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Market success for inventions

Patent commercialisation scoreboard: European SMEs



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Foreword

Dear readers,

As the patent office for Europe, our mission is to provide high-quality patents for all those who want to protect their innovations in up to 44 member states. Patents are a form of legally robust IP for enterprises and individuals who want to reap the rewards of their creativity and hard work.

Patents are not just for large multinational corporations, anyone can apply. Applicants for European patents range from teams of scientists collaborating in university spin-offs to sole inventors with brilliant ideas. Innovation is one of Europe's strengths. We are not just a culturally diverse continent, we are a myriad of creators and inventors working with, and for, a multitude of different enterprises.

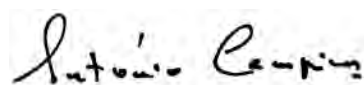
One type of enterprise files over one fifth of all European patent applications in Europe, namely small and medium-sized enterprises (SMEs). SMEs do not just contribute to our economy. They are also responsible for some of the biggest breakthroughs of our time in medical technology, clean energy, road safety and all of the other sectors that are making our world, safer, smarter and more sustainable.

If we are to support SMEs in these endeavours, we have to assess whether they are able to access patent protection and truly make use of their IP portfolio. This report aims to monitor the practices, successes and challenges related to the commercialisation of European patents by SMEs. It is the first in a series of studies that can be seen as part of a larger patent commercialisation scoreboard that will survey different categories of stakeholders in the European patent system.

With these studies, we aim to provide policymakers with comprehensive and reliable evidence that will help them to make informed decisions. The studies will effectively provide some indication of the extent to which Europe is fulfilling its potential in the field of patents.

The results of this first study are encouraging. They reveal that European SMEs generally make effective use of European patents to protect their key inventions, and successfully commercialise up to two thirds of them. But we want to make the patent system even better. To do so, we have to identify the obstacles facing SMEs when it comes to commercialising their patents and look at ways of removing them.

This study shows that European SMEs face serious challenges, ranging from a lack of IP expertise and resources to the need for more contacts to support their commercialisation efforts across Europe. These are the issues that everyone in the IP ecosystem must try to resolve if we are to unleash the full power of patents. Given the crucial role of patents in boosting our economy and spearheading new technologies, we must continue to seek ways of successfully tackling the challenges revealed in this study.



António Campinos
President, European Patent Office

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List of abbreviations

BvD	Bureau Van Dijk
CATI	Computer-assisted telephone interviewing
CIS	Community Innovation Survey
EPC	European Patent Convention
EPO	European Patent Office
EU	European Union
FTO	Freedom to operate
HBC	Healthcare, Biotechnology and Chemistry (Principal Directorate at the EPO according to technical field of the patent application)
ICT	Information and Communications Technology (Principal Directorate at the EPO according to technical field of the patent application)
IP	Intellectual property
IPR	Intellectual property rights
M&M	Mobility and Mechatronics (Principal Directorate at the EPO according to technical field of the patent application)
PRO	Public research organisation
R&D	Research and development
SME	Small and medium-sized enterprise
UK	United Kingdom
WIPO	World Intellectual Property Organization

Executive summary

Patents help small and medium-sized enterprises (SMEs) to protect their inventions and bring them to market. They can also be a major asset to setting up licensing or co-operation agreements that enable SMEs to move into new markets for patented inventions. In 2018, one in every five patent applications received by the European Patent Office (EPO) was filed by an SME or individual entrepreneur from Europe. The broad geographical scope of protection conferred by European patents¹ is especially useful to these actors when commercialising an invention internationally.

This study explores how SMEs commercialise their European patents in practice. It is based on a large sample of European patent applications from European SMEs interviewed in the first half of 2019. All related applications were made between 2008 and 2018. The European patents themselves are either still pending at the EPO or have already been granted. The study documents whether and how the related inventions – referred to as the “patented inventions” in this report – are commercially exploited, with a focus on collaborative forms of exploitation like licensing or co-operation. By analysing the patent commercialisation practices of European SMEs, the study offers policymakers valuable insights into the challenges facing these key players in European innovation ecosystems.

Key findings

The study's results suggest that SMEs rely on the European patent system to commercialise important inventions. Most of them consider the invention for which they have filed a European patent application as important in their industry or highly relevant to their core business. Up to two thirds of the European inventions covered by the survey are already commercially exploited. Most of the inventions that have yet to be commercially exploited are either still in development or have not yet reached the market research phase.

Unsurprisingly, SMEs typically rely on European patents to prevent competitors from imitating their inventions, build up a reputation and secure freedom to operate. However, about half of them also intend to use their patents for transactional purposes like setting up licensing agreements and commercial contracts.

Another key finding of the study is that SMEs rely heavily on partnerships with domestic or foreign partners. Half of all commercialised inventions are exploited in collaboration with an external partner via a licence, technology spin-off, or co-operation; and this figure is even higher if planned partnerships are taken into account. Resource-constrained SMEs use partnerships as a way of entering new markets or sharing the financial burden of innovation. The majority of SMEs reported targeting business partners located in other European countries and the broad geographical scope of European patents makes them a useful tool in this respect.

But SMEs seeking international partners face major challenges. According to the study, SMEs struggle to find partners outside their close circle of personal or business contacts. Against this background, increasing the effectiveness of market intermediaries emerges as a key policy lever for fostering patent commercialisation by SMEs in Europe.

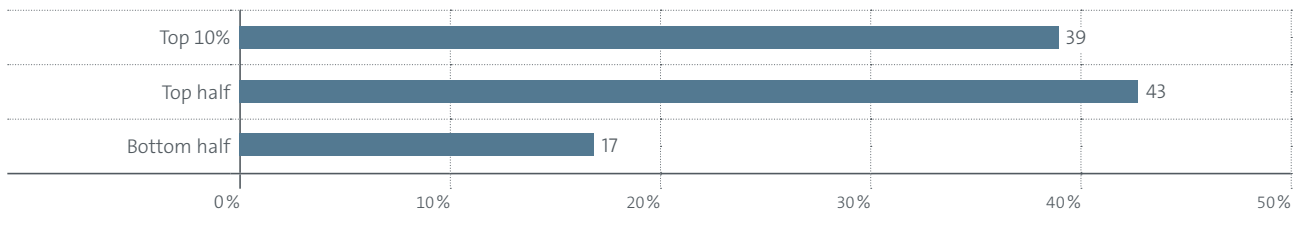
¹ The EPO provides a single uniform grant procedure for Europe, enabling owners of European patents to exercise their rights in over forty countries. European patents can also be validated in four additional countries: Morocco, the Republic of Moldova, Tunisia and Cambodia.

Importance of SMEs' patented inventions to their industries

A clear majority of the SMEs surveyed consider the inventions for which they have filed a European patent application as important compared with other inventions in their industry.

Over 80% of respondents consider their inventions to be ranked in the top half of all inventions in their industry, and up to 39% perceive their inventions as being ranked in the top 10% of technical developments in their industry. Only 17% perceive their inventions to be ranked in the bottom half of all inventions in their industry.

Importance to industry

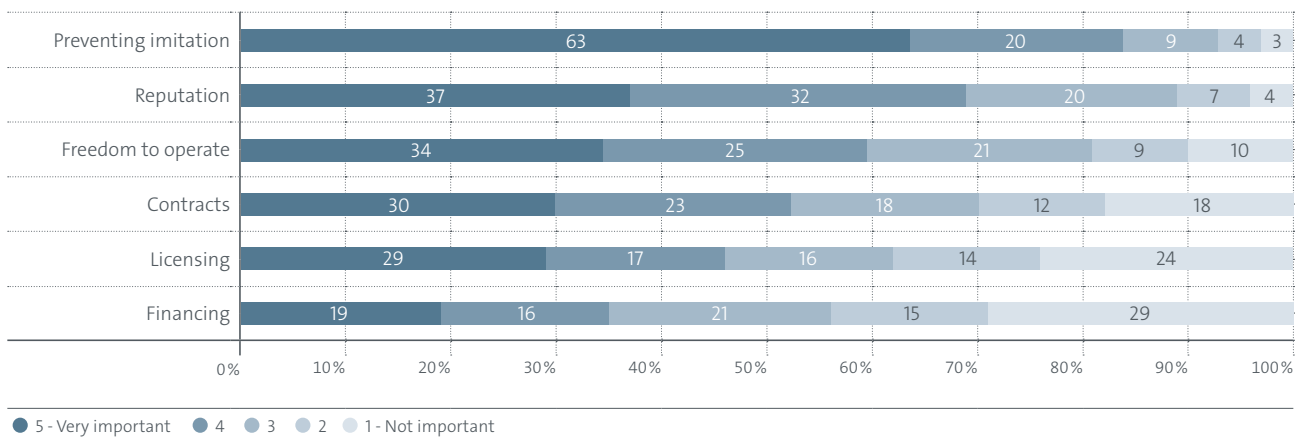


Motives for maintaining a patent

Preventing imitation was cited by 83% of SMEs as an important or highly important motive for maintaining their European patents, followed by improving the SME's reputation (69%) and helping to obtain freedom to operate (FTO)² (59%).

Roughly half of the SMEs surveyed also consider motives related to the use of patents in technology transactions as important. These motives include facilitating commercial contracts (53%) and licensing (46%). Using European patent applications to secure financing is regarded by over one third (35%) of SMEs as an important or highly important motive for maintaining their patent.

Motive for maintaining patents



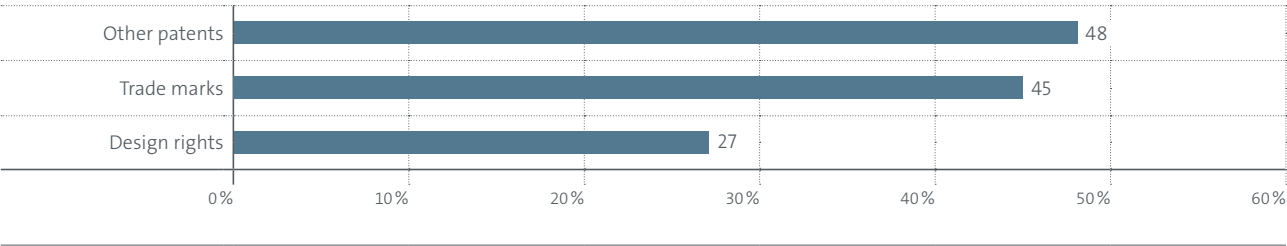
² Freedom-to-operate (FTO) analyses are usually conducted before or in preparation for commercialisation activities. They allow a company to determine whether an invention, product or technology can be used without running the risk of infringing someone else's patent rights.

Use of trade marks, design rights or additional patents in relation to the invention

When asked to identify complementary IP rights that are also relevant for the commercial exploitation of their patented invention, SMEs report using or plans to use additional patents in 48% of cases.

A similarly high percentage of SMEs use complementary trade marks (45%), whereas design rights are cited in just a quarter of the cases.

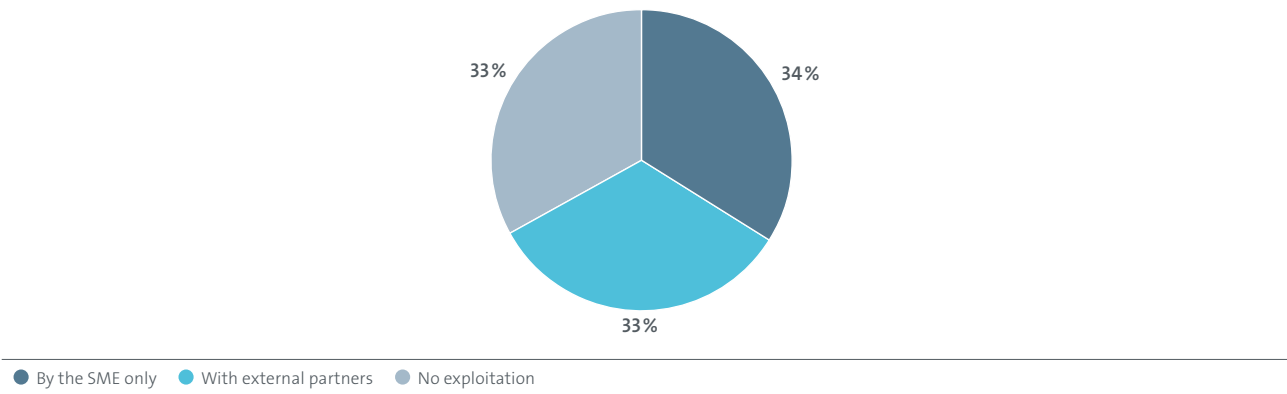
Use of trade marks, design rights or additional patents in relation to the invention



Commercial exploitation

Roughly two thirds (67%) of the inventions for which SMEs have filed a patent application with the EPO are exploited for commercial purposes. One third (34%) of all inventions are exploited exclusively by SMEs, and another third (33%) are commercialised in collaboration with external partners, via technology transfers or co-operation agreements. In other words, half of all patented inventions that reach the market are exploited via a partnership.

Type of commercial exploitation

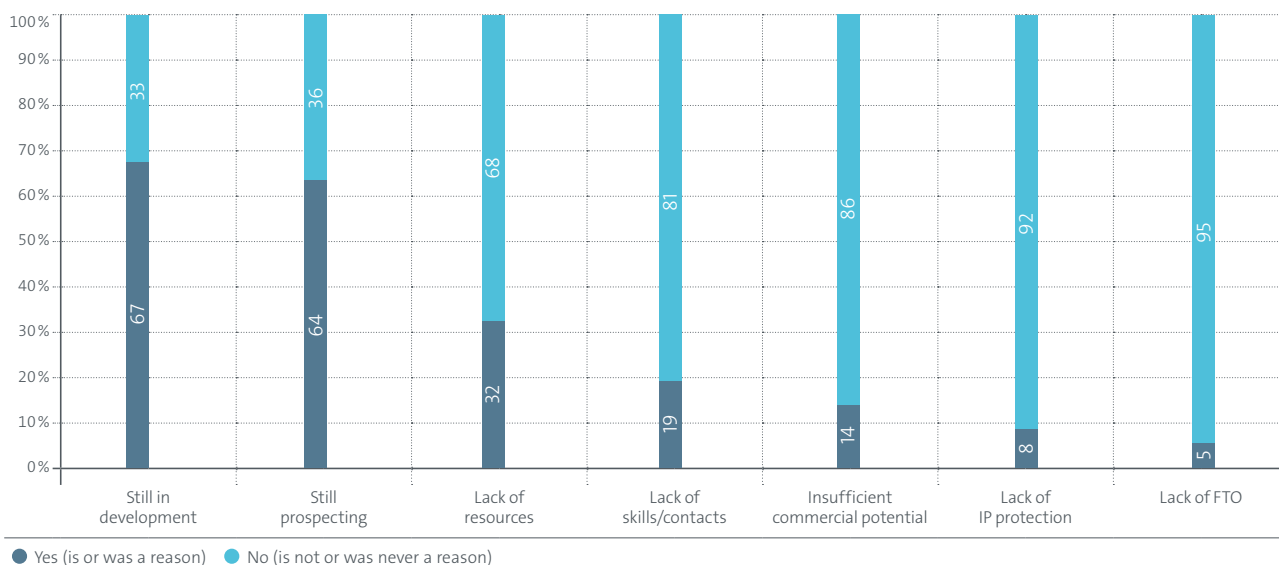


Motives for not exploiting inventions

Some patented inventions are not commercially exploited. According to the SMEs surveyed, this is mainly because these inventions are either only at the development stage (67%), or potential commercial opportunities are still being explored (64%).

Other reasons given include a lack of resources (32%), skills or contacts (19%) to pursue further development and commercialisation. Insufficient commercial potential (14% of unexploited inventions to date), a lack of IP protection (8%) and insufficient freedom to operate (5%) were cited less frequently.

Reasons for not exploiting inventions

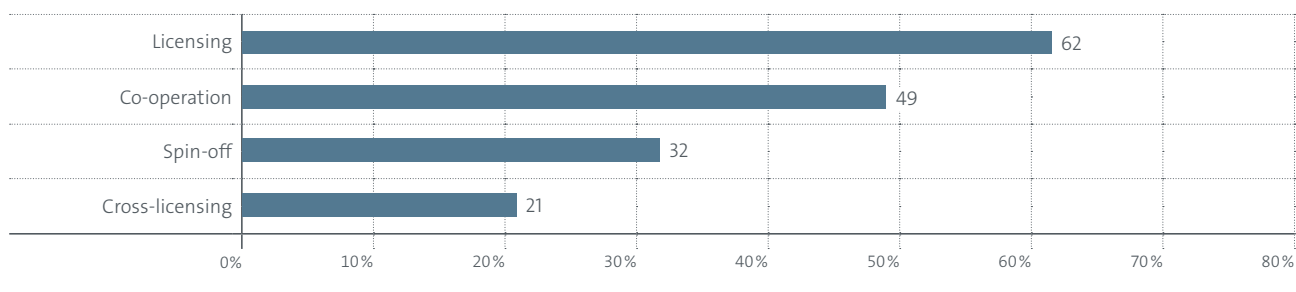


Forms of collaborative exploitation

Licensing is the most frequent (62%) form of collaborative exploitation used by SMEs. Almost half of joint commercialisation cases also involve a broader form of co-operation.

Nearly one third of the surveyed SMEs involved in collaborative exploitation create spin-offs based on their patented inventions, while just over 21% co-operate via cross-licensing.

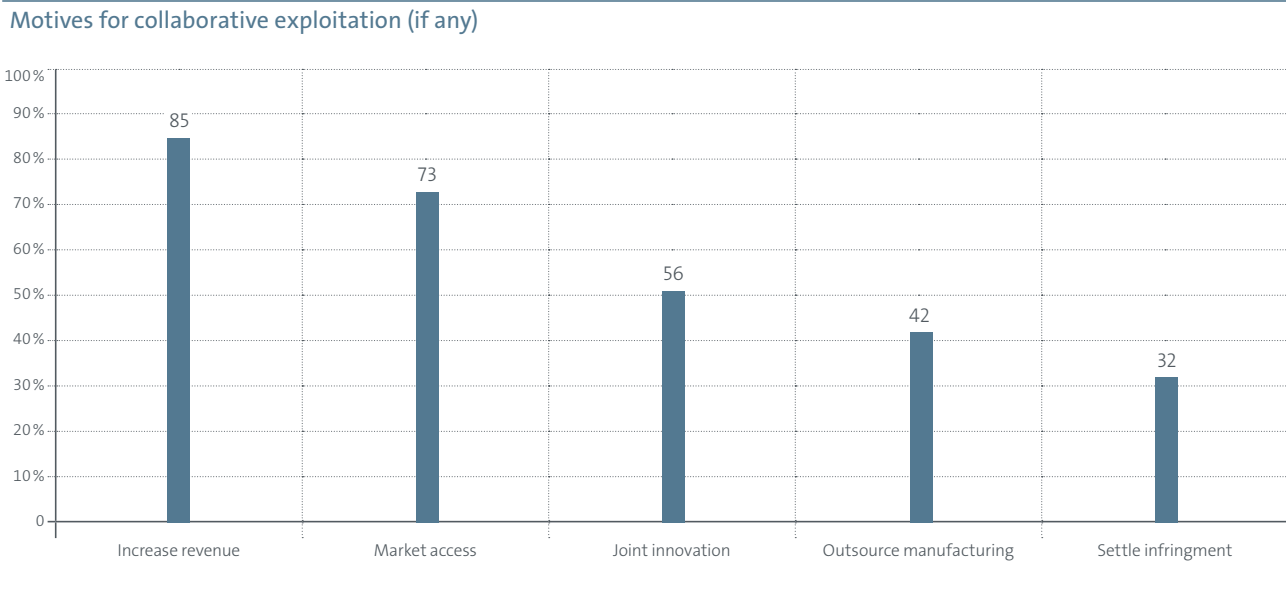
Forms of collaborative exploitation (if any)



Motives for collaborative exploitation

Jointly exploiting patented inventions with external partners enables SMEs to leverage their partners’ resources and accelerate IP commercialisation.

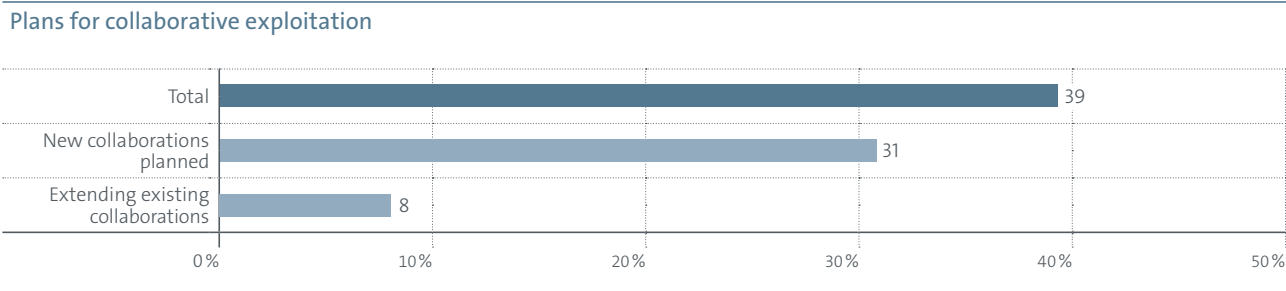
SMEs that are involved in partnerships identify increasing revenue (85%) and market access (73%) as the main motives for collaborative exploitation. Over half (56%) of them also cite joint innovation as a motive, followed by outsourcing manufacturing (42%) and settling infringements (32%).



Potential for collaborative exploitation

Over a third of SMEs (39%) that applied for European patents reported plans for future collaborative exploitation. The vast majority (80%) of these plans concern inventions that have not yet been exploited with external partners.

The remaining share comprises patented inventions that are already jointly exploited, but may potentially lead to further partnerships. These figures indicate that SMEs perceive collaborative exploitation as a relevant mode of commercialisation for up to two thirds of all the inventions for which they have filed a European patent application.

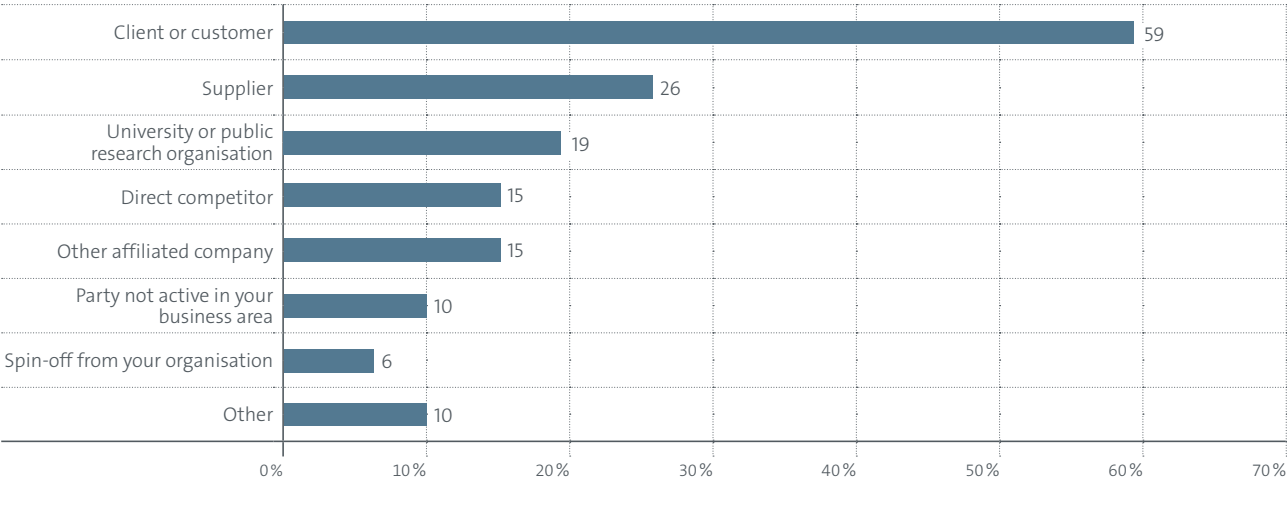


Business profile of partners

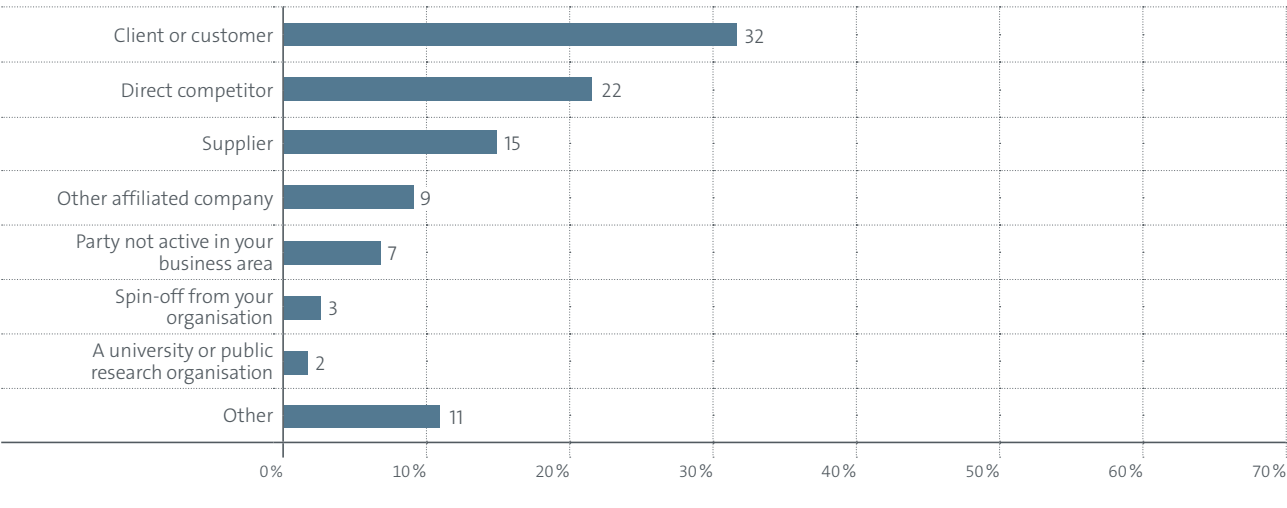
SMEs seeking to exploit patented inventions most frequently partner up with prior clients (59%) and prior suppliers (26%).

Around one fifth (19%) of these inventions are also jointly exploited with a university or public research organisation. Partnerships with competitors are less frequent (15%), but are often cited by SMEs (22%) planning to find partners.

Current partner profile



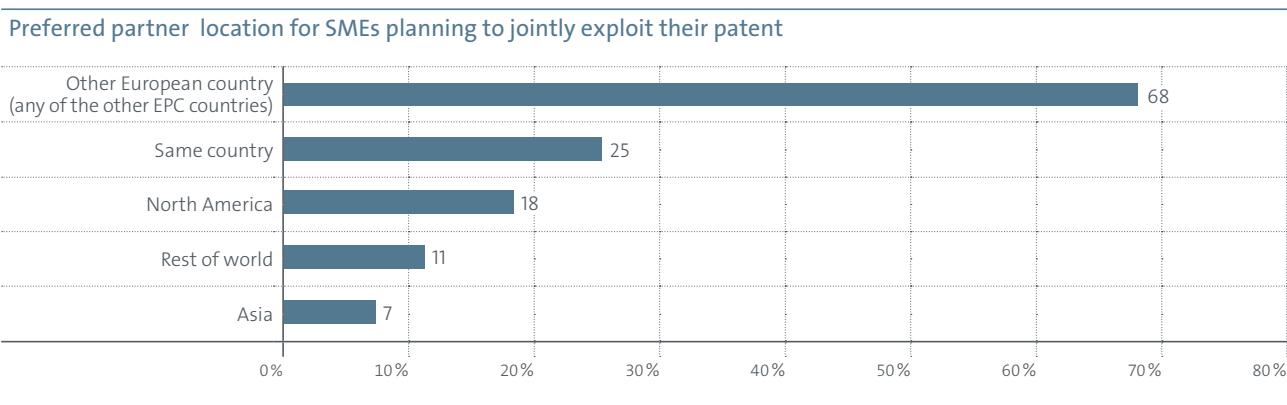
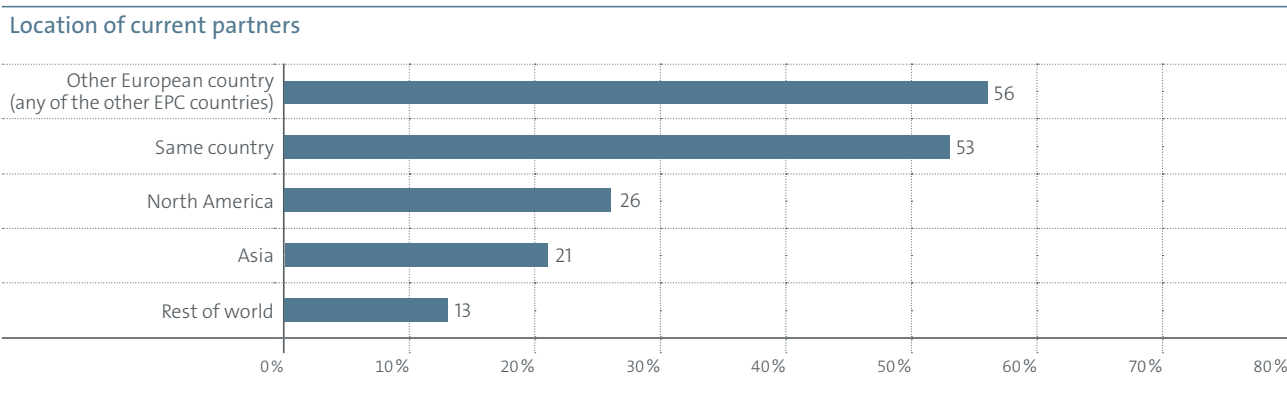
Planned partner profile



Geographical location of partners

European SMEs most frequently engage in collaborative exploitation with partners located in other European countries (56%) or in their own country (53%).

SMEs commercialising inventions outside of Europe prefer their partners to be located in North America (26%) or Asia (21%). When it comes to planned partnerships, 68% of SMEs prefer their partner to be located in another EPC contracting state.

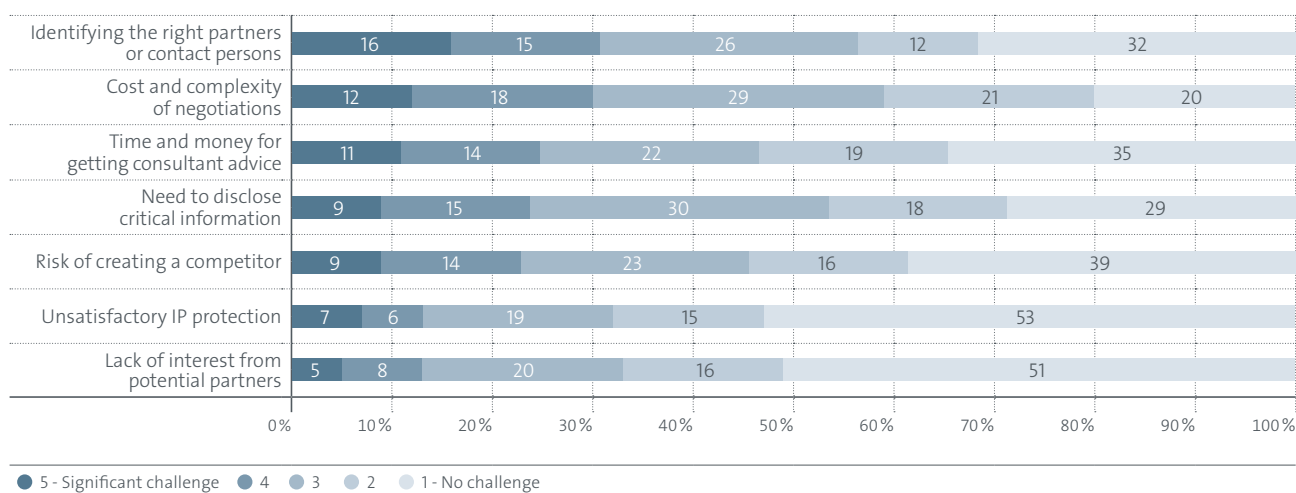


Challenges in collaborative exploitation

European SMEs involved in collaborative exploitation cite identifying the right partners or the cost and complexity of negotiations as the biggest challenge.

Resources for obtaining advice from consultants, the need to disclose critical information and the risk of creating a competitor are seen as important challenges in around a quarter of the cases respectively. Unsatisfactory IP protection and the lack of interest from potential partners are cited as major barriers for just 13% of patents commercialised via collaboration.

Challenges in collaborative exploitation

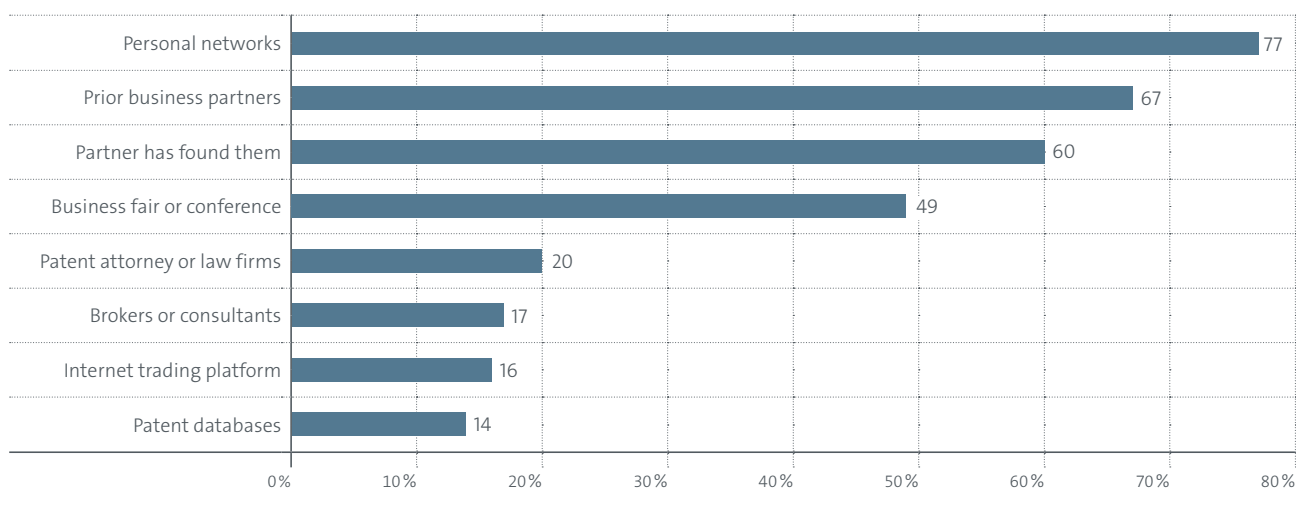


Channels used to find partners

Analysis of the channels used by SMEs to find partners confirms that identifying the right contacts for setting up collaborations across Europe is a really tough challenge for SMEs. Up to 60% of partnerships involving SME patents or patent applications are actually initiated by their partners.

SMEs' own efforts to find partners are mainly based on direct contacts, and they seldom use available intermediary channels. SMEs cite prior personal contacts (77%) and business partners (67%) as by far the most important channels for collaborative exploitation, along with fairs or conferences (49%). They use brokers (17%), patent attorneys (20%), internet platforms (16%) and patent information tools (14%) far less frequently.

Channels used to find partners



1. Introduction

In 2018, one in every five European patent applications originating from the European Patent Organisation's member states was filed by a small and medium-sized enterprise (SME) or individual entrepreneur. These small businesses are typically driven by innovation and focused on scaling up their activities beyond their domestic market. As such, they constitute a key driver of economic growth and a priority target for policymakers.

IP statistics show that 9% of SMEs in Europe own registered intellectual property rights (IPRs) like patents, trade marks or design rights, versus 40% of large companies.^{3,4} These IPR-owning SMEs outperform their counterparts that hold no IP rights. They are, for instance, more innovative, more likely to grow over time,⁵ and have almost 32% higher revenues per employee than SMEs that have no registered IPRs.⁶ However, the evidence also suggests that SMEs face specific barriers to using patents and other IPRs. These barriers include the cost and complexity of securing IP protection, as well as a lack of awareness of the benefits of IP. In other words, not all SMEs may be in a position to fully leverage the potential of IP protection to develop and exploit their intellectual assets.⁷

IPRs enable SMEs to capture the value of their ideas and bring them to the market. Patents protect inventions intended to serve as new solutions to technical problems. This protection is needed to ensure sufficient returns on risky investments in research and development. In addition, well-managed patents can generate a wide range of transactional benefits for SMEs. Small technology businesses, for instance, may use patents to set up licensing or co-operation agreements. This allows them to leverage their partners' resources with a view to rapidly scaling up their activities, entering new markets and generating additional revenues from their patented inventions. A growing number of small technology businesses also use patents to attract investors.

While most SMEs that use patents primarily rely on national rights, the broad geographical scope of the protection conferred by European patents⁸ is instrumental for those aiming to grow rapidly in international markets. SMEs that have filed a European patent application are 25% more likely to experience turnover growth of 10% or more during three consecutive years.⁹ Effective IP protection in different national markets is a prerequisite for SMEs to transfer and exploit their inventions abroad. This is especially the case for conventional SMEs or start-ups which, due to their small size, are dependent on licensing agreements or co-operation partnerships with foreign entities to commercialise their inventions internationally.

Ensuring that these small businesses make successful use of the European patent system is one of the EPO's key objectives. It is also part of its mission to deliver high-quality patents and efficient services that foster innovation, competitiveness and economic growth. Although the SMEs that file applications with the EPO are usually aware of the value of patent protection, they face a number of challenges when trying to commercially exploit their patented inventions in European markets. In addition to providing SMEs with sound patent protection, the EPO also needs to monitor their patent commercialisation practices and shed light on their successes and needs.

3 European Union Intellectual Property Office, "Intellectual property rights and firm performance in Europe: an economic analysis – Firm-Level Analysis Report", June 2015.

4 Using a broader definition of IP rights (including trade secrets), the Community Innovation Survey 2016 finds similar results. The CIS results indicate that 20.5% of SMEs in the European Union used at least one IP right during the period 2014-2016, of which 6.1% used patents, 10.6% used trade marks and 3.3% used industrial designs. <http://ec.europa.eu/eurostat/web/microdata/community-innovation-survey>

5 European Patent Office and European Union Intellectual Property Office, "High-growth firms and intellectual property rights – IPR profile of high-potential SMEs in Europe", May 2019.

6 European Union Intellectual Property Office, "Intellectual property rights and firm performance in Europe: an economic analysis – Firm-Level Analysis Report", June 2015.

7 European Commission staff working document SWD (2012) 458 final: Towards enhanced patent valorisation for growth and jobs.

8 The EPO provides a single uniform grant procedure for Europe, enabling owners of European patents to exercise their rights in over forty countries. European patents can also be validated in four additional countries: Morocco, the Republic of Moldova, Tunisia and Cambodia.

9 European Patent Office and European Union Intellectual Property Office, "High-growth firms and intellectual property rights – IPR profile of high-potential SMEs in Europe", May 2019.

By analysing how SMEs commercially exploit their European patents, this study provides insights that foster a deeper understanding of how to help European SMEs harness the business potential of IP rights. The study is based on a large random sample of pending and granted European patents applied for by European SMEs interviewed in the first half of 2019. All related European patent applications were filed between 2008 and 2018. The study documents whether and how the related inventions – referred to as the “patented inventions” in this report – are commercially exploited. Particular emphasis is placed on collaborative forms of exploitation, such as licensing or co-operation, as opposed to the exploitation of the patented invention exclusively within the SME. Besides describing the practices of SMEs with respect to commercialisation, the study also examines their motives and the challenges that they face in commercialising patented inventions.

The next section of the report describes the methodology and sampling used in the study, and the following four sections discuss its results. As well as presenting the characteristics of the inventions and SMEs’ motives for patenting them, the study examines whether and how SMEs commercially exploit their patented inventions. The fifth section focuses on the specific challenges faced by SMEs engaged in collaborative exploitation and its potential benefits. The last section documents SMEs’ practices in managing their patents.

2. Methodology

2. Methodology

2.1 Survey

The purpose of the survey was to collect evidence on how European SMEs commercially exploit patented inventions, either independently or via external partners.¹⁰ 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 field work for the survey of SME applicants was conducted during the first half of 2019 and targeted all EPC contracting states. A total of 1 505 interviews were conducted.¹¹

2.2 Sampling

The aim of the sampling approach was to conduct a sufficient number of interviews to represent the population of active European patent applications owned by European SMEs. 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 2008, including those still pending at the EPO on 1 January 2019, were taken into consideration, as well as all European patents granted by the EPO between 2015 and 2017.

Within both groups, all the patent applications selected listed an SME originating from one of the 38 EPC contracting states as the applicant on the latest available information. European SMEs were identified using the ORBIS database,¹² which provides financial and other information on millions of European companies, and following the definition of the European Commission for micro, small and medium-sized enterprises.¹³ The final group of European patent applications contained 14 100 pending applications and 12 550 granted European patents.

Each of the two groups was then further stratified according to the three operational sectors of the EPO¹⁴ (Mobility and Mechatronics (M&M), Information and Communications Technology (ICT), and Healthcare, Biotechnology and Chemistry (HBC)) as well as the geographical origin of the SME applicant (Germany, United Kingdom, France, north-west Europe and south-east Europe).¹⁵ The geographical distribution of the patent population across these three sectors is presented in Table 2.1.

A gross sample was randomly selected from these European patent applications such that only one patent application was chosen per SME and a sufficient number of potential records entered each stratum. These were important steps to ensure that the final sample of interviews is representative of the population of European patent applications. The aim was to achieve a net sample of approximately 1 500 interviews, each focusing on a selected SME patent.

Table 2.1

Geographical distribution of the European patent application population filed by European SMEs by sector

	Pending (%)				Granted (%)			
	M&M	HBC	ICT	Total	M&M	HBC	ICT	Total
North-west Europe	15.7	12.5	6.6	34.8	15.4	10.8	3.8	30.0
South-east Europe	11.0	6.5	2.8	20.4	15.1	6.7	2.0	23.9
Germany	11.0	5.3	3.5	19.9	15.0	6.9	3.0	24.9
France	3.1	3.4	2.0	8.5	5.8	3.3	1.2	10.3
United Kingdom	6.2	5.7	4.6	16.4	4.8	4.2	1.9	10.9
Total	47.0	33.4	19.5	100.0	56.1	32.0	11.9	100.00

¹⁰ The final questionnaire can be found in Annex 1

¹¹ The survey was carried out on behalf of the EPO by BERENT Deutschland GmbH. See Annex 2 for the full field report.

¹² ORBIS data as of January 2019 was used. For more information about the ORBIS database, see <https://www.bvdinfo.com/en-gb/our-products/data/international/orbis>

¹³ According to Article 2 of the annex to Recommendation 2003/361/EC, the category of micro, small and medium-sized enterprises (SMEs) is made up of autonomous enterprises that employ fewer than 250 persons and have an annual turnover that does not exceed EUR 50 million, and/or an annual balance sheet total that does not exceed EUR 43 million. See for example: ec.europa.eu/regional_policy/sources/conferences/state-aid/sme/smedefinitionguide_en.pdf. In the study, information from the ORBIS database was used to comply with these quantitative thresholds and the criterion of autonomy.

¹⁴ Together, these three sectors cover all technical fields and, in turn, all patent applications filed with the EPO.

¹⁵ These two groups were defined according to geographical location, IP business practices and sample size balance. The north-west Europe group includes SME applicants from Austria, Belgium, Denmark, Finland, Ireland, Iceland, Liechtenstein, Luxembourg, Monaco, the Netherlands, Norway, Sweden and Switzerland. The south-east Europe group includes SME applicants from Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Italy, Lithuania, Latvia, Malta, North Macedonia, Poland, Portugal, Romania, Serbia, Slovenia, Slovakia, San Marino, Spain and Turkey.

2.3 Fieldwork

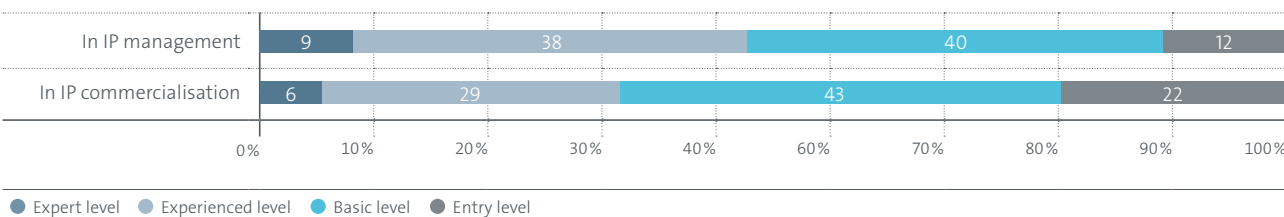
Data collection was conducted via telephone interviews (computer-assisted telephone interviewing - CATI) by BERENT Deutschland GmbH. To ensure high response rates, the survey was carried out in five languages: English, French, German, Italian and Spanish, and the EPO sent invitation letters to all companies in the gross sample. These letters consistently targeted those individuals within SMEs responsible for commercial decisions on the patented inventions selected in the sample.

In most of the cases the respondents were the owners or executive directors of the SMEs. Other respondent profiles included R&D, sales and IP managers. As indicated in Figure 2.1, about half of the respondents reported being experienced or experts in IP management, while 40% reported a basic level of experience. A third of respondents claimed that they were experienced or experts in IP commercialisation.

The interviews, which lasted 17 minutes on average, were conducted between February and May 2019. A total of 5 784 randomly selected companies were contacted, although contact details were wrong or non-existent for 838 (14%). Out of the remaining 4 946 successfully made contacts, 1 505 interviews were completed. This gives a net response rate of 26% for the total sample. More specifically, the net response rate was above 20% across all three dimensions: status of the application, geographical origin of the SME and technology sector. The main reasons for non-responses were difficulties finding a suitable contact person to complete the questionnaire and refusal to participate in the survey. All interviews were also checked for completeness, consistency and the plausibility of the answers given.

Figure 2.1

Experience of the respondents



Basis: number of interviews unweighted N=1 441, of which <1% Don't know and 1% No answer for IP management, and 1% Don't know and 2% No answer for IP commercialisation.

2.4 Final sample

The distribution of the final sample of 1 505 interviews across the stratification dimensions is presented in Table 2.2. A total of 761 interviews were conducted for pending and 744 for granted European patent applications.

Table 2.2

Final net sample

	Unweighted					
	Pending (N)			Granted (N)		
	MM	HBC	ICT	MM	HBC	ICT
North-west Europe	60	64	43	66	71	43
South-east Europe	62	46	31	61	41	30
Germany	113	62	78	120	75	57
France	34	43	42	31	28	25
United Kingdom	37	25	21	36	34	26
Total	761			744		

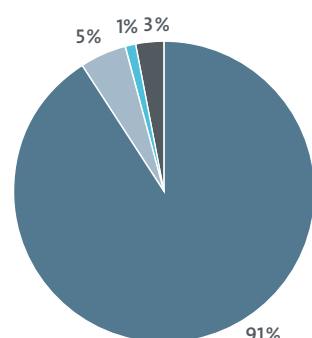
During the interviews the respondents were asked to indicate whether the SME applicant was still the owner of the patent or the patent application. In 5% of cases the respondents reported that it had already been sold, transferred or abandoned. To ensure that answers to questions about the exploitation of patents were fully relevant at the time of the interview, this report focuses on those patents or patent applications that were still owned or co-owned by responding SME applicants. All of the results below are thus based on the remaining 95%, or 1 441 observations, of which 742 were pending patent applications and 699 were granted patents (Figure 2.2).

To provide a more granular and industry-oriented analysis of the different technology fields, the number of technical sectors was extended to WIPO's five technology sectors:¹⁶ electrical engineering, instruments, chemistry and pharmaceuticals, mechanical engineering, and other fields. In terms of data analysis, all observations were weighted to align them with the distribution of the population.

All results are based on a sample and are therefore subject to statistical errors. Percentages calculated for less than 50-65 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 N=1 441 interviews and for a percentage value of around 50% is +/- 2.58 percentage points.

Figure 2.2

Ownership of patent applications (unweighted)



● Owner ● Co-owner
● Sold or transferred ● Abandoned

Basis: number of interviews unweighted N=1 505.

¹⁶ See Schmoch (2008), "Concept of a Technology Classification for Country Comparisons – Final Report to the World Intellectual Property Organisation (WIPO)".

The distribution of the weighted final sample of 1 440 observations, of which 737 concern pending patent applications and 703 granted European patents, by geographical region and WIPO technical sectors is provided in Tables 2.3 and 2.4 and Figures 2.2 and 2.3.

All of 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 2.3

Distribution of owned or co-owned European patent applications by geographical area

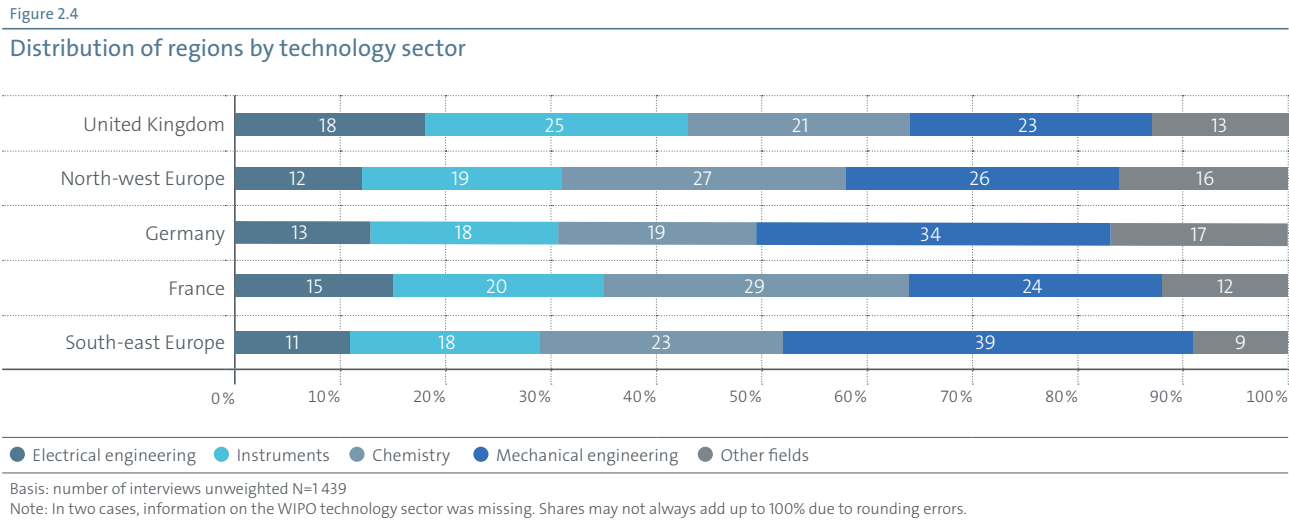
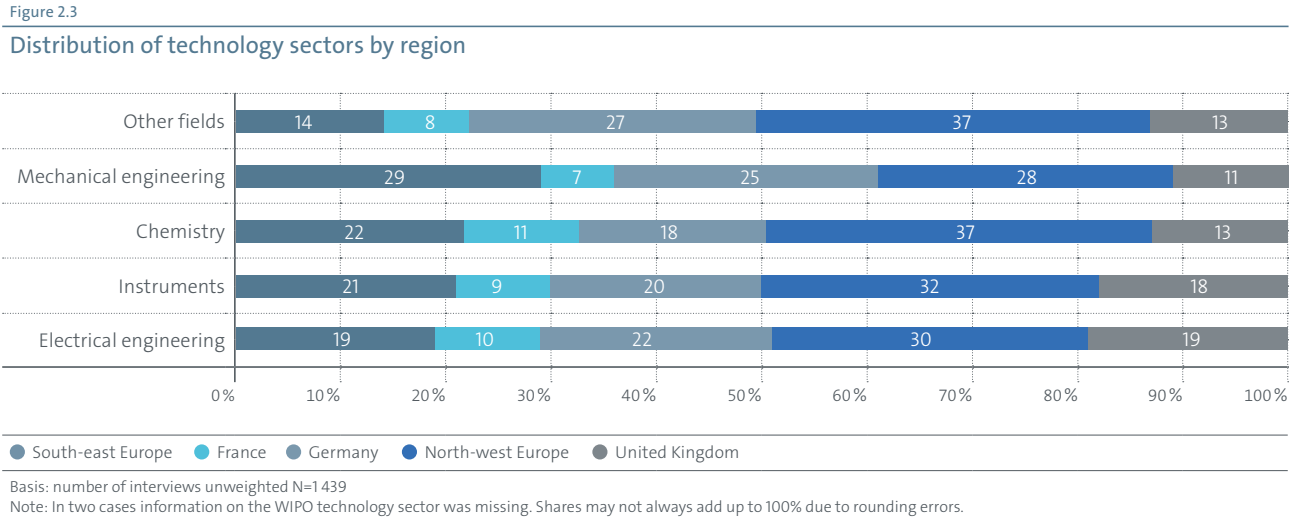
	South-east Europe	France	Germany	North-west Europe	United Kingdom	Total
Unweighted	264	187	483	328	179	1 441
Share	18%	13%	34%	23%	12%	100%
Weighted	321	129	322	463	205	1 440
Share	22%	9%	22%	32%	14%	100%

Table 2.4

Distribution of owned or co-owned European patent applications by sector

	Electrical engineering	Instruments	Chemistry	Mechanical engineering	Other fields	Total
Unweighted	308	286	323	355	167	1 439
Share	21%	20%	22%	25%	12%	100%
Weighted	193	281	334	433	197	1 438
Share	13%	20%	23%	30%	14%	100%

Figures 2.3 and 2.4 present the distribution of the final weighted sample along both dimensions simultaneously. Figure 2.2 shows how each technology sector is divided by geographical region and Figure 2.3 shows the importance of the five technology sectors for each geographical region.



3. Overview of patented inventions

3. Overview of patented inventions

3.1 Technical profile

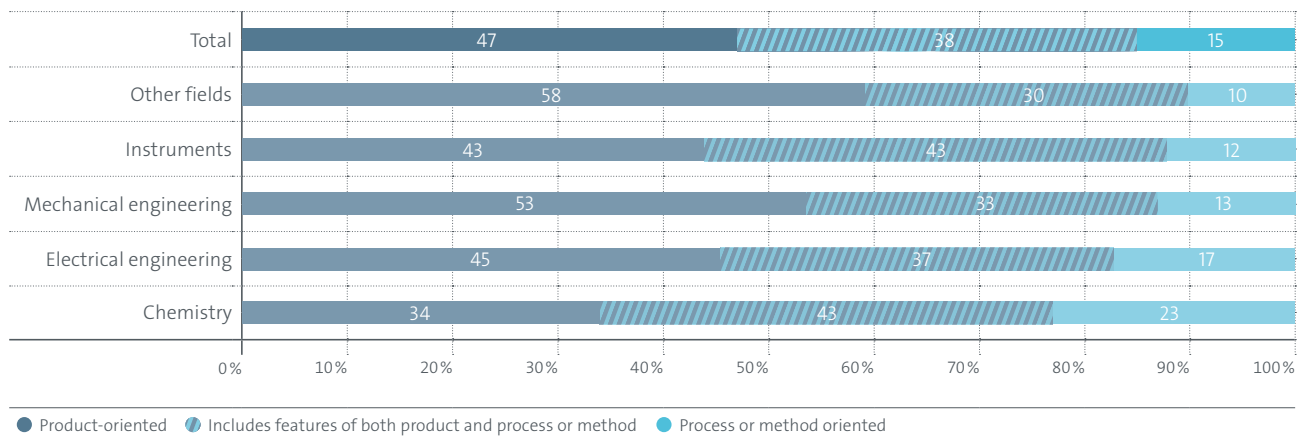
Most of the European patent applications filed by SMEs are oriented towards product inventions (Figure 3.1). This is the case for 85% of all applications, with 47% relating to pure product inventions and 38% to inventions combining product and process features. Pure process inventions represent 15% of applications, well below the share of inventions combining product and process features.

The technical sectors with the highest share of purely product-related inventions are other fields (58%) and mechanical engineering (53%). By contrast, chemistry has a relatively low share of purely product-related patented inventions (34%).

Only one in five of these inventions are still in the research and development phase (Figure 3.2). The vast majority (almost 80%) have already reached the implementation or operation stage, making them suitable for commercialisation. The results for different sectors are fairly similar, although chemistry (26%) and electrical engineering (24) have a slightly higher share of patented inventions reported as still being at the research and development stage.

Figure 3.1

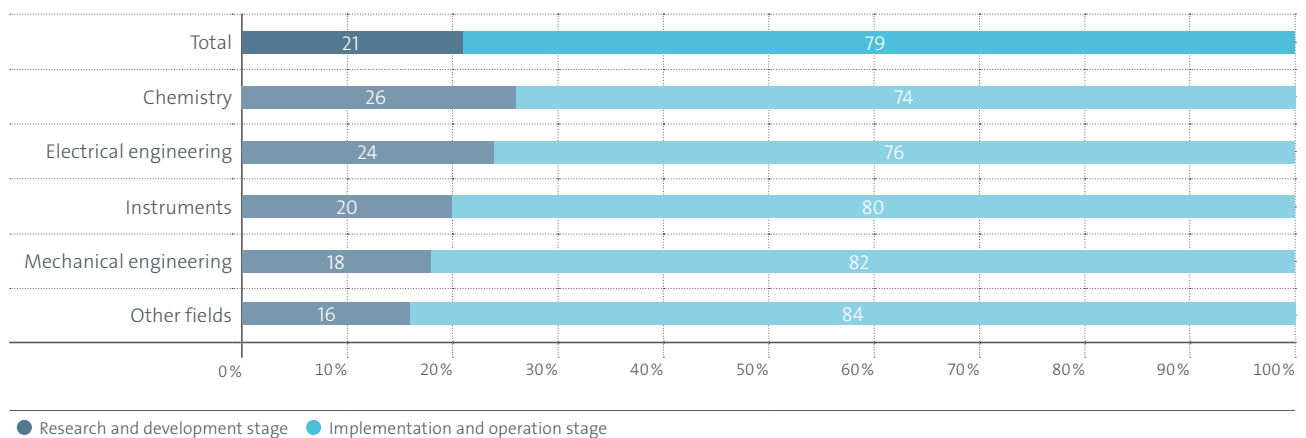
Type of patented invention



Basis: number of interviews unweighted N=1 441, of which 1% Don't know.

Figure 3.2

Stage of development



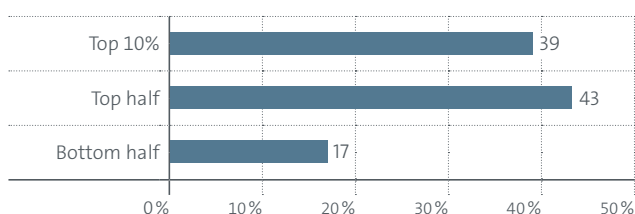
Basis: number of interviews unweighted N=1 441, of which 1% Don't know and 2% No statement.

3.2 Importance of patented inventions

A clear majority of the SMEs surveyed consider the inventions for which they have filed a European patent application as important compared with other inventions in their industry (Figure 3.3). Over 80% of respondents consider their inventions to be ranked in the top half of all inventions in their industry, and up to 39% perceive their inventions as being ranked in the top 10% of technical developments in their industry. Only 17% perceive their inventions to be ranked in the bottom half of all inventions in their industry, while no ranking was offered by the remaining 5% of respondents.

Figure 3.3

Importance of SME's patented inventions to their industries

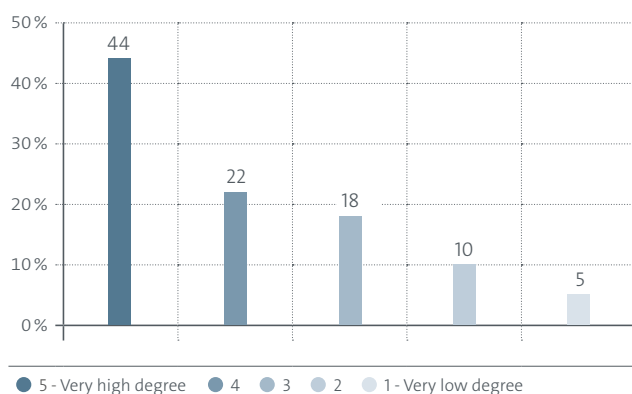


Basis: number of interviews unweighted N=1 441, of which 4% Don't know and 1% No statement.

A second dimension that enables applicants to assess the importance of an invention is its relevance to the company's core business activity (Figure 3.4). Two thirds (66%) of patented inventions were considered as highly relevant (ratings 4 and 5), versus only 15% reported as not very important to current core business (ratings 1 and 2).

Figure 3.4

Relevance to core business

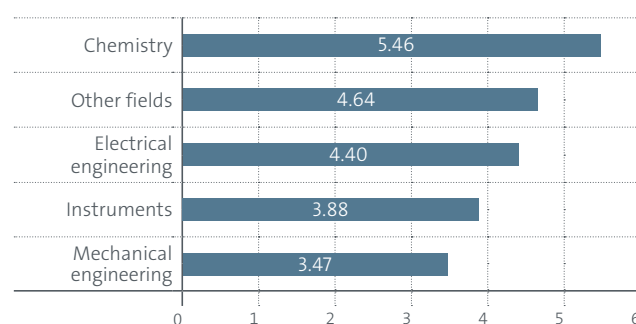


Basis: number of interviews unweighted N=1 441, of which 1% Don't know and 1% No statement.

The share of patented inventions that are highly relevant to core business varies slightly across technical sectors if considered in isolation (Figure 3.5). However, it is always several times higher than the share of those that are of low relevance. The ratio between patented inventions rated as having a "high" or "very high degree" of importance compared with those of "low" or "very low degree" is highest in chemistry (5.5 to 1) and other fields (4.6 to 1) and lowest in instruments (3.9 to 1) and mechanical engineering (3.5 to 1). In electrical engineering the ratio is 4.4 and above the overall average.

Figure 3.5

Core business focus by sector – ratio of high and low importance



Basis: number of interviews unweighted N=1 440, of which 1% Don't know and 1% No statement.

Note: Rating 4 and 5 are considered as of „high importance“ and ratings 1 and 2 are considered as „low importance“

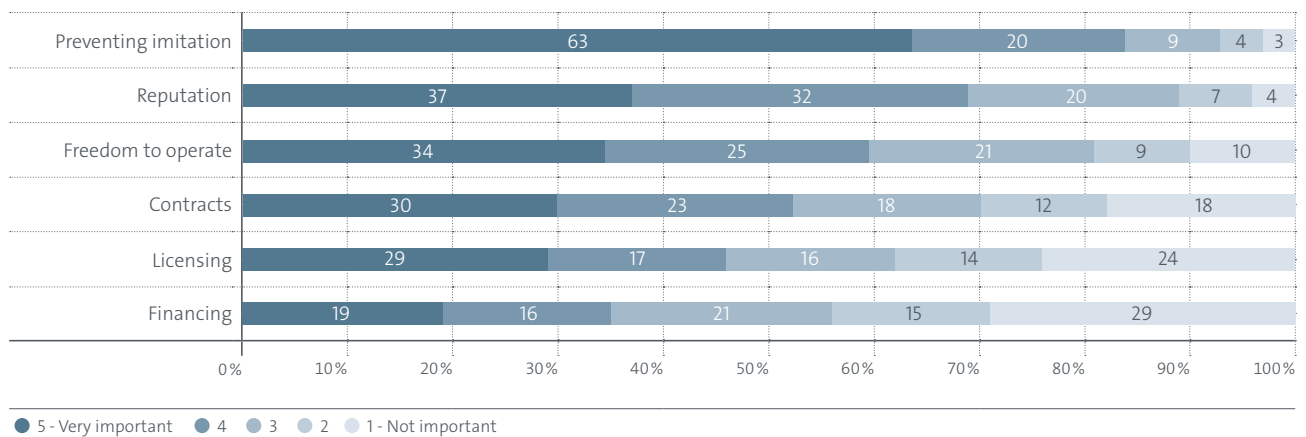
3.3 Motives for maintaining patents

Figure 3.6 reports the SMEs' assessment of various possible motives for maintaining their European patents. "Preventing imitation" stands out as an important or highly important motive in 82% of cases. "Improving the reputation of the SME" comes next with 67%. "Helping to obtain freedom to operate (FTO)" is cited by 55% of the respondents as an at least "important" reason for maintaining a European patent on the invention.

Roughly half of the SMEs also consider motives related to the use of patents in technology transactions as important. These motives include "facilitating licensing" (51%) and "facilitating commercial contracts" (44%). Over one third of SMEs see "using European patent applications to secure financing" as an important or highly important motive for maintaining their patent.

Figure 3.6

Motive for maintaining patents



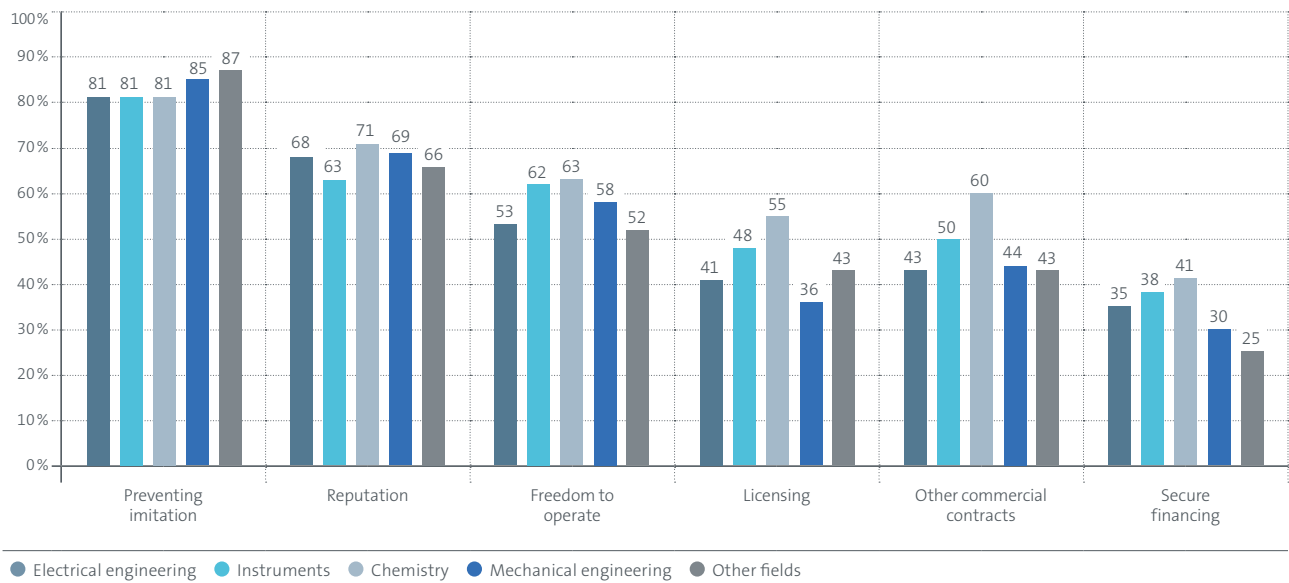
Basis: number of interviews unweighted N=1 441, of which 1%-2% Don't know and 1%-2% No statement.

The two motives “preventing imitation” and “improving reputation” are almost equally important across all five technical sectors. As for the other four motives, some sectorial variation can be observed (Figure 3.7).

Facilitating licensing and commercial contracts are more important motives in chemistry and instruments than in the other technical sectors. Securing financing is a more important motive for maintaining patents in chemistry, for example, than it is in mechanical engineering and other fields.

Figure 3.7

Share of motives considered “important” or “very important” by sector



Basis: number of interviews unweighted N=1440, of which 1%-2% Don't know and 1%-2% No statement.

A close-up photograph showing a mechanical pipe cleaning tool, likely a hydro-jetting nozzle, inserted into a large, circular pipe. The tool has a central nozzle and a surrounding rotating chamber. The pipe's interior is visible, showing some residue. The background is a solid green color.

Picote

Finnish firm Picote has developed innovative tools for restoring and cleaning pipes within buildings. Its strong patent portfolio has proven crucial to securing contracts throughout Europe and sustaining a turnover of EUR 15 million.

4. Exploitation of European patents

4. Exploitation of European patents

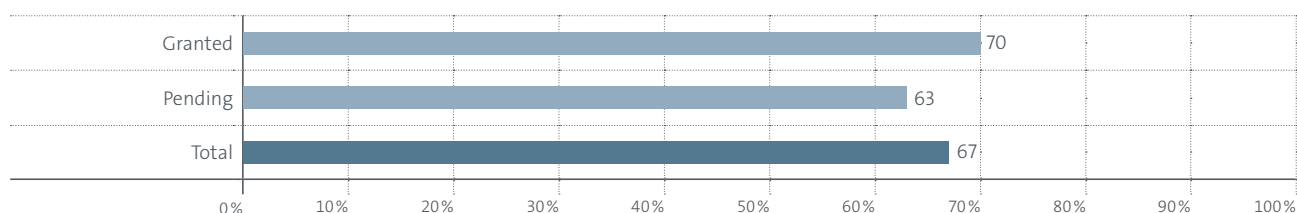
4.1 Rate of exploitation

Around two thirds (67%) of the patented inventions have already been exploited for commercial purposes – either by the SMEs themselves or in co-operation with external partners through technology transfers or co-operation agreements (Figure 4.1). The share of commercially exploited inventions is slightly higher for those where European patents have already been granted (70%) compared with those where the patent application is still pending at the EPO (63%). While these proportions are relatively stable regardless of the SMEs' geographical origin, differences between technology sectors will be analysed in further detail in this section.

A third of the patented inventions had not yet been commercially exploited at the time of this survey. As indicated in Figure 4.2, this is mainly due to the fact that the invention was still in the development stage (67% of the inventions not exploited to date), or that potential commercial possibilities were still being actively explored (64%). Other motives include a lack of resources (32%) and skills and contacts (19%) to pursue further development and commercialisation. Insufficient commercial potential (14%), the absence of IP protection (8%) and a lack of freedom to operate (5%) are cited as motives for a small share of unexploited patented inventions.

Figure 4.1

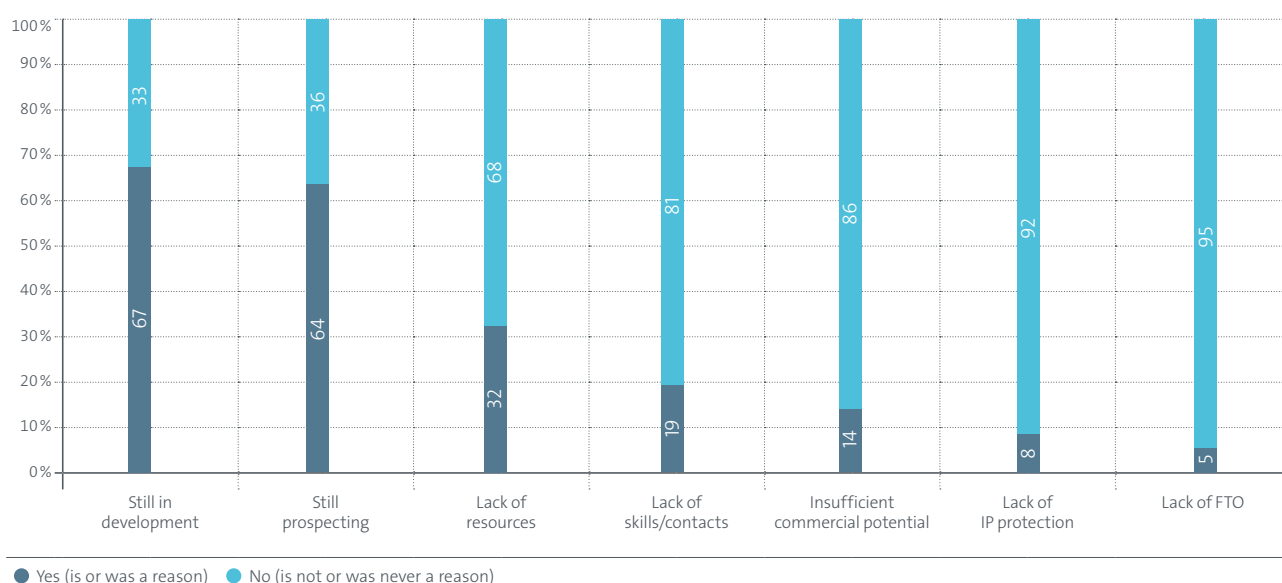
Share of patented inventions that are commercially exploited



Basis: number of interviews unweighted N=1 441, <1% Don't know and <1% No statement.

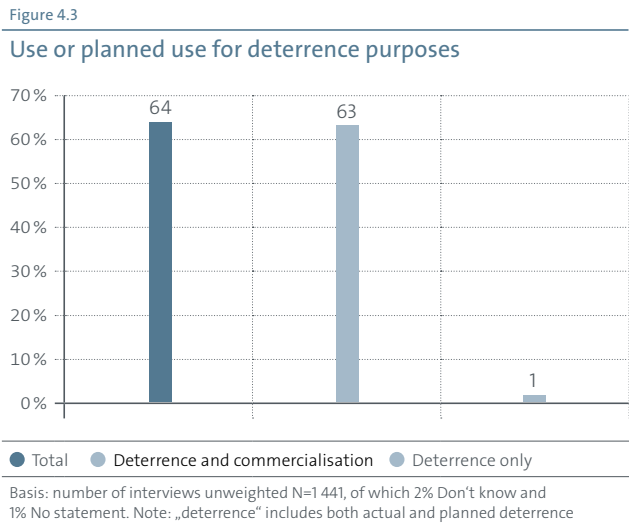
Figure 4.2

Reasons for not exploiting inventions



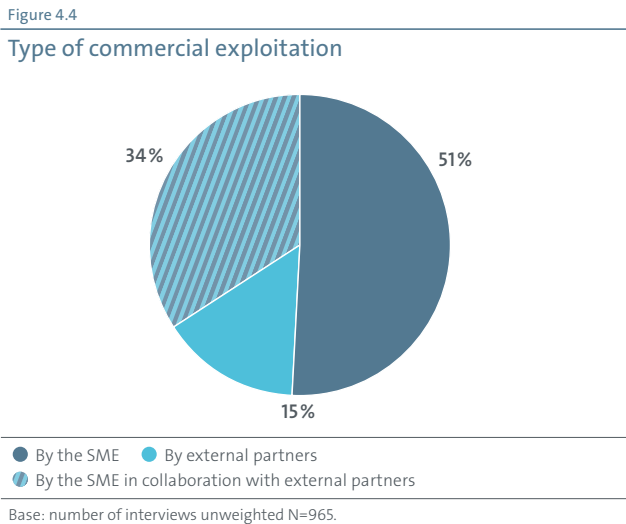
Basis: number of interviews unweighted N=469, of which 1%-3% Don't know and 3%-4% No statement.
Note: Respondents were allowed to provide multiple answers.

Around two thirds (64%) of SMEs are either already using – or are planning to use – their patent to deter potential competitors (Figure 4.3). This deterrence motive is almost systematically (in 98% of cases) tied to the use or planned use of the patent for commercial exploitation. Deterrence is cited as the sole means of exploitation for only 1% of all patented inventions owned by the SMEs.



4.2 Commercial exploitation practices

Figure 4.4 provides more information on the way in which patented inventions are commercially exploited. Around half (51%) of all commercially exploited inventions are exploited exclusively by SMEs, while the other half (49%) are exploited in collaboration with external partners, through technology transfers or co-operation agreements. External exploitation is frequently combined with exploitation by the SME. This is the case for a third (34%) of all commercially exploited inventions, and over two thirds (70%) of inventions that are externally exploited.





Lontra

British inventor Steve Lindsey is shaking up the multi-billion-euro air compressor market with his energy-saving blade-compressor technology. His European patent helped his company Lontra secure multi-million-euro licensing deals in a range of industries and substantial European funding.

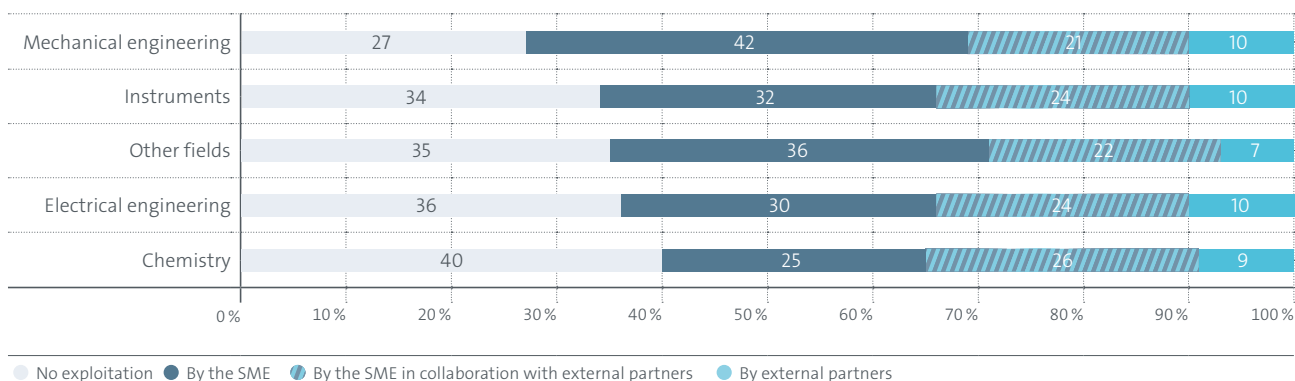
Figure 4.5 indicates the share of commercially exploited inventions and the type of commercial exploitation at sector level. Although the overall results are consistent across sectors, some differences are worth pointing out. Mechanical engineering stands out as the only sector with an above-average share of commercially exploited inventions (73%), while chemistry (60%) has the lowest share. The latter finding may be linked to the fact that a larger share of patented inventions in chemistry was still in the R&D phase when the survey was carried out (see Figure 3.2).

There are also some differences in the type of commercial exploitation across technical sectors. The higher share of commercial exploitation in mechanical engineering (73%) is mainly due to exclusive exploitation by SMEs, whereas the proportion of patented inventions that are exploited in collaboration with an external partner is relatively low in this sector (31%). By contrast, the share of collaborative exploitation as a share of all commercially exploited patented inventions is larger in chemistry (35%), electrical engineering (34%) and instruments (34%).

Figure 4.6, in turn, shows little difference in consistent shares and forms of commercial exploitation between geographical regions. Although German and UK SMEs report the highest and lowest shares of commercially exploited patented inventions (70% and 62% respectively), these differences are not large enough to be considered as statistically significant. There are, however, significant differences in the proportion of inventions that are exploited by SMEs only. This proportion is relatively higher among German SMEs (41%) than in north-west Europe as a whole, for instance (34%).

Figure 4.5

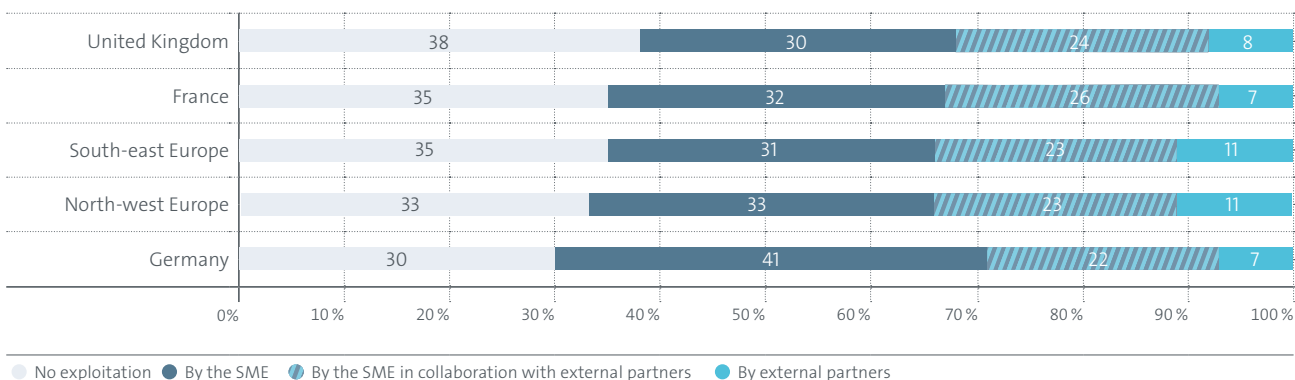
Type of exploitation by sector



Basis: number of interviews unweighted N=1 439, of which 1%-3% Don't know and 1%-2% No statement.

Figure 4.6

Type of exploitation by region



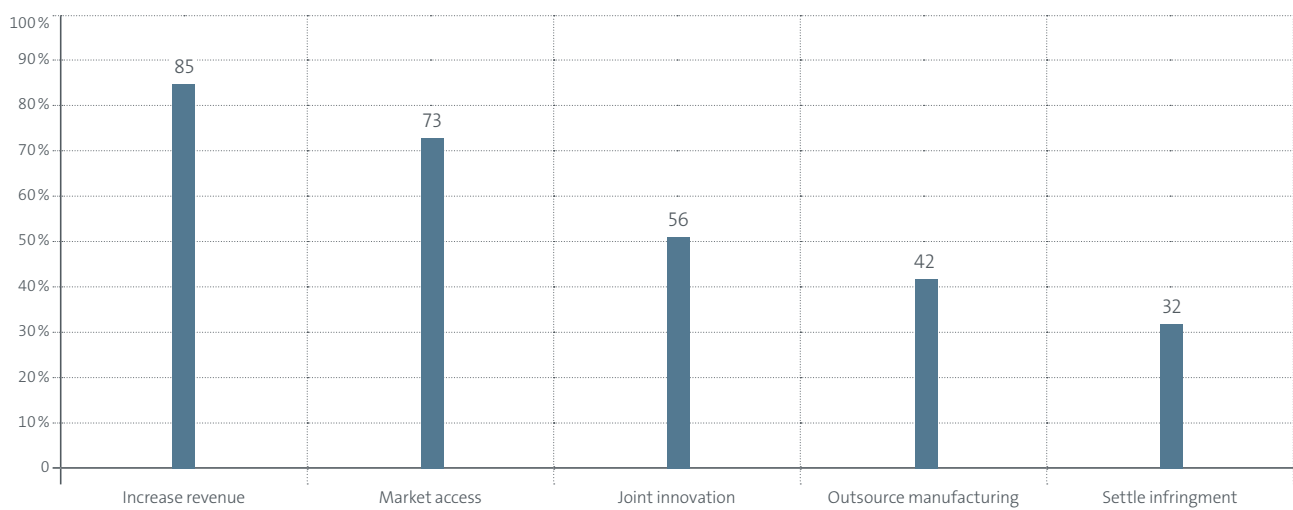
Basis: number of interviews unweighted N=1 441, of which 1%-3% Don't know and 1%-2% No statement.

4.3 Motives for collaborative exploitation and its channels

As reported in Figure 4.7, the key reasons why SMEs engage in collaborative exploitation are “increasing revenues” (85%) and “enabling market access” (73%). Over half (56%) of the SMEs that are involved in partnerships also cite “facilitating joint innovation with a partner” as an important motive, followed by “outsourcing manufacturing” (42%) and “settling infringements” (33%). These motives are similarly ranked across all technology sectors.

Figure 4.7

Motives for collaborative exploitation (if any)

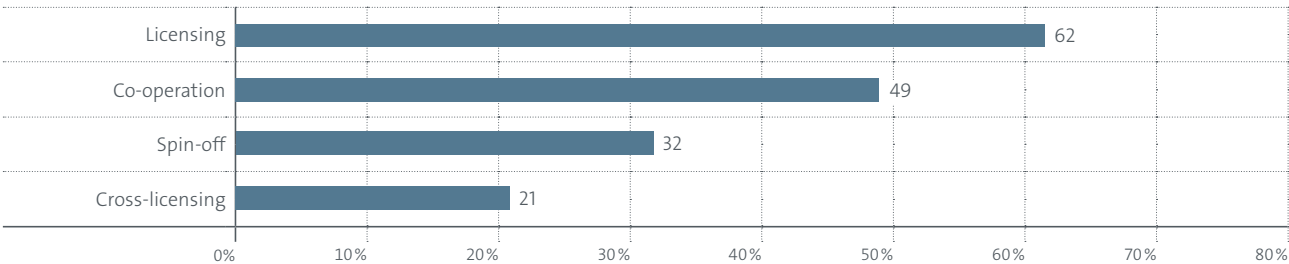


Basis: number of interviews unweighted N=285, of which <1%-2% Don't know and 1% No statement.
Note: Respondents were allowed to provide multiple answers.

Survey respondents were also asked to indicate the type of collaborative exploitation that was used by distinguishing between licensing and selling, cross-licensing, setting up spin-offs and concluding co-operation agreements with external partners (Figure 4.8). For European SMEs, licensing and selling is reported as the most frequent type of collaborative exploitation (62%). Almost half of the cases also involve some form of co-operation. The creation of spin-offs based on the patented invention is reported in almost one third of cases and cross-licensing for just over 20%.

Figure 4.8

Forms of collaborative exploitation (if any)



Basis: number of interviews unweighted N=356.
Note: Respondents were allowed to provide multiple answers.



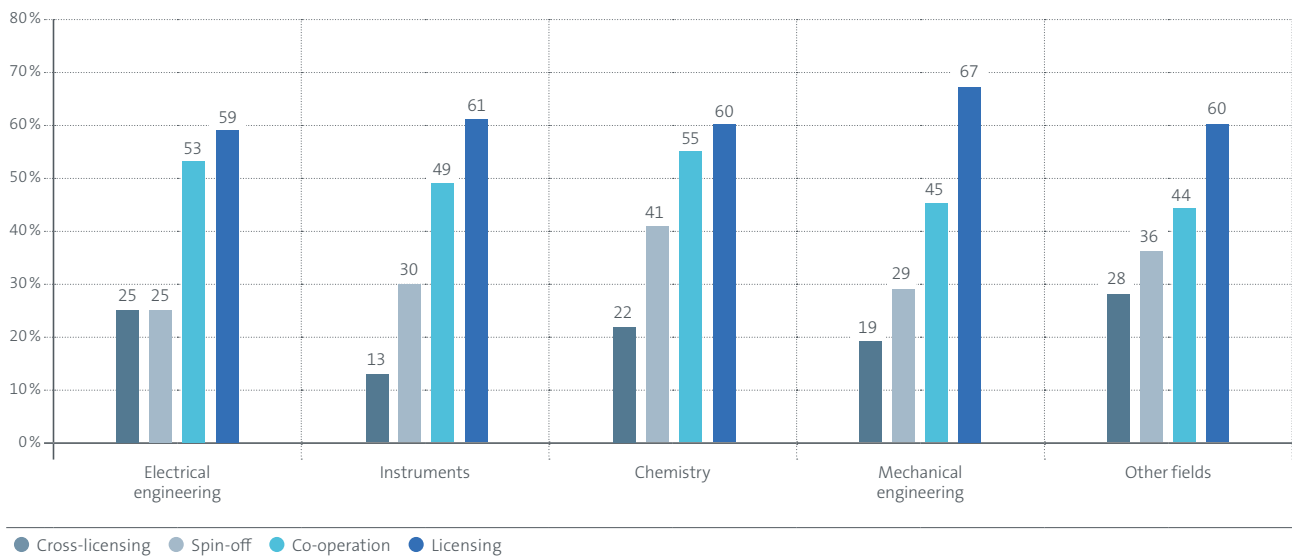
EKSPLA

The patents that protect EKSPLA's lasers and laser systems have raised the Lithuanian SME's profile as a knowledgeable partner for international projects.

Although there is some variation in the frequency of the different types of collaborative exploitation across technical sectors, the ranking is the same across the board (Figure 4.9). Licensing and selling is clearly the dominant type of joint exploitation in mechanical engineering (67%). In chemistry, by contrast, commercial exploitation in the framework of co-operation (55%) is almost equally as important as licensing and selling (60%). Chemistry is also the technical field in which patented inventions are most frequently commercially exploited as a basis for spin-offs (41%).

Figure 4.9

Type of collaborative exploitation (if any) by sector



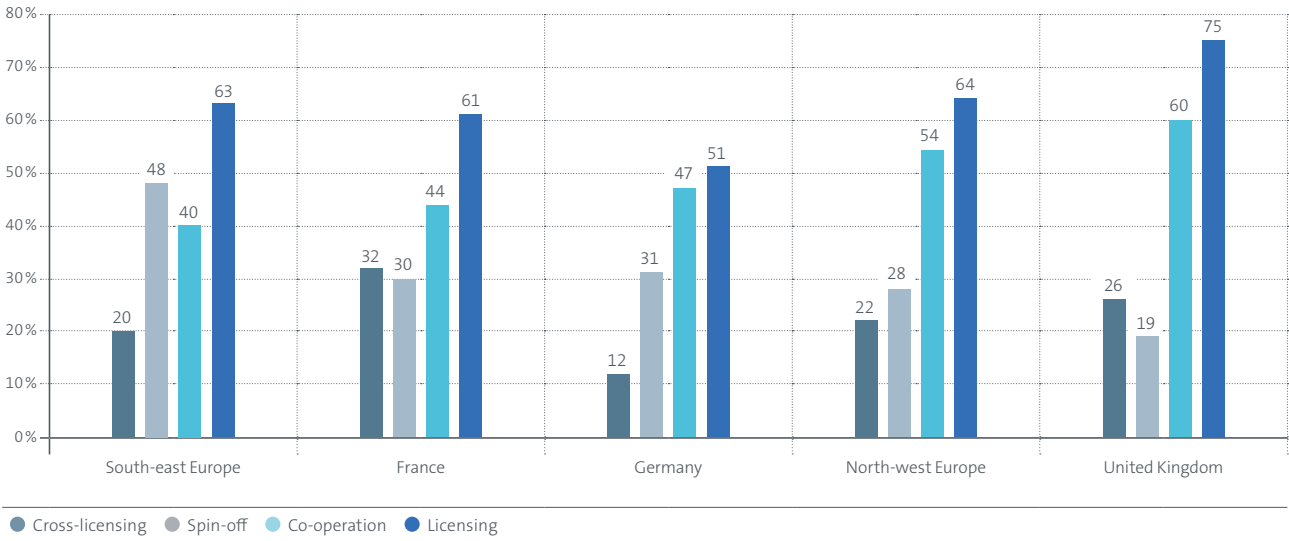
Basis: number of interviews unweighted N=356.

Note: Respondents were allowed to provide multiple answers.

The ranking of different types of collaborative exploitation is also roughly similar across geographical regions (Figure 4.10), with the exception of Germany, where SMEs make less frequent use of both licensing (51%) and cross-licensing (12%).

Figure 4.10

Type of collaborative exploitation (if any) by region



Basis: number of interviews unweighted N=356.
Note: Respondents were allowed to provide multiple answers.

5. Potential for and challenges of collaborative exploitation

5. Potential for and challenges of collaborative exploitation

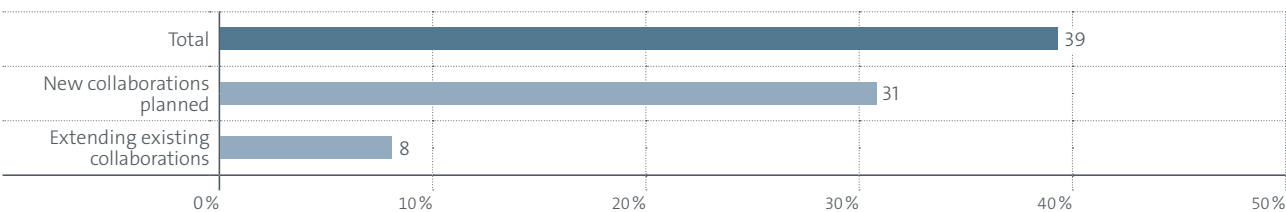
5.1 Potential for collaborative exploitation

As part of the survey questionnaire, European SMEs were specifically asked whether, in addition to the existing commercial exploitation of the patented invention, they had plans to collaboratively exploit their inventions. They reported planned future partnerships for 39% of the European patent applications covered by this survey (Figure 5.1).

Only one fifth of these plans (i.e. 8% of all SME-owned patented inventions) concern patented inventions that are already jointly exploited with external partners, but offer potential for further collaborative exploitation. In other words, the vast majority (80%) of the plans concern inventions that had not yet been jointly exploited at the time of the survey. This second group of inventions, which represents 31% of all patented inventions owned by SMEs, provides an upper limit for the potential for collaborative exploitation. Adding together the shares of patented inventions that are exploited and those for which exploitation is planned suggests that collaborative exploitation is perceived by SMEs as a relevant mode of commercialisation for up to two thirds of all their European patents.

Figure 5.1

Plans for collaborative exploitation

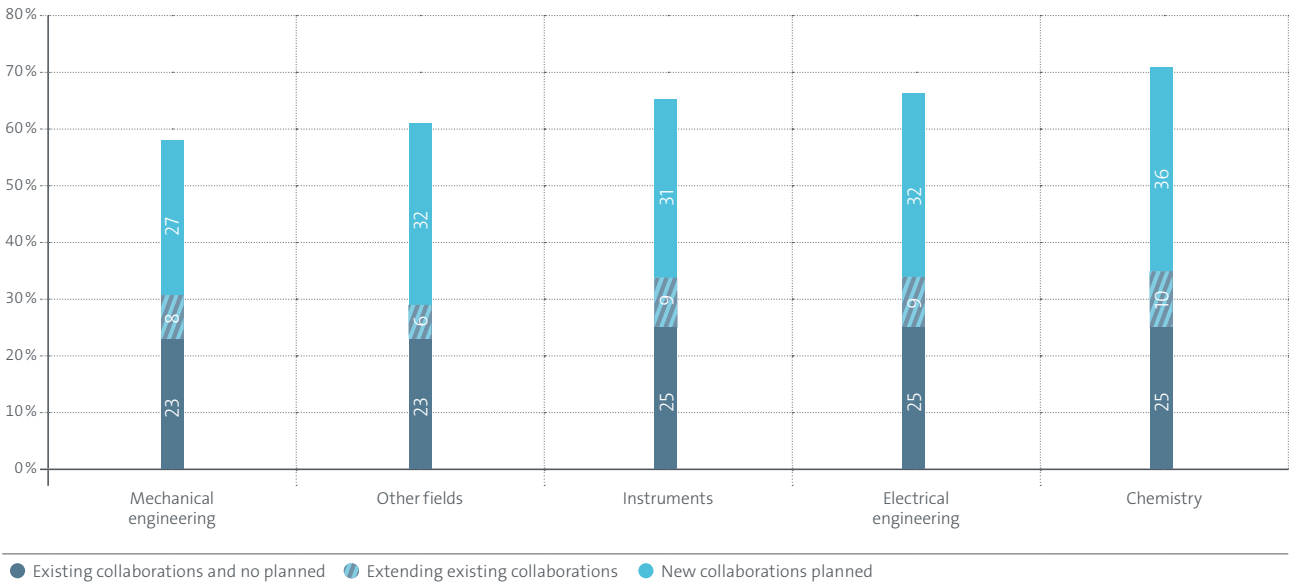


Basis: number of interviews unweighted N=1 441, of which 1%-3% Don't know and 1%-2% No statement.

As can be seen in Figure 5.2, reported plans for collaborative exploitation seem to reinforce the potential of sectors that already use this form of commercialisation (reported in Figure 4.5). First-time joint exploitation, for instance, is envisaged for 36% of inventions patented in chemistry. In addition, collaborative exploitation is already underway for 10% of patented inventions, but further opportunities are being explored. If these two categories are added to the 25% of inventions that are already jointly exploited, but for which no additional forms of collaborative exploitation are yet foreseen, the full potential for collaborative exploitation amounts to 71% in chemistry.

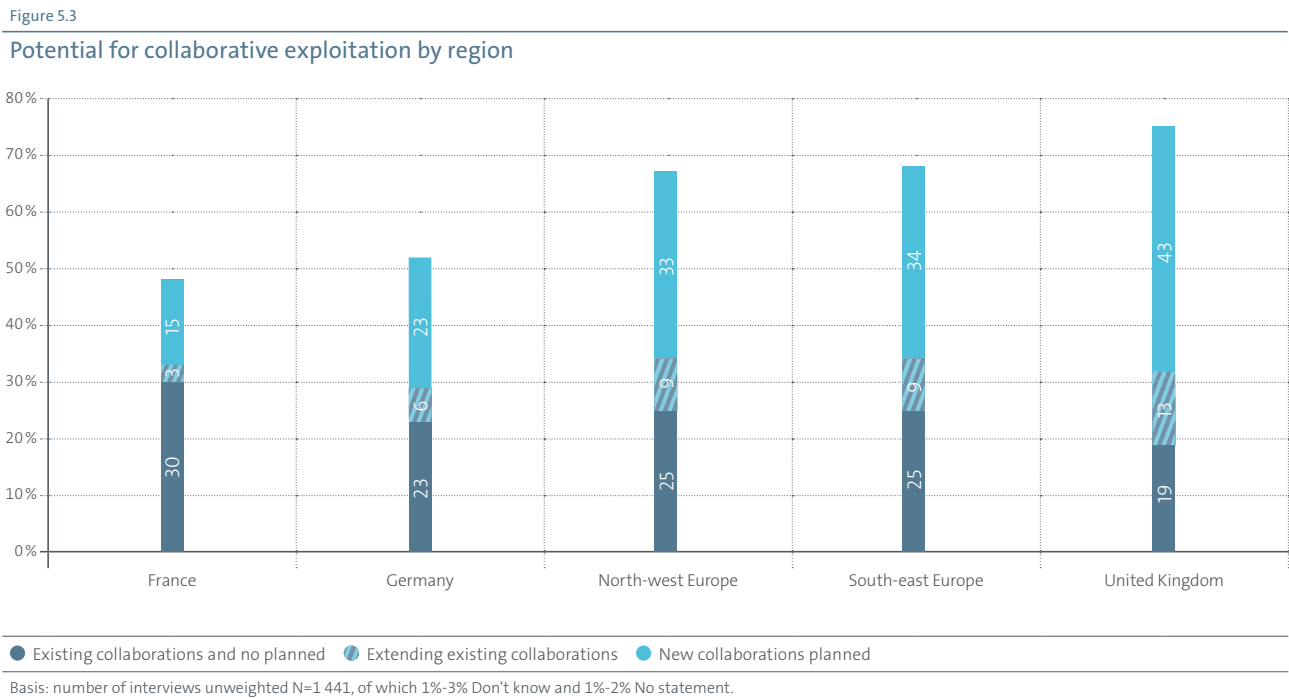
Figure 5.2

Potential for collaborative exploitation by sector



Basis: number of interviews unweighted N=1 439, of which 1%-3% Don't know and 1%-2% No statement.

The variation between geographical regions is more pronounced than differences between technical fields (Figure 5.3). SMEs from the UK and north-west and south-east Europe seem to be more open to collaborative exploitation than those from France and Germany. UK SMEs, for instance, report a planned partnership for 56% of patented inventions. By contrast, collaborative exploitation is planned for just 18% of patented inventions in France. Germany's profile is similar to that of France, although with a higher share of planned collaborative exploitation (29%).



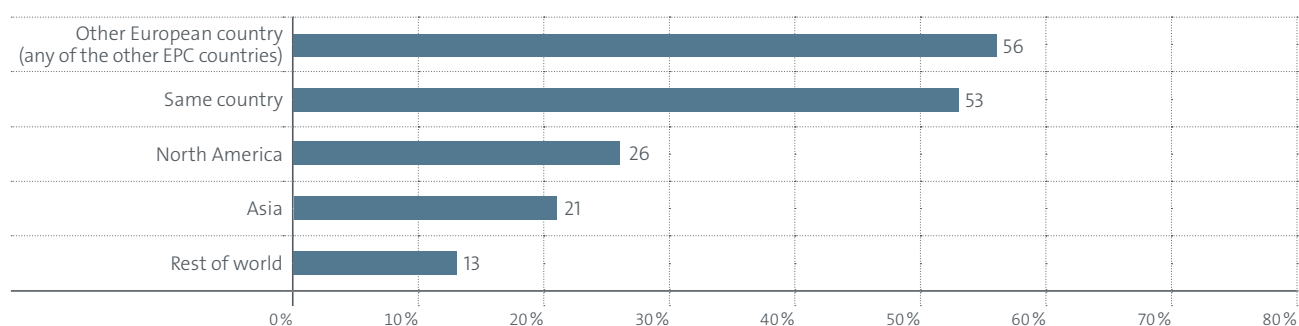
5.2 Partner profiles

Figure 5.4 indicates the geographical locations of the SMEs' partners. European SMEs transfer technology or co-operate more frequently (56%) with partners located in other European countries. This is consistent with their objective to access new markets in Europe. A roughly equivalent number of SMEs have a partner located in their home country (53%). Almost a quarter of SMEs (26%) with patented inventions that are commercialised externally have a partner located in North America. Asian partners are involved in the exploitation of another 19% of these patented inventions.

Figure 5.5, in turn, indicates the preferred partner location of SMEs that are planning to exploit their patented inventions via a partnership. For such SMEs European partnerships are even more important, as other EPC contracting states are reported as the preferred location for technology transfer or co-operation partners in 68% of cases. By contrast, the SMEs' own country is mentioned as the preferred partner location for just 25% of the patented inventions. The shares of planned partnerships in North America (18%), the rest of the world (11%) and Asia (7%) are also below those observed in actual partnerships.

Figure 5.4

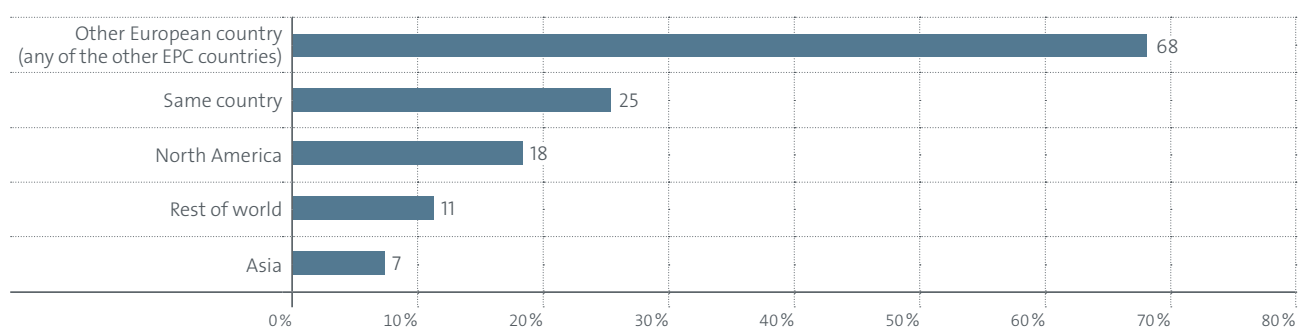
Location of current partners



Basis: Number of interviews unweighted N=285, of which 2% Don't know and 5% No statement.
Note: Respondents were allowed to provide multiple answers.

Figure 5.5

Preferred partner location for SMEs planning to jointly exploit their patent



Basis: number of interviews unweighted N=452, of which 9% Don't know and 4% No statement.
Note: Respondents were allowed to provide multiple answers.



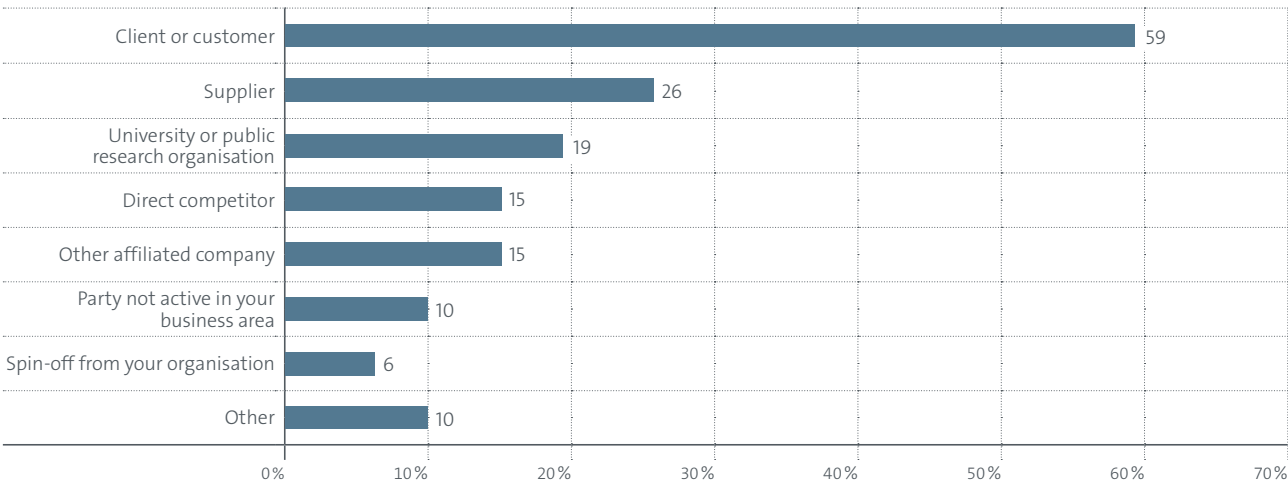
Marinomed

Without its three main patents, the Austrian drug discovery company Marinomed would never have received funding for its antiviral technologies. Now validated in almost 100 countries, these patents also helped the SME to enter international markets.

SMEs most frequently team up with prior clients and customers (59%) or with prior suppliers (26%) to exploit patented inventions (Figure 5.6). Around one fifth (19%) of these inventions are also jointly exploited with a university or public research organisation (PRO). Partnerships with competitors (15%) or parties that are not active in an SME's business area (10%) are less common.

Figure 5.6

Current partner profile

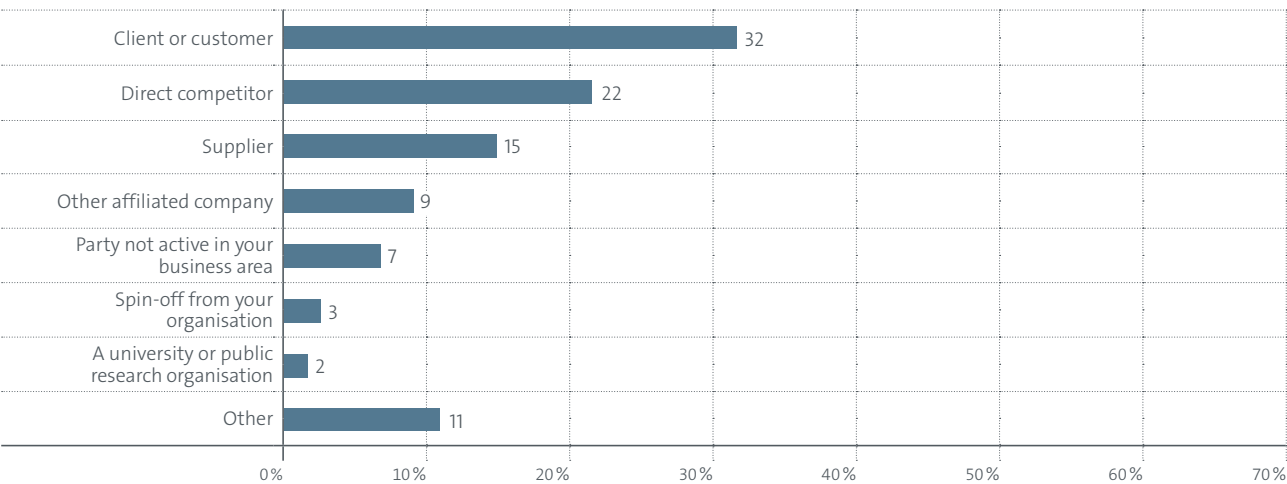


Basis: Number of interviews unweighted N=285, of which 1% Don't know and 1% No statement.
Note: Respondents were allowed to provide multiple answers.

The preferred partner profiles of those SMEs that are planning to jointly exploit their inventions are somewhat different, highlighting discrepancies between SMEs' expected and actual partnerships (Figure 5.7). Although the group of established clients and customers (32%) still dominates, European SMEs consider direct competitors (22%) as important potential partners. Universities and PROs are identified as potential partners for just 2% of cases. A likely explanation is that partnerships between SMEs and universities mainly take place at an earlier stage of technology development and are not sought after by SMEs as part of their commercialisation strategy.

Figure 5.7

Planned partner profile

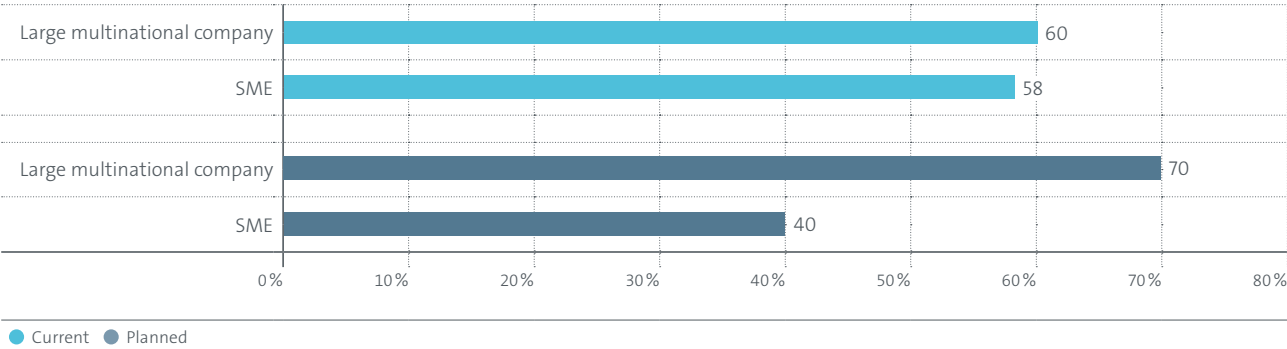


Basis: number of interviews unweighted N=453, of which 2% Don't know and 5% No statement.
Note: Respondents were allowed to provide multiple answers.

European SMEs establish partnerships in almost equal proportions with large companies (60%) and with other SMEs (58%) when they commercially exploit their patented inventions (Figure 5.8). However, SMEs that are planning to find partners to exploit their patented inventions indicate a preference for large multinational companies (70%) over other SMEs (40%).

Figure 5.8

Size of corporate partner



Basis: number of interviews unweighted N=221 for current partners, of which 1% Don't know and 3% No statement. N=453 for planned partners, of which 2% Don't know and 9% No statement.
Note: Respondents were allowed to provide multiple answers.



Avantium

As chief technology officer at Avantium, Dutch chemist Gert-Jan Gruter invented a new process for manufacturing plastic bottles from plants, not petroleum. His green plastic has led to his company's co-operation with the likes of Coca-Cola and Danone.

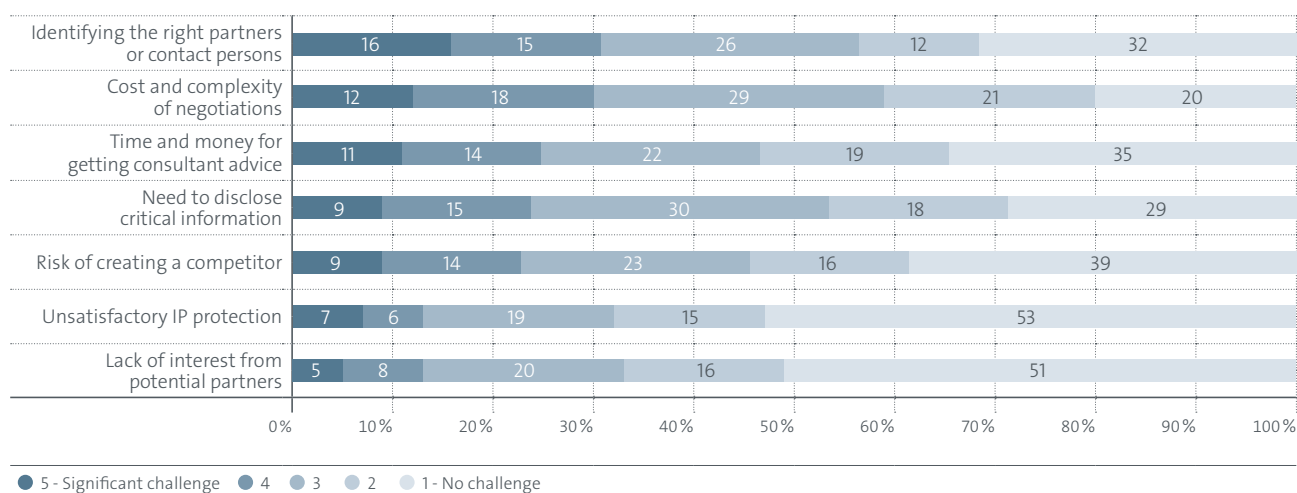
5.3 Challenges

Identifying the right partners or contact persons is rated as the greatest challenge by European SMEs involved in collaborative exploitation, with a significance scoring of 4 or 5 for 31% of the patented inventions (Figure 5.9). Negotiating agreements is a highly challenging issue for 30% of the European SMEs involved in external exploitation. Resources for getting consultant advice (25%), the need to disclose critical information (24%) and the risk of creating a competitor (23%) are also seen as important challenges in around a quarter of the cases. Unsatisfactory IP protection and the lack of interest from potential partners are cited as major barriers for 13% of jointly exploited patented inventions.

A closer analysis reveals some differences between technology sectors (Figure 5.10). Identifying the right partners or contact persons is a key issue in instruments, chemistry and other fields, but is perceived as less critical in electrical engineering. The cost and complexity of negotiations is a serious challenge in almost all sectors.

Figure 5.9

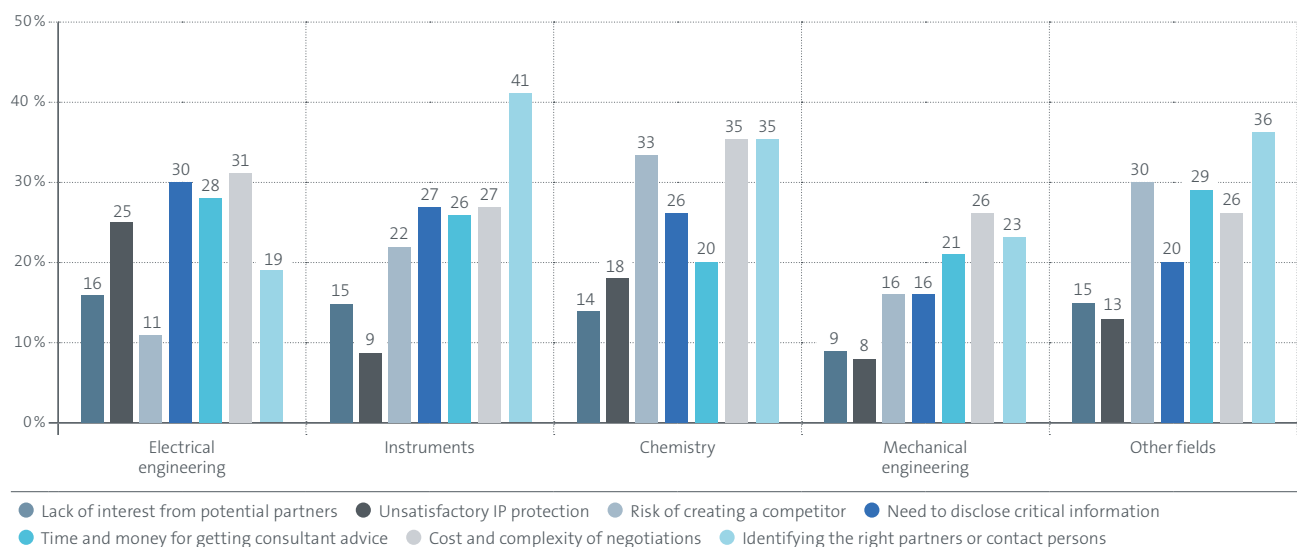
Challenges in collaborative exploitation



Basis: number of interviews unweighted N=285, of which 4% Don't know and 3% No statement.

Figure 5.10

Challenges in collaborative exploitation by sector

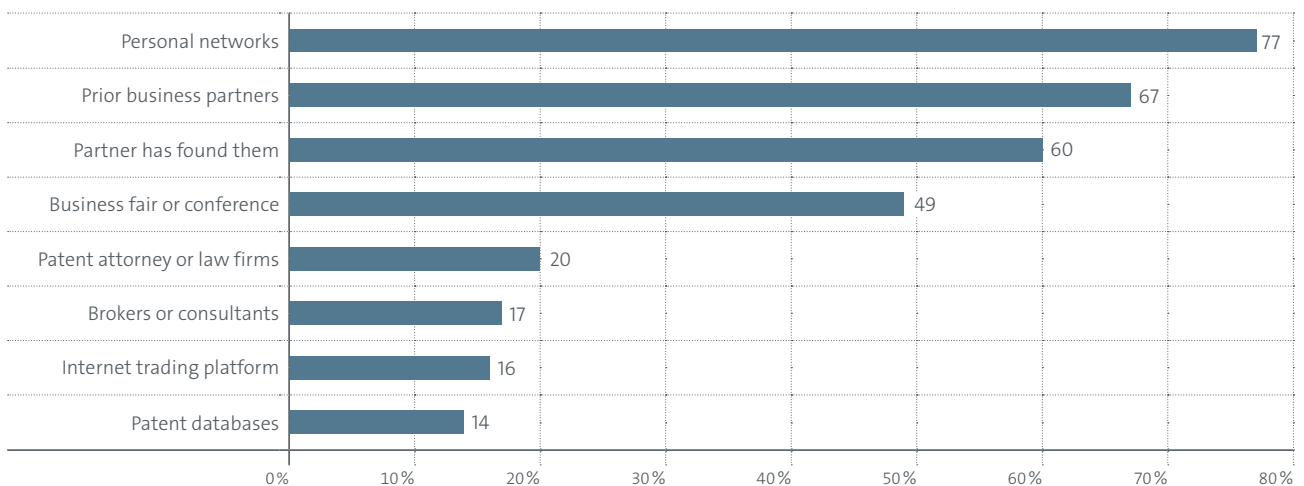


Basis: number of interviews unweighted N=285, of which 4% Don't know and 3% No statement. The results show the share of respondents rating a challenge 4 or 5 on a 1-5 scale of importance.

Figure 5.11 provides further insights into how SMEs manage to find partners. A first important observation is that in about 60% of cases, SMEs were found by their partners. This implies that a majority of the current partnerships are actually not due to the SMEs' own efforts to find business partners. The results also clearly indicate the prevalence of direct contacts over intermediary channels. Prior personal contacts (77%) and business partners (67%) are by far the most important channel used for external exploitation. By contrast, market intermediaries like brokers, patent attorneys, patent databases or internet platforms are used much less frequently, with shares ranging from 16% in the case of internet platforms to 20% in the case of patent attorneys.

Figure 5.11

Channels used to find partners



Basis: number of interviews unweighted N=285, of which 1%-2% Don't know and 1%-2% No statement.

Note: Respondents were allowed to provide multiple answers.

6. IP management practices

6. IP management practices

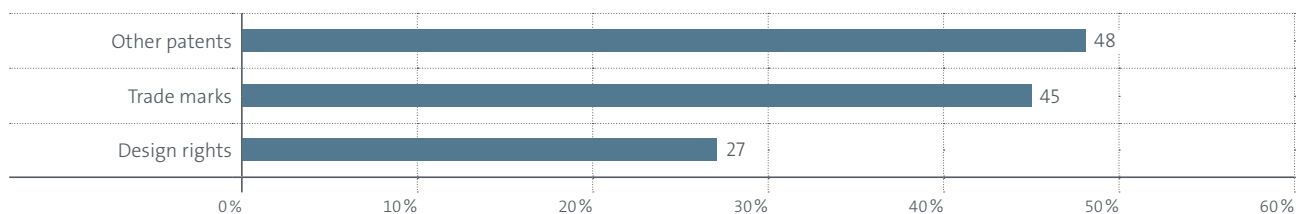
6.1 IP bundle

When asked to identify complementary IP rights that are also relevant for the commercial exploitation of their patented invention (Figure 6.1), SMEs report that they are already using, or plan to use additional patents in 48% of cases. They make similar use of complementary trade marks (45%), whereas design rights are cited in just a quarter of cases.

The shares of SMEs using trade marks or additional patents are fairly similar across all sectors (Figure 6.2). There is, however, greater variation in the case of design rights, with the lowest use rate (18%) seen in chemistry and the highest (35%) in other fields.

Figure 6.1

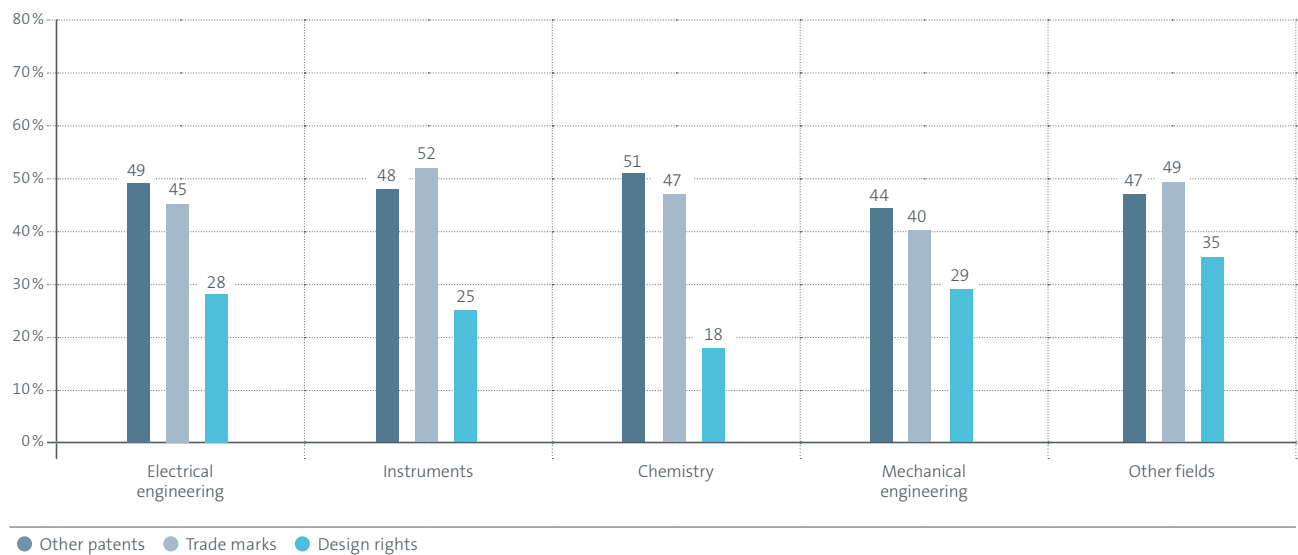
Use of trade marks, design rights or additional patents in relation to the invention



Basis: number of interviews unweighted N=1 440, of which 3%-4% Don't know and 2% No statement.

Figure 6.2

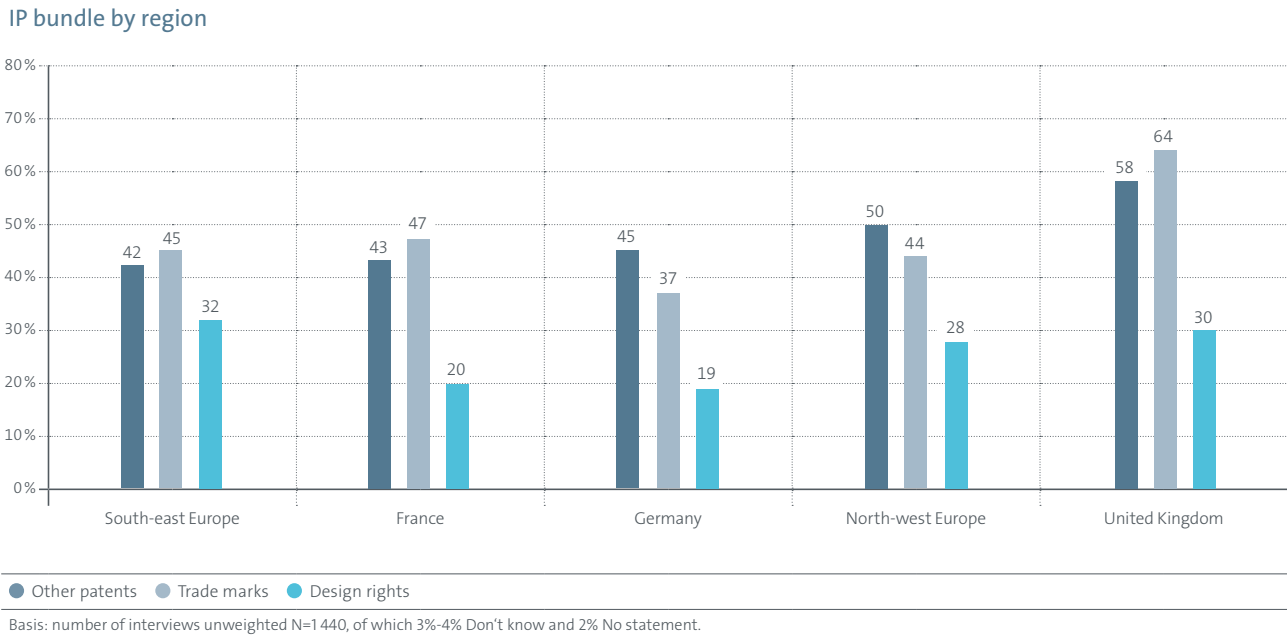
IP bundle by sector



Basis: number of interviews unweighted N=1 439, of which 3%-4% Don't know and 2% No statement.

Additional patents or IP bundles are used at similar levels of frequency across most geographical regions. However, UK-based SMEs stand out as a major exception to this rule, as they make far more frequent use of all types of IP rights in IP bundles. IP bundles are also slightly more frequent in north-west Europe.

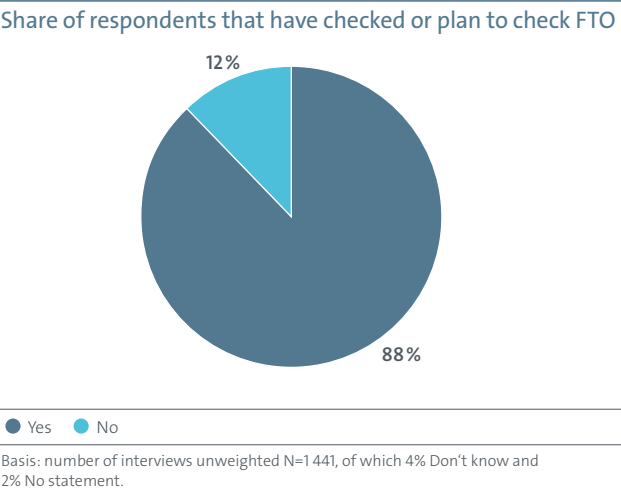
Figure 6.3

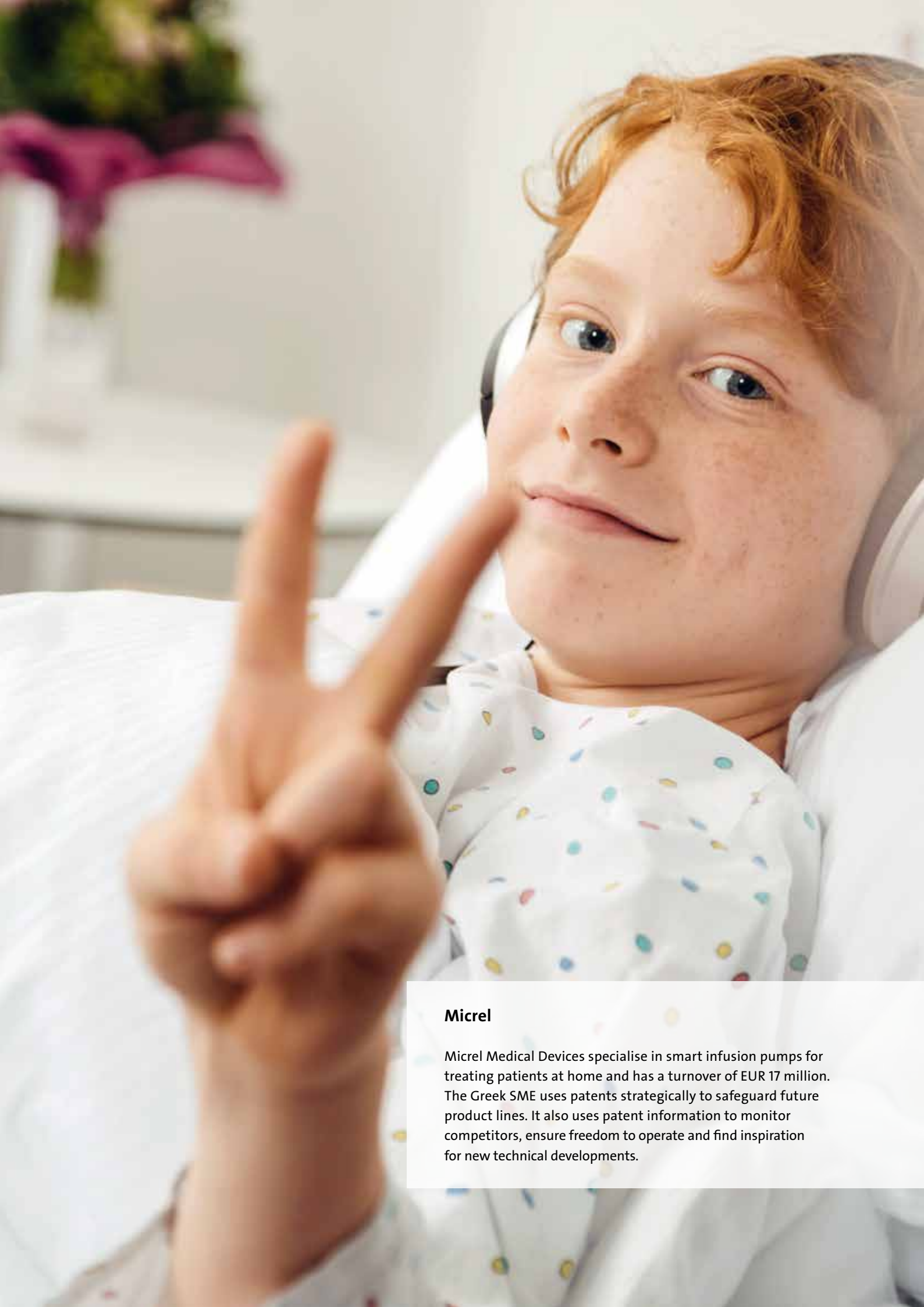


6.2 FTO analyses

Freedom-to-operate (FTO) analyses are usually conducted before or in preparation for commercialisation activities. They allow a company to determine whether an invention, product or technology can be used without the risk of infringing someone else's patent rights. The vast majority (88%) of SMEs report that they have checked or are planning to check their freedom to operate the patented invention (Figure 6.4).

Figure 6.4





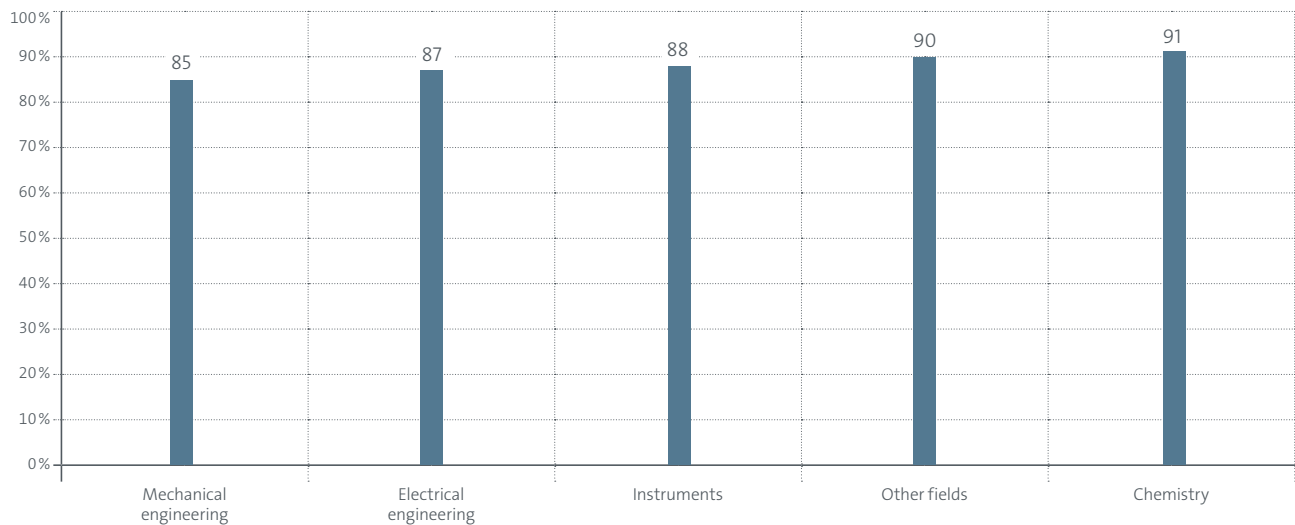
Micrel

Micrel Medical Devices specialise in smart infusion pumps for treating patients at home and has a turnover of EUR 17 million. The Greek SME uses patents strategically to safeguard future product lines. It also uses patent information to monitor competitors, ensure freedom to operate and find inspiration for new technical developments.

The frequency of FTO checks is remarkably similar across all sectors (Figure 6.5). However, some significant differences can once again be observed between SMEs operating in different geographical regions (Figure 6.6). France- and UK-based SMEs have above-average rates of FTO checks that are higher than 95%. By contrast, SMEs based in Germany report a 77% frequency of FTO checks, which is significantly below the European average of 88%.

Figure 6.5

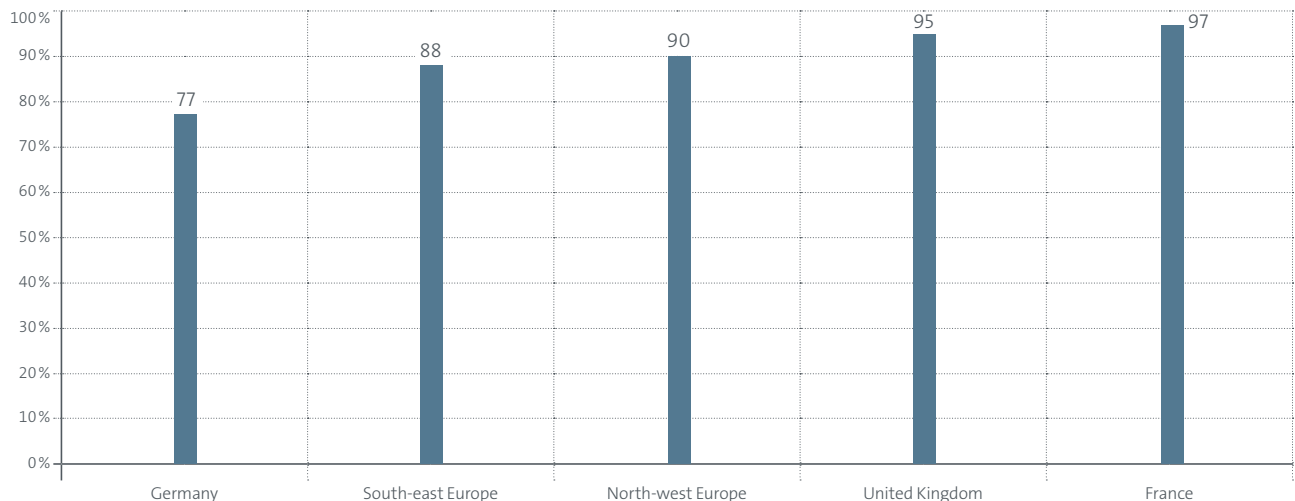
FTO checks by sector



Basis: number of interviews unweighted N=1 439, of which 4% Don't know and 2% No statement.

Figure 6.6

FTO checks by region



Basis: number of interviews unweighted N=1 441, of which 4% Don't know and 2% No statement.

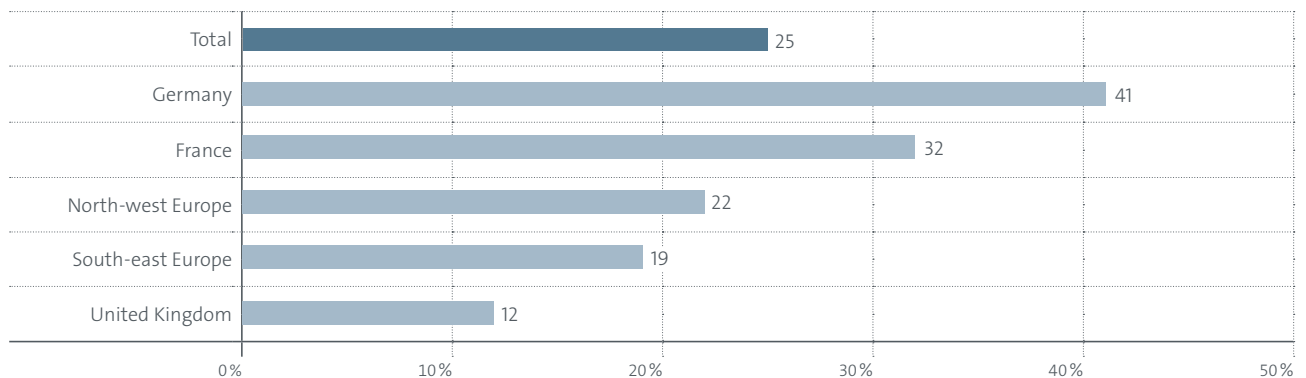
6.3 IP management

This last section documents the internal IP management practices of the SMEs surveyed. The analysis focuses on the geographical origins of the SMEs, as no significant differences were observed at the sector level. Figure 6.7 firstly indicates whether the surveyed SMEs have a dedicated IP department or dedicated IP staff, highlighting stark contrasts between geographical areas. While SMEs at European level report having a dedicated IP department in 25% of cases, this share is much higher (41%) among German SMEs and somewhat higher among French SMEs (32%). By contrast, the fact that only 12% of UK-based SMEs report having a dedicated IP department suggests that they rely more heavily on external IP counsel.

The frequency of IP activity reporting to the company's top management is another indicator of the importance given to IP business matters within SMEs. Figure 6.8 shows that SMEs based in the United Kingdom and Germany have a relatively high rate of IP reporting on a daily or weekly basis in 44% and 40% of cases respectively. By contrast, such frequency of reporting is observed for only 26% of French SMEs and 28% of SMEs in south-east Europe.

Figure 6.7

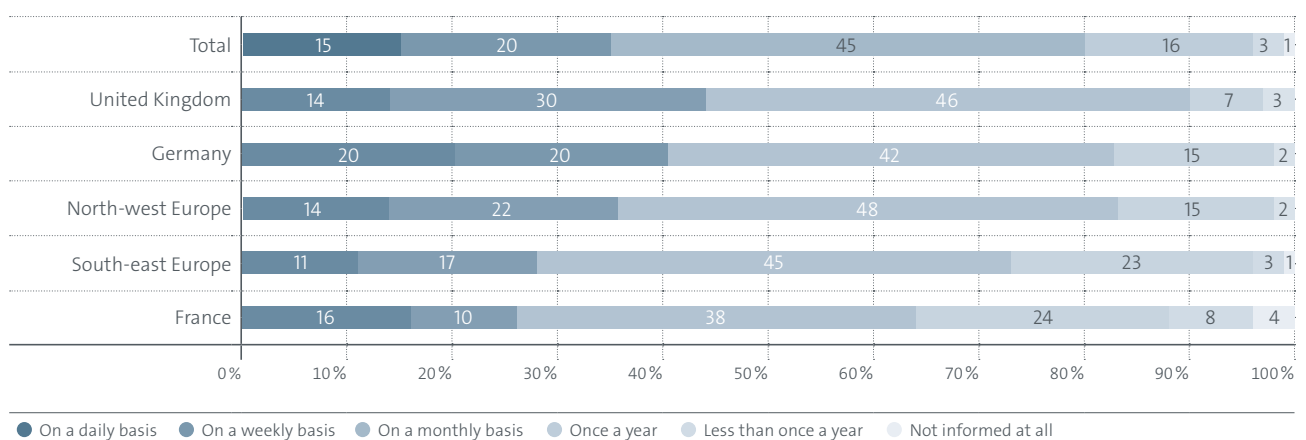
Dedicated IP department or IP staff



Basis: number of interviews unweighted N=1 441, of which <1% Don't know and <1% No statement.

Figure 6.8

Information of directorate



Basis: number of interviews unweighted N=1 441, of which 3% Don't know and 4% No statement.

Annex 1: Questionnaire – European SMEs

Annex 1: Questionnaire – European SMEs

Section A: Patent/invention details

(EPA1) – Ownership	Is your organisation the current owner or co-owner of the patent application/granted patent?	Owner – Co-owner – No, it was sold or transferred to another entity – No, we abandoned it – Don't know – No statement
(EPA2) – Type of invention	Which of the following best describes the type of the aforementioned patented invention?	Product-oriented – Process- or method-oriented (related to a particular manufacturing process or method) – Includes features of both product and process or method – Don't know – No statement
(EPA3) – Stage of development	At what stage is the current development of the mentioned patented invention at or the related technology within your company / At what stage was the mentioned patented invention at or the related technology when you sold it?	Research & development stage – Implementation and operation stage – Don't know – No statement
(EPA4) – Importance of invention	Compared with other current technical developments in your 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 industry It rates in the top half of all inventions It rates in the bottom half of all inventions Don't know – No statement
(EPA5) – Relevance of invention	To what degree do you think that the patented invention is relevant to your organisation's current core business activities?	1 Very low degree – 2 – 3 – 4 – 5 Very high degree – Don't know – No statement
(EPA6) – Motives for maintaining	I am now going to read out some possible motives for maintaining a patent for this invention. How important are these motives for your organisation with respect to the patented invention?	1 Not important – 2 – 3 – 4 – 5 Very important – Don't know – No statement Preventing others from imitating/copying the patented invention Improving the reputation of the organisation, e.g. with respect to clients, partners and investors Helping to obtain freedom to operate the invention Facilitating licensing agreements (licensing-out or cross-licensing) Facilitating commercial contracts (e.g. supply agreements, development agreements) or co-operations (e.g. joint ventures or joint R&D agreements) Help to secure financing
(EPA7) – Freedom-to-operate check	Did your organisation check (or is it planning to check) that it has freedom to operate the invention?	Yes – No – Don't know – No statement
(EPA8) – Other patents	Do you already have or do you plan to obtain other patents in relation to the invention?	Yes – No – Don't know – No statement
(EPA9) – Registered trade mark	Do you already have or do you plan to obtain a registered trade mark in relation to the invention?	Yes – No – Don't know – No statement
(EPA10) – Registered design rights	Do you already 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

(EPB1) – Commercial exploitation status	Is the patented invention currently being commercially exploited, or was it exploited in the past, i.e. has your organisation benefitted - or is it benefitting - commercially from it? Examples include making, using, selling, offering for sale or licensing its appropriation or use.	Yes, it is currently – Yes, it was but is not anymore – No, but planning to do so in the future – No, and there are currently no plans to do so – Don't know – No statement
(EPB2) – Commercial exploitation possibilities	Which of the following commercial exploitation possibilities of the patented invention is or has your organisation been using or is planning to use in the future?	Yes, is or has been using – Yes, is planning to use – No, not using / not planning – Don't know – No statement Internally by the organisation, e.g. by using it in a product or in production Externally by other organisations in the framework of a technology transfer arrangement, e.g. licensing or selling In cross-licensing negotiations In co-operation with an external organisation, e.g. in a joint venture, R&D co-operation In a spin-off from our organisation To actively deter other companies from using this technology
(EPB3) – Reasons for non-exploitation	We would like to establish the reasons why the patented invention was not commercially exploited. I am now going to read out some reasons. Please tell me for each reason whether it is applicable or not. Was the patented invention not commercially exploited, because...?	Yes (is or was a reason) – No (is not or was never a reason) – Don't know – No statement The patented invention does not have sufficient commercial potential The commercial possibilities of this invention are currently being actively explored The invention is still in development and just not ready for a 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 Lack of know-how or the appropriate network for commercialisation

Section CA: Licensing/co-operation

(EPCA1) – Size of external partners	In the following questions, we would like to understand more about these transactions or your co-operation with other partners. You stated that you have licensed out the patented invention. Which of the following types of organisation have you had licensing and co-operation agreements with?	A small or medium-sized enterprise (SME) – A large company/multinational – Other – Don't know – No statement
(EPCA2) – 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 - Rest of the world – Don't know – No statement
(EPCA3) – Type of external partners	You stated that you have exploited the patented invention through licensing or other types of co-operation agreements. With which of the following types of organisation have you had licensing or co-operation agreements?	Spin-off from your organisation – Other affiliated company – A client or customer – A supplier – A direct competitor – A party not active in your business area – A university or public research organisation – Other – Don't know – No statement
(EPCA4) – Reasons for licensing/co-operation	What were the main reasons for the licensing or co-operation agreement? I will take you through some of the options now and would like you to state which ones apply to your situation with regards to this patented invention.	Yes – No – Don't know – No statement Increase revenue from the invention Gain or retain market access or access to distribution systems Enable joint R&D and innovation Outsource manufacturing Stop (perceived) infringement of some of the patents and/or avoid further patent litigation
(EPCA5) – Challenges faced with licensing/co-operation	I would now like to understand the challenges you faced when setting up the licensing or co-operation agreements for the patented invention. I will mention some perceived challenges now and would like you to rate them using a scale from 1 “No challenge at all” to 5 “Was a significant challenge”, or somewhere in between based upon your experience.	1 No challenge – 2 – 3 – 4 – 5 – Significant challenge – Don't know – No statement Identifying the right partners or contact persons – Lack of interest from potential partners – Risk of creating a competitor – Cost and complexity of negotiations – Need to disclose non-patented know how or critical information on technology needs – Time and money for getting consultant advice – Unsatisfactory protection by patents or other IP rights
(EPCA6) – Partner search channels: Personal networks	Which of the following channels has your organisation used to find licensing or co-operation partners? Did you use...?	Yes – No – Don't know – No statement Personal networks – Prior business partners – Internet trading platforms – Patent databases (e.g. Espacenet) – Via patent attorneys or law firms - Via brokers or consultants – At a business fair or conference – The partner found us

Section CB: Planned tech transfer/co-operation

(EPCB1) – Size of external partners	In the following questions, we would like to understand more about the partners of the planned transaction or co-operation. Of the following types of organisations, which one would be your preferred partner to license, sell or engage in a co-operation in relation to the mentioned patented invention?	A small or medium-sized enterprise (SME) – A large company/multinational – Other – Don't know – No statement
(EPCB2) – Location of external partners	Of the following types of organisations, which one would be your preferred partner to license, sell or engage in a co-operation on the basis of the patented invention?	Spin-off from your organisation – Other affiliated company - A client or customer – A supplier – A direct competitor – A party not active in your business area – A university or public research organisation – Other – Don't know – No statement
(EPCB3) – 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 – Rest of the world – Don't know – No statement
(EPCB4) – Reasons for licensing/co-operation	What are the main reasons for the planned licensing, selling or co-operation agreement? I will take you through some of the options now and would like you to state which ones apply to your situation with regard to this patented invention.	Yes – No – Don't know – No statement Increase revenue from the invention – Gain or retain market access or access to distribution systems – Enable joint R&D and innovation – Outsource manufacturing – Stop (perceived) infringement of some of the patents and/or avoid further patent litigation.
(EPCB5) – Challenges faced with licensing/co-operation	I would now like to understand the challenges that you faced when setting up the licensing, selling or co-operation agreements for the patented invention. I will mention some perceived challenges now and would like you to rate them using a scale from 1 “No challenge” to 5 “Was a significant challenge”, or somewhere in between based upon your experience.	1 No challenge – 2 – 3 – 4 - 5 Significant challenge – Don't know - No statement Identifying the right partners or contact persons – Lack of interest from potential partners – Risk of creating a competitor – Cost and complexity of negotiations – Need to disclose non-patented know-how or critical information on technology needs – Time and money for getting consultant advice – Unsatisfactory protection by patents or other IP rights
(EPCB6) – Partner search channels: Personal	Which of the following channels does your organisation use or plan to use to find its licensing, selling or co-operation partners? Have you used or do you plan to use...?	Yes – No – Don't know – No statement Personal networks - Prior business partners – Internet trading platforms – Patent databases (e.g. Espacenet) – Via patent attorneys or law firms – Via brokers or consultants – At a business fair or conference – The partner has found us

Section D: Organisation details

(EPD1) – Patent/IP department or staff	Does your organisation have a fully dedicated staff or department for patent or intellectual property related issues?	Yes – No – Don't know – No statement
(EPD2) – Information of directorate	How regularly is the managing or executive director of the organisation informed about patent-related issues?	On a daily basis – On a weekly basis – On a monthly basis – Once a year – Less than once a year – Not informed at all – Don't know – No statement
(EPD3) – Level of expertise in patent management	How would you describe your level of expertise in patent management?	Entry level – Basic level – Experienced level – Expert level – Other – Don't know – No answer
(EPD4) – Level of expertise in patent commercialisation	How would you describe your level of expertise in patent commercialisation?	Entry level – Basic level – Experienced level – Expert level – Other – Don't know – No answer

Annex 2: Fieldwork report by BERENT Deutschland GmbH

Annex 2: Fieldwork report by BERENT Deutschland GmbH

Study on the exploitation of patented inventions by SMEs

1. Survey design

To design the survey, questions had to be 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
- interview length

Pilot interviews began on 5 February 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 all 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 – “The Survey System”, or “TSS” – 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, or approximately after 150 full interviews had been conducted, with data captured under real conditions.

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 a study's objective and the population.

The aim was to create a (feasible) sample that best represented the population of applications filed by European SMEs with the European Patent Office. The population was all such applications meeting set criteria.

Since it was assumed that how SMEs 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 has been published (European patent application with or without a search report respectively)
- that were filed between 2009 and the most recent year possible (2017)

Applications that had resulted in

- European patents being 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 in the respective areas.

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

Tables 3.1.1 and 3.1.2 show the final population and its breakdown.

Table 3.1.1

Final population – breakdown in figures

	Pending (N)				Grant (N)			
	MM	HBC	ICT	Total	MM	HBC	ICT	Total
BAL+TU+SO_EU+EA_EU*	1 552	923	397	2 872	1 897	846	253	2 996
IRE+NO_EU+WE_EU**	2 220	1 759	933	4 912	1 929	1 356	480	3 765
France	438	481	282	1 201	722	419	146	1 287
Germany	1 552	748	499	2 799	1 883	868	379	3 130
United Kingdom	872	800	644	2 316	604	530	238	1 372
Total	6 634	4 711	2 755	14 100	7 035	4 019	1 496	12 550

* Baltic countries + Turkey + Southern Europe + Eastern Europe

** Ireland + Northern Europe + Western Europe (excl. France and Germany)

Table 3.1.2

Final population – percentage breakdown

	Pending (%)				Grant (%)			
	MM	HBC	ICT	Total	MM	HBC	ICT	Total
BAL+TU+SO_EU+EA_EU	11.0	6.5	2.8	20.4	15.1	6.7	2.0	23.9
IRE+NO_EU+WE_EU	15.7	12.5	6.6	34.8	15.4	10.8	3.8	30.0
France	3.1	3.4	2.0	8.5	5.8	3.3	1.2	10.3
Germany	11.0	5.3	3.5	19.9	15.0	6.9	3.0	24.9
United Kingdom	6.2	5.7	4.6	16.4	4.8	4.2	1.9	10.9
Total	47.0	33.4	19.5	100.0	56.1	32.0	11.9	100.0

3.2 Gross sample

The gross sample is a (criteria-based) selection from the population within which the interviews are to be conducted. The gross sample 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 this study, the goal was to interview companies about a specific application, i.e. one unit in the population, even though they may have filed more than one application.

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

1. Ideally, interview a given company only once, unless the gross sample proves too small.
2. Stratify the gross sample by status, technical field and country/region to ensure that, for groups accounting for relatively few units in the population, enough interviews are conducted for data analysis.
3. Within the strata, sample randomly.

Based on these criteria, we first assigned the units of the population to batches. Each batch contained a given company only once; in other words a company was not allowed to appear more than once in a batch.

Since some companies were present more than once in the population, they were identified and randomly assigned to a batch. In batch 1, all of the companies present in the population appeared only once. As this batch was assumed to be a large enough sample to achieve the target number of interviews, it was then used as the gross sample.

Table 3.2.1 shows how often the various companies appeared in the population. The first row of figures shows batch 1, i.e. the size of the gross sample: 9 794 pending applications and 8 568 granted European patents.

After stratification by technical field and country/region, the maximum gross sample for the fieldwork was as shown in Table 3.2.2.

Table 3.2.1

Frequency of companies in the population

Occurrence of a company in the population (number)	Pending (N)				Grant (N)			
	MM	HBC	ICT	Total	MM	HBC	ICT	Total
1	4 769	3 196	1 829	9 794	4 859	2 734	975	8 568
2	989	732	420	2 141	1 063	628	207	1 898
3	354	292	184	830	399	247	101	747
4	170	168	98	436	219	127	51	397
>=5	352	323	224	899	495	283	162	940
Total	6 634	4 711	2 755	14 100	7 035	4 019	1 496	12 550

Table 3.2.2

Maximum gross sample for batch 1

	Pending (N)				Grant (N)			
	MM	HBC	ICT	Total	MM	HBC	ICT	Total
BAL+TU+SO_EU+EA_EU	1 171	720	320	2 211	1 341	668	192	2 201
IRE+NO EU+WE EU	1 641	1 160	617	3 418	1 392	907	290	2 589
France	326	282	179	787	484	271	99	854
Germany	975	496	285	1 756	1 172	515	213	1 900
United Kingdom	661	533	428	1 622	470	373	181	1 024
Total	4 774	3 191	1 829	9 794	4 859	2 734	975	8 568

3.3 Target quotas for fieldwork

The aims of the net sample were to (a) best represent the population's size and (b) collect enough completed interviews in each of the strata. This approach was designed to ensure that the basis for the subsequent data analysis would be as broad as possible. The target quotas for the fieldwork are presented in Table 3.3.1.

Target quotas were chosen in such a way that the net sample could be weighted based on population size or its size within specific divisions. The quotas were based on the highest possible number of interviews.

A target number of 1 500 interviews was set for the net sample: 750 for pending applications and 750 for granted European patents.

Table 3.3.1

Target quotas for the fieldwork

	Pending (N)				Grant (N)			
	MM	HBC	ICT	Total	MM	HBC	ICT	Total
BAL+TU+SO_EU+EA_EU	60	55	35	150	65	53	37	154
IRE+NO EU+WE EU	60	55	35	150	65	53	37	154
France	60	55	35	150	65	40	28	133
Germany	60	55	35	150	65	53	37	154
United Kingdom	60	55	35	150	65	53	37	154
Total	300	275	175	750	325	250	175	750

4. Fieldwork

4.1 Fieldwork – dates

Fieldwork started on 5 February 2019 with pilot interviews to test the questions under real conditions.

The fieldwork ran until 15 May 2019, when the last interview was completed.

4.2 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 guided the fieldwork. Since response rates varied by country/language area and technical field, this was necessary to prevent quotas from being exceeded.

There were 18 362 companies to potentially contact in batch 1 (in which all of the companies in the population were present only once). 5 784 were selected to be contacted via a random selection of SMEs from each stratum. In 4 946 cases (86%) it was possible to make contact, and in 1 505 cases (26%) a full interview was conducted. In the 838 cases (14%) where it was not possible to make contact, this was either due to incorrect contact details or because the interviewer was unable to find any contact details during the research.

The remaining 12 578 companies in batch 1 were not selected for contact, either because the relevant quota had already been met or because the fieldwork had already come to an end.

Table 4.2.1 gives an overview of the gross sample broken down into the strata of status, technical field (sector) and country/region. It shows that the most common reason for not being able to conduct an interview with a company selected for contact was not being able to find the target contact there (1 363 cases, or 24%). Of the companies selected for contact, 1 139 (20%) declined to participate.

Table 4.2.1

Breakdown of gross sample by stratum

	Total (N)	Status (N)		Sector (N)			Country/Region (N)				
		Pending	Grant	MM	HBC	ICT	BAL+TU +SO_EU +EA_EU	IRE+NO_ EU+WE_ EU	France	Germany	United Kingdom
Contact: completed	1 505	761	744	620	489	396	271	347	203	505	179
Contact: refusal	1 139	619	520	451	345	343	119	267	131	556	66
Contact: target person cannot be found in the company	1 363	722	641	449	492	422	141	406	360	100	356
Contact: other outcome	939	533	406	382	329	228	238	279	118	152	152
No contact: no contact could be established	838	533	305	316	300	222	189	387	46	107	109
Not selected for the fieldwork	12 578	6 626	5 952	7 415	3 970	1 193	3 454	4 321	783	2 236	1 784
Total	18 362	9 794	8 568	9 633	5 925	2 804	4 412	6 007	1 641	3 656	2 646

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 35.6% of those selected for contact gave an interview. The equivalent rates for France and the United Kingdom were lower at 23.7% and 20.8% respectively. There were hardly any differences in the interview rates across status and sector.

Table 4.2.2: Interview rates for the gross sample by stratum and based on whether a company was selected for contact or contact was made.

Table 4.2.2

Interview rates for the gross sample by stratum and based on whether a company was selected for contact or contact was made

	Status			Sector			Country/Region				
	Total	Pending	Grant	MM	HBC	ICT	BAL+TU +SO_EU +EA EU	IRE+NO_ EU+WE_ EU	France	Germany	United Kingdom
Interview by contact attempt rate (%)	26.0	24.0	28.4	28.0	25.0	24.6	28.3	20.6	23.7	35.6	20.8
Interview by established contact rate (%)	30.4	28.9	32.2	32.6	29.5	28.5	35.2	26.7	25.0	38.5	23.8

4.3 Fieldwork management

Each company in batch 1 was allocated to a stratum. Companies were then selected at random to be contacted for the first time.

Within a stratum, all companies were initially equally likely to be selected to be contacted for the first time. Since companies were not put back, this probability rose as the fieldwork progressed.

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

This automatic procedure determined when and to which interviewer a company 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 17.3 minutes, but for outliers interviews lasted up to more than an hour (outliers were disregarded when calculating the average time).

The most obvious differences are between the various countries/regions. The interviews in France, which lasted 13.2 minutes on average, were significantly shorter.

Table 5.1.1

Interview length by country/region

	Mean interview length (in minutes)
BAL+TU+SO_EU+EA_EU	18.7
IRE+NO_EU+WE_EU	18.1
France	13.2
Germany	16.0
United Kingdom	17.4
Total	17.3

6. Final data preparation

Once fieldwork was finished, data captured was checked for:

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

7. Weighting

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

Target quotas were set for the final net sample (Table 3.3.1) and interviewers tried to meet them during the fieldwork. The final net sample is the net sample at the end of the fieldwork.

For data analysis purposes, and for content-based reasons, the data was weighted based on the population, and separately at first for pending applications and granted European patents. To this end, we used the figures/percentages for the population as shown in Tables 3.1.1 and 3.1.2. This weighting made the net sample representative of the population in terms of its size, and separately for the groups of pending patent applications and granted European patents. It involved “underweighting” (weighting factor <1) and “overweighting” (weighting factor >1) sampling units in certain strata.

The next step was to aggregate the two status groups and to **equally** weight them based on a total of 1500 sampling units. In other words, in the final net sample each of the two status groups has 750 sampling units. Table 7.1.1 shows the final net sample.

Table 7.1.1

Final net sample

	Unweighted						Weighted					
	Pending (N)			Grant (N)			Pending (N)			Grant (N)		
	MM	HBC	ICT	MM	HBC	ICT	MM	HBC	ICT	MM	HBC	ICT
BAL+TU+SO_EU+EA_EU	62	46	31	61	41	30	83	49	21	113	51	15
IRE+NO_EU+WE_EU	60	64	43	66	71	43	118	94	50	115	81	29
France	34	43	42	31	28	25	23	26	15	43	25	9
Germany	113	62	78	120	75	57	83	40	27	113	52	23
United Kingdom	37	25	21	36	34	26	46	43	34	36	32	14
Total	761			744			750			750		

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