is cited for 71% of patented inventions with existing exploitation plans and 46% of inventions for which no such plans exist. The lack of commercial possibilities (55%) is the second most frequent reason. At 66% it is particularly important for patented inventions with existing exploitation plans compared with those without (31%). Both causes of exploitation failure confirm that having a proof of concept for a technology is a crucial step towards successful exploitation.

Failure to identify the right partner appears to be another major obstacle to exploitation (38%). Lack of resources was mentioned by around one quarter of respondents, followed by lack of commercial potential (10%). Freedom to operate (3%) and lack of effective IP protection (3%) were reported as obstacles to exploitation of UNI/PROs patented inventions in a very small number of cases only.

Figure 5.1

Reasons for no exploitation



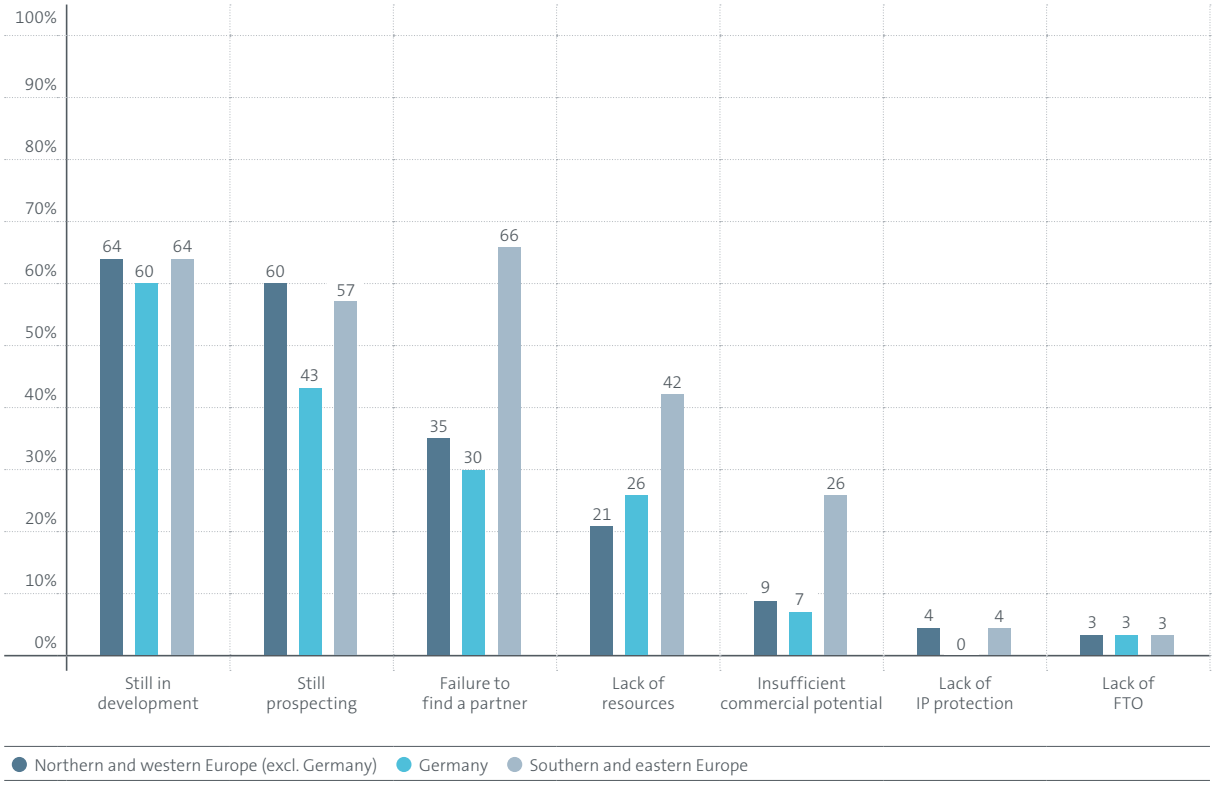
Source: European Patent Office

Basis: Number of interviews unweighted N=400, of which <1% Don't know and <1% No statement.

A geographic breakdown reveals that finding interested partners is a much bigger issue for institutions from southern and eastern Europe. It is actually the main reason for exploitation failure (66%) in these countries. Lack of resources follows (42%), which was mentioned twice as much by respondents in southern and eastern Europe than by those in the rest of Europe.

Figure 5.2

Reasons for no exploitation by region (planned exploitation and no exploitation)



Source: European Patent Office

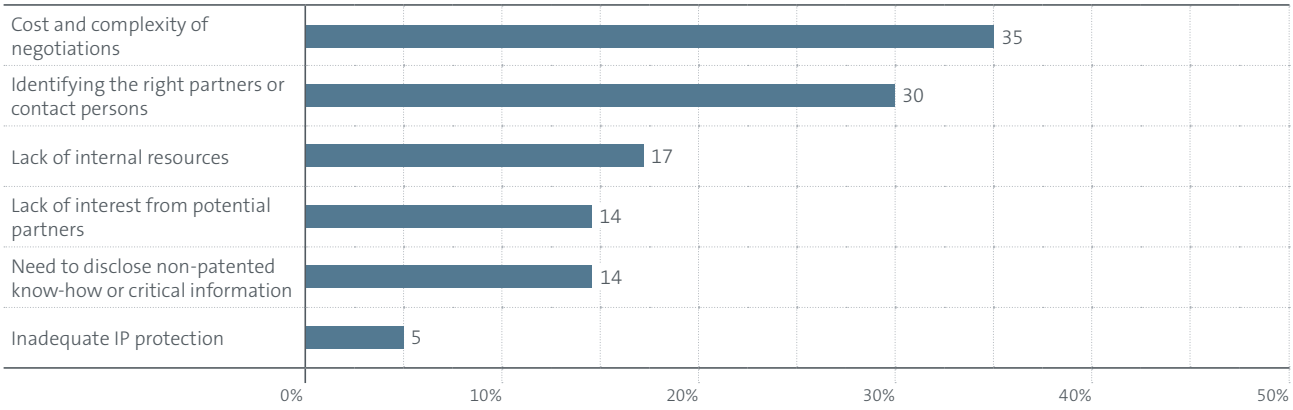
Basis: Number of interviews unweighted N=400, of which <1% Don't know and <1% No statement.

The cost and complexity of negotiation appears to be the major challenge faced by universities and public research organisations when they successfully exploit a patented invention. Over a third of respondents consider it an important or very important challenge when setting up licensing, selling or co-operation agreements. Identifying the rights partners or contact persons (30%) is the second most relevant challenge, followed, some way back, by lack of internal resources (17%), lack of interest from potential partners (14%) and the need to disclose non-patented know-how (14%). Inadequate IP protection (5%) is the least important challenge in the exploitation of patented inventions.

Important regional differences can be observed here as well in the case of exploited inventions. Identifying the right partners and the lack of internal resources seem to be bigger challenges for UNI/PROs in southern and eastern Europe (42% and 28% respectively) than in northern and western Europe (17% and 10% respectively). The need to disclose non-patented know-how (25%) is likewise reported as a more serious challenge that is more of an issue in southern and eastern Europe. By contrast, the cost and complexity of negotiations is perceived as an important challenge throughout Europe.

Figure 5.3

Challenges in realised exploitation (important + very important)

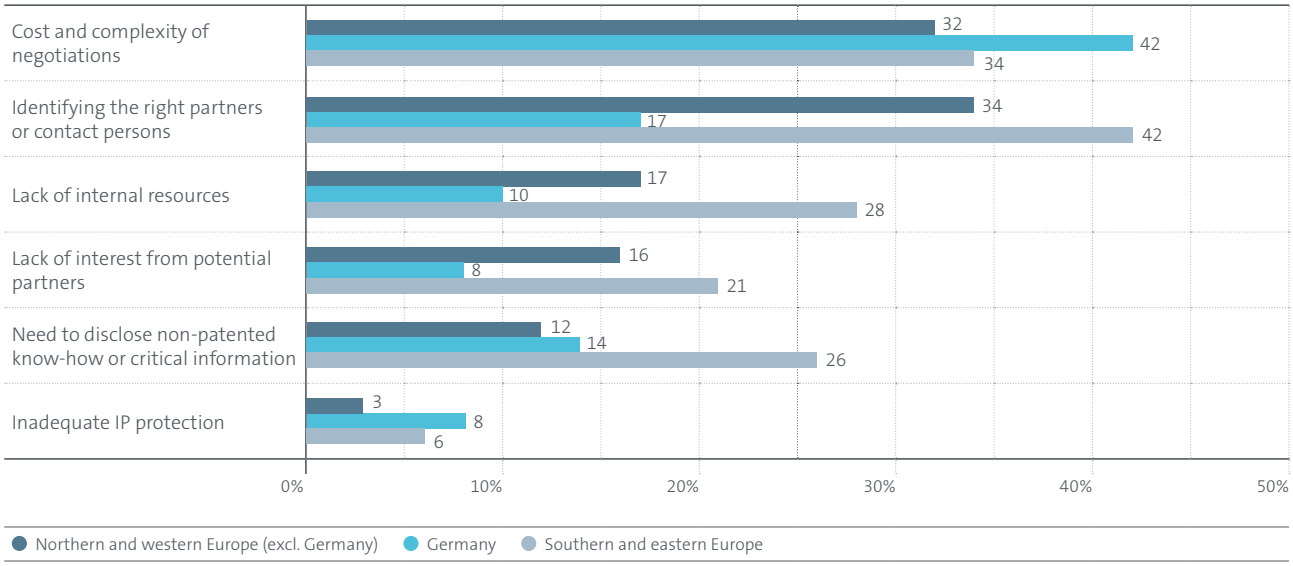


Source: European Patent Office

Basis: Number of interviews unweighted N=217, of which 3-4% Don't know and <1% No statement.

Figure 5.4

Challenges in realised exploitation by region (important + very important)



Source: European Patent Office

Basis: Number of interviews unweighted N=217, of which 3-4% Don't know and <1% No statement.

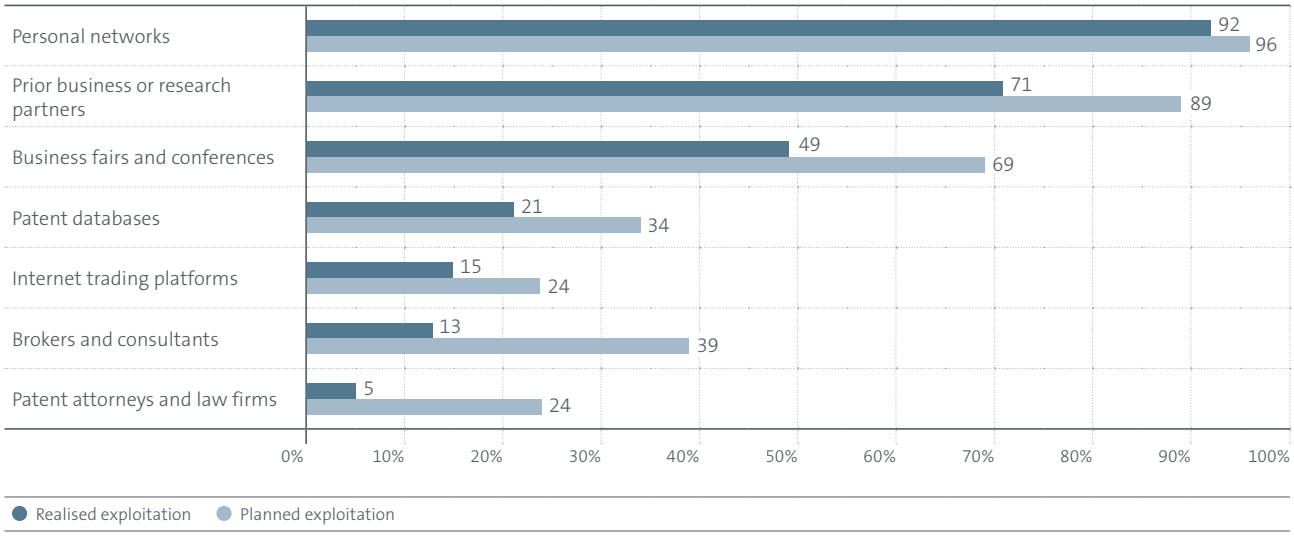
Since identifying (the right) partner is a major issue for the exploitation of UNI/PRO patented inventions, survey participants were asked to report the main channels used to find partners. Personal networks are reported as the most important channel by far (90%) for realised and planned exploitation. Prior business or research partners, with 71% of exploited patented inventions and 89% of patented inventions with planned exploitation, and business fairs and conferences, with 49% and 69% respectively, follow in second and third place.

Other channels such as patent databases or internet trading platforms were mentioned much less frequently in the case of planned exploitation (34% and 24% respectively) and especially of successful exploitation (21% and 15% respectively). Interestingly, institutions from southern and eastern Europe use digital channels, patent databases and internet trading platforms more often for their patented inventions than their counterparts in northern and western Europe, especially in Germany. With the advent of the COVID-19 crisis in 2020, and the ensuing need for more virtual interaction and digital services, these two channels may become more important in the future.

Brokers or consultants (39%) and patent attorneys or law firms (24%) are meaningful channels for patented inventions with planned exploitation; however their importance is much reduced for those with already realised exploitation (13% and 5% respectively). Overall, German institutions seem to be more effective in finding business partners through personal networks than their counterparts from other European countries, given that they use fewer channels per patented invention on average.

Figure 5.5

Channels used to find partners

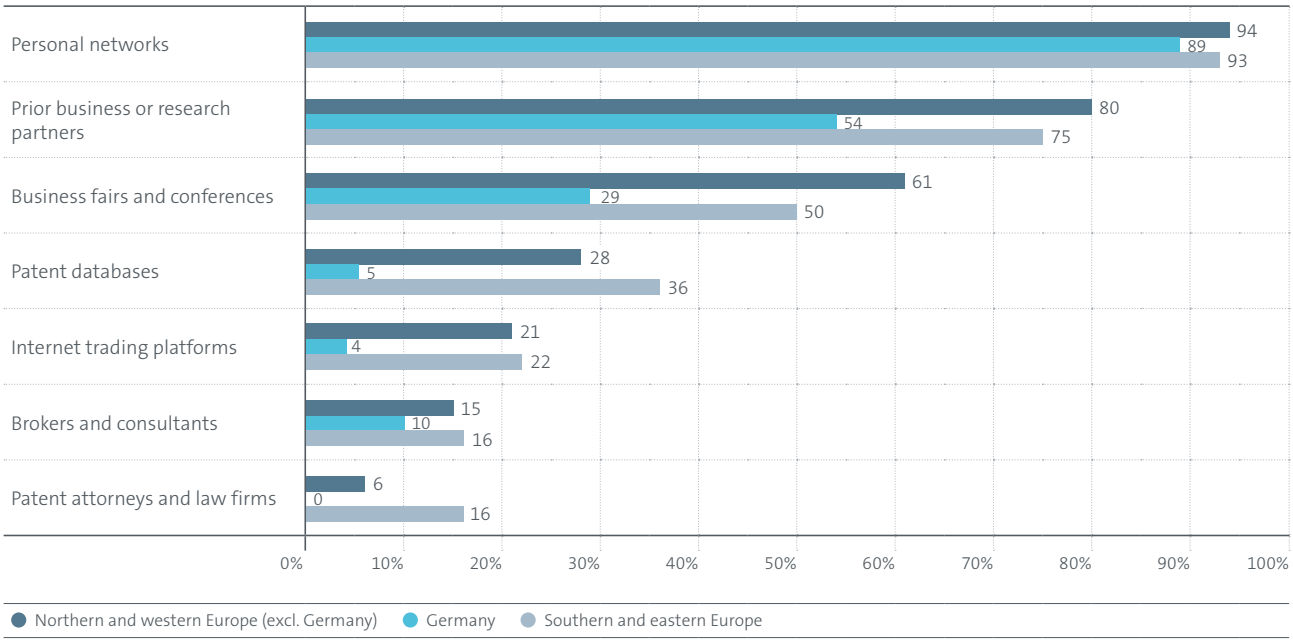


Source: European Patent Office

Basis: Number of interviews unweighted N=217, of which 1-2% Don't know and <1% No statement.

Figure 5.6

Channels used to find partners for realised exploitation by region

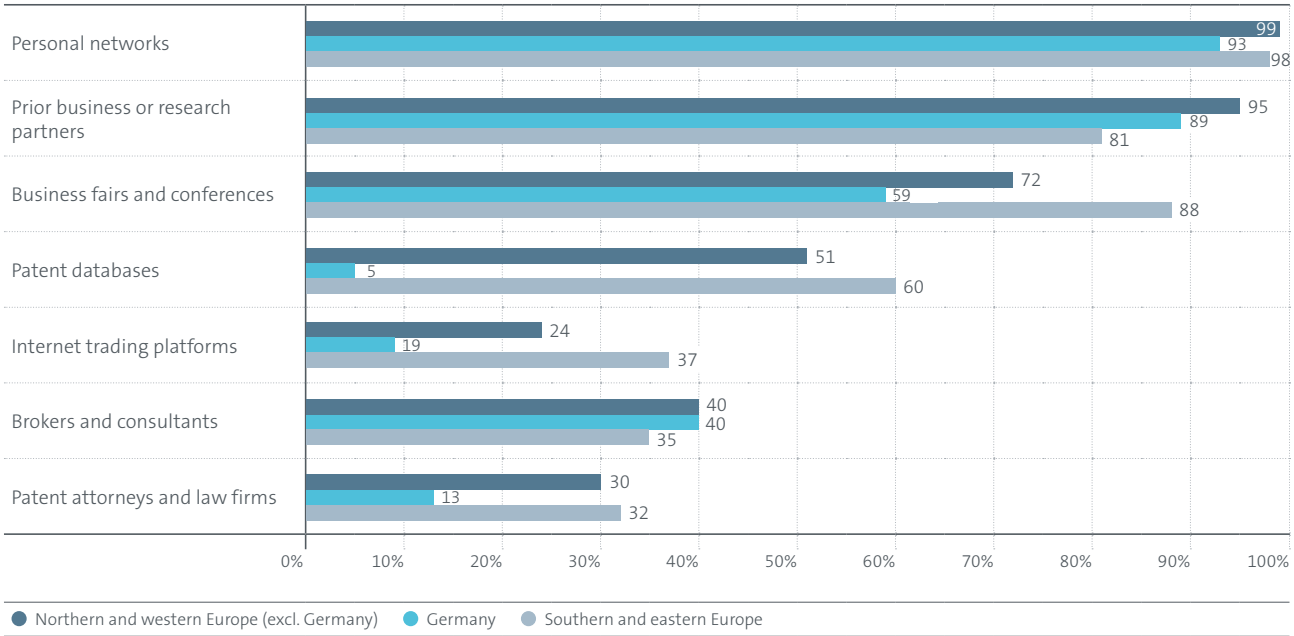


Source: European Patent Office

Basis: Number of interviews unweighted N=217, of which 1-2% Don't know and <1% No statement.

Figure 5.7

Channels used to find partners for planned exploitation by region



Source: European Patent Office

Basis: Number of interviews unweighted N=290, of which 5% Don't know and <1% No statement.

6. European technology transfer and licensing office landscape

6. European technology transfer and commercialisation office landscape

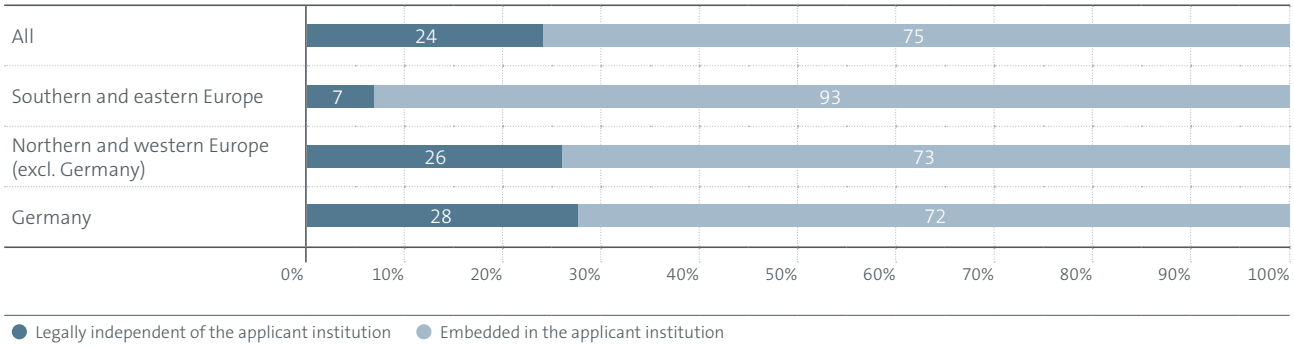
Organisation of European TTO/TLOs

For three quarters of patented inventions the technology transfer or licensing office (TTO/TLO) in charge of their exploitation is directly embedded in the university or public research organisation. In the other cases it is legally independent. Interestingly, the results vary greatly by geographic region. For 93% of patented inventions from southern and eastern Europe, a TTO/TLO embedded in the applicant institution is responsible for their exploitation. In northern and western Europe and Germany, a significantly larger share of patented inventions (26% and 28% respectively) is dealt with by legally independent TTO/TLOs.

TTO/TLOs also vary considerably in size. The majority of patented inventions are dealt with by a TTO/TLO with ten or fewer employees (56%). Another 28% are exploited by medium-sized organisations with between 11 and 50 employees. The remaining 16% are in the hands of large TTO/TLOs with more than 50 employees.

Figure 6.1

Status of TTO/TLOs

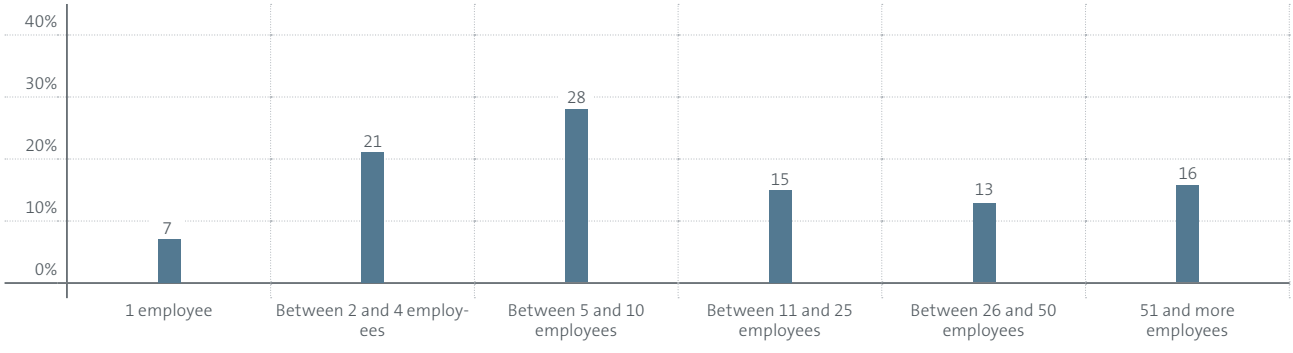


Source: European Patent Office

Basis: Number of interviews unweighted N=596, of which 1% Don't know and <1% No statement.

Figure 6.2

Distribution of the overall size of TTO/TLOs



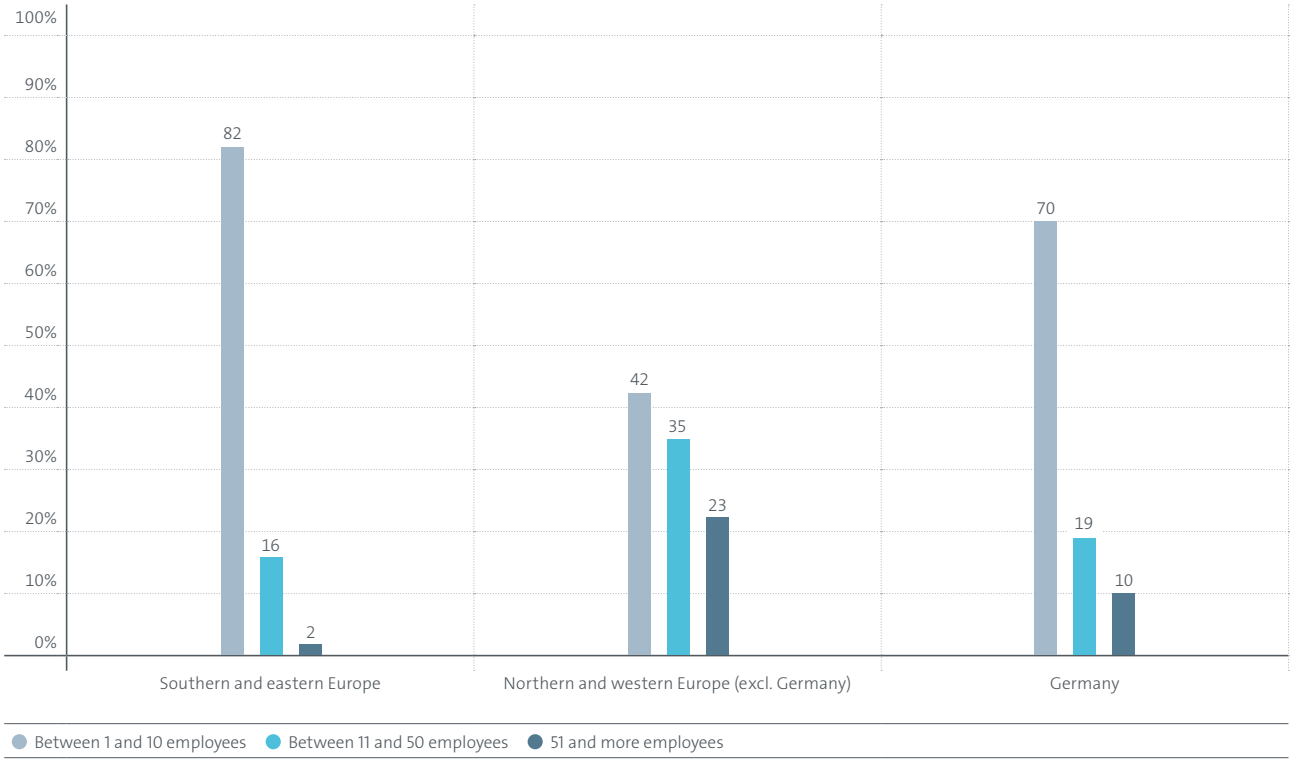
Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which <1% Don't know and <1% No statement.

Size differences can be observed along several dimensions. For example, European PROs tend to use larger TTO/TLOs for their patented inventions, compared with universities. The majority of patented inventions from southern and eastern Europe (82%) and Germany (70%) are dealt with by small TTO/TLOs (82%) with ten or fewer employees. In other northern and western European countries, a majority of patented inventions are managed by medium-sized (35%) or large (23%) TTO/TLOs.

Figure 6.3

Distribution of the overall size of TTO/TLOs by region



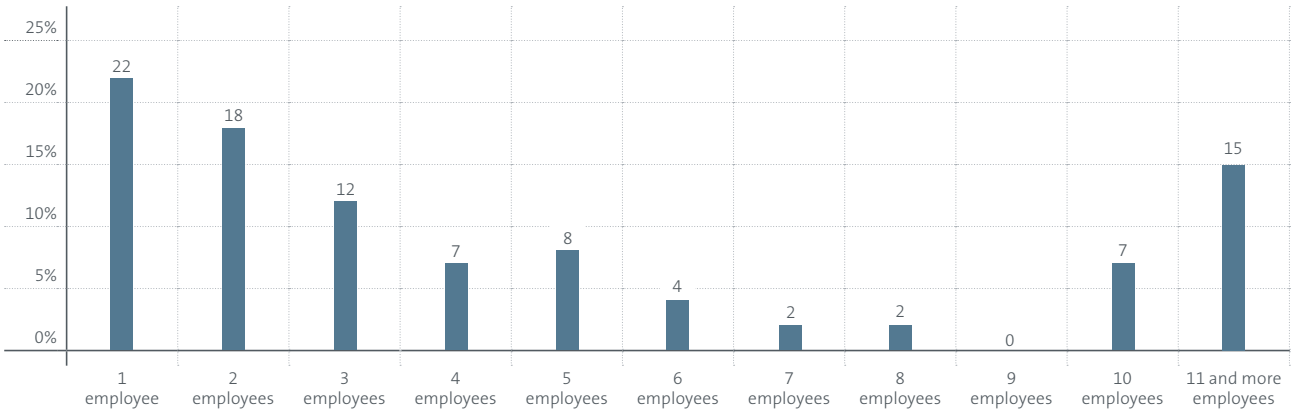
Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which <1% Don't know and <1% No statement.

The number of commercialisation experts within a TTO/TLO is a particularly interesting indicator for the exploitation of patented inventions. More than half of all patented inventions (52%) are dealt with by TTO/TLOs with three or fewer such experts, almost one third by TTO/TLOs with 4 to 10 experts, and only 15% by TTO/TLOs with more than 10 experts. Interestingly, all sizes of TTO/TLOs were equally successful in exploiting patented inventions. However, compared with smaller TTO/TLOs, larger TTO/TLOs seem to maintain larger shares of patented inventions without existing exploitation plans.[16]

Figure 6.4

Distribution of TTO/TLOs by number of commercialisation experts



Source: European Patent Office

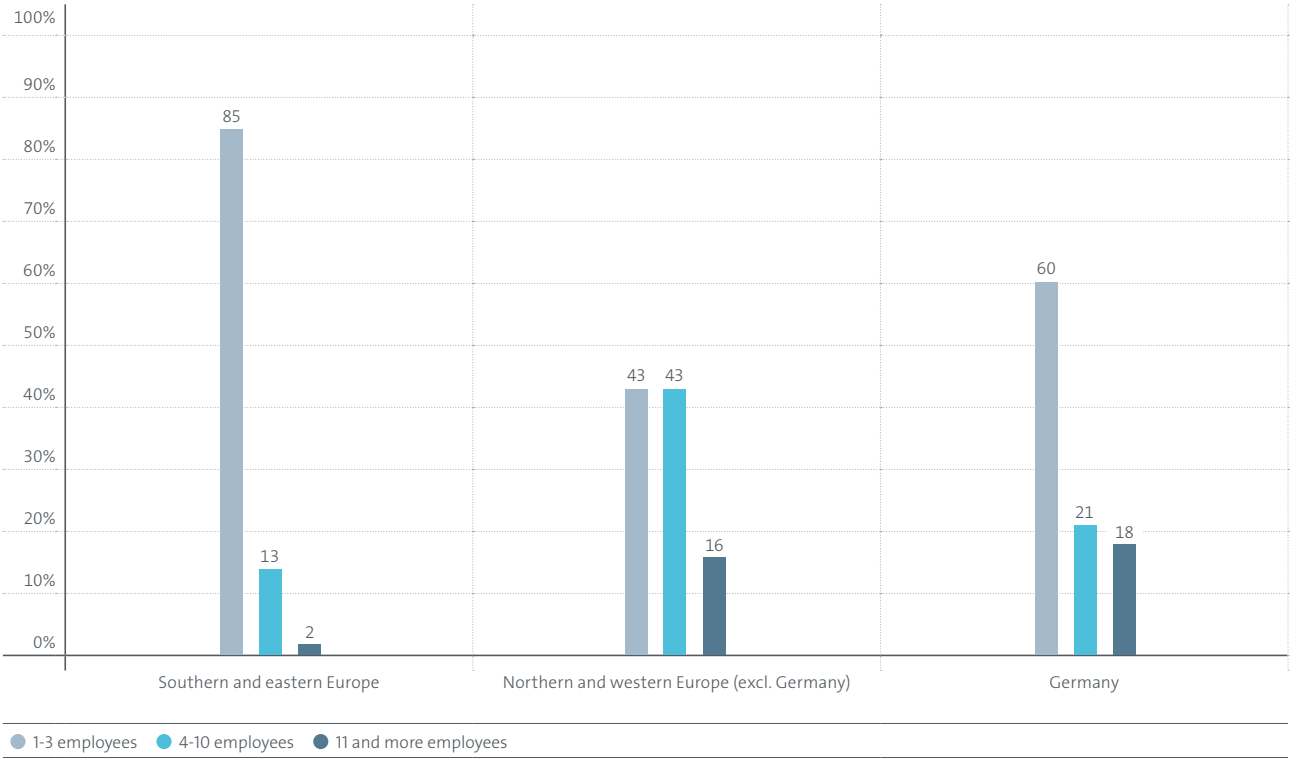
Basis: Number of interviews unweighted N=686, of which 1% Don't know and <1% No statement.

16 Larger TTO/TLOs may have more resources available, with which they can afford to maintain patent assets "speculatively" for a longer period in the hope that they prove useful later.

The geographical distribution of patented inventions by number of commercialisation specialists within the TTO/TLOs largely reflects the distribution by their overall size. In southern and eastern Europe, up to 85% of the exploitation of patented inventions is taken care of by TTO/TLOs with three or fewer commercialisation experts. This proportion drops to 60% in Germany and to 43% in the rest of northern and western Europe. A majority of patented inventions from northern and western Europe (excluding Germany) are exploited by TTO/TLOs with more than three commercialisation experts.

Figure 6.5

Distribution of TTO/TLOs by number of commercialisation experts and region



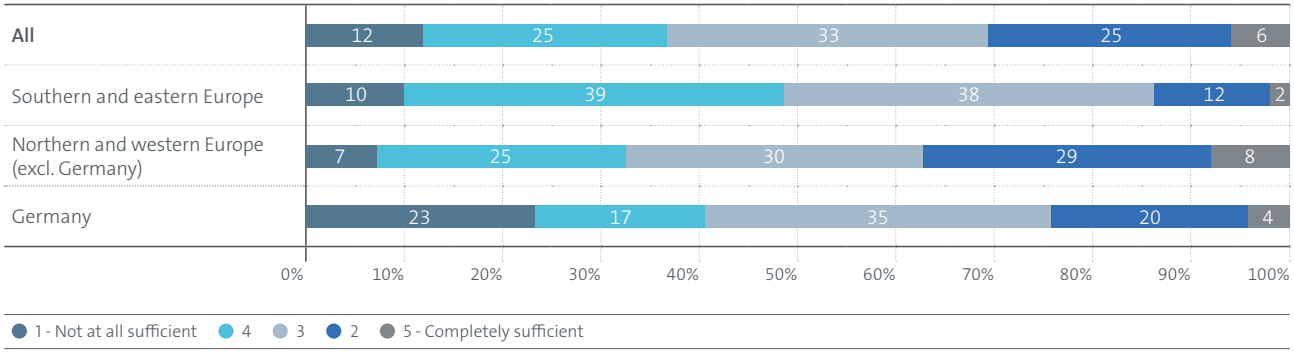
Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which 1% Don't know and <1% No statement.

The survey shows that the persons responsible for the patented inventions are frequently unsatisfied (37% vs 31%) with the resource endowment of their TTO/TLO. However, this varies widely across Europe. Resource endowment of the TTO/TLO is considered insufficient for 49% of patented inventions from southern and eastern Europe, as compared with 14% of positive opinions. For patented inventions from northern and western Europe (excluding Germany), a larger share of respondents consider the resource endowment of their TTO/TLO as sufficient (37%). For German patented inventions, the resource endowment of the TTO/TLO is considered sufficient in 24% of cases and insufficient in 40% of cases.

Figure 6.6

Resource endowment of TTO/TLOs



Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which 1% Don't know and 1% No statement.

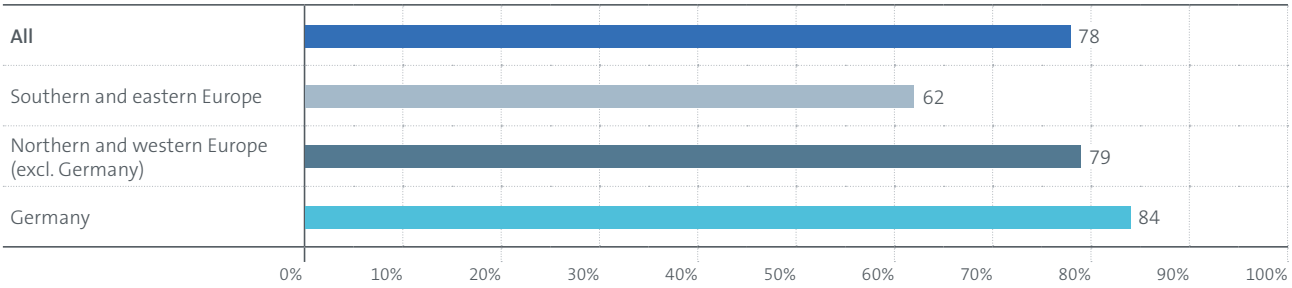
IP management practices

An institutional technology transfer and commercialisation strategy can be crucial for universities and public research organisations: it defines the main mission, sets out their goals and how to achieve them as well as establishing a framework for successful collaboration between academia and business partners. According to the survey, more than three out of four patented inventions originate from an institution with such a written strategy. However, the geographical breakdown reveals a discrepancy between southern and eastern European countries (where 62% of respondents report a written strategy) and northern and western European countries, including Germany (where about 80% of respondents report a written strategy).

Freedom-to-operate (60%) analyses are used to determine whether a product, technology or invention might infringe someone else's patent and, as such, are an important step prior to or during the exploitation process. According to the survey, an FTO analysis has been performed for a large majority of the patented inventions (64%). FTO analyses have been performed for a significantly large share of patented inventions in northern and western Europe (66%) and southern and eastern Europe (71%). In comparison, the proportion of FTO analyses is relatively low in Germany (56%). Also, FTO analyses are performed for a larger share of patents for which exploitation is planned or has already been realised.

Figure 6.7

Written technology transfer and commercialisation strategy

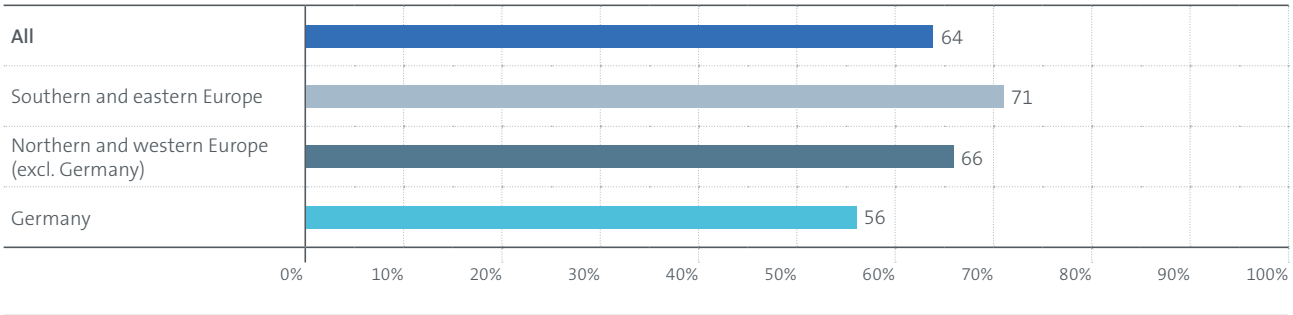


Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which 1% Don't know and <1% No statement.

Figure 6.8

FTO checks



Source: European Patent Office

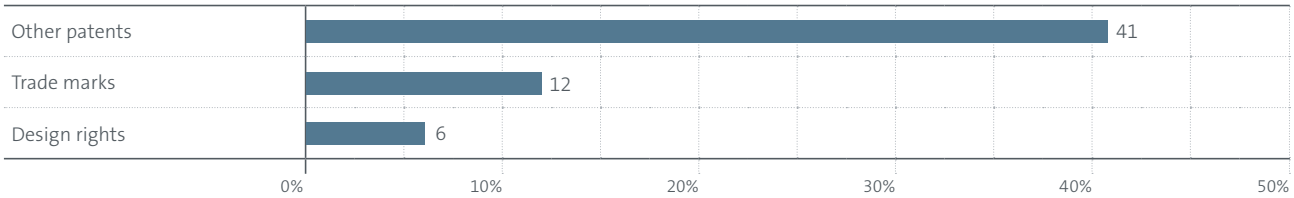
Basis: Number of interviews unweighted N=650, of which 5% Don't know and 1% No statement.

The use of complementary IP rights for patented inventions is reported in Figure 6.9. Additional patents related to the invention have been filed for 41% of the patented inventions. However, UNI/PROs seldom file complementary trade marks (12%) or design rights (6%). Since UNI/PROs are usually not the ones who bring the final product or service to market, the benefits of these IP rights may be limited for them. In addition, patented inventions of larger TTO/TLOs tend to use complementary IP rights more often than smaller ones.

While the use of trade marks and designs is very similar across all technology areas, complementary patents are filed more frequently for patented inventions in electrical and mechanical engineering, suggesting that more patents may be needed to sufficiently protect a transferable technology in these two fields.

Figure 6.9

Use of trade marks, design rights and additional patents in relation to an invention

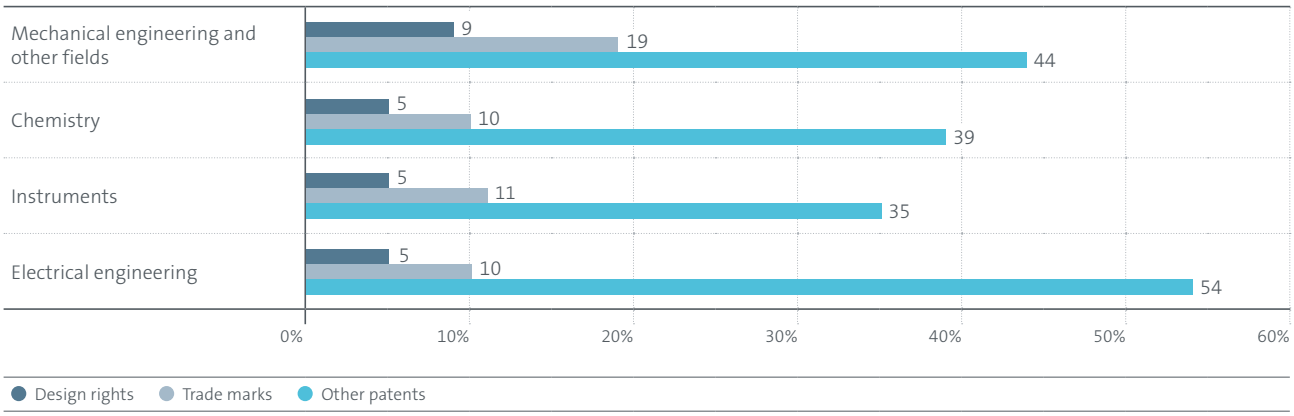


Source: European Patent Office

Basis: Number of interviews unweighted N=650, of which 5% Don't know and 1% No statement.

Figure 6.10

Use of trade marks, design rights and additional patents in relation to an invention by technology sector



Source: European Patent Office

Basis: Number of interviews unweighted N=650, of which 2% Don't know and 1% No statement.

Johannes Homa (l) and **Johannes Benedikt** (r) were researchers at the **Vienna University of Technology**, investigating ceramic materials and 3D-printing systems using photosensitive resins. The resulting products have exceptional properties of density and strength and offer structural possibilities unachievable in conventionally manufactured components, e.g. carved from a ceramic block. The university applied for patents, which were the basis for a spin-off company founded by Dr Homa and Dr Benedikt. This company, **Lithoz**, is now a world market and technology leader in the field of additively manufactured high-performance ceramics and currently employs over 70 people at their headquarters in Vienna and their subsidiary in the US. Read the full case study at *epo.org/smes*

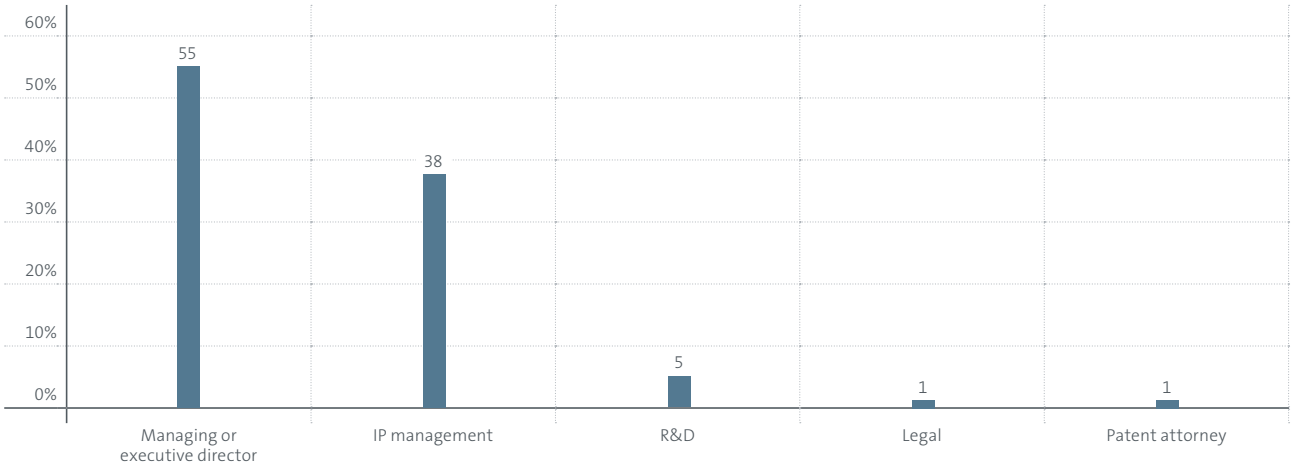
Annex 1 Survey respondents

Annex 1 Survey respondents

The majority of respondents (55%) are managing or executive directors of a TTO, which is not surprising, since 52% of all TTOs have three or fewer commercialisation experts in their teams (see Figure 6.4). A further 38% are IP managers, while the remaining 7% are R&D staff, legal people, patent attorneys or people with other roles. The share of IP managers increases with the size of the TTO, while in smaller TTOs, it is not only managing and executive directors who take on the role of looking for ways to exploit the patented invention, but also R&D people or people with a legal background.

Figure A.1.1

Current role or position of interviewee



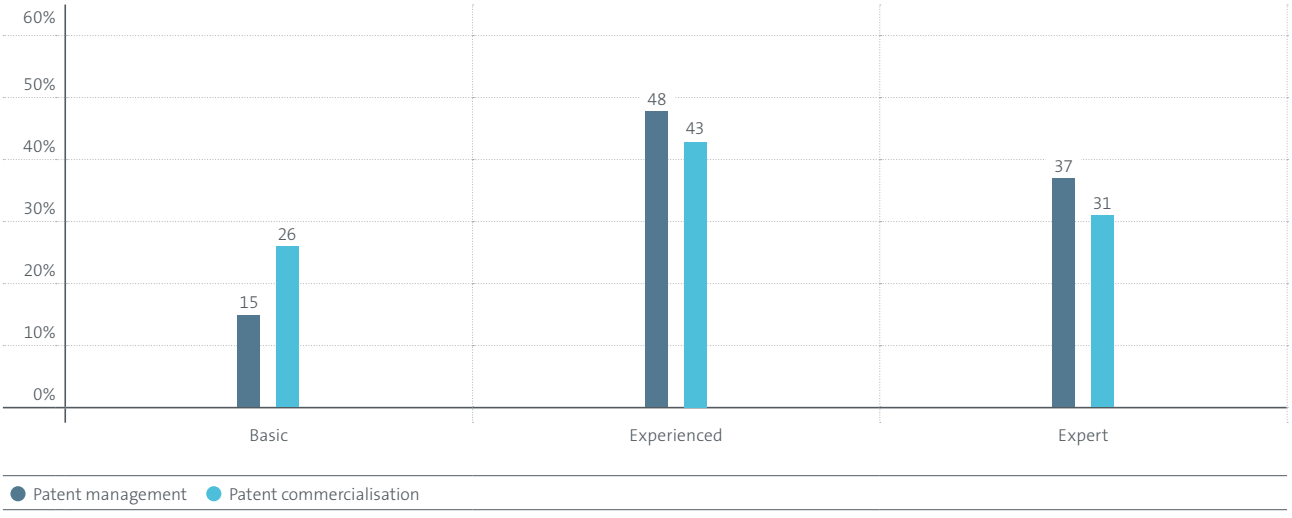
Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which <1% Don't know and 1% No statement.

Respondents were also asked to self-assess their level of expertise in patent management and commercialisation. In the vast majority of cases, respondents considered themselves to be at expert or at least experienced level, with a larger share for patent management (85%) than patent commercialisation (74%). Respondents from southern and eastern Europe show a more modest level of expertise than respondents from northern and western Europe.

Figure A.1.2

Level of expertise



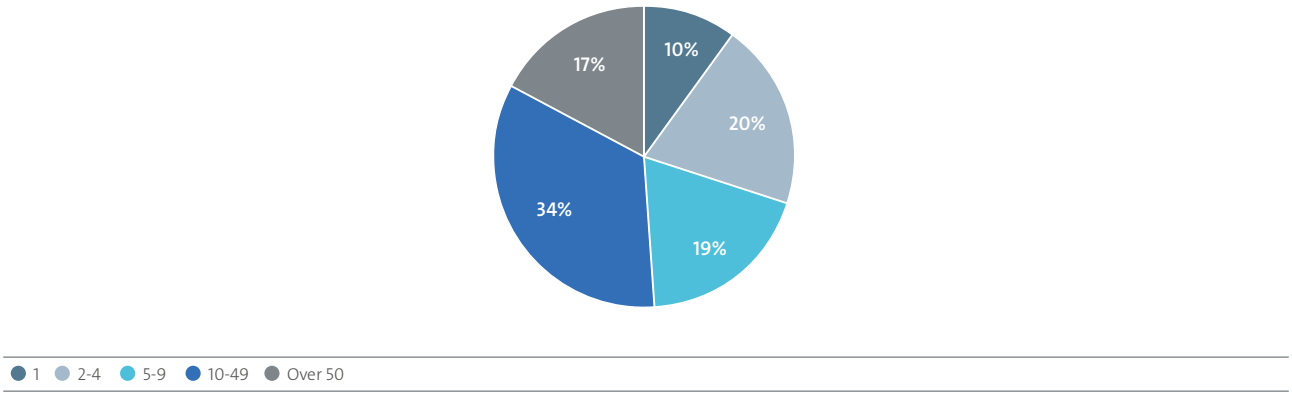
Source: European Patent Office

Basis: Number of interviews unweighted N=686, of which < 1% Don't know and <1% No statement.

Around one third of patented inventions originate from European UNI/PROs that filed between 10 and 49 patent applications with the EPO in the time period under consideration, while 17% originate from institutions that filed more than 50 EP applications in the same period. The other half of patented inventions were filed by institutions that filed fewer than 10 EP applications.

Figure A.1.3

EP patent applications filed by European UNI/PROs by size of institution



Source: European Patent Office

Basis: Number of interviews unweighted N=686

Annex 2 Fieldwork report

Annex 2 Fieldwork report

1. Survey design

When the survey was designed, the questions were tested under real interview conditions. Pilot interviews were conducted to test:

- whether the wording of the questions worked in practice
- if the questions were clear, and whether any explanatory notes or briefings were needed for the interviewers
- whether the interview length was appropriate

Pilot interviews began on 31 March 2019. Based on the results, the questions were modified.

The length of the survey proved particularly problematic, mainly because question blocks with lengthy text took a relatively long time to read out. This problem did not emerge until the first few weeks of fieldwork. By rewording the questions and giving the interviewers ongoing training, it was possible to cut the length of the interviews (see point 5).

2. Programming

Once the final survey was designed, it was prepared for programming. Each language version was programmed separately.

The master version was programmed first and then used as a template for the different language versions. This ensured that they all had the same technical basis.

For the master version, the survey was converted into a syntax that was then loaded into the survey software and amended where necessary.

The master version then underwent a two-step check.

The first step was to check the survey logic for errors. Survey logic covers:

- question routing
- display logic
- rotation/randomisation

To this end, test interviews were conducted covering the different routes through the survey and texts to be displayed. Any errors in the master version were corrected.

After checking the logic, the second step was to check the data capture. This meant checking that all the data required was saved in the correct place on the survey server.

The logic and data capture were checked again after starting the fieldwork with data captured under real conditions. A first check was run after approximately 50 full interviews had been conducted and a second after approximately 150 interviews. Due to the complexity of the questionnaire, the first 50 full interviews were not enough to cover all possible filtering paths in the questionnaire in all three language versions, so the logic and data capture had to be checked again on the larger number of 150 interviews.

After the master version was released, all the different language versions based on it were also created. In each version, only the text visible to the interviewer was changed. The logic and data capture were the same for all languages.

Lastly, native speakers reviewed the different language versions and corrections were made where necessary. After the language check, the surveys were released for the interviews.

3. Sampling and administration

3.1 Population

Sampling is the process of selecting a subset of the population for data collection based on the study's objective and the population.

The aim was to create a (feasible) sample that best represented the population of applications filed by European universities and public research organisations (UNI/PROs) with the European Patent Office. The population was all such applications meeting set criteria.

Since it was assumed that the way in which UNI/PROs exploit a patented invention depends on the stage in the examination procedure the application has reached, the population was divided into pending applications and granted European patents.

These two groups were defined as follows:
Pending applications
- for which an A1 or A2 document had been published (European patent application with or without a search report respectively)
- that were filed between 2007 and the most recent year possible (2017)

Applications that had resulted in
- European patents granted between 2015 and 2017
- a B1 document being published (European patent specification)

The two groups – pending applications and granted European patents – were divided into the technical fields of Mobility and Mechatronics (M&M), Healthcare, Biotechnology and Chemistry (HBC) and Information and Communications Technology (ICT), as it was assumed that applicants' approaches to commercialisation would differ depending on the area concerned.

For the stratification cells in the further processing of the gross sample, it was decided to merge the technical fields of M&M and ICT. This would provide a big enough number of interviews for the target numbers for the net sample in these two particular technical fields, considering all stratification dimensions.

The population was also divided by country/region, in anticipation of differences in exploitation practices in the different countries/regions.

Tables A.2.1 and A.2.2 show the final population and its breakdown.

Table A 2.1

Final population - breakdown in figures

	Granted (N)		Total	Pending (N)		Total
	HBC	M&M + ICT		HBC	M&M + ICT	
Southern and eastern Europe	664	331	995	795	516	1 311
Northern and western Europe (excl. Germany)	2 501	2 128	4 629	3 564	3 407	6 971
Germany	910	1 062	1 972	1 128	1 436	2 564
Total	**4 075**	**3 521**	**7 596**	**5 487**	**5 359**	**10 846**

Table A 2.2

Final population - percentage breakdown

	Granted (N)		Total	Pending (N)		Total
	HBC	M&M + ICT		HBC	M&M + ICT	
Southern and eastern Europe	9	4	13	7	5	12
Northern and western Europe (excl. Germany)	33	28	61	33	31	64
Germany	12	14	26	10	13	24
Total	**54**	**46**	**100**	**51**	**49**	**100**

3.2 Gross sample

The gross sample is a (criteria-based) selection from the population within which the interviews are to be conducted. It is selected so that the interviews actually conducted – i.e. the net sample – best represent the population.

Its size (number of sampling units) depends on the target number of interviews (net sample). Depending on its content, the gross sample may be stratified to achieve a target number of interviews for specific groups.

In the given population as defined in section 3.1 above, the number of UNI/PRO institutions was too small to conduct only one interview about a specific application with each institution to achieve the initially projected net sample. This meant that more than one interview had to be conducted within individual institutions.

In order to meet the fieldwork criteria - random selection of the sampling units (applications) and equal probability of each unit to be selected - the gross sample was processed as follows:

The population of patent applications was consolidated down to the level of individual institutions. The units of institutions were then selected at random. The application(s) within the institution which were to be the subject of the interview were then also selected at random (see section 3.3 below). The main limitation to the random selection was the fact that in some cases, the target persons responsible for a specific application were no longer available. In this case alternative applications were selected to be the subject of the interview.

Table A 2.3

Distribution of institutions by number of patent applications

Number of applications per institution	Country/region	Granted (N)		Pending (N)		Total
		HBC	M&M + ICT	HBC	M&M + ICT	
1	Southern and eastern Europe	56	25	78	40	199
	Northern and western Europe (excl. Germany)	59	33	77	47	216
	Germany	23	22	23	26	94
	Total	**138**	**80**	**178**	**113**	**509**
2-4	Southern and eastern Europe	49	25	59	30	163
	Northern and western Europe (excl. Germany)	49	28	66	33	176
	Germany	15	26	18	17	76
	Total	**113**	**79**	**143**	**80**	**415**
5-9	Southern and eastern Europe	20	15	27	9	71
	Northern and western Europe (excl. Germany)	25	11	32	36	104
	Germany	8	7	12	10	37
	Total	**53**	**33**	**71**	**55**	**212**
10-49	Southern and eastern Europe	19	7	23	13	62
	Northern and western Europe (excl. Germany)	38	17	48	38	141
	Germany	20	11	20	14	65
	Total	**77**	**35**	**91**	**65**	**268**
50+	Southern and eastern Europe	2	1	0	0	3
	Northern and western Europe (excl. Germany)	6	2	10	11	29
	Germany	1	2	3	8	14
	Total	**9**	**5**	**13**	**19**	**46**

The following criteria for selecting the gross sample and stratification were set:

- Consolidation of the population down to the institutional level, by keeping all applications of the population linked to each institution.
- Only one interview per institution (ideal scenario, but not often achievable). Due to the limited number of institutions, more than one interview was necessary in the stratification groups.
- The gross sample to be stratified by status, technical field and country/region to ensure that for groups accounting for relatively few application units in the population, enough interviews were conducted to enable a data analysis.
- Within the strata, random sampling.

After stratification by status, technical field and country/region, the maximum gross sample, based on institutions for the fieldwork, was as shown in Table A.2.4.

Table A 2.4

Maximum gross sample based on institutions

	Granted (N)		Pending (N)		Total
Country/region	HBC	M&M + ICT	HBC	M&M + ICT	
Southern and eastern Europe	146	73	187	92	498
Northern and western Europe (excl. Germany)	177	91	233	165	666
Germany	67	68	76	75	286
Total	**390**	**232**	**496**	**332**	**1 450**

3.3 Target quotas for fieldwork

The aims of the net sample were
(a) to best represent the population and
(b) to collect enough completed interviews for each stratum.

This approach ensured that the basis for the subsequent data analysis would be as broad and representative as possible. The initial target quotas set for the fieldwork with a targeted total number of 500 interviews are presented in Table A.2.5. Since the exhaustion rate of the gross sample was uncertain (as was also showed during the fieldwork), the target quotas were changed to maximise the number of interviews in the stratification cells during fieldwork.

Table A 2.5

Initial target quotas for the fieldwork

	Granted (N)		Pending (N)		Total
Country/region	HBC	M&M + ICT	HBC	M&M + ICT	
Southern and eastern Europe	18	9	22	14	63
Northern and western Europe (excl. Germany)	68	58	97	93	315
Germany	25	29	31	39	123
Total	**110**	**95**	**149**	**145**	**500**

4. Fieldwork

Fieldwork – dates

Fieldwork started on 31 March 2019 with pilot interviews to test the questions under real conditions.

The fieldwork ran until 2 May 2019, when the last interview was completed.

Course of the fieldwork

To conduct the fieldwork, the gross sample was divided across the different language versions of the survey software.

The target quotas were adjusted during the fieldwork, since response rates varied by country/language area and technical field. The adjustment was necessary to ensure that the stratification cells contain enough completed interviews for later analysis.

Records were drawn from the sample at random, and contact was established with the aim of identifying the person or persons able to answer questions about the application concerned. The selection of the application, which was supposed to be the subject of an interview was randomly among all the given application carried by one institution. In order to achieve the interviews practically, the most recent application(s) have been presented to the respondent first, whereas the selection of these was also randomly.

Respondents were sometimes unable to remember how a particular application had been exploited because too much time had elapsed. In other cases the target person was no longer with the institution. In such cases, respondents were able to choose an application themselves, as long as the filing date of the application was no more than 10 years ago.

There were N=1 450 consolidated institutions in the gross sample. Since the number of institutions per stratification cell was not big enough and there were no duplicate institutions in each cell, the sample was not divided into batches. N=644 (44%) institutions were selected to be contacted, from which N=241 resulted in one or more interviews. This equates to a completion rate on the overall gross sample of institutions of 17%. For the remaining N=403 contacted institutions, it was not possible to conduct an interview because the target person could not be found or was absent/not reachable, or refused to participate.

The remaining N=806 institutions were not selected for contact because either the relevant target quota had already been met or the fieldwork had already come to an end.

Table A.2.6 gives an overview of the gross sample broken down into the strata of status, technical field (sector) and country/region.

For each stratum, the interview rate can be calculated by dividing the number of interviews conducted by the number of companies contacted.

The interview rate was highest for Germany, where 50% of those selected for contact were interviewed. The equivalent rate for France was lower at 20.5%. There were hardly any differences in interview rates across status and sector.

Table A 2.6

Breakdown of gross sample by stratum

	Total	Status (N)		Sector (N)		Country/region		
		Grant	Pending	HBC	M&M + ICT	Southern and eastern Europe	Northern and western Europe (excl. Germany)	Germany
Completed interviews	241	53	188	140	101	101	85	55
Other outcome	403	83	320	246	157	193	155	55
Not selected for fieldwork	806	206	600	501	305	204	426	176
Total	**1 450**	**342**	**1 108**	**887**	**563**	**498**	**666**	**286**
Interview rate (%) ***	**37.4**	**39**	**37**	**36.3**	**39.1**	**34.4**	**35.3**	**50**

* Interview rate: Calculated as a percentage share of complete interviews of contacted institutions (complete Interviews plus other outcome)

Fieldwork management

Each institution was allocated to a stratum. Institutions were then selected at random to be contacted for the first time.

Within a stratum, all institutions were initially equally likely to be selected to be contacted for the first time. Since institutions were not reconsidered, the probability of being selected rose as the fieldwork progressed.

Depending on the outcome of the initial contact, institutions were either put on a list to be automatically contacted again, or an appointment was made to call them back, or the caller noted that the institutions were not to be contacted again (e.g. because they had declined to participate).

This automatic procedure determined when and to which interviewer an institution was suggested for re-contacting if a previous contact had not produced a definitive result. The automatic re-suggestion maximised use of the gross sample and compensated for fluctuations in the likelihood of a response between the different strata as far as possible.

5. Interview length

The average length of the interviews conducted was 22.84 minutes, with outliers lasting up to an hour or more (outliers were disregarded when calculating the average time).

In France, the average interview time was the highest compared with the other regional groups/Germany, at around 26 minutes.

Table A 2.7

Interview length by country/region

	Mean interview length (in minutes)
Southern and eastern Europe	23.78
Northern and western Europe (excl. Germany)	23.44
Germany	21.11
Total	**22.84**

6. Final data preparation

Once the fieldwork was finished, the captured data was checked for:

- completeness
- logic (conditional logic)
- consistency – whether the answers given by a company were consistent, and close analysis of any outliers, which were removed in some cases
- plausibility – with close analysis of any outliers, which were removed in some cases

7. Weighting

Weighting was used to adjust the net sample to best reflect the population in terms of its size.

For data analysis purposes, and for content-based reasons, the data was weighted based on the distribution in the population of the dimensions status (granted/pending), EPO technical fields and country/region.

For the weighting, the distribution in the population shown in Table A.2.1 was used as the basis. But northern and western Europe and Germany were eventually merged, because with Germany as a separate country/region category, in some of the stratification cells, the number of interviews was too small or the weighting too big. In order to keep the weighting factors within a reasonable range, the categories of northern and western Europe and Germany were merged.

The weighting factors involved "underweighting" (weighting factor <1) and "overweighting" (weighting factor >1) sampling units in certain strata.

The final figures/percentages for the population as the basis for the weighting are shown in Table A.2.8.

The final net sample is the net sample at the end of the fieldwork.

Table A 2.8

Final population distribution for weighting (N and percentage)

	Granted (N)		Pending (N)		Total (N)	Granted (%)		Pending (%)		Total (%)
	HBC	M&M + ICT	HBC	M&M + ICT		HBC	M&M + ICT	HBC	M&M + ICT	
Southern and eastern Europe	664	331	795	516	2 306	4	2	4	3	13
Northern and western Europe	3 411	3 190	4 692	4 843	16 136	18	17	25	26	87
Total	**4 075**	**3 521**	**5 487**	**5 359**	**18 442**	**22**	**19**	**30**	**29**	**100**

Table A 2.9

Final net sample

	Unweighted					Weighted				
	Granted		Pending		Total	Granted		Pending		Total
	HBC	M&M + ICT	HBC	M&M + ICT		HBC	M&M + ICT	HBC	M&M + ICT	
Southern and eastern Europe	68	33	102	55	258	25	12	30	19	86
Northern and western Europe	58	58	173	139	428	127	119	175	180	600
Total	**126**	**91**	**275**	**194**	**686**	**152**	**131**	**204**	**199**	**686**

Annex 3 Survey questions

Annex 3 Survey questions

Section A: Patent/invention details		
Ownership	Are you in charge of the commercialisation/ technology of the patent application/granted patent concerned?	Yes - No, it was sold or transferred to another entity - No, it was abandoned - No, it was neither sold nor abandoned, but another colleague, unit or another organisation is now in charge of the commercial exploitation - Don't know - No statement
Employment	Are you employed by the applicant institution?	Yes - No - Don't know - No statement
Office	Do you work in a technology transfer/ licensing/commercialisation office?	Yes - No - Don't know - No statement
Dependency of the applicant institution	Is the technology transfer or technology licensing department legally independent of the applicant institution?	Yes, it is legally independent of the applicant institution - No, it is embedded in the applicant institution - Other - Don't know - No statement
Technology transfer/licensing/ commercialisation office	Does the applicant institution have a technology transfer/licensing/ commercialisation office?	Yes - No - Don't know - No statement
Development of invention	Was the invention concerned developed by the applicant institution alone or together with another organisation?	By the applicant institution alone - Together with another organisation - Don't know - No statement
Development partner	With which other organisation was the invention in question developed?	Another university, hospital or public research organisation - A private company or independent inventor - Other - Don't know - No statement
Type of invention	Which of the following best describes the type of the patented invention in question?	Product-oriented - Process- or method-oriented (related to a particular manufacturing process or method) - It has features of both (product and process or method-oriented) - Don't know - No statement
Stage of development	At what stage is the current development of the patented invention/the related technology? /What stage of development was the patented invention/the related technology at when you sold it?	Research stage (basic or applied research) - Development stage (development of a product, service or process that can be marketed or employed) - Implementation and operation stage (turning the prototype into a scalable product, service or process, product launched or process fully implemented) - Don't know - No statement
Importance of invention	Compared with other current technical developments in the relevant industry, how would you rate the importance of this invention? Would you say .. ..?	It is a highly significant invention and belongs to the top 10% in the relevant industry - It ranks in the top half of all inventions - It ranks in the bottom half of all inventions - Don't know - No statement

Section A: Patent/invention details

Motives for maintaining: imitation/copying prevention	I am now going to read out some possible motives for maintaining a patent/patent application for this invention. How important are these motives with respect to this patented invention?	Preventing others from imitating/copying the patented invention Boosting the reputation of the organisation, e.g. with respect to clients, partners and investors Facilitating technology sale or licensing agreements Facilitating other commercial or third-party contracts (e.g. contract research, supply or development agreements) or co-operations (e.g. joint R&D agreements) Facilitating technology spin-offs
Freedom-to-operate check	To your knowledge, has a freedom-to-operate analysis for the patented invention been carried out or is one being planned?	Yes - No - Don't know - No statement
Other patents	Do you have - or do you plan to obtain - other patents in relation to the invention?	Yes - No - Don't know - No statement
Registered trade marks	Do you have - or do you plan to obtain - a registered trade mark in relation to the invention?	Yes - No - Don't know - No statement
Registered design rights	Do you have - or do you plan to obtain - registered design rights in relation to the invention?	Yes - No - Don't know - No statement

Section B: Exploitation details

Commercial exploitation status	Is the patented invention currently being commercially exploited, or was it exploited in the past? Examples include making, using, selling, offering for sale or licensing its appropriation or use or using it in contractual or collaborative research.	Yes, it is currently being exploited - Yes, it was but is not anymore - No, but there are plans to do so in the future - No, and there are currently no plans to do so - Don't know - No statement
Reasons for non-exploitation: Insufficient potential	We would like to establish the reasons why the patented invention was not commercially exploited. Please tell me for each reason whether it is applicable or not.	The patented invention does not have sufficient commercial potential The commercial possibilities of the invention are currently being actively explored The invention is still in development and not ready for possible commercial exploitation Lack of resources to pursue further development or commercialisation Lack of effective IP protection for the commercial exploitation Lack of freedom to operate to commercialise the invention Failure to find an interested partner

Section CA: Licensing/co-operation		
Out-licensing	Has the patented invention been licensed out?	Yes - No - Don't know - No statement
Exploitation in co-operation with external partners	Apart from licensing, has the patented invention been exploited in any other type of co-operation with external partners, e.g. in a joint venture, contractual research or R&D collaboration? If yes, please specify.	Joint venture - R&D co-operation - Manufacturing, distribution, sales, marketing, etc. agreement - Sold - Other - Don't know - No statement
Size of external partners	In the following questions, we would like to understand more about these transactions and/or co-operation activities. With which of the following types of organisation were licensing or co-operation agreements established on the basis of the patented invention?	A small or medium-sized enterprise (SME) - A university, hospital or public research organisation which is not the applicant institution - A large company/multinational - Other - Don't know - No statement
Location of external partners	Where are the licensees or co-operation partners located?	The same country as your organisation - Other European country (any of the other EPC countries) - North America - Asia - Other parts of the world - Don't know - No statement
Reasons for licensing/co-operation	What were the main reasons for the licensing or co-operation agreement? Which ones apply to your situation with regards to this patented invention?	Generate revenue from the invention - Enable commercial exploitation of the invention - Support practical use of the invention - Enable follow-on development of the invention - Facilitate formation of a spin-off company - Facilitate contract research or research collaboration
Challenges faced in licensing/co-operation	What were the challenges faced when setting up the licensing or co-operation agreements for the patented invention? I will detail some perceived challenges now and would like you to rate them using a scale from 1 "No challenge" to 5 "Significant challenge", or somewhere in between based on your experience.	Identifying the right partners or contact persons - Lack of interest from potential partners - Lack of internal resources - Complexity of negotiations - Need to disclose non-patented know-how or critical information on technology needs - Inadequate protection by patents or other IP rights
Partner search channels	Which of the following channels has your organisation used to find licensing or co-operation partners?	Did you use .. .. ? Personal networks - Prior business or research partners - Internet trading platforms - Patent databases (e.g. Espacenet) - Patent attorneys and law firms - Brokers and consultants - Business fairs and conferences
Potential for further licensing/co-operation	Apart from current activities, do you see any potential for further licensing or co-operation activities in relation to the patented invention?	Yes - No - Don't know - No statement

Section CB: Planned selling/licensing/co-operation

Plans to sell	Do plans exist to sell the patented invention?	Yes - No - Don't know - No statement
Plans to license out	Do plans exist to license out the patented invention?	Yes - No - Don't know - No statement
Plans to license out in co-operation with external partners	Apart from licensing or selling, do plans exist to exploit the patented invention in any other type of co-operation with external partners, e.g. in a joint venture, contractual research or R&D collaboration? If so, please explain to us the nature of the plan.	Joint venture - R&D co-operation - Manufacturing, distribution, sales, marketing, etc. agreement - Start-up, spin-off - Other - No plans to exploit the patented invention in any other type of co-operation with external partners - Don't know - No statement
Size of external partners	In the following questions, we would like to understand more about the partners for the planned transaction or co-operation activities. Of the following types of organisation, which one would be your preferred partner to license, sell or engage in a co-operation in relation to the patented invention concerned?	A small or medium-sized enterprise (SME) - A university, hospital or public research organisation which is not the applicant institution - A large company/multinational - Other - Don't know - No statement
Type of external partners	Where would be your preferred location to license, sell or engage in a co-operation on the basis of the patented invention?	The same country as your organisation - Other European country (any of the other EPC countries) - North America - Asia - Other parts of the world - Don't know - No statement
Reasons for selling/licensing/co-operation	What are the main reasons for the planned licensing, selling or co-operation agreement? Please state which ones apply to your situation with regard to this patented invention.	Generate revenue from the invention - Enable commercial exploitation of the invention - Support practical use of the invention - Enable follow-on development of the invention - Facilitate formation of a spin-off company - Facilitate contract research or research collaboration
Challenges faced in selling/licensing/ co-operation	I would now like to understand the challenges faced when setting up licensing, selling or co-operation agreements for the patented invention. Please rate the following challenges using a scale from 1 "No challenge" to 5 "Significant challenge", or somewhere in between based on your experience.	Identifying the right partners or contact persons - Lack of interest from potential partners - Lack of internal resources - Complexity of negotiations - Need to disclose non-patented know-how or critical information on technology needs - Inadequate protection by patents or other IP rights
Partner search channels	Which of the following channels have been used or are planned to be used to find licensing, selling or co-operation partners?	Personal networks - Prior business or research partners - Internet trading platforms - Patent databases (e.g. Espacenet) - Patent attorneys and law firms - Brokers and consultants - Business fairs and conferences
Potential for further selling/licensing/ co-operation	Apart from the current planned activities, do you see potential for further licensing or co-operation activities on the basis of the patented invention?	Yes - No - Don't know - No statement

Section F: Organisation details		
Organisation size	How many employees in total work for the department or organisation involved in the technology transfer/commercialisation process? Please include all professional, administrative and support staff, regardless of whether these are employed on a permanent, full-time, part-time or project basis, and please include yourself. If you do not have easy access to this information, then a "best guess" figure is acceptable.	1 employee - Between 2 and 4 employees - Between 5 and 10 employees - Between 11 and 25 employees - Between 26 and 50 employees - 51 and more employees - Don't know - No statement
Commercialisation office size	And how many employees are responsible for the commercialisation currently? Please include yourself. If you do not have easy access to this information, then a "best guess" figure is acceptable.	1 employee - 2 employees - 3 employees - 4 employees - 5 employees – 6 employees - 7 employees - 8 employees - 9 employees - 10 employees - 11 and more employees - Don't know - No statement
Commercialisation resources	How would you assess the current resource endowment of the organisation for commercial exploitation or transfer of technologies?	1 - Not sufficient - 2 - 3 - 4 - 5 Completely sufficient - Don't know - No statement
Strategy for technology commercialisation	Does the organisation have a written strategy for technology commercialisation or technology transfer?	Yes - No - Don't know - No statement
Successful licensing deals	How many successful licensing, selling, co-operation or other commercialisation deals, including spin-off formations, based on patented inventions were facilitated by the organisation in the last five years?	Licensing - Selling - Spin-off formations - Co-operations - Other
Role and position	What is your current role and position within the organisation?	Owner - R&D - Sales - Intellectual property management - Legal - Finance - IT - Managing or Executive Director (CEO, CTO, CSO, CIO) - Patent attorney - Other - Don't know - No statement
Level of expertise in patent management	How would you describe your personal level of expertise in patent management?	Entry level - Basic level - Experienced level - Expert level - Other - Don't know - No statement
Level of expertise in patent commercialisation	How would you describe your personal level of expertise in patent commercialisation?	Entry level - Basic level - Experienced level - Expert level - Other - Don't know - No statement

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