



European Patent Office

PATENT FILINGS SURVEY 2017

INTENTIONS OF APPLICANTS REGARDING PATENT APPLICATIONS AT THE EUROPEAN PATENT OFFICE AND OTHER OFFICES

Munich, April 2018

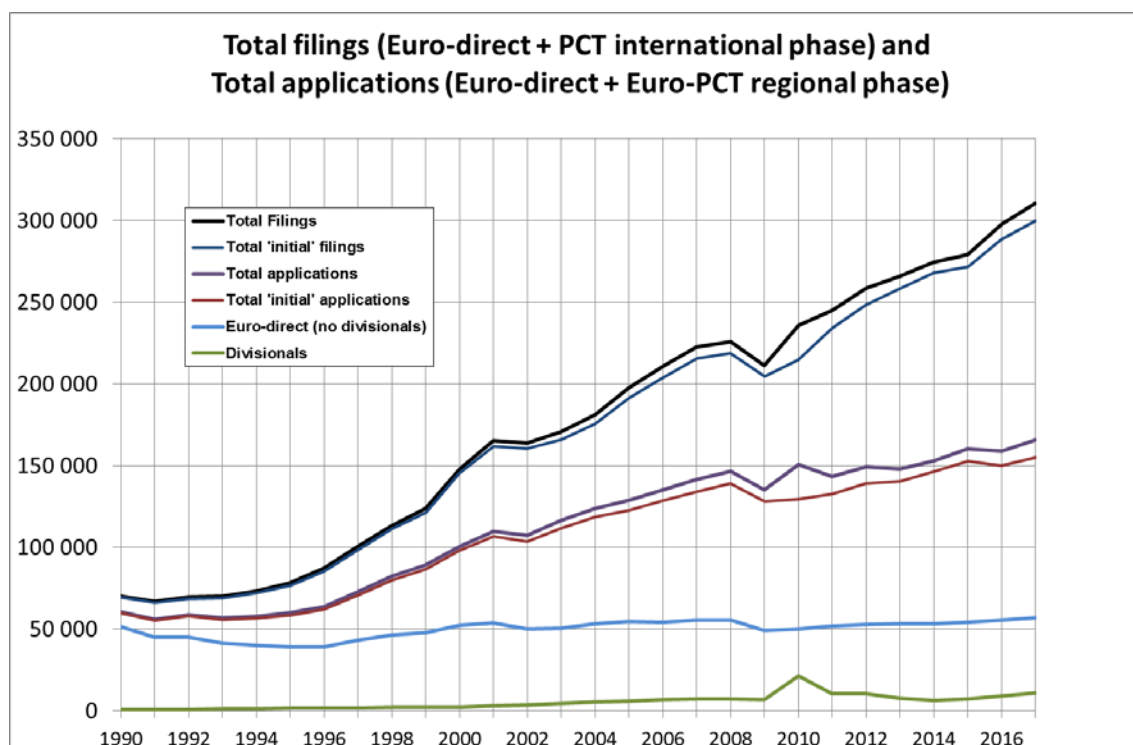
EXECUTIVE SUMMARY

- The forecasts and further analyses documented in this report originate from the results of the annual Patent Filings Survey that was carried out in the middle of 2017. The forecasts that are made for EPO Total filings exclude divisional filings.
- Based upon this survey, Total filings (Euro-direct + PCT-IP) growth at the European Patent Office for 2017 is estimated to be negative at -1.2% versus 2016 filings.
- The survey forecast predicted 285,159 Total filings for 2017, compared to 300,119 actual Total filings in 2017. This forecast significantly underestimates the observed filings growth of +4.0% from 2016 to 2017.
- The source of this underestimation can be traced back to respondents underestimating their PCT-IP subsequent filings, with the highest underestimation emanating from the Other residence bloc, which can partly be attributed to the lack of responses from China. Additional analysis, that was performed on “knowledgeable” respondents, suggests that better forecasts for 2017 and 2018 can be obtained by excluding respondents who did not answer for all years out to 2019.
- The estimated standard errors in forecasts for all of the years under review in this survey are generally similar to those of last year, but there is higher uncertainty concerning the development of Euro-direct first filings from the US and with Euro-direct subsequent filings development in JP residence bloc, for all of the years in question.
- For 2018, the survey predicts +3.4% growth versus 2016 (+4.6% year-on year), resulting in 298,312 Total filings at the EPO. This forecast for 2018 is still below the observed number of Total filings in 2017.
- For 2019, the final year for which a forecast was made, +5.9% growth versus 2016 has been forecast (+2.4% year-on year), resulting in 305,541 Total filings at the EPO.
- The growth of Total EPO applications (Euro-Direct and Euro-PCT-RP filings, excluding divisional filings) is estimated to be +1.8% in 2017, +7.4% in 2018, and +9.5% in 2018 versus 2016. Positive growth is therefore forecasted for the entire period. The predicted growth rate for 2017, +1.8%, is more in-line with the currently expected actual one-year growth rate of +3.9% than is the case with the Total filings growth rates forecasts.
- From other information provided in the survey, an estimate was made that 55% of EPO applicants are small and medium-sized enterprises (SMEs) according to the EU definition (with 95% confidence limits ranging from 50% to 61%). The proportion of applications originating from SMEs is estimated at 17%. Strong growth of European patent portfolios since 2005 is indicated. The estimated median R&D spend per first patent filing is € 150,000 and the median year that enterprises started patenting activities within the EPO is 2010.

Commentary by the European Patent Office

Each year, the EPO carries out a survey of filing intentions of applicants for European patents. This report concerns the 2017 survey that was done by the market research firm BERENT Deutschland GmbH. The main use that is made of the survey at EPO is to provide information on probable filing developments for budgetary planning purposes. Applicants were approached for a Biggest group of about 600 largest clients and a Random group of about 3 000 from the general population, with a random sampling method that preferentially selected larger applicants. The fieldwork period was May to October 2017. There were 647 responses, which is similar to the number that was achieved in the previous year. The consultancy company for this survey adopted a new approach that used an electronic form of questionnaire that was available online (CAWI, see Section 7.6). In earlier surveys there had been a fixed file questionnaire that could either be completed or printed out to be completed by hand (PAPI).

In the report, in addition to the main forecasts themselves, the degree of agreement of the forecasts from the series of annual surveys up to now with the out-turns is also assessed. The annexes describe the survey setup; fieldwork experiences and response rates; analytical methodology; forecasts broken down by technical areas; forecasts for worldwide first filings and for filings at other offices; and a description of respondent profiles including company economic attributes. The final two annexes of the report add further descriptions of the population and samples.



The diagram shows the main types of European Patent that are forecasted. These are the numbers of total 'initial' filings, that are direct European route filings (Euro-direct, here always excluding divisional filings) and PCT international phase filings (PCT-IP) taken together; and the numbers of total 'initial' applications, that are Euro-direct (excluding divisionals) and Euro-PCT regional phase filings (Euro-PCT-RP) taken together¹. The observed number of Total filings at the EPO increased strongly in 2017 to a level that was fairly close (within 10,000) to the number that had already been rather well forecasted as far back as the 2015 survey.

In the current survey, the favoured forecasting scenario that has been chosen for Total filings involves Random Group results with sub-forecasts broken down by blocs of residence of the applicants (Europe, Japan, US, Others, see Table 10). This scenario posits 5.9% growth from 2016 to 2019 (1.9% compound annual growth), which seems rather low when compared to recent developments. In terms of the technical criterion used for evaluating the usual provided set of scenarios (see the column "RMSEF" in Table 2), under the best scenario there is no breakdown by blocs of residence and a winsorized analysis is used that cuts off the 5% lowest and highest growth indices from the respondents. But this posits even lower 3.3% growth from 2016 to 2019 (1.1% compound annual growth), and so the residence bloc breakdown scenario is favoured this time.

Under the favoured scenario, the projection for Total filings in 2017 is unfortunately somewhat lower than the observed figure for 2016. This contrasts with strong positive growth that is now seen in the observed count for 2017. This is the second year in a row that forecasts for the current year show a decline when positive growth was actually achieved. It is suggested to stick with the favoured scenario but to seek other explanations concerning what may have been going on.

This is explored in Section 4.4, where it is suggested that a better forecast for 2017 can be found by concentrating on a more "knowledgeable" set of respondents, being those who were prepared to estimate their future filings at the EPO for all three years 2017, 2018 and 2019. The version of the residence bloc-based scenario under this condition shows a forecast for Total filings in 2017 that becomes higher than the number in 2016. Also the observed value for Total filings in 2017 lies within the 95% confidence interval for this forecast. Another way to increase the forecasts for Total filings is to employ correction factors that are legitimately based on the development of the underlying population of applicants over time, which is very dynamic (see Annex VIII). This year a new method is used to calculate these CFs that is based on Total filings rather than Total applications. Application of these CFs to the results for the "Knowledgeable sample" gives upward corrections to the Total filings forecasts that estimates 294,019 in 2017 (vs observed), 305,814 in 2018 and 308,659 in 2019. This is equivalent to year-to-year growth rates of 6.0% in 2017, 4.0 % in 2018 and 0.9% in 2019.

The projections from the survey for Total applications in 2018 and 2019 are quite positive. The favoured scenario for Total applications has a residence bloc breakdown of forecasts for the applicants. Positive growth was expected for 2017 that slightly underestimated the observed out-turn, but this out-turn was already within the 95% confidence limits of the forecast without the need for any further adjustments.

In Annex V, for worldwide first filings growth there is a prediction for moderate growth in 2017 and on to 2019 (1.9% annual compound growth), under the scenario with a residence bloc breakdown. Results also appear in Annex V for questions on filings at specific national patent

¹ Total applications constitute an important downstream workload item at EPO and therefore are forecasted as well as the Total filings.

offices. Here there is evidence for fairly strong continuing growth at the Chinese office (SIPO) out to 2019, as well as in Other Countries apart from the main ones asked about.

Wherever practical, statistics are given in the report with breakdowns by main technical areas (called mega clusters) and by blocs of residence of the applicants.

Annex VI analyses respondents' profiles in terms of several regular questions. Histograms appear (from Fig. 11 onwards) about the numbers of employees at these companies. Various features of the applicant population, including those on R&D expenditures and numbers of first filings broken down by residence blocs and main sectors areas, are shown in a set of tables from Table 52 onwards.

Many of the questions did not change since earlier recent surveys, which allows for survey-to-survey reproducibility to be checked. Some of the measures relate to the sizes of applicant companies, examples of which are the calculated proportions of small and medium sized enterprises (SMEs) with respect to applicants and applications. The percentages that were estimated for SMEs (55% of applicants and 17% of applications) are largely consistent with those from several of the previous surveys. Although it has not adversely affected the apparent proportion of SMEs to any great extent, one difference that we noted in the survey this time was that the average size of the responding applicants, in terms of their numbers of EPO applications, was lower than in previous surveys. This can be seen for example by comparing the lower numbers of filings accounted for in the responses in the 2016 and 2017 surveys, by comparing the tables in Annex IX in both reports. It remains to be seen whether these effects have anything to do with the new method of data collection that was employed. One problem that can be mentioned is the results of the question on the numbers of employees, where in the case of Japan no responses were recorded for companies with less than 50 employees, while the estimate in the previous survey was 15% from Japan. This question should be asked again carefully in the next survey before drawing conclusions.

The median estimate of R&D expenditure per first patent filing is a barometer of motivations for patenting, although the survey estimates are as ever subject to statistical error. This median has previously decreased continuously, from € 450,000 in 2011 (2012 survey) to € 200,000 in 2014 (2015 survey), with a step up to € 250,000 in the 2016 survey. In this survey, the median has gone down again to € 150,000, which may indicate a further trend towards strategic usages of patenting. For the Other countries Bloc, which includes China, the median estimate median is as low as € 39,000 (see Table 58).

The question about sizes of applicants' European patent portfolios was this year limited back to 2005 rather than to 2000 as in earlier surveys (see Annex VII). The median estimated European portfolio growth in this survey was 200% from 2005 to 2016, compared to a result that was obtained last year of a median estimated growth of 275% from 2000 to 2015. This growth rate only applies to "survivors" over the period however, since there is an estimate that 76% of applicants that applied in 2016 had no European patent Portfolio in 2005. However, the previous survey estimated that only 63% of applicants that applied in 2015 had no European patent portfolio in 2000, which is strange because the time difference was longer so a higher percentage is expected. There may be a problem with this year's 76% estimate, because of a feature of the questionnaire that respondents were only asked about 2005 if they had already stated that they started patenting at EPO by 2005.

A question was included in this survey to ask the respondents to comment on promising medium to long term technical trends in their area of business. The information received is interesting for planning at the EPO and shows that many respondents expect there to be further developments in the digital and Internet-of-Things areas.

We are very grateful to the respondents for providing the data to allow for the various forecasts and estimations. Please try to participate in the survey in case you are approached with a request to do so in future. We would like the response rates to increase further in order to be able to improve the quality and accuracy of the analyses.

We will be happy to receive your feedback on any of the issues that are covered in this report. For this, you are welcome to send an e-mail to EPO at the address below. This 2017 survey report appears at the site www.epo.org/service-support/contact-us/surveys/patent-filings.html. Please note that reports for earlier annual surveys can also be accessed from this site by using the “archive” link.

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1 INTRODUCTION

1.1 Background and objectives

The European Patent Office (EPO) has been conducting Patent Filings Surveys annually since 1996. They were previously known as "Future Filings" and "Applicant Panel" Surveys. The Survey is carried out among a group of its randomly selected patent applicants, the main objective being to predict the number of patent filings for that year as well as the two subsequent years. This enables the EPO to use these predictions when planning the allocation of their resources in order to ensure that a high level of service is provided when processing future patent filings.

Last year (2017) saw the 22nd Annual Survey taking place and the interviews, data collection, data analysis and interpretation were performed by BERENT.

The primary objective of the survey was to calculate quantitative forecasts of patent filings at the EPO and other patent offices by various filing routes and applicants' residence blocs (EPC², Japan, USA, Others). The bloc breakdown may be of special interest when assessing the impact of varying economic environments around the globe. The secondary objective was to explore the technological areas of patenting in order to make more detailed forecasts and to explore the relationship between research and development (R&D) expenditures and patent applications. These two objectives remain constant from year to year, but a third objective has been to ask 'one-off' questions relating to matters of topical interest. In this survey, the opportunity was taken to ask for information on the development of European patent portfolios. In addition, open questions on emerging technologies and future patenting activities were also asked.

Data was collected on the basis of the industries that underlie 12 technologies that correspond to the structure in which the EPO organised its search, examination and opposition departments up to 2017. These 12 technologies were then amalgamated into five larger "mega clusters".

1.2 Content and structure of this report

The survey involves establishing forecasts from basic filing types and residence blocs of the applicants. The underlying types of Total filings at the EPO are first and subsequent filings, each of which can be either Euro-direct or PCT international phase filings (PCT-IP), excluding divisionals. The PCT-IP filings can later on become PCT filings entering the regional phase (Euro-PCT-RP). Total applications are also forecasted, which are either Euro-direct or Euro-PCT-RP filings, excluding divisionals. At other offices, there are national filings and PCT applications entering the national phase (PCT-NP), the latter of which also originate as PCT-IP applications.

Overview of the report sections:

Section 1.3 outlines the characteristics of this year's survey and sample groups.

Section 2 provides high-level summaries of the predicted counts of Total filings and growth rates for 2017, 2018 and 2019, based on the recommended forecasting method.

² European Patent Convention (EPC) contracting states, considered here as at December 2017 with 38 members.

Section 3 summarises forecasts (for Euro-direct and PCT-IP filings) based on two sample groups using the different forecasting methods, and puts the report into perspective by comparing results with those from previous surveys dating back to 2009.

Section 4 describes the statistical methodologies employed for forecasting growth, and provides forecast results (for Euro-direct and PCT-IP filings) for both sample groups with the various breakdown scenarios employed.

Section 5 provides various forecast approaches for Total applications at the EPO (Euro-direct and Euro-PCT-RP filings).

Section 6 finishes with the conclusions and an outlook.

Annexes in the report:

Annex I contains the survey fieldwork methodology as well as this year's questionnaire, and details the data validation procedures that were employed.

Annex II reports on the comments made by the respondents during the survey.

Annex III contains details of the analytical methodology employed.

Annex IV reports on the forecasting results broken down by mega cluster.

Annex V provides forecasts for applications at other national patent offices (national filings including worldwide first filings, PCT-NP filings, and Euro-PCT-RP application at the EPO).

Annex VI provides an overview of the sample composition as per various technical domains. This Annex also contains summary statistics and analyses respondents based on economic characteristics of EPO applicants in 2016, such as number of employees, R&D budgets, first filings, and selected ratios including proportions of small and medium-sized enterprises (SMEs) and the share of applications filed by SMEs.

Annex VII reports on the development of European patent portfolios.

Annex VIII gives details on the estimation of possible correction factors based on birth/death effects.

Annex IX reports on population sizes and sample sizes underlying the 2017 survey.

1.3 The 2017 survey

For this survey, the data collection method was changed in that the traditional paper questionnaire was replaced by an electronic form being available online.

The survey was conducted following a combination of telephone and/or email contacts and self-completed web interviews and consisted of the phases described later in this report (see **Annex I**).

The contact phase began in early May 2017, with interviews being completed by the end of October. A total of 647 interviews were completed during this period.

The survey sampling design was, to a large extent, similar to that of the previous years in that selected applicants were drawn from the Biggest and Random groups and on an overlapping basis. Sampling for both target groups was based on the raw name of each applicant after capitalising it, and the main results for EPO filings were calculated on counts excluding divisional applications from Euro-direct filings. So all results that are shown below exclude divisional applications.

The total number of applicants involved was 3,019, with most of the Biggest group also appearing in the Random group. The survey responses covered applicants for more than 30% of the applications at the EPO (Euro-direct and PCT-RP filing numbers of the Random sample relating to population, see **Annex IX**).

The EPO provided two gross samples of applicants drawn from the EPO database of applications (EPASYS) in March 2017.

- "Biggest": This sample comprises the 629 largest applicants and was designed to allow for separate analysis of the intentions of the biggest applicants.
- "Random": This sample included 2,920 applicants and was designed to represent all applicants of the parent population. It was obtained from a simple random sample of applications, with the effect of over-weighting large applicants due to their high number of applications. This sample included a booster sample of 603 applicants from the US in order to compensate for the low response rates previously experienced in earlier surveys. This was necessary due to the importance of the region. The US boost is included in the Random group for analysis purposes.

The following figure shows the composition of the gross sample and the total number of applicants approached for the survey 2017³:

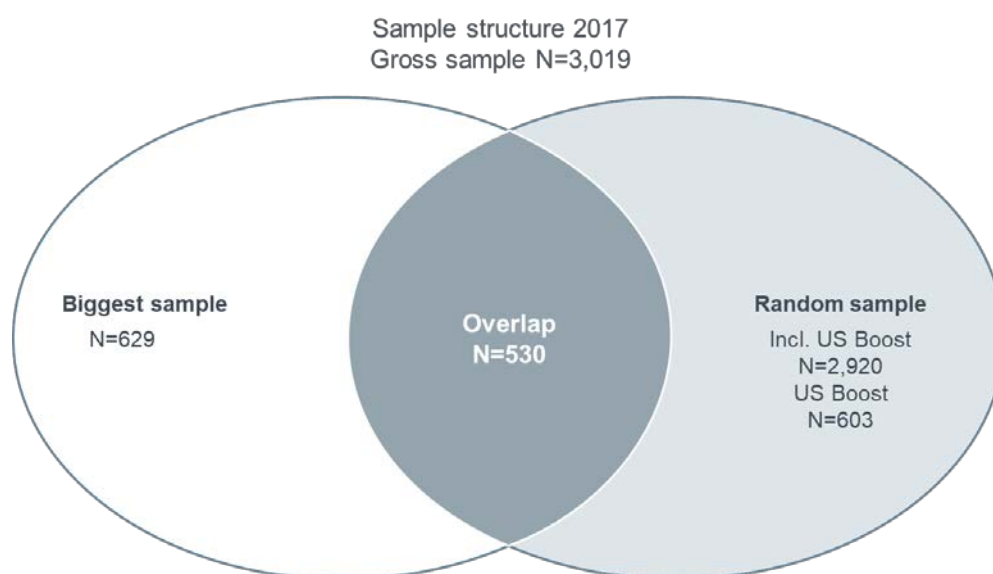


Figure 1: Sample structure of the 2017 survey

The samples were drawn separately for the Random and Biggest groups and, as a result, contained an overlap of 530 large applicants. Taking this into consideration, the total gross sample was 3,019 applicant addresses. It is considered that both samples adequately represent the three regions of Europe, the US, and Japan. However, it should be noted that the US is over-represented in the gross addresses due to the additional boost sample. Other countries (apart from Europe, Japan and US) consist of a residual group for the rest of the world. The sampling scheme for the Random group should give other countries adequate representation in terms of their number of patent applications to the EPO.

The questionnaire used for this data collection contained a matrix of questions on patent filings and expectations for patent filings for the base year 2016 and for the following three years, namely 2017, 2018, and 2019. The requested patent filings counts were broken down by first and subsequent filings, not only at the EPO but also at other main worldwide patent offices. Apart from the main questions on predicting numbers of patent filings, questions were asked to elicit information on economic characteristics of applicants, including R&D

³ The sampling procedures were done on database counts for Euro-direct and Euro-PCT-RP filings only (PCT-IP filings were ignored for the sampling due to a lack of timeliness).

expenditures and first filings by 12 technologies that are relevant to EPO operations. Descriptive information was also collected on company type and size in terms of persons employed, classification into small and medium-sized enterprises (SME), and on European patent portfolio sizes.

For further details about parent population, target persons, questionnaire topics, data collection procedure, and response statistics refer to **Annex I**.

2 FORECAST OF FUTURE PATENT FILINGS AT THE EPO

It should be noted that all the filings totals in this report, both actual and estimated, do not include divisional filings⁴, which needs to be borne in mind when any such reference is made.

Based on the recommended forecast method explained in Section 3, the estimated growth rates (with respect to 2016) for Total filings were calculated as **-1.2%** for **2017**, **+3.4%** for **2018**, and **+5.9%** for **2019**. The **overall survey forecast** for Total filings in **2017** is **285,159**, with approximate 95% confidence limits of **275,073** and **295,245**, resulting in a deviation⁵ of 3.5%. This forecast clearly underestimates the currently assumed figure of **300,119** for actual 2017 filings, with the actual filing number being above the upper 95% confidence limit of the forecast. The estimated percentage of PCT-IP filings amongst Total filings for 2017 is 78.6%, which is slightly lower than the observed value of 80.9%. For **2018**, the recommended forecast method predicts **298,312** Total filings with approximate 95% confidence limits of **289,074** and **307,550**. The forecast for **2018** is lower than the currently assumed figure for the actual 2017 filings. For **2019**, the recommended method estimates **305,541** Total filings with approximate 95% confidence limits of **295,232** and **315,850**.

With regards to the Total filings estimates, forecasts for the Biggest group this year are more pessimistic for both the two-year and three-year forecasts when compared to the Random group, with both estimates indicating clear year on year reductions in filings from 2016 to 2017.

In summary, this year's survey predicts a drop in filing numbers for 2017 with a return to moderate growth for 2018 and 2019. Two-year growth forecasts are estimated as between 3% and 4%, while three-year growth forecasts are all below 10% at 5% to 6% (**see Tables 1 and 2** below). Last year's survey also projected a decline for a one-year period, but most of methods forecasted stronger growth for the later years, with two-year growth between 5% and 6%, and three-year growth estimates between 8% and 9% (2016 report Table 1). Additionally, the 2016 survey featured a compensated scenario that was constructed to exclude respondents from China, while adding expected growth rates for China from a non-survey source. This year's forecasts exhibit a return to larger deviations than those calculated for the 2016 survey.

In terms of Total applications (Euro-direct + Euro-PCT-RP), growth rates based on the recommended forecast are estimated to be +1.8% in 2017, +7.4% in 2018, and +9.5% in 2019 vs. 2016. Total application growth rates are more in line with the currently assumed figures for actual 2017 applications than the Total filings forecasts are.

⁴ The survey question on filings at the EPO specifically excludes divisional filings in the counts, so divisional filings were excluded from all the actual and predicted filing counts.

⁵ Deviation is the distance from the forecast filings number to the lower 95% confidence limit of the forecast as a percentage of the forecast filings number. For details on deviation calculation please see Annex III.

3 SUMMARY OF FORECASTS AND COMPARISON WITH PREVIOUS PATENT FILINGS SURVEYS

3.1 Summary of this year's forecasts for Total filings

This report presents and discusses a variety of different forecasting approaches. Overviews of the main results presented in **Section 4** are summarised in **Table 1** with respect to growth rates and in **Table 2** for the resulting predicted filing numbers.

Comparison of forecasts: growth from 2016
Euro-direct and PCT-IP

			2017		2018		2019	
Critical	Group	Breakdown	Growth rate	Deviation	Growth rate	Deviation	Growth rate	Deviation
Included	Biggest	None	-0.8%		0.3%		1.9%	
Included	Biggest	Residence bloc	0.2%		2.6%		3.7%	
Included	Random	None	-1.3%	2.9%	2.1%	3.0%	3.4%	3.3%
Included	Random	None (winsorized)	-1.0%	2.8%	2.0%	3.0%	3.3%	3.3%
Included	Random	None (Euro-direct and PCT-IP filings combined)	-3.0%	4.9%	3.8%	5.5%	5.2%	5.9%
Included	Random	Residence bloc	-1.2%	3.5%	3.4%	3.1%	5.9%	3.4%
Included	Random	Residence bloc (winsorized)	-1.2%	3.7%	2.3%	3.6%	4.6%	2.9%
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	-1.0%	7.1%	5.5%	8.8%	6.9%	9.4%
Included	Random	Residence bloc (First and Subsequent filings combined)	-2.6%	3.7%	1.6%	3.0%	4.4%	2.9%
Included	Random	Residence bloc (All filings combined)	-5.4%	3.2%	-0.7%	3.5%	1.5%	3.2%
Excluded	Biggest	None	-0.3%		0.3%		1.6%	
Excluded	Biggest	Residence bloc	-0.1%		2.6%		3.7%	
Excluded	Random	None	-2.8%	3.2%	1.3%	3.2%	2.5%	3.6%
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	-6.1%	4.2%	1.3%	4.5%	2.5%	4.9%
Excluded	Random	Residence bloc	-4.1%	3.4%	0.4%	2.8%	2.1%	3.3%
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	-5.2%	6.0%	0.0%	6.8%	1.0%	8.0%
Excluded	Random	Residence bloc (First and Subsequent filings combined)	-5.5%	3.9%	-1.0%	3.4%	1.2%	3.3%
Excluded	Random	Residence bloc (All filings combined)	-6.9%	3.5%	-1.8%	3.9%	-0.1%	3.6%
Actual growth			4.0%					

Table 1: Predicted growth rates for Total filings by forecasting method

Comparison of forecasts: Predicted total filings
Euro-direct and PCT-IP
LCL/UCL indicates lower/upper 95% confidence limit

			2017				2018			2019		
Critical	Group	Breakdown	Predicted filings	LCL	UCL	RMSEF*	Predicted filings	LCL	UCL	Predicted filings	LCL	UCL
Included	Biggest	None	286 372				289 528			293 886		
Included	Biggest	Residence bloc	289 189				296 062			299 195		
Included	Random	None	284 923	276 708	293 138	15 763	294 725	285 858	303 592	298 462	288 510	308 414
Included	Random	None (winsorized)	285 774	277 880	293 668	14 900	294 277	285 448	303 106	298 149	288 240	308 058
Included	Random	None (Euro-direct and PCT-IP filings combined)	279 959	266 191	293 727	21 349	299 597	283 015	316 179	303 563	285 601	321 525
Included	Random	Residence bloc	285 159	275 073	295 245	15 820	298 312	289 074	307 550	305 541	295 232	315 850
Included	Random	Residence bloc (winsorized)	284 941	274 401	295 481	16 103	295 247	284 636	305 858	301 712	292 856	310 568
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	285 632	265 277	305 987	17 825	304 288	277 371	331 205	308 520	279 618	337 422
Included	Random	Residence bloc (First and Subsequent filings combined)	280 927	270 553	291 301	19 909	293 027	284 118	301 936	301 151	292 383	309 919
Included	Random	Residence bloc (All filings combined)	272 896	264 154	281 638	27 586	286 568	276 492	296 644	292 820	283 542	302 098
Excluded	Biggest	None	287 802				289 440			293 128		
Excluded	Biggest	Residence bloc	288 109				296 142			299 359		
Excluded	Random	None	280 337	271 462	289 212	20 294	292 349	282 899	301 799	295 813	285 127	306 499
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	271 083	259 588	282 578	29 364	292 398	279 294	305 502	295 760	281 183	310 337
Excluded	Random	Residence bloc	276 798	267 478	286 118	23 801	289 827	281 668	297 986	294 539	284 961	304 117
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	273 491	256 988	289 994	27 928	288 449	268 957	307 941	291 287	267 864	314 710
Excluded	Random	Residence bloc (First and Subsequent filings combined)	272 628	262 022	283 234	28 019	285 563	275 876	295 250	292 021	282 463	301 579
Excluded	Random	Residence bloc (All filings combined)	268 660	259 312	278 008	31 818	283 328	272 315	294 341	288 277	277 943	298 611
Actual filings			300 119									

*) RMSEF: Root mean squared error of forecast, for details see Annex III.

Table 2: Predicted Total filings by forecasting method

A priori, the Biggest group is not the preferred sample on which to base overall estimates of growth rates and filings, since its composition is skewed towards large companies. Although it gives valuable information about the intentions of major applicants to the EPO, it is not representative of the overall EPO applicant population in the same way that the Random group is.

When considering which forecast method to use for the Random group, last year's recommendation was to use the one that minimises the "root mean squared error of forecast" (RMSEF), based on the full sample including those cases with critical comments (see Annex III). This year we used RMSEF (See **Section 9.5** for an explanation of the RMSEF), but also took into account additional attributes of the forecasts (see **Section 4.3** for more details). The RMSEF for each estimate is shown in **Table 2**.

We recommend using the forecast broken down by residence bloc with critical codes included. Its one-year estimate has one of the best aligns of all the estimates with the current expectation of actual filings in 2017, although all the reported scenarios are too low. The filing estimates using the recommended prediction method are **285,159** for **2017**, **298,312** for **2018**, and **305,541** for **2019**. For the two-year and three-year time horizon, our recommended forecast is the second most optimistic of forecasts based on the Random group. The most optimistic forecast for the Random group is based on the scenario with a residence bloc breakdown where growth rates are calculated on Euro-direct and PCT-IP filings combined, but this also has the highest deviations. The recommended forecast is more optimistic out to 2019 than those that are based on the Biggest group, although the Biggest group estimates are slightly better aligned with the current expectation of actual filings in 2017.

Due to the design of the survey, growth estimates and predicted Total filings based purely on the survey data cannot properly account for birth and death effects in the underlying EPO applicant population. **Annex VIII** details the calculation of some correction factors in order to address this issue. This year, correction factors were calculated based on Total filings dynamics, whilst in previous years, they were computed from Total applications dynamics. Inclusion of the correction factors would serve to increase expected filing counts for all three years. In order to remain consistent with recent reports, separate predictions including correction factors are not included in the main part of the report.⁶

3.2 Comparison with previous Patent Filings Surveys

Figure 2 and **Table 3** as well as **Figure 3** and **Table 4** compare the forecasting results of previous surveys since 2009 for the Biggest and Random groups, respectively.

The **precision of predictions** from previous years' surveys can be evaluated by comparison with actual filing numbers, which are given in the last row of the respective tables⁷. The numbers in brackets show the percentages of the actual filings that are given by the forecasts. For the recommended forecasts, deviation in terms of the percentage of actual filings remains between 90% and 103%, with the notable exception of estimates based on the 2009 survey for the crisis-affected years of 2009 and 2010. In the more recent surveys, predictions from the 2014 survey have turned out to be quite accurate. But the 2015 survey provided a better estimate of 2017 filings than either the 2016 or 2017 surveys could do.

⁶ But see Annex VIII.

⁷ See also an analysis of several earlier surveys in Dannegger, F. and Hingley, P., "Predictive accuracy of survey-based forecasts for numbers of filings at the European Patent Office", World Patent Information (2013), 35:187-200.

Concerning which sample to base estimates on, when looking as far back as 2009, the estimates that were based on the Random group were slightly more accurate than estimates based on the Biggest group. The mean absolute percentage error (MAPE) of the recommended forecast based on the Random group was 2.8% for one-year, 2.7% for two-year, and 3.6% for three-year estimates. In contrast, for the Biggest group estimate without further breakdown, the MAPE is 3.9% for one-year, 4.4% for two-year, and 5.7% for three-year estimates. Please see **Section 9.6** for more details on the MAPE.

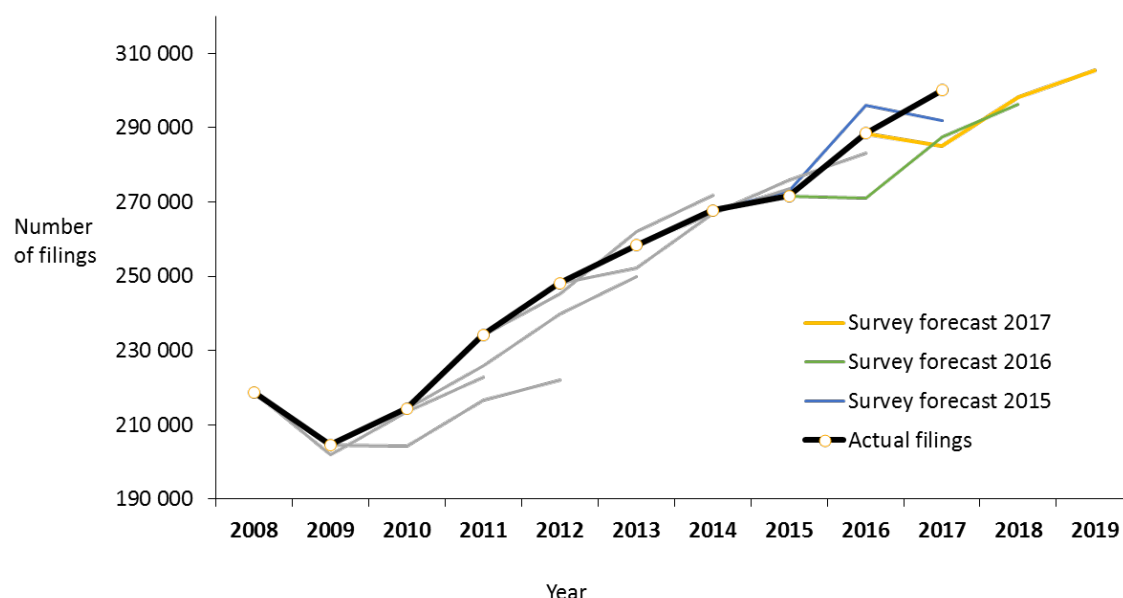


Figure 2: Comparison of forecasts since 2009 (Biggest group with no subsidiary breakdown)

Comparison of forecasts since 2009 based on Biggest Sample without subsidiary breakdown

Number of filings* forecasted based on ...	Forecasting Year											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
... 2009 survey (in % of actual filings)	218,757 (=actual)	203,663 (100%)	209,379 (98%)	213,281 (91%)								
... 2010 survey (in % of actual filings)		204,600 (=actual)	201,136 (94%)	210,322 (90%)	214,193 (86%)							
... 2011 survey (in % of actual filings)			214,430 (=actual)	221,120 (94%)	233,136 (94%)	243,874 (94%)						
... 2012 survey (in % of actual filings)				234,267 (=actual)	245,211 (99%)	253,902 (98%)	259,949 (97%)					
... 2013 survey (in % of actual filings)					248,166 (=actual)	248,858 (96%)	257,570 (96%)	263,346 (97%)				
... 2014 survey (in % of actual filings)						258,319 (=actual)	256,904 (96%)	271,052 (100%)	276,535 (96%)			
... 2015 survey (in % of actual filings)							267,799 (=actual)	270,052 (99%)	284,005 (98%)	295,078 (98%)		
... 2016 survey (in % of actual filings)								271,624 (=actual)	262,261 (91%)	271,578 (90%)	277,815 (N/A)	
... 2017 survey (in % of actual filings)									288,541 (=actual)	286,372 (95%)	289,528 (N/A)	293,886 (N/A)
Actual filings	218,757	204,600	214,430	234,267	248,166	258,319	267,799	271,624	288,541	300,119	N/A	N/A

*) First and subsequent Euro-direct and PCT-IP filings excluding divisional filings

Table 3: Comparison of forecasts since 2009 (Biggest group with no subsidiary breakdown). Precision values (value of point estimate in % of true value) in brackets

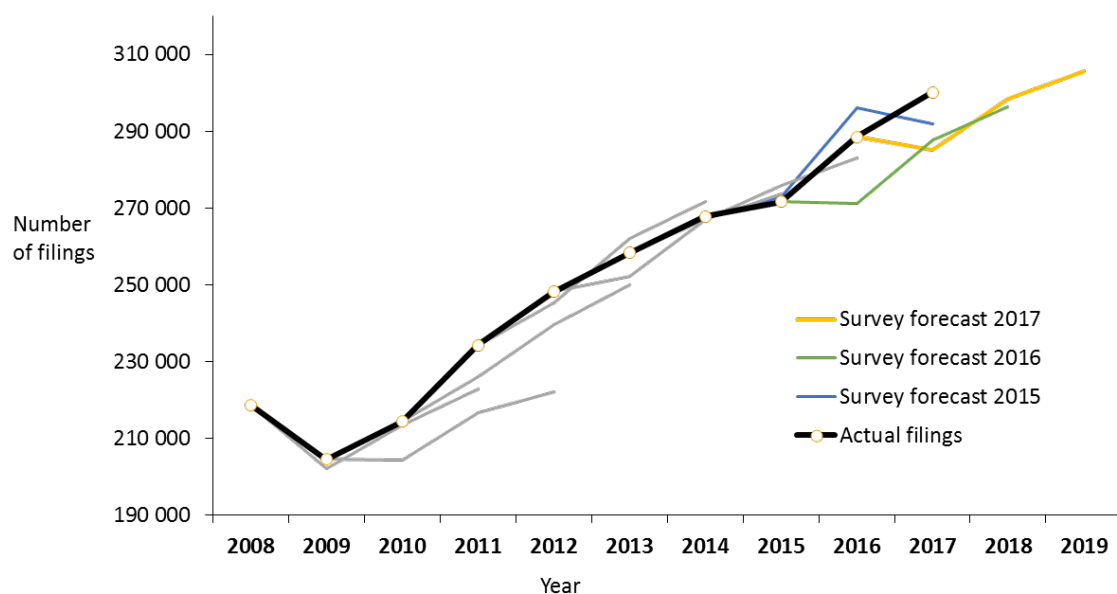


Figure 3: Comparison of recommended forecasts since 2009 (Random group)

Survey year	Recommended forecast method	Forecasting Year												
		Forecast ¹⁾	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
2009	Random group without subsidiary breakdown Euro-direct and PCT-IP filings combined	Number of filings	218,757 (=actual)	202,063 (99%)	213,529 (100%)	222,822 (95%)								
		Lower confidence limit		201,830	211,940	220,420								
		Upper confidence limit		216,251	229,862	240,610								
2010	Random group without subsidiary breakdown Euro-direct and PCT-IP filings combined	Number of filings		204,600 (=actual)	204,354 (95%)	216,620 (92%)	222,160 (90%)							
		Lower confidence limit			199,117	210,324	215,126							
		Upper confidence limit			209,591	222,915	229,195							
2011	Random group with residence bloc breakdown (winsorized)	Number of filings			214,430 (=actual)	226,027 (96%)	239,711 (97%)	249,925 (97%)						
		Lower confidence limit				212,517	223,930	232,328						
		Upper confidence limit				239,536	255,492	267,522						
2012	Random group with residence bloc breakdown	Number of filings				234,267 (=actual)	245,346 (99%)	262,090 (101%)	271,727 (101%)					
		Lower confidence limit					238,788	251,178	256,786					
		Upper confidence limit					251,903	273,003	286,668					
2013	Random group with residence bloc breakdown	Number of filings					248,166 (=actual)	252,305 (98%)	266,948 (100%)	273,621 (101%)				
		Lower confidence limit						241,921	255,429	258,522				
		Upper confidence limit						262,689	278,467	288,721				
2014	Random group with residence bloc breakdown (winsorized)	Number of filings						258,319 (=actual)	266,951 (100%)	275,872 (102%)	283,098 (98%)			
		Lower confidence limit							256,951	268,194	273,938			
		Upper confidence limit							276,952	283,550	292,257			
2015	Random group with residence bloc breakdown Euro-direct and PCT-IP filings combined	Number of filings							267,799 (=actual)	272,993 (101%)	296,111 (103%)	291,927 (98%)		
		Lower confidence limit								261,955	277,330	277,199		
		Upper confidence limit								284,030	314,892	306,655		
2016	Random group with residence bloc breakdown	Number of filings								271,624 (=actual)	271,072 (94%)	287,577 (96%)	296,266 (N/A)	
		Lower confidence limit									261,340	277,887	286,260	
		Upper confidence limit									275,721	293,500	302,446	
2017	Random group with residence bloc breakdown	Number of filings									288,541 (=actual)	285,159 (95%)	298,312 (N/A)	305,541 (N/A)
		Lower confidence limit										275,074	289,077	295,233
		Upper confidence limit										295,248	307,553	315,853
		Actual filings	218,757	204,600	214,430	234,267	248,166	258,319	267,799	271,624	288,541	300,119	N/A	N/A

Table 4: Comparison of recommended forecasts since 2009 (Random group). Precision values (value of point estimate in % of true value) in brackets

4 METHODOLOGY AND INDIVIDUAL FORECASTS

Section 4.1 details the methodology employed for obtaining the growth forecasts. In **Sections 4.2** and **4.3**, results for the Biggest group and the Random group are presented, respectively. **Section 4.4** details special analysis with a reduced sample that gives better results for 2017.

4.1 Methodology and structure of results

The main part of the survey covers the predictions of future patent filings. The basic approach was the same as in the previous surveys. For a detailed description of the methodology see the *Applicant Panel Survey 2002 report*. This is summarised in **Annex III**. The survey data from the main questions in **Pages 1 to 3** of the questionnaire⁸ are used to measure patent growth rates.

For the Biggest group, growth rates are calculated as a **Composite index** (see **Annex III, Section 9.1**), which is, in essence, constructed by adding the number of filings in the forecast year from all respondents as the numerator and adding the declared numbers of filings in the base year from the same respondents as the denominator.

On the other hand, growth rates in the Random group are calculated as a **Q-index** (see **Annex III, Sections 9.2** and **9.3**, for details). This involves weighting each applicant's response with a so-called Poisson weight, to account for the fact that the Random group is a random sample of applications, rather than of applicants. The number of filings an applicant has made in the base year is a central factor in the determination of the Poisson weight. In order to align with the sampling procedure, this number of filings was taken from the EPO's database recorded for each applicant. Using these "database-tethered Poisson weights" ensures that the number of filings which directly determine each applicant's probability of inclusion in the sample is used in the weighting procedure. However, the respondent is also asked to provide the number of filings that were made in the base year on the questionnaire, which may differ from the number recorded in the EPO's database. One of the main reasons for this is that the respondent could be answering for a different, or overlapping, entity to the one that was selected from the EPO's database. Or the respondent may represent a smaller or larger company than the database entity reflects. The extent of such mismatching was minimised by selecting applicants from the database using capitalised names and applying fuzzy name matching with restriction to countries. Records of potentially same companies were merged, but not across different countries. This was done to maximise the number of addresses available for the data collection effort.

As in previous years, a natural logarithmic transformation was applied to the data before calculating the Q-index. A finite population correction (FPC) was included when calculating the confidence limits for forecasts of either Total filings or Total applications. For an explanation of this methodology, including references to more detailed documentation, see **Annex III**.

When analysing data subsets, e.g. itemisations by residence bloc or mega cluster, cases arise where the sample size falls below a critical threshold of six respondents (sample size is five or less). In such cases, for either the Composite index or the Q-index, replacement is done by a growth value taken from the corresponding analysis on the next available level of aggregation (typically ignoring residence bloc breakdowns).

⁸ The questionnaire is presented in Annex I.

Once the growth indices were calculated based on the survey results, they were multiplied by the actual numbers of filings (excluding divisional filings) in the 2016 base year in order to generate explicit forecasts. Data on Euro-direct, PCT-IP, and Euro-PCT-RP filings for 2016 and 2017 were supplied by the EPO on 20 February 2018. In many cases, the responses on growth forecasts in the questionnaire (**Pages 1-3**) made it necessary for the researchers to validate them. After the validation attempts, the validity and integrity of some responses remained doubtful and such cases were marked with a critical code. In this year's survey, **95** cases, or **14.7%**, of survey responses, were marked with a critical code. The number of cases marked with critical codes is slightly higher than the 2016 report's **11.0%**. This difference is minimal, considering some changes that were made this year to the mode of data collection and to the critical code definitions. There are also non-critical codes. For details, refer to the plausibility checks described in **Annex I, Section 7.9**. The definitions of reasons to set the critical codes were revised in this survey to make them as relevant as possible.

As in previous years, all growth forecasts were carried out twice: once on the full dataset including those cases marked with a critical code, and once on a reduced set of cases which do not have any critical codes. The summary tables shown in **Section 3.1** thus show results for both sets of data, while the detailed tables in this report always refer to the full dataset including cases with critical codes.

The patent filing predictions are presented in various **breakdown** scenarios (typically by filing types, blocs of residence, and mega-clusters). Based on the resulting forecasts, an overall growth forecast is derived for each year that is based on an accumulation of the individual forecasts. The breakdown scenarios that are based on mega clusters are of some interest to look for variations between major industrial areas of patenting. Mega cluster forecasts are shown as growth rate forecasts only, and appear in **Annex IV**.

As a means of analysing and reducing distortions by outliers, the technique of winsorization was applied to some of the forecasts as an additional forecast approach. See **Section 9.7** for details on winsorization.

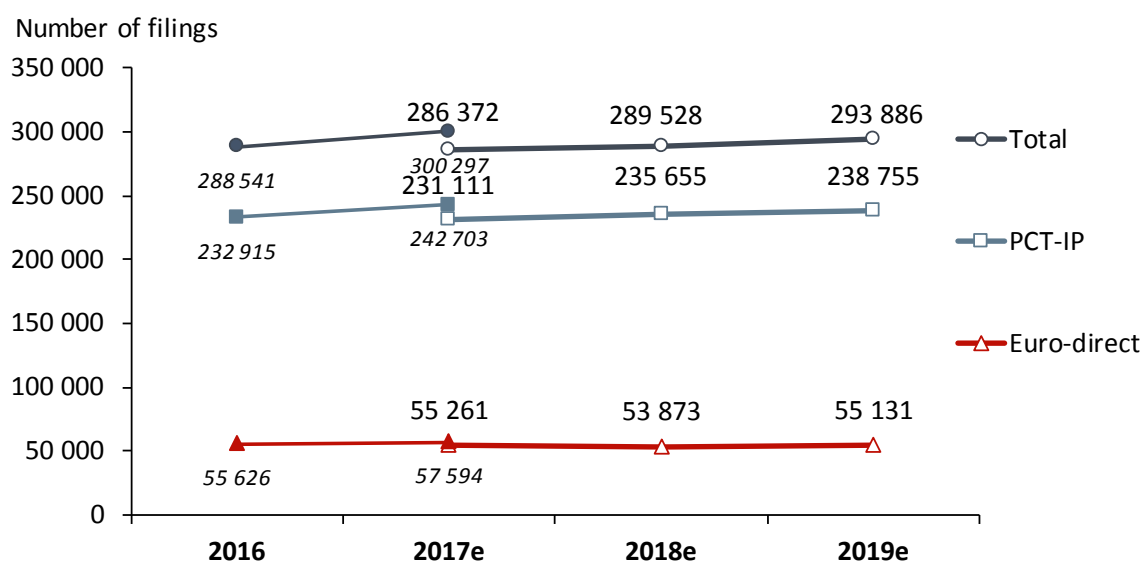
In the 2016 report, special analysis was conducted and reported for a scenario that excluded all observed EPO filings from applicants that were resident in China. This was done because a mismatch between forecast and observed filings for 2016 was particularly dramatic for applicants from this region. It was concluded that this might have been due to a policy of the Chinese government to promote filings abroad (for more details, see Applicant Panel Survey 2016 report). This year a similar analysis was not conducted because there were perceptions of pessimism from several residence blocs as well as from China for 2017. See **Section 7.12** for details on response rates.

4.2 Biggest group

This year, the Biggest group is based on a sample of **629** total addresses (601 addresses found) for Euro-direct filings and Euro-PCT-RP filings, comprising applicants making at least **43** such applications (excluding divisionals) in 2016. From this group, **159** responded to the survey (**26.5%** based on addresses found).

Using the Composite index, detailed information on the forecasts by filing type and route are shown in **Table 5** and **Figure 4** (no subsidiary breakdown). **Table 6** shows details of the forecasts by filing type and route, broken down by residence bloc. No confidence limits are given for the estimates as this is a survey of the intentions of the Biggest applicants and not of a random statistical sample.

Forecasts based on the Biggest group this year dramatically underestimate one-year growth. While actual growth was **4.1%** for 2017, the tables below show that Biggest group forecasts predict a decline of **0.8%** or increase of **0.2%**. **Table 5**, with no subsidiary breakdown, and **Figure 4** indicate that both forecasts for 2017 Euro-direct filings and PCT-IP are lower than the actual numbers, with PCT-IP forecasts for 2017 falling short of actual development of PCT-IP filings quite heavily. **Table 6**, with a residence bloc breakdown, sheds some additional light on the source of the “missing” PCT-IP growth: PCT-IP filings from the US, JP, OT residence blocs for 2017 are underestimated by almost 3,000, 3,000 and 4,000 filings, respectively. The implied PCT-IP filings percentages of **80.7%** or **80.6%**, in Tables 5 and 6 respectively, are close to the actual percentage of PCT-IP filings of **80.9%** in 2017.



Forecasted counts are above the line, while actuals are in smaller *italic* font and below the line

Figure 4: Forecasts for EPO filings – Biggest group with no subsidiary breakdown (solid marks indicate actual numbers, outlined marks indicate estimates)

Biggest group (including critical codes)

No subsidiary breakdown

Composite Indices

			2016	2017				2018			2019		
Filing type	Filing route	Res. Block	Actual filings	Cases	Index	Predicted filings	Actual filings	Cases	Index	Predicted filings	Cases	Index	Predicted filings
First	Euro-direct	Total	23 089	74	0.9663	22 310	24 475	64	1.0224	23 606	59	1.0365	23 932
	PCT-IP	Total	31 242	49	0.9398	29 363	33 119	43	0.9688	30 267	40	0.9986	31 199
Subsequent	Euro-direct	Total	32 537	75	1.0127	32 951	32 941	62	1.0228	33 278	59	1.0268	33 407
	PCT-IP	Total	201 673	94	1.0004	201 748	209 584	80	1.0184	205 388	75	1.0292	207 556
All	Euro-direct	Total	55 626			55 261	57 594			53 873			55 131
	PCT-IP	Total	232 915			231 111	242 703			235 655			238 755
Grand total			288 541			286 372	300 297			289 528			293 886
Growth from 2016						-0.8%	4.1%			0.3%			1.9%
Implied % PCT-IP			80.7%			80.7%	80.8%			81.4%			81.2%

Table 5: Forecasts for Total filings – Biggest group with no subsidiary breakdown

Biggest group (including critical codes)

For breakdowns with less than 6 cases, higher aggregation level growth index is used

Breakdown by residence bloc

Composite indices

			2016	2017				2018			2019		
		Res. Block	Actual filings	Cases	Index	Predicted filings	Actual filings	Cases	Index	Predicted filings	Cases	Index	Predicted filings
Filing type	Filing route												
First	Euro-direct	EP	21 210	50	1.0121	21 468	22 597	43	1.0559	22 395	38	1.0748	22 797
		US	1 092	9	0.7289	796	1 082	7	0.7234	790	7	0.7256	792
		JP	271	1	0.9654	262	311	1	1.0201	276	1	1.0332	280
		OT	516	1	0.9654	498	485	1	1.0201	526	1	1.0332	533
		Total	23 089	61		23 024	24 475	52		23 987	47		24 402
First	PCT-IP	EP	5 605	19	0.9464	5 302	5 737	17	0.9677	5 421	15	0.9656	5 410
		US	5 449	10	0.7971	4 344	5 444	8	0.6944	3 803	8	0.6979	3 803
		JP	7 749	3	0.9668	7 492	8 253	3	0.9866	7 645	3	1.0089	7 818
		OT	12 439	1	0.9668	12 026	13 686	1	0.9866	12 272	1	1.0089	12 550
		Total	31 242	33		29 164	33 119	29		29 141	27		29 581
Subsequent	Euro-direct	EP	14 116	42	0.9943	14 036	14 196	34	1.0209	14 411	31	1.0218	14 424
		US	6 880	11	1.0565	7 269	7 204	9	1.0654	7 330	9	1.0662	7 335
		JP	5 144	11	1.0314	5 306	5 199	10	1.0573	5 439	10	1.0716	5 512
		OT	6 397	4	1.0192	6 520	6 342	3	1.0348	6 620	3	1.0380	6 640
		Total	32 537	68		33 131	32 941	56		33 800	53		33 911
Subsequent	PCT-IP	EP	53 978	56	1.0374	55 996	55 250	49	1.0416	56 225	45	1.0482	56 580
		US	51 148	14	0.9762	49 931	51 101	11	1.0273	52 544	10	1.0316	52 766
		JP	37 461	13	1.0092	37 805	39 895	11	1.0445	39 128	11	1.0683	40 021
		OT	59 086	4	1.0178	60 138	63 337	2	1.0364	61 237	2	1.0482	61 934
		Total	201 673	87		203 870	209 584	73		209 134	68		211 301
All	Euro-direct	EP	35 326			35 504	36 793			36 806			37 221
		US	7 972			8 065	8 286			8 120			8 127
		JP	5 415			5 568	5 510			5 715			5 792
		OT	6 913			7 018	6 827			7 146			7 173
		Total	55 626			56 155	57 416			57 787			58 313
All	PCT-IP	EP	59 583			61 298	60 987			61 646			61 990
		US	56 597			54 275	56 545			56 347			56 569
		JP	45 210			45 297	48 148			46 773			47 839
		OT	71 525			72 164	77 023			73 509			74 484
		Total	232 915			233 034	242 703			238 275			240 882
Grand total		EP	94 909			96 802	97 780			98 452			99 211
		US	64 569			62 340	64 831			64 467			64 696
		JP	50 625			50 865	53 658			52 488			53 631
		OT	78 438			79 182	83 850			80 655			81 657
		Total	288 541			289 189	300 119			296 062			299 195
Growth from 2016						0.2%	4.0%			2.6%		3.7%	
Implied % PCT-IP			80.7%			80.6%	80.9%			80.5%			80.5%

Table 6: Forecasts for Total filings – Biggest group, broken down by residence bloc

4.3 Random group

The Random group this year is based on a sample of **2,921** total addresses (2,750 addresses found) for Euro-direct filings and Euro-PCT-RP filings (including US boost sample of **603** addresses), of which **647** responded to the survey (**23.5%** based on addresses found).

For responses from the Random group, the Q-index method for growth indications was used following logarithmic transformation of the data. All the tables in this section show the numbers of cases that estimates were based on, Q-indices with their standard errors, the resulting filing forecasts, and the 95% confidence intervals based thereon (for details see **Annex III, Section 9.4**).

As can be seen in **Table 2**, this year there are clear differences between analyses including critical comments and those excluding critical comments, in terms of forecasting the 2017 observed filings. Forecasts for 2017 based on the reduced sample are **1.5%** to **4.2%** absolute points lower than respective scenarios' forecasts based on the full sample. The deviations of forecasts based on the reduced sample are somewhat similar to those for forecasts based on the full dataset, but RMSEF values for reduced sample forecasts are higher than for full sample forecasts. Thus, unless explicitly stated otherwise, all results documented in this report are based on the full version of the Random group dataset, including cases with critical comments.

The forecasts for numbers of patent filings without a breakdown by residence bloc are illustrated in **Table 7** to **Table 9**. **Figure 5** and **Table 7** depict the results with breakdowns by filing type and filing route. **Table 8** gives the results of the same forecast method using winsorized data. To address any uncertainty about whether it is advisable to forecast separately by filing route, a forecast combining the Euro-direct and PCT-IP filing routes was conducted, the results of which are displayed in **Table 9**. This gives an even lower forecast for 2017 with a higher RMSEF, which is therefore less suitable for building a scenario.

Analyses for the Random group using a breakdown into the four residence blocs, Europe (EPC), Japan (JP), Other (OT), and the US, are shown in **Table 10** to **Table 12**. **Table 10**, as well as **Figure 6** and **Figure 7** show the results of this residence bloc breakdown without any further enhancements. This is the recommended forecast for this survey (see **Section 3.1**). **Table 11** depicts the results of the residence bloc breakdown using winsorized data. Finally, **Table 12** shows results of the residence bloc breakdown when combining Euro-direct and PCT-IP filing routes.

Compared to the 2016 report, two more combined filings scenarios were calculated – a forecast combining First and Subsequent filing types and breakdown by routes and residence blocs; and a forecast combining all filings across filing types (First + Subsequent) and filing routes (Euro-direct + PCT-IP). Both scenarios forecasts are not presented as there was no improvement to the recommended forecast scenarios. For comparison see **Table 1** and **Table 2**.

The survey forecasts clearly underestimate Total filings for 2017. **Table 10** and **Figure 7** show the source(s) of this underestimation: for PCT-IP filing routes, applicants from all the residence blocs underestimate the number of filings in 2017, with the biggest shortage being in the OT residence bloc by more than 8,000 filings, US more than 4,000 filings, JP around 3,000 filings and EPC around 2,500 filings shortage. While actual one-year growth for PCT-IP filings from the OT residence bloc is anticipated to be 7.7% for total filings, forecast growth is a negative 4.5%. A similar effect can be observed for PCT-IP filings in the US, EPC and JP residence blocs, but on a smaller scale. On the other hand, forecasts for Euro-direct filing

routes are overestimated by 4,000 filings, that are mostly from the US residence bloc with a forecast overestimation of nearly 3,000 filings.

This year, the best forecast in terms of the lowest RMSEF is the forecast shown in **Table 8** employing no breakdown and with winsorization. However, the three-year growth is 3.3% and falls short of the observed one-year growth of 4.0%. The second lowest RMSEF has the forecast shown in **Table 7**, a scenario with no breakdown, but it also suffers from same growth underestimation as the previous scenario with winsorization.

For most of the surveys in recent years, the recommended forecasts involved subsidiary breakdowns by blocs of residence of the applicants. But the analysis corresponding to **Table 7**, with no subsidiary breakdown, was used for the recommended filing forecasts in the 2005, 2007, and 2008 reports. This recommendation was based mostly on narrow confidence intervals of the forecast and better adherence to known filing figures of the survey year compared to other forecasting approaches.

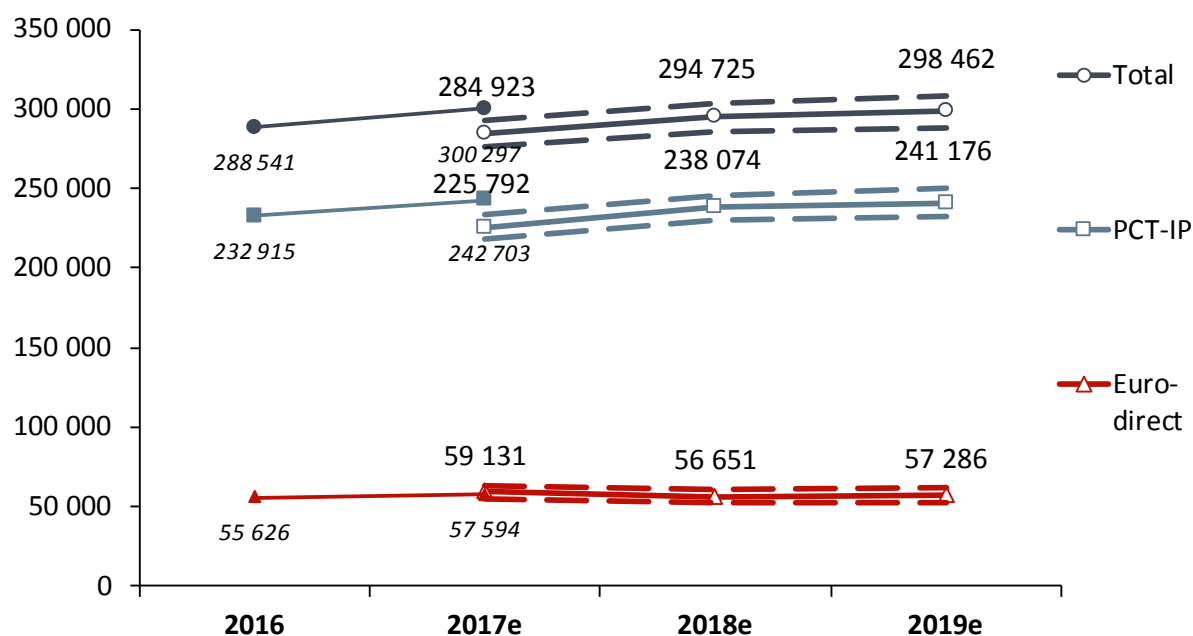
In the 2009 and 2010 surveys, the recommended forecast method was the one shown in **Table 9** (analysis with no subsidiary breakdown and with Euro-direct and PCT-IP filings combined), because of a better fit with the 2009 actual filings and narrower confidence intervals.

The winsorization of individual estimates this year has not led to an improvement of forecasts based on a residence bloc breakdown, although narrower confidence intervals were achieved.

Thus, despite the known deficiency in underestimating PCT-IP filings from all the residence blocs (OT mainly and, to a lesser extent, other blocs), the recommended forecast approach this year is the Random group forecast based on the full sample and employing a residence bloc breakdown shown in **Table 10** and **Figure 6** and **Figure 7**. The main reasons for recommending this scenario are:

- As in 2016, for two-year and three-year future predictions, this approach is among the more optimistic forecasts. The span of forecast growth rates (the difference between the most optimistic and most negative forecast growth rate) based on the Random group is wide: 6.2% for two-year and 5.4% for three-year growth.
- RMSEF of the approach is 3rd lowest among forecast scenarios and is rather small.
- High underestimation of PCT-IP filings by the OT residence block applicants could partially be due to the low number of respondents from China, where the observed growth of PCT-IP applications is 11.7%.
- This approach performs well in additional analysis with a “knowledgeable” sample (see **Section 4.4**).

Number of filings



Forecasted counts are above the line, while actuals are in smaller *italic* font and below the line

Figure 5: Forecasts for EPO filings – Random group without breakdown by residence bloc (solid marks indicate actual numbers, outlined marks indicate estimates and dashed lines illustrate 95% confidence limits)

Random group (including critical codes)
No subsidiary breakdown
Q-indices

S.E. indicates standard error of logarithm
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

			2016	2017					2018				2019			
Filing type	Filing route	Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
First	Euro-direct	Total	23 089	160	0.9906	0.0469	22 872	24 475	139	1.0657	0.0558	24 606	119	1.0986	0.0583	25 366
		LCL					20 766					21 909				22 460
		UCL					24 978					27 303				28 272
First	PCT-IP	Total	31 242	100	0.9915	0.0327	30 976	33 119	85	1.0257	0.0302	32 045	78	1.0217	0.0294	31 920
		LCL					28 989					30 147				30 079
		UCL					32 963					33 943				33 761
Subsequent	Euro-direct	Total	32 537	173	1.1144	0.0438	36 259	32 941	148	1.1635	0.0427	37 857	136	1.2117	0.0478	39 425
		LCL					33 142					34 684				35 725
		UCL					39 376					41 030				43 125
Subsequent	PCT-IP	Total	201 673	270	0.9660	0.0184	194 816	209 584	221	1.0216	0.0188	206 029	200	1.0376	0.0209	209 256
		LCL					187 788					198 435				200 681
		UCL					201 844					213 623				217 831
All	Euro-direct	Total	55 626				59 131	57 594				56 651				57 286
		LCL					55 369					52 487				52 581
		UCL					62 893					60 815				61 991
All	PCT-IP	Total	232 915				225 792	242 703				238 074				241 176
		LCL					218 489					230 246				232 406
		UCL					233 095					245 902				249 946
Grand total		Total	288 541				284 923	300 297				294 725				298 462
		LCL					276 708					285 858				288 510
		UCL					293 138					303 592				308 414
Growth from 2016						-1.3%	4.1%				2.1%				3.4%	
Implied % PCT-IP			80.7%			79.2%	80.8%				80.8%				80.8%	
Deviation in % of forecast						2.9%					3.0%				3.3%	

Table 7: Forecasts for Total filings – Random group with no subsidiary breakdown

Random group (including critical codes)
No subsidiary breakdown
Q-indices

S.E. indicates standard error of logarithm
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

			2016	2017					2018				2019			
Filing type	Filing route	Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
First	Euro-direct	Total	23 089	160	1.0113	0.0441	23 350	24 475	139	1.0922	0.0532	25 218	119	1.1295	0.0509	26 079
		LCL					21 330					22 583				23 474
		UCL					25 370					27 853				28 684
First	PCT-IP	Total	31 242	100	0.9961	0.0331	31 120	33 119	85	1.0323	0.0318	32 251	78	1.0324	0.0307	32 254
		LCL					29 098					30 239				30 313
		UCL					33 142					34 263				34 195
Subsequent	Euro-direct	Total	32 537	173	1.0954	0.029	35 641	32 941	148	1.1336	0.0309	36 884	136	1.1770	0.0368	38 296
		LCL					33 611					34 646				35 530
		UCL					37 671					39 122				41 062
Subsequent	PCT-IP	Total	201 673	270	0.9702	0.0184	195 663	209 584	221	1.0143	0.0196	204 557	200	1.0292	0.022	207 562
		LCL					188 590					196 686				198 619
		UCL					202 736					212 428				216 505
All	Euro-direct	Total	55 626				58 991	57 594				57 469				58 333
		LCL					56 127					54 012				54 533
		UCL					61 855					60 926				62 133
All	PCT-IP	Total	232 915				226 783	242 703				236 808				239 816
		LCL					219 427					228 684				230 665
		UCL					234 139					244 932				248 967
Grand total		Total	288 541				285 774	300 297				294 277				298 149
		LCL					277 880					285 448				288 240
		UCL					293 668					303 106				308 058
Growth from 2016							-1.0%	4.1%				2.0%				3.3%
Implied % PCT-IP			80.7%				79.4%	80.8%				80.5%				80.4%
Deviation in % of forecast							2.8%					3.0%				3.3%

Table 8: Forecasts for Total filings – Random group with no subsidiary breakdown, analysis employing winsorization

Random group (including critical codes)
No subsidiary breakdown
Q-indices
Euro-direct and PCT-IP filings combined

S.E. indicates standard error of logarithm
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

			2016	2017					2018				2019			
Filing type	Filing route	Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
First	All	Total	54 331	244	0.9774	0.0371	53 103	57 594	203	1.0578	0.0414	57 471	183	1.0907	0.0443	59 259
		LCL					49 238					52 802				54 106
		UCL					56 968					62 140				64 412
Subsequent	All	Total	234 210	321	0.9686	0.0297	226 856	242 525	257	1.0338	0.0335	242 126	237	1.0431	0.0359	244 304
		LCL					213 642					226 215				227 097
		UCL					240 070					258 037				261 511
Grand total		Total	288 541				279 959	300 119				299 597				303 563
		LCL					266 191					283 015				285 601
		UCL					293 727					316 179				321 525
Growth from 2016						-3.0%	4.0%									5.2%
Deviation in % of forecast						4.9%						5.5%				5.9%

Table 9: Forecasts for Total filings – Random group with no subsidiary breakdown (Euro-direct and PCT-IP filings combined)

Random group (including critical codes)

Breakdown by residence bloc

S.E. indicates standard error of logarithm

Q-indices

LCL/UCL indicates lower/upper 95% confidence limit

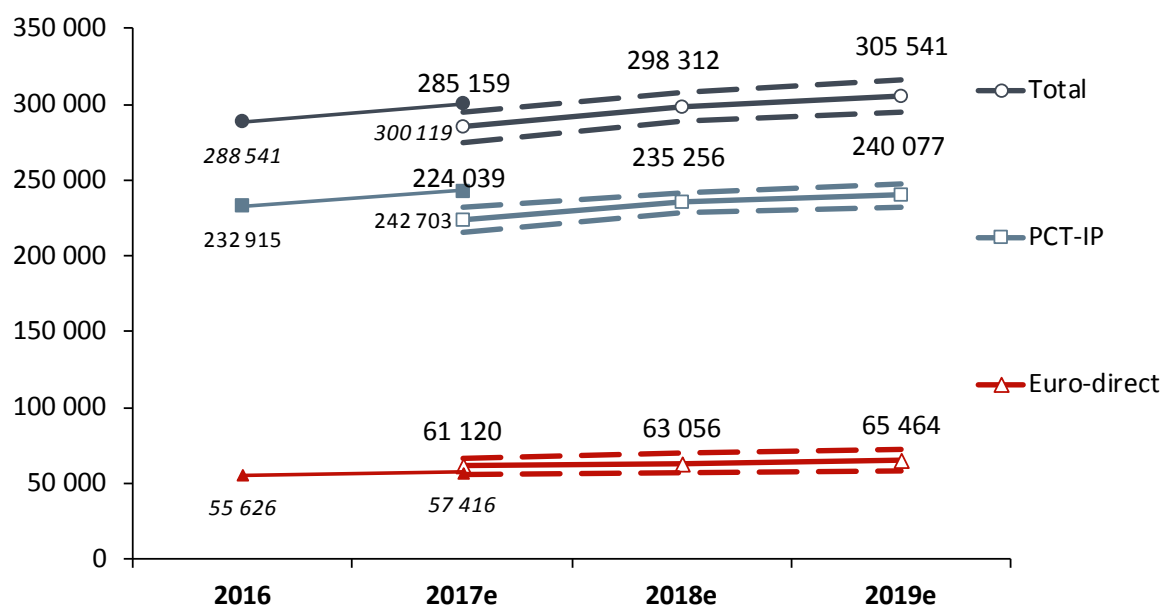
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

For breakdowns with less than 6 cases, higher aggregation level growth index is used

Q-indices			2016	2017					2018				2019			
Res.		Actual	Predicted			Actual	Predicted			Predicted			Predicted			
Filing type	Filing route	Block	filings	Cases	Index	S.E.	filings	filings	Cases	Index	S.E.	filings	Cases	Index	S.E.	filings
First	Euro-direct	EP	21 210	138	1.0066	0.0260	21 350	22 597	121	1.0590	0.0260	22 461	100	1.1006	0.0303	23 344
		US	1 092	17	0.6593	0.2647	720	1 082	13	0.5861	0.4985	640	13	0.6048	0.5047	660
		JP	271	2	0.9906	0.0469	268	311	2	1.0657	0.0558	289	2	1.0986	0.0583	298
		OT	516	3	0.9906	0.0469	511	485	3	1.0657	0.0558	550	4	1.0986	0.0583	567
	Total	23 089	160			22 849	24 475	139			23 940	119			24 869	
	LCL					21 690					22 567				23 271	
UCL					24 008					25 313				26 467		
First	PCT-IP	EP	5 605	54	1.0178	0.0421	5 702	5 737	47	1.0405	0.0447	5 829	43	1.0031	0.0415	5 619
		US	5 449	22	0.9465	0.1591	5 157	5 444	20	1.0685	0.0981	5 822	20	1.0864	0.0984	5 920
		JP	7 749	16	0.9270	0.0530	7 183	8 253	13	0.9893	0.0370	7 666	10	0.9815	0.0536	7 606
		OT	12 439	8	0.9793	0.0336	12 182	13 686	5	1.0257	0.0302	12 759	5	1.0217	0.0294	12 709
	Total	31 242	100			30 224	33 119	85			32 076	78			31 854	
	LCL					28 196					30 521				30 208	
UCL					32 252					33 631				33 500		
Subsequent	Euro-direct	EP	14 116	109	1.0138	0.0346	14 311	14 196	94	1.1179	0.0236	15 780	83	1.1443	0.0288	16 153
		US	6 880	36	1.5418	0.2409	10 608	7 204	30	1.4259	0.2921	9 810	30	1.5208	0.2867	10 463
		JP	5 144	22	1.1636	0.1077	5 986	5 199	19	1.1826	0.1145	6 083	18	1.2108	0.1173	6 228
		OT	6 397	6	1.1515	0.0505	7 366	6 342	5	1.1635	0.0427	7 443	5	1.2117	0.0478	7 751
	Total	32 537	173			38 271	32 941	148			39 116	136			40 595	
	LCL					32 751					32 897				34 071	
UCL					43 791					45 335				47 119		
Subsequent	PCT-IP	EP	53 978	144	0.9753	0.0243	52 645	55 250	126	1.0424	0.0265	56 267	117	1.0511	0.0295	56 736
		US	51 148	77	0.9215	0.0457	47 133	51 101	59	0.9520	0.0416	48 693	54	0.9587	0.0509	49 036
		JP	37 461	39	1.0117	0.0431	37 899	39 895	30	1.0248	0.0504	38 390	25	1.0983	0.0515	41 143
		OT	59 086	10	0.9501	0.0508	56 138	63 337	6	1.0126	0.0161	59 830	4	1.0376	0.0209	61 308
	Total	201 673	270			193 815	209 584	221			203 180	200			208 223	
	LCL					185 703					196 672				200 578	
UCL					201 927					209 688				215 868		
All	Euro-direct	EP	35 326				35 661	36 793				38 241				39 497
		US	7 972				11 328	8 286				10 450				11 123
		JP	5 415				6 254	5 510				6 372				6 526
		OT	6 913				7 877	6 827				7 993				8 318
	Total	55 626				61 120	57 416				63 056				65 464	
	LCL					55 479					56 687				58 747	
UCL					66 761					69 425				72 181		
All	PCT-IP	EP	59 583				58 347	60 987				62 096				62 355
		US	56 597				52 290	56 545				54 515				54 956
		JP	45 210				45 082	48 148				46 056				48 749
		OT	71 525				68 320	77 023				72 589				74 017
	Total	232 915				224 039	242 703				235 256				240 077	
	LCL					215 677					228 565				232 257	
UCL					232 401					241 947				247 897		
Grand total		EP	94 909				94 008	97 780				100 337				101 852
		US	64 569				63 618	64 831				64 965				66 079
		JP	50 625				51 336	53 658				52 428				55 275
		OT	78 438				76 197	83 850				80 582				82 335
	Total	288 541				285 159	300 119				298 312				305 541	
	LCL					275 073					289 074				295 232	
UCL					295 245					307 550				315 850		
Growth from 2016						-1.2%	4.0%				3.4%				5.9%	
Implied % PCT-IP			80.7%			78.6%	80.9%				78.9%				78.6%	
Deviation in % of forecast						3.5%					3.1%				3.4%	

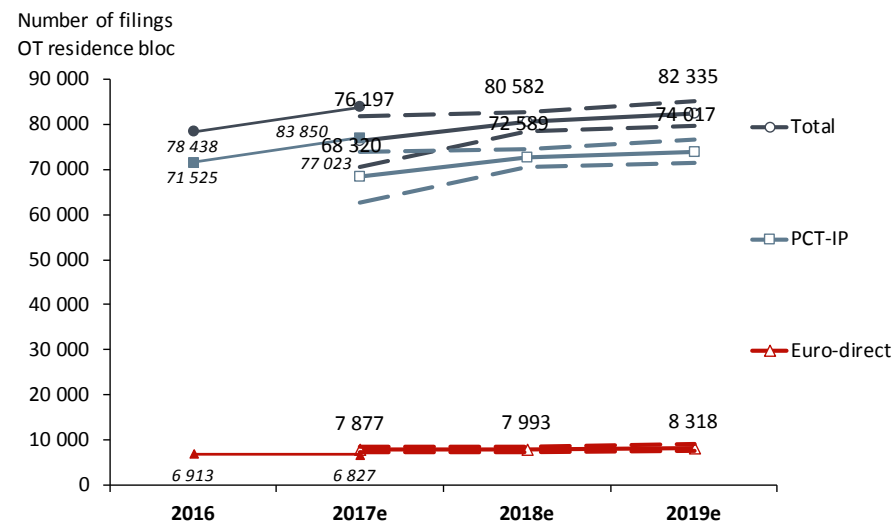
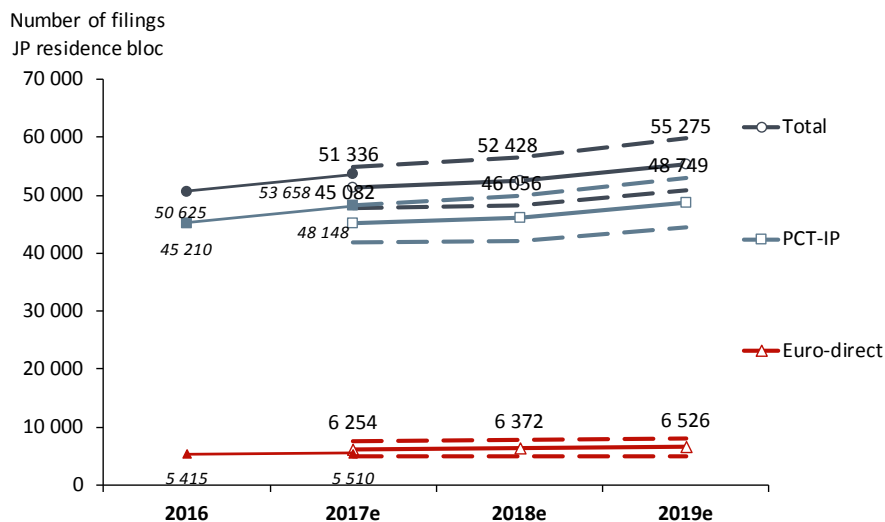
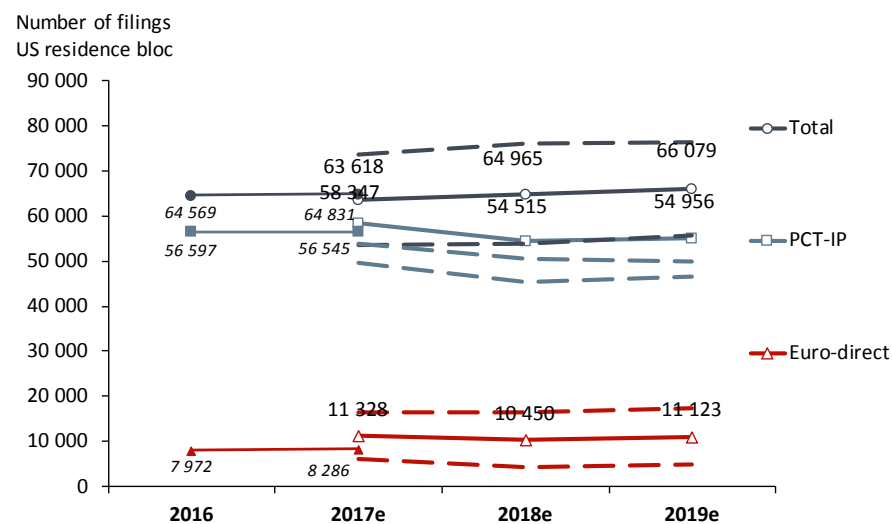
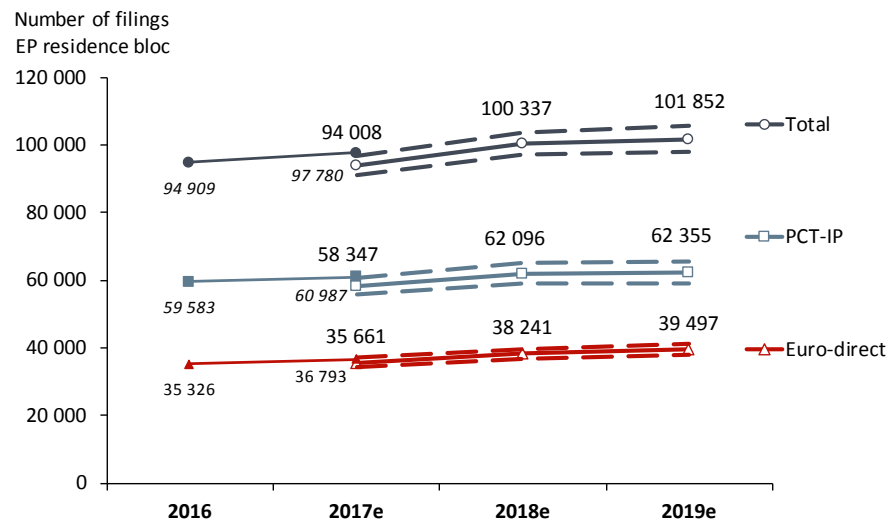
Table 10: Forecasts for total filings – Random group, broken down by residence bloc

Number of filings



Forecasted counts are above the line, while actuals are in smaller *italic* font and below the line

Figure 6: Forecasts for EPO filings based on the recommended forecast – Random group with breakdown by residence bloc (solid marks indicate actual numbers, outlined marks indicate estimates and dashed lines illustrate 95% confidence limits)



Forecasted counts are above the line, while actuals are in smaller *italic* font and below the line

Figure 7: Forecasts for EPO filings by residence bloc based on the Random group with residence bloc breakdown (solid marks indicate actual numbers, outlined marks indicate estimates and dashed lines illustrate 95% confidence limits)

Random group (including critical codes)
Breakdown by residence bloc
S.E. indicates standard error of logarithm
Q-indices

LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings
For breakdowns with less than 6 cases, higher aggregation level growth index is used

			2016	2017					2018					2019				
Filing type	Filing route	Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings		
First	Euro-direct	EP	21 210	138	1.0036	0.0289	21 286	22 597	121	1.0524	0.0290	22 321	100	1.0987	0.0342	23 303		
		US	1 092	17	0.8088	0.1135	883	1 082	13	0.7765	0.4146	848	13	0.7942	0.4210	867		
		JP	271	2	1.0113	0.0441	274	311	2	1.0922	0.0532	296	2	1.1295	0.0509	306		
		OT	516	3	1.0113	0.0441	522	485	3	1.0922	0.0532	564	4	1.1295	0.0509	583		
	Total	23 089	160			22 965	24 475	139			24 029	119			25 059			
	LCL					21 741					22 535				23 293			
UCL					24 189					25 523				26 825				
First	PCT-IP	EP	5 605	54	1.0229	0.0466	5 730	5 737	47	1.0460	0.0487	5 860	43	1.0235	0.0468	5 734		
		US	5 449	22	1.0357	0.1199	5 644	5 444	20	1.0808	0.1120	5 889	20	1.0930	0.1110	5 956		
		JP	7 749	16	0.9555	0.0388	7 404	8 253	13	0.9853	0.0434	7 635	10	0.9641	0.0555	7 471		
		OT	12 439	8	0.9865	0.0586	12 271	13 686	5	1.0323	0.0318	12 841	5	1.0324	0.0307	12 842		
	Total	31 242	100			31 049	33 119	85			32 225	78			32 003			
	LCL					28 955					30 469				30 201			
UCL					33 143					33 981				33 805				
Subsequent	Euro-direct	EP	14 116	109	1.0258	0.0247	14 480	14 196	94	1.1042	0.0255	15 587	83	1.1368	0.0350	16 047		
		US	6 880	36	1.2506	0.1073	8 604	7 204	30	1.1650	0.1468	8 015	30	1.1927	0.1155	8 206		
		JP	5 144	22	1.1915	0.1441	6 129	5 199	19	1.1696	0.1362	6 016	18	1.1979	0.1424	6 162		
		OT	6 397	6	1.1497	0.2535	7 355	6 342	5	1.1336	0.0309	7 252	5	1.1770	0.0368	7 529		
	Total	32 537	173			36 568	32 941	148			36 870	136			37 944			
	LCL					31 918					33 879				35 101			
UCL					41 218					39 861				40 787				
Subsequent	PCT-IP	EP	53 978	144	0.9764	0.0271	52 704	55 250	126	1.0333	0.0277	55 775	117	1.0401	0.0313	56 143		
		US	51 148	77	0.9382	0.0462	47 987	51 101	59	0.9509	0.0434	48 637	54	0.9669	0.0521	49 455		
		JP	37 461	39	0.9809	0.0285	36 745	39 895	30	1.0090	0.0510	37 798	25	1.0757	0.0560	40 297		
		OT	59 086	10	0.9634	0.0648	56 923	63 337	6	1.0140	0.0645	59 913	4	1.0292	0.0220	60 811		
	Total	201 673	270			194 359	209 584	221			202 123	200			206 706			
	LCL					185 216					192 206				198 708			
UCL					203 502					212 040				214 704				
All	Euro-direct	EP	35 326				35 766	36 793				37 908				39 350		
		US	7 972				9 487	8 286				8 863				9 073		
		JP	5 415				6 403	5 510				6 312				6 468		
		OT	6 913				7 877	6 827				7 816				8 112		
	Total	55 626				59 533	57 416				60 899				63 003			
	LCL					54 724					57 556				59 656			
UCL					64 342					64 242				66 350				
All	PCT-IP	EP	59 583				58 434	60 987				61 635				61 877		
		US	56 597				53 631	56 545				54 526				55 411		
		JP	45 210				44 149	48 148				45 433				47 768		
		OT	71 525				69 194	77 023				72 754				73 653		
	Total	232 915				225 408	242 703				234 348				238 709			
	LCL					216 028					224 277				230 510			
UCL					234 788					244 419				246 908				
Grand total		EP	94 909				94 200	97 780				99 543				101 227		
		US	64 569				63 118	64 831				63 389				64 484		
		JP	50 625				50 552	53 658				51 745				54 236		
		OT	78 438				77 071	83 850				80 570				81 765		
	Total	288 541				284 941	300 119				295 247				301 712			
	LCL					274 401					284 636				292 856			
UCL					295 481					305 858				310 568				
Growth from 2016							-1.2%	4.0%				2.3%				4.6%		
Implied % PCT-IP			80.7%				79.1%	80.9%				79.4%				79.1%		
Deviation in % of forecast							3.7%					3.6%				2.9%		

Table 11: Forecasts for Total filings – Random group, broken down by residence bloc, analysis employing winsorization

Random group (including critical codes)
Breakdown by residence bloc
Euro-direct and PCT-IP filings combined
Q-indices

For breakdowns with less than 6 cases, higher aggregation level growth index is used
S.E. indicates standard error of logarithm
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

			2016	2017					2018				2019			
Filing type	Res. route	Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
First	All	EP	26 815	175	0.9843	0.0234	26 394	28 334	145	1.0651	0.0244	28 561	129	1.0940	0.0273	29 336
		US	6 541	35	0.7644	0.1426	5 000	6 526	31	0.8038	0.2170	5 258	30	0.8363	0.2255	5 470
		JP	8 020	24	1.5182	0.3399	12 176	8 564	21	1.6827	0.3582	13 495	18	1.7773	0.3887	14 254
		OT	12 955	10	0.9627	0.0467	12 472	14 171	6	0.9899	0.0535	12 824	6	1.0404	0.0430	13 478
		Total	54 331	244			56 042	57 594	203			60 138	183			62 538
		LCL					46 928					49 278				49 963
		UCL					65 156					70 998				75 113
Subsequent	All	EP	68 094	174	0.9466	0.0234	64 458	69 446	148	1.0435	0.0231	71 056	136	1.0507	0.0266	71 546
		US	58 028	89	1.0786	0.1292	62 589	58 305	65	1.1601	0.1671	67 318	62	1.1449	0.1762	66 436
		JP	42 605	49	0.9178	0.0937	39 103	45 094	39	0.8938	0.1107	38 080	35	0.9317	0.1197	39 695
		OT	65 483	9	0.9688	0.0286	63 440	69 679	5	1.0338	0.0335	67 696	4	1.0431	0.0359	68 305
		Total	234 210	321			229 590	242 525	257			244 150	237			245 982
		LCL					211 390					219 522				219 959
		UCL					247 790					268 778				272 005
Grand total		EP	94 909				90 852	97 780				99 617				100 882
		US	64 569				67 589	64 831				72 576				71 906
		JP	50 625				51 279	53 658				51 575				53 949
		OT	78 438				75 912	83 850				80 520				81 783
		Total	288 541				285 632	300 119				304 288				308 520
		LCL					265 277					277 371				279 618
		UCL					305 987					331 205				337 422
Growth from 2016							-1.0%	4.0%				5.5%				6.9%
Deviation in % of forecast							7.1%					8.8%				9.4%

Table 12: Forecasts for Total filings – Random group, broken down by residence bloc (Euro-direct and PCT-IP filings combined)

4.4 Forecasts for Total Filings on a “knowledgeable” sample

Analysis of this year's survey data revealed that forecasts for 2017 growth are overly pessimistic compared to observed growth. Pessimism is not restricted to specific residence bloc and filing route/type. So there could be some structural cause for pessimism. Thus, a somewhat synthetic and experimental analysis of the survey data was performed. While calculating the specific breakdowns, only “knowledgeable” respondents were included when calculating forecasts for that specific breakdown. “Knowledgeable” means those respondents who estimated how many filings will be made in all years (2016-2019), i.e. data on filings is not missing for any of these years. It is known that carry-over of applicants' year on year is around 33%, as shown in **Annex VIII**. This implies that around 67% of Random group respondents might not conduct any filings next year. Thus, they could be inherently more pessimistic or unsure about the future state of filings and possibly inclined to make no input at all for next year, which may explain why some data are missing.

Table 13 summarises the results of forecasting approaches applied on the dataset, as was already shown in Table 1, but where only the “knowledgeable” respondents have been retained. The observed one-year growth rate is now positive. **Table 14** shows forecast filing numbers, confidence intervals and the RMSEF for the 2017 forecast by the forecasting approaches, corresponding to Table 2 for the full data set.

Based on this “knowledgeable” sample, the recommended forecast employing a residence bloc breakdown shows growth of 1.2% in 2017 compared to currently anticipated true filing growth of 4.0%. The latter growth rate is within the 95% confidence interval for the forecasts.

A detailed look at the recommended forecast (residence bloc breakdown), with critical codes included for “knowledgeable” respondents, is shown in **Table 15**. When compared to the

corresponding analysis for the full dataset shown in **Table 10**, it becomes apparent that the biggest mismatch between 2017 forecasts and observed values for subsequent PCT-IP filings from the OT residence blocs has not been remedied. Even though the discrepancy between the 2017 forecast and observed filings from the US residence bloc remains, the overall difference has been reduced from roughly 14,000 filings to about 7,000 filings.

The two-year and three-year growth rates for recommended approach based on “knowledgeable” sample forecasts are 4.3% and 5.9% respectively. The three-year forecast growth rate is equal to the rate calculated by the recommended approach, as in Table 10, thus increasing trust in it.

Predicted growth rates for Total filings by forecasting method
Comparison of forecasts: growth from 2016
Euro-direct and PCT-IP

			2017		2018		2019	
Critical	Group	Breakdown	Growth rate	Deviation	Growth rate	Deviation	Growth rate	Deviation
Included	Biggest	None	-0.8%		0.3%		1.9%	
Included	Biggest	Residence bloc	0.2%		2.6%		3.7%	
Included	Random	None	1.3%	2.9%	2.0%	3.1%	3.4%	3.3%
Included	Random	None (winsorized)	1.9%	2.6%	2.0%	3.0%	3.3%	3.3%
Included	Random	None (Euro-direct and PCT-IP filings combined)	-0.2%	5.6%	4.1%	5.7%	5.2%	5.9%
Included	Random	Residence bloc	1.2%	3.9%	4.3%	3.1%	5.9%	3.4%
Included	Random	Residence bloc (winsorized)	0.8%	8.8%	3.0%	2.6%	4.6%	2.9%
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	2.4%	9.4%	6.5%	9.3%	6.9%	9.4%
Included	Random	Residence bloc (First and Subsequent filings combined)	-0.1%	3.6%	2.5%	2.7%	4.4%	2.9%
Included	Random	Residence bloc (All filings combined)	-2.0%	2.6%	0.5%	2.9%	1.5%	3.2%
Excluded	Biggest	None	-0.3%		0.3%		1.6%	
Excluded	Biggest	Residence bloc	-0.1%		2.6%		3.7%	
Excluded	Random	None	-0.5%	3.1%	1.3%	3.3%	2.5%	3.6%
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	-3.4%	4.4%	1.7%	4.6%	2.5%	4.9%
Excluded	Random	Residence bloc	-2.2%	3.6%	1.3%	2.9%	2.1%	3.3%
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	-3.5%	8.1%	1.3%	7.8%	1.0%	8.0%
Excluded	Random	Residence bloc (First and Subsequent filings combined)	-3.3%	3.8%	-0.1%	3.1%	1.3%	3.3%
Excluded	Random	Residence bloc (All filings combined)	-3.7%	3.1%	-0.6%	3.2%	-0.1%	3.6%
Actual growth			4.0%					

Table 13: Predicted growth rates for Total filings including “knowledgeable” respondents

Comparison of forecasts: Predicted total filings
Euro-direct and PCT-IP
LCL/UCL indicates lower/upper 95% confidence limit

			2017				2018			2019		
Critical	Group	Breakdown	Predicted filings	LCL	UCL	RMSEF*	Predicted filings	LCL	UCL	Predicted filings	LCL	UCL
Included	Biggest	None	286 372				289 528			293 886		
Included	Biggest	Residence bloc	289 189				296 062			299 195		
Included	Random	None	292 150	283 721	300 579	9 055	294 334	285 271	303 397	298 462	288 510	308 414
Included	Random	None (winsorized)	293 909	286 311	301 507	7 321	294 397	285 688	303 106	298 149	288 240	308 058
Included	Random	None (Euro-direct and PCT-IP filings combined)	287 821	271 766	303 876	14 776	300 515	283 262	317 768	303 449	285 486	321 412
Included	Random	Residence bloc	291 998	280 665	303 331	9 969	300 941	291 522	310 360	305 541	295 232	315 850
Included	Random	Residence bloc (winsorized)	290 938	265 479	316 397	15 906	297 216	289 392	305 040	301 712	292 856	310 568
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	295 556	267 703	323 409	14 925	307 203	278 709	335 697	308 434	279 532	337 336
Included	Random	Residence bloc (First and Subsequent filings combined)	288 268	277 987	298 549	12 960	295 739	287 756	303 722	301 276	292 506	310 046
Included	Random	Residence bloc (All filings combined)	282 670	275 184	290 156	17 862	289 880	281 618	298 142	292 754	283 469	302 039
Excluded	Biggest	None	287 802				289 440			293 128		
Excluded	Biggest	Residence bloc	288 109				296 142			299 359		
Excluded	Random	None	287 060	278 204	295 916	13 819	292 358	282 750	301 966	295 813	285 127	306 499
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	278 706	266 307	291 105	21 858	293 405	279 839	306 971	295 781	281 199	310 363
Excluded	Random	Residence bloc	282 076	271 858	292 294	18 781	292 358	283 898	300 818	294 539	284 961	304 117
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	278 532	256 075	300 989	24 439	292 308	269 561	315 055	291 298	267 875	314 721
Excluded	Random	Residence bloc (First and Subsequent filings combined)	279 061	268 529	289 593	21 733	288 232	279 395	297 069	292 229	282 671	301 787
Excluded	Random	Residence bloc (All filings combined)	277 889	269 173	286 605	22 670	286 685	277 477	295 893	288 343	278 008	298 678
Actual filings			300 119									

*) RMSEF: Root mean squared error of forecast, for details see Annex III.

Table 14: Predicted Total filings including “knowledgeable” respondents

Random group (including critical codes)

Breakdown by residence bloc

S.E. indicates standard error of logarithm

Q-indices

LCL/UCL indicates lower/upper 95% confidence limit

Deviation in % of forecast means (predicted filings - LCL)/predicted filings

For breakdowns with less than 6 cases, higher aggregation level growth index is used

			2016	2017					2018				2019			
		Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
First	Euro-direct	EP	21 210	100	1.0293	0.0278	21 831	22 597	103	1.0817	0.0281	22 943	100	1.1006	0.0303	23 344
		US	1 092	14	0.5853	0.4755	639	1 082	13	0.5861	0.4985	640	13	0.6048	0.5047	660
		JP	271	2	1.0219	0.0528	277	311	2	1.0829	0.0586	293	2	1.0986	0.0583	298
		OT	516	3	1.0219	0.0528	527	485	3	1.0829	0.0586	559	4	1.0986	0.0583	567
		Total	23 089	119			23 274	24 475	121			24 435	119			24 869
	LCL					21 889					22 961				23 271	
UCL					24 659					25 909				26 467		
First	PCT-IP	EP	5 605	44	0.9860	0.0383	5 524	5 737	42	0.9886	0.0415	5 538	43	1.0031	0.0415	5 619
		US	5 449	19	1.1458	0.0811	6 243	5 444	19	1.0784	0.1004	5 876	20	1.0864	0.0984	5 920
		JP	7 749	10	0.9777	0.0324	7 576	8 253	10	0.9638	0.0430	7 468	10	0.9815	0.0536	7 606
		OT	12 439	5	1.0112	0.0235	12 578	13 686	4	1.0047	0.0284	12 497	5	1.0217	0.0294	12 709
		Total	31 242	78			31 921	33 119	75			31 379	78			31 854
	LCL					30 605					29 816				30 208	
UCL					33 237					32 942				33 500		
Subsequent	Euro-direct	EP	14 116	86	1.0704	0.0213	15 110	14 196	86	1.1317	0.0241	15 975	83	1.1443	0.0288	16 153
		US	6 880	31	1.5049	0.2805	10 354	7 204	30	1.4259	0.2921	9 810	30	1.5208	0.2867	10 463
		JP	5 144	18	1.1733	0.1233	6 035	5 199	18	1.2026	0.1172	6 186	18	1.2108	0.1173	6 228
		OT	6 397	5	1.1460	0.0454	7 331	6 342	5	1.1752	0.0441	7 518	5	1.2117	0.0478	7 751
		Total	32 537	140			38 830	32 941	139			39 489	136			40 595
	LCL					32 548					33 251				34 071	
UCL					45 112					45 727				47 119		
Subsequent	PCT-IP	EP	53 978	116	1.0041	0.0228	54 199	55 250	117	1.0385	0.0272	56 056	117	1.0511	0.0295	56 736
		US	51 148	55	0.9339	0.0547	47 767	51 101	56	0.9578	0.0431	48 990	54	0.9587	0.0509	49 036
		JP	37 461	25	1.0676	0.0535	39 993	39 895	25	1.0698	0.0474	40 076	25	1.0983	0.0515	41 143
		OT	59 086	6	0.9480	0.0541	56 014	63 337	4	1.0242	0.0191	60 516	4	1.0376	0.0209	61 308
		Total	201 673	202			197 973	209 584	202			205 638	200			208 223
	LCL					188 736					198 916				200 578	
UCL					207 210					212 360				215 868		
All	Euro-direct	EP	35 326				36 941	36 793				38 918				39 497
		US	7 972				10 993	8 286				10 450				11 123
		JP	5 415				6 312	5 510				6 479				6 526
		OT	6 913				7 858	6 827				8 077				8 318
		Total	55 626				62 104	57 416				63 924				65 464
	LCL					55 671					57 514				58 747	
UCL					68 537					70 334				72 181		
All	PCT-IP	EP	59 583				59 723	60 987				61 594				62 355
		US	56 597				54 010	56 545				54 866				54 956
		JP	45 210				47 569	48 148				47 544				48 749
		OT	71 525				68 592	77 023				73 013				74 017
		Total	232 915				229 894	242 703				237 017				240 077
	LCL					220 564					230 116				232 257	
UCL					239 224					243 918				247 897		
Grand total		EP	94 909				96 664	97 780				100 512				101 852
		US	64 569				65 003	64 831				65 316				66 079
		JP	50 625				53 881	53 658				54 023				55 275
		OT	78 438				76 450	83 850				81 090				82 335
		Total	288 541				291 998	300 119				300 941				305 541
	LCL					280 665					291 522				295 232	
UCL					303 331					310 360				315 850		
Growth from 2016							1.2%	4.0%				4.3%				5.9%
Implied % PCT-IP			80.7%				78.7%	80.9%				78.8%				78.6%
Deviation in % of forecast							3.9%					3.1%				3.4%

Table 15: Forecasts for Total filings including "knowledgeable" respondents – Random group, broken down by residence bloc

5 FORECASTS FOR TOTAL EPO APPLICATIONS

Beginning with the 2014 survey, the data available have also been used to estimate growth in Total applications made at the EPO, as determined by the sum of Euro-direct and Euro-PCT-RP applications.

Since no distinction between first and subsequent applications was requested in the survey for Euro-PCT-RP applications, the forecast approaches shown here for Total EPO applications do not distinguish between first and subsequent filings. Within the context of this chapter, this also applies to Euro-direct filings, even though they were identified separately as first and subsequent filings. Please see the tables in **Section 4** for Euro-direct forecasts distinguished between first and subsequent applications. Unless explicitly stated otherwise, the results for the Random group are based on the full version of the dataset that includes cases with critical comments.

An overview of the main results of the forecasts for Total EPO applications according to the different methods is given in terms of growth rates (**Table 16**) and in terms of absolute numbers of filings with RMSEF values (**Table 17**). Initially, Total EPO applications are estimated for the Biggest group with no subsidiary breakdown (**Table 18**) and broken down by residence bloc (**Table 19**). Then a series of tables provide forecasts for Total EPO applications based on the Random group. Q-indices for the Random group sample are calculated with no subsidiary breakdown using the full Random group dataset (**Table 20**). The same analysis is repeated with Total EPO applications broken down by residence bloc using the full dataset (**Table 21**).

From **Table 16** it can be seen that estimates based on the Biggest group are generally somewhat less optimistic than corresponding estimates based on the Random group for all years' growth of Total EPO applications.

Comparing the RMSEF of Random group forecasts, the analysis with no breakdown has nearly the same RMSEF as analysis with residence bloc breakdown and both approaches have similar point estimates of forecasted applications. The estimate with residence bloc breakdown, as shown in **Table 21**, is the preferred estimate for Total EPO applications as it takes into account the residence bloc growth rates. In terms of one-year growth, this forecast can be characterised by a 95% confidence interval which encompasses the observed actual one-year growth of Total applications at the EPO.

There is a contrast to forecasts for Total filings, as discussed in **Section 4**, which were seriously affected this year due to an underestimation of PCT-IP filings mainly from the OT and US residence blocs. Euro-PCT-RP estimates for the OT and US residence blocs also underestimate true Euro-PCT-RP growth (see **Table 21**) by roughly 1,300, but this has a less negative affect on the overall forecast for Total applications, than in the Total filings forecast.

Comparison of forecasts: Growth from 2016
Euro-direct and Euro-PCT-RP combined

			2017		2018		2019	
Critical	Group	Breakdown	Growth rate	Deviation	Growth rate	Deviation	Growth rate	Deviation
Included	Biggest	None	0.7%		4.2%		6.1%	
Included	Biggest	Residence bloc	0.6%		4.0%		5.6%	
Included	Random	None	1.9%	2.7%	7.9%	3.0%	10.3%	3.8%
Included	Random	Residence bloc	1.8%	2.6%	7.4%	2.8%	9.5%	3.3%
Excluded	Biggest	None	0.1%		3.7%		6.0%	
Excluded	Biggest	Residence bloc	-0.5%		3.7%		5.8%	
Excluded	Random	None	0.8%	3.2%	7.6%	3.5%	9.4%	4.5%
Excluded	Random	Residence bloc	-0.1%	2.8%	5.5%	3.1%	6.6%	3.6%
Actual Growth			3.9%					

Table 16: Overview of predicted growth rates for Total applications at the EPO by forecasting method

Comparison of forecasts: Predicted total applications
Euro-direct and Euro-PCT-RP combined
LCL/UCL indicates lower/upper 95% confidence limit

			2017				2018			2019		
Critical	Group	Breakdown	Predicted apps.	LCL	UCL	RMSEF	Predicted apps.	LCL	UCL	Predicted apps.	LCL	UCL
Included	Biggest	None	151 034				156 274			159 102		
Included	Biggest	Residence bloc	150 926				156 057			158 403		
Included	Random	None	152 790	148 592	156 988	3 693	161 908	157 000	166 816	165 368	159 162	171 574
Included	Random	Residence bloc	152 668	148 687	156 649	3 731	161 093	156 557	165 629	164 250	158 839	169 661
Excluded	Biggest	None	150 128				155 566			158 953		
Excluded	Biggest	Residence bloc	149 242				155 510			158 705		
Excluded	Random	None	151 152	146 293	156 011	5 266	161 449	155 787	167 111	164 154	156 837	171 471
Excluded	Random	Residence bloc	149 827	145 626	154 028	6 344	158 302	153 355	163 249	159 844	154 114	165 574
Actual Total Applications			155 798									

Table 17: Overview of predicted filing numbers for Total applications at the EPO by forecasting method

Biggest group (including critical codes)
Euro-direct and Euro-PCT-RP combined

No subsidiary breakdown
Composite Indices

			2016	2017				2018			2019		
Patent Office	Filing route	Res. Block	Actual apps.	Cases	Index	Predicted apps.	Actual apps.	Cases	Index	Predicted apps.	Cases	Index	Predicted apps.
EPO	Euro-direct	Total	55 626	96	0.9904	55 093	57 416	77	1.0195	56 711	72	1.0286	57 217
EPO	Euro-PCT-RP	Total	94 359	116	1.0168	95 941	98 382	103	1.0551	99 563	97	1.0798	101 885
Grand total			149 985	151 034				156 274			159 102		
Growth from 2016				0.7%				4.2%			6.1%		
Implied % PCT-RP			62.9%	63.5%				63.7%			64.0%		

Table 18: Forecasts for Total applications at the EPO – Biggest group (no subsidiary breakdown)

Biggest group (including critical codes) For breakdowns with less than 6 cases, higher aggregation level growth index is used
Euro-direct and Euro-PCT-RP combined Breakdown by residence bloc
Composite indices

Composite indices			2016	2017				2018			2019		
Patent Office		Res. Block	Actual apps.	Cases	Index	Predicted apps.	Actual apps.	Cases	Index	Predicted apps.	Cases	Index	Predicted apps.
EPO	Euro-direct	EP	35 326	65	0.9967	35 210	36 793	52	1.0331	36 496	47	1.0443	36 892
		US	7 972	14	0.9416	7 507	8 286	10	0.9638	7 683	10	0.9649	7 692
		JP	5 415	14	1.0542	5 708	5 510	13	1.0317	5 587	13	1.0488	5 679
		OT	6 913	3	0.9904	6 847	6 827	2	1.0195	7 048	2	1.0286	7 111
		Total	55 626	96		55 272	57 416	77		56 814	72		57 374
EPO	Euro-PCT-RP	EP	37 948	74	1.0114	38 380	38 473	66	1.0394	39 444	62	1.0581	40 153
		US	27 904	18	1.0045	28 031	29 363	16	1.0712	29 892	15	1.0867	30 324
		JP	14 554	21	1.0345	15 056	15 051	19	1.0433	15 185	18	1.0641	15 486
		OT	13 953	3	1.0168	14 187	15 495	2	1.0551	14 722	2	1.0798	15 066
		Total	94 359	116		95 654	98 382	103		99 243	97		101 029
Grand total		EP	73 274			73 590	75 266			75 940			77 045
		US	35 876			35 538	37 649			37 575			38 016
		JP	19 969			20 764	20 561			20 772			21 165
		OT	20 866			21 034	22 322			21 770			22 177
		Total	149 985			150 926	155 798			156 057			158 403
Growth from 2016						0.6%	3.9%			4.0%			5.6%
Implied % PCT-RP						63.4%				63.6%			63.8%

Table 19: Forecasts for Total applications at the EPO – Biggest group (broken down by residence bloc)

Random group (including critical codes) S.E. indicates standard error of logarithm
Euro-direct and Euro-PCT-RP combined LCL/UCL indicates lower/upper 95% confidence limit
No subsidiary breakdown Deviation in % of forecast means (predicted filings - LCL)/predicted filings
Q-indices

Q-indices			2016	2017					2018				2019			
Res.			Actual	Predicted			Actual	Predicted			Predicted			Predicted		
Filing type	Filing route	Block	apps.	Cases	Index	S.E.	apps.	apps.	Cases	Index	S.E.	apps.	Cases	Index	S.E.	apps.
EPO	Euro-direct	Total	55 626	256	1.0143	0.0265	56 421	57 416	211	1.0671	0.0271	59 359	194	1.0986	0.0317	61 111
		LCL					53 489					56 204				57 311
		UCL					59 353					62 514				64 911
EPO	Euro-PCT-RP	Total	94 359	364	1.0213	0.0159	96 369	98 382	299	1.0868	0.0187	102 549	277	1.1049	0.024	104 257
		LCL					93 365					98 789				99 351
		UCL					99 373					106 309				109 163
Grand total			Total	149 985			152 790	155 798				161 908				165 368
		LCL					148 592					157 000				159 162
		UCL					156 988					166 816				171 574
Growth from 2016							1.9%	3.9%				7.9%				10.3%
Implied % PCT-RP			62.9%				63.1%	63.1%				63.3%				63.0%
Deviation in % of forecast							2.7%					3.0%				3.8%

Table 20: Forecasts for Total applications at the EPO – Random group (no subsidiary breakdown)

Random group (including critical codes)
Euro-direct and Euro-PCT-RP combined
Breakdown by residence bloc
S.E. indicates standard error of logarithm
Q-indices

For breakdowns with less than 6 cases, higher aggregation level growth index is used
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

Q-indices			2016	2017					2018				2019			
		Res. Block	Actual apps.	Cases	Index	S.E.	Predicted apps.	Actual apps.	Cases	Index	S.E.	Predicted apps.	Cases	Index	S.E.	Predicted apps.
Filing type	Filing route															
EPO	Euro-direct	EP	35 326	185	0.9823	0.0221	34 701	36 793	153	1.0530	0.0184	37 198	137	1.0703	0.0212	37 809
		US	7 972	40	1.0031	0.0781	7 997	8 286	33	0.9818	0.0749	7 827	32	1.0770	0.1000	8 586
		JP	5 415	25	1.0764	0.0957	5 829	5 510	22	1.0711	0.1005	5 800	21	1.0911	0.1036	5 908
		OT	6 913	6	1.1618	0.0654	8 032	6 827	3	1.0671	0.0271	7 377	4	1.0986	0.0317	7 595
		Total	55 626	256			56 559	57 416	211			58 202	194			59 898
	LCL					54 098					56 055				57 246	
UCL					59 020					60 349				62 550		
EPO	Euro-PCT-RP	EP	37 948	189	1.0298	0.0210	39 079	38 473	165	1.0764	0.0252	40 847	151	1.1014	0.0335	41 796
		US	27 904	106	1.0118	0.0404	28 233	29 363	85	1.0904	0.0489	30 427	84	1.0742	0.0561	29 974
		JP	14 554	53	1.0064	0.0430	14 647	15 051	39	1.0973	0.0509	15 970	34	1.1233	0.0546	16 349
		OT	13 953	16	1.0141	0.0295	14 150	15 495	10	1.1214	0.0294	15 647	8	1.1634	0.0265	16 233
		Total	94 359	364			96 109	98 382	299			102 891	277			104 352
	LCL					92 979					98 895				99 635	
UCL					99 239					106 887				109 069		
Grand total		EP	73 274				73 780	75 266				78 045				79 605
	US		35 876				36 230	37 649				38 254				38 560
	JP		19 969				20 476	20 561				21 770				22 257
	OT		20 866				22 182	22 322				23 024				23 828
	Total		149 985				152 668	155 798				161 093				164 250
	LCL						148 687					156 557				158 839
	UCL						156 649					165 629				169 661
Growth from 2016							1.8%	3.9%				7.4%				9.5%
Implied % PCT-RP			62.9%				63.0%	63.1%				63.9%				63.5%
Deviation in % of forecast							2.6%					2.8%				3.3%

Table 21: Forecasts for Total applications at the EPO – Random group (broken down by residence bloc)

6 CONCLUSIONS AND OUTLOOK

In terms of Total filings (Euro-direct + PCT-IP), the 2017 survey predicts decreasing filings for 2017, with a growth rate of -1.2%. However, this forecast contrasts with observed growth from 2016 to 2017, which was +4.0%. This discrepancy between predicted and observed growth in 2017 can be traced primarily to respondents from all residence blocks providing conservative forecasts for subsequent PCT-IP filings growth in 2017, most conservative being Other countries followed by US, EPC and JP. For 2018 and 2019, the recommended survey scenario anticipates a return to filings growth with a year-on-year growth of 4.8% followed by 2.4%, respectively. The recommended scenario's forecasted 298,312 Total filings for 2018 is lower than the observed 300,119 Total filings in 2017. The observed number of 2017 Total filings is above the upper confidence limit of the forecasted point estimate for 2017.

The variability of this year's forecasts in terms of deviation is higher this year than last year and similar to the variability observed for the 2015 survey, indicating higher uncertainty due to a lower level of agreement level on expectations between respondents. There seems to be a subset of respondents ("knowledgeable") that were less pessimistic about 2017 and 2018 growth rates. An additional analysis with "knowledgeable" respondents and filing counts shows a better similarity between forecasts and out-turn for 2017. Pessimism could be an attribute of respondents that have less knowledge about expected Total filings, perhaps because the sample was constructed on the universe of the Total Application applicants, some of whom may well not be intending to make any Euro-direct or PCT-IP filings in the years that are asked for.

In contrast to forecasts for Total filings, estimates of EPO Total applications appear to be better aligned with the actual growth in 2017, thus providing a more robust indicator for expected EPO workload. Total EPO applications are forecasted to increase by 1.8% from 2016 to 2017, compared to the actual observed increase of 3.9%. Forecasts for Total EPO applications then increase further, with year-on-year growth of 5.5% in 2018 and 2.0% in 2019.

The EPO uses the forecasts of this survey to allocate its resources and capacities in order to optimise the patent examination process. We would thus like to thank all those who participated for their valuable time and input. We realise that the diligent and full completion of the questionnaire is a time-consuming process. In order to be able to continue with a well-founded resource allocation process at the EPO, we would like to appeal to all applicants that might be approached in the future to kindly answer the questions as far as they possibly can.

Please see the Annexes for information on the survey methodology and analysis of individual responses (Annexes I to III); and for further results (Annexes IV to IX). The further results include forecasts broken down by mega clusters (Annex IV); respondents' profiles and analyses of company economic attributes, such as R&D budget, numbers of first filings, and SME status (Annex VI). Applicants were also asked to provide some details of their European patent portfolio (Annex VII). Annex VIII reports on correction factors that can account for new filings and for applicants ceasing to file at the EPO. Finally, Annex IX gives details on this year's survey population and sample sizes.

ANNEXES PART A: SURVEY METHODOLOGY AND ANALYSIS OF INDIVIDUAL RESPONSES

7 ANNEX I: METHODOLOGICAL APPROACH, DATA COLLECTION PROCEDURE, AND QUESTIONNAIRE

7.1 Underlying population and target persons

The underlying population of the Patent Filings Survey comprises applicants who filed a patent application (excluding divisional filings) at the EPO in 2016. These applicants are mainly companies, but there are also some educational, government or public organisations and private inventors. The applicants come from all over the world, but are mostly residents of Europe, the US, and Japan.

The following **Table 22** shows the distribution of the applicant population in 2016, broken down by residence bloc (applicants for Euro-direct and Euro-PCT-RP, here excluding divisional filings). Generally, there are only minor differences to the population in 2015, although the proportion for US decreased from 24% to 22%.

Residence bloc	Applicants (population)	%
EPC countries	19516	55%
Japan	1987	6%
US	7878	22%
Other countries	5951	17%
Total	35332	100%

Table 22: Population size (applicants for Euro-direct and Euro-PCT-RP in 2016)

The following **Table 23** shows the probability distributions of the same applicant population in terms of number of filings made per applicant, with separate distributions shown per bloc of origin and overall.

class	lb	ub	EP	JP	OT	US	Total
1	1	1	0,67	0,48	0,72	0,65	0,66
2	2	2	0,14	0,16	0,14	0,14	0,14
3	3	3	0,06	0,07	0,05	0,06	0,06
4	4	5	0,05	0,08	0,04	0,05	0,05
5	6	9	0,03	0,07	0,03	0,04	0,04
6	10	19	0,02	0,06	0,02	0,03	0,03
7	20	39	0,01	0,04	0,01	0,02	0,01
8	40 and higher		0,01	0,05	0,01	0,01	0,01

Table 23: Grouped bloc-wise probabilities of existence of specific filing counts in 2016

The probability values in this table are almost the same as those in the previous survey, the individual bloc columns show small changes, but the Total column is identical.

Details of each selected applicant were provided by the EPO, including the name of the company/person, address, and further information from the EPO database, such as number of filings at the EPO in 2016.

The target persons within companies are the head of the intellectual property department, an in-house or external patent agent, a member of the R&D department, or a member of management. Especially in the case of smaller sized applicants, this may well turn out also to be the proprietor.

7.2 Questionnaire

The content of the questionnaire used for data collection is broadly similar to questionnaires used in previous years and covers the following key topics:

- **Current and future filings**⁹ split by - First and subsequent filings - Different procedures: Euro-direct, PCT international and national/regional phase, and national procedures - Different countries: Germany, United Kingdom, Japan, the US, Republic of Korea, People's Republic of China, and Other countries.
- **Research and Development budget.**
- **Patenting activities**¹⁰ split by 12 technical domains that were equivalent to the organisational groupings used for examinations at the EPO. There is also a 13th box for "Other area(s)".
- **Details of patent portfolio**¹¹ - the total number of European patents in the portfolio across different time periods.
- **Company details**¹², such as organisation type, number of employees, and whether company is an SME.
- **General comments** regarding the future patenting activities and emerging technologies.

An introductory letter from the EPO was sent to respondents together with the survey link. The introductory letter contained information on the background of the study, the target group and data protection, a contact person at the EPO in cases of doubt, and stated that the report of the general results would be published on the internet. The letter also suggested that guesses are welcome in case no exact figures can be retrieved.

To cover the requirements of the contact persons, the letters and questionnaires were available in English, French, German, Japanese, Chinese (Simplified as well as Traditional), Italian, and Spanish, as in previous years.

The questionnaire provided to the respondents was electronic as a survey web link. Respondents were requested to enter their data into the online form only. Only in cases of technical difficulties or where it was specially requested, respondents used a pdf version of the electronic questionnaire and returned it by email or fax.

In order to test the new mode of the questionnaire, the pilot was conducted using forty randomly selected respondents (only English and German versions). Telephone contact could be established with thirty of these companies, to which an email with the EPO introductory letter and the survey link was sent. The pilot resulted in a few technical changes being made but none to the main questionnaire. Therefore, the six fully completed pilot interviews have been included in the final analysis.

Snapshots of the English version of the online questionnaire's screens are included below.

⁹ Called Part B.

¹⁰ Called Part C.

¹¹ Also covered in Part C.

¹² Called Part A.



Thank you for taking time to complete the Patent Filings Survey of the European Patent Office.

Please answer the whole online form in respect of company: X

We kindly ask you to enter only real and final information in the online form.

Please indicate the numbers of first filings¹ and subsequent filings (claiming priority of an earlier application), that you filed at the European Patent Office (EPO) in the last calendar year and that you expect to file in the present and future calendar years.

① Please enter "0" if you have no applications in a year/procedure, and leave the cell empty, if you do not know or do not want to tell.

	Filed 2016		Expected 2017		Expected 2018		Expected 2019	
	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings
European patent applications under the EPC, excluding PCT and any divisional applications								
International applications under the PCT (International Phase)								
PCT applications entering the regional/ national phase at:	Entered 2016		Expected 2017		Expected 2018		Expected 2019	
European Patent Office (EPO)								

1 A first filing is a patent application that, according to the Paris Convention for the Protection of Industrial Property, confers a right of priority for a period of twelve months for the purpose of filing patent applications in other countries or systems, with respect to the same invention.

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Please indicate the numbers of first filings¹ and subsequent filings (claiming priority of an earlier application) broken down by patent types and countries, that you filed in the last calendar year and that you expect to file in the present and future calendar years.

① Please enter "0" if you have no applications in a year/procedure, and leave the cell empty, if you do not know or do not want to tell.

	Filed 2016		Expected 2017		Expected 2018		Expected 2019	
	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings
European patent applications under the EPC, excluding PCT and any divisional applications ²	♦♦	♦♦	♦♦	♦♦	♦♦	♦♦	♦♦	♦♦
International applications under the PCT (International Phase) ²	♦♦	♦♦	♦♦	♦♦	♦♦	♦♦	♦♦	♦♦
National applications (excluding EPC and PCT) to the Patent Offices of these countries:	Germany							
	United Kingdom							
	Japan							
	United States ³							
	Republic of Korea							
	People's Republic of China							
	Other countries. Please specify:							
Worldwide Total First Filings								

Please confirm that this is total number of Worldwide first filings.

- ☒ Yes, I do confirm
☐ No, but I am not able to provide more precise numbers

1 A first filing is a patent application that, according to the Paris Convention for the Protection of Industrial Property, confers a right of priority for a period of twelve months for the purpose of filing patent applications in other countries or systems, with respect to the same invention.

2 Displayed number of applications you indicated in previous question.

3 Include provisional filings at USPTO in the cells for first filings of this row, and exclude all kinds of continuations.

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Please indicate the numbers of your PCT applications that entered the regional/national phase at the listed offices during the last calendar year, and also those that you expect to enter the regional/national phase in the present and future calendar years

① Please enter "0" if you have no applications in a year/procedure, and leave the cell empty, if you do not know or do not want to tell.

PCT applications entering the regional/ national phase at:	Entered 2016	Expected 2017	Expected 2018	Expected 2019
European Patent Office (EPO) ¹	♦♦	♦♦	♦♦	♦♦
United States Patent and Trademark Office (USPTO)				
Japan Patent Office (JPO)				
German Patent and Trade Mark Office (DPMA)				
China State Intellectual Property Office (SIPO)				
Korean Intellectual Property Office (KIPO)				

¹ Displayed number of applications you indicated in previous question.

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How many first patent filings have you made per domain in 2016 throughout the world?

① Count each filing only once.

Technical domains	The number of first patent filings made per domain in 2016 throughout the world.
Audio, Video and Media	
Biotechnology	
Civil Engineering: Thermodynamics (including engines and pumps)	
ICT (including computers and telecommunications)	
Electricity and Semiconductor Technology	
Electrical and Electronic Technology	
Handling and Processing	
Medical and Consumer Technology (including agriculture)	
Technical Chemistry (including industrial and inorganic chemistry)	
Applied Physics	
Pure and Applied Organic Chemistry (including pharmaceuticals)	
Vehicles and General Technology (including transporting mechanisms, lighting)	
Other area(s), please specify:	
TOTAL	

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Please state the total number of European patents (including divisionals) in your portfolio at the end of the 2016.

① "European patents" is to include patent applications that are still pending at the EPO as well as EPO patents that have been granted. Let one European patent grant count as one patent, even when validated later on at several national offices.

Number of European patents:

Please choose the year in which your company started patenting activities at the European Patent Office?

1978-1985	2001-2005	2009	2013
1986-1990	2006	2010	2014
1991-1995	2007	2011	2015
1996-2000	2008	2012	2016

Please state the total number of European patents (including divisionals) in your portfolio at the end of the following years.

① Please enter "0" if you have no applications in a year/procedure, and leave the cell empty, if you do not know or do not want to tell. "European patents" is to include patent applications that are still pending at the EPO as well as EPO patents that have been granted. Let one European patent grant count as one patent, even when validated later on at several national offices.

	2005	2010	2014	2015	2016
Number of European patents in portfolio:					♦♦

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Please state the approximate size
of your R&D budget 2016:
Specify currency:

Euro (EUR)
US Dollar (US\$)
Pound Sterling (GBP)
Swiss Franc (CHF)
Yen (JPY)

Australian Dollar (AUD)
Brazilian Real (BRL)
Hong Kong Dollar (HKD)
Indian Rupee (INR)
New Zealand Dollar (NZD)
Russian Ruble (RUR)

Singapore Dollar (SGD)
South Korean Won (KRW)

If the currency is not listed, please state it in this field:

Please share with us the 3-5 most promising (medium to long term) technology trends in your area of business.

Please comment on any aspect of your future patenting activities that may be of interest to the European Patent Office.

The European Patent Office may be interested in carrying out in-depth analysis based on company level statistics.
The answers you have provided will only be used for statistical purposes internally at the EPO and BERENT.

Will you allow us to pass on your company name and your contact details to the EPO together with your answers?

- ☐ Yes, I allow you to pass the EPO our company name including my name and contact details
☐ Yes, I allow you to pass the EPO our company name but not my name and contact details
☐ No, I wish to remain fully anonymous

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We assure you that we will provide your answers to the EPO in anonymised format only.

Thank you very much for your cooperation!

More about this survey:

The Patent Filings Survey 2017 results will be published in April 2018.

To see the results from previous surveys or get more information on survey background visit www.epo.org/patentfilings

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This survey is conducted by BERENT on behalf of the EPO



Survey background information: <http://www.epo.org/service-support/contact-us/surveys/patent-filings.html>
Glossary: <http://www.berent-surveys.com/6630wk11/FAQ6630EN.htm>

7.3 Data collection procedure

Data collection was conducted through a combination of telephone / email contacts and self-completed web interviews, according to the phases described further below.

The team, consisting of 11 experienced interviewers, were either multilingual or native speakers. They received a project briefing prior to the commencement of the fieldwork, which involved delegates from the EPO via a conference call. All the interviewers have suitable experience with this particular target group as a result of conducting previous EPO user satisfaction surveys.

The telephone contact phase and the sending of survey links to the participants started on 4th May 2017.

7.4 Search for applicants' contact details

Details of each selected applicant in the samples were provided by the EPO, including the name of the company, organisation, person, and address as far as possible. The contact details of the entire sample were enriched using the following sources:

- Companies' websites
- Social networks (LinkedIn, Xing, etc.)
- Worldwide business address directories
- Other internet sources

Despite these efforts, the details could not be found for all applicants included in the sample. In particular, difficulties were experienced when researching contact details of private inventors as well as some companies in the US, China and the "Other countries" category. It was not possible to identify contact details for 173 applicants.

7.5 Telephone and email contact

Once the contact details had been obtained, the contact phase commenced on the following basis:

- A telephone call to a target person within the company or organisation who could answer the questions in the questionnaire
- Introducing the background and the purpose of the survey to the identified person and requesting their participation

As a result of the telephone conversations, the majority of applicants agreed to receive the invitation to the survey by email (in total 2,500 email invitations were sent, although there were a few cases where emails were sent to more than one person within the same organisation). Due to the complexity of some of the survey questions, participants were given an opportunity to review the questionnaire in printable pdf form and/or use the pdf form for inputting the required information, which was a welcome facility for a number of respondents who wished to use it as a shared internal working document in order to view the questions

and co-ordinate the responses. In just 12 cases (mostly China and Japan), the questionnaire and the EPO letter were sent to respondents by fax.

7.6 Data collection modes

The biggest change in the 2017 survey was with the data collection method, changing from PAPI (*Pencil Assisted Paper Interview*) to CAWI (*Computer Assisted Web Interview*). The traditional paper questionnaire was replaced by the electronic form with the data collection being undertaken online.

Principally, the respondents were asked to complete a web form of the questionnaire, and then their answers were automatically saved on BERENT's server. However, if requested, either a telephone interview was conducted or a PDF form was sent by their preferred method to enable completion of the survey questions.

The fieldwork ran until 13th October 2017. However, in order to maximise the number of responses, all completed questionnaires received by 16th November 2017 were included in the final analysis.

Only 5 of all questionnaires completed were done by using the PDF paper version.

A number of questionnaires were completed over the phone during reminder calls between interviewers and respondents. However, as the answers were inputted by either interviewer or the respondent into the online questionnaire, exact numbers are not available, but it is estimated to be around 50 cases.

The following table shows the distribution of responses received by the EPO and research agencies for the period 2014-2017:

Return Type	Questionnaires sent back to EPO/Ipsos			BERENT web questionnaires
	2014	2015	2016	2017
E-Mail	603	212	546	5
Fax/letter	25	18	66	-
Phone	28	121	26	-
CAWI	0	0	0	642
Total	656	351	638	647

Table 24: The distribution of responses received for surveys between 2014-2017

In total, 647 questionnaires were completed in 2017 which is comparable to the number of responses that were achieved in the 2016 survey.

As shown in Figure 8, of the 647 respondents, 630 were part of the Random group sample and 159 were part of the Biggest group sample, with 142 cases overlapping.

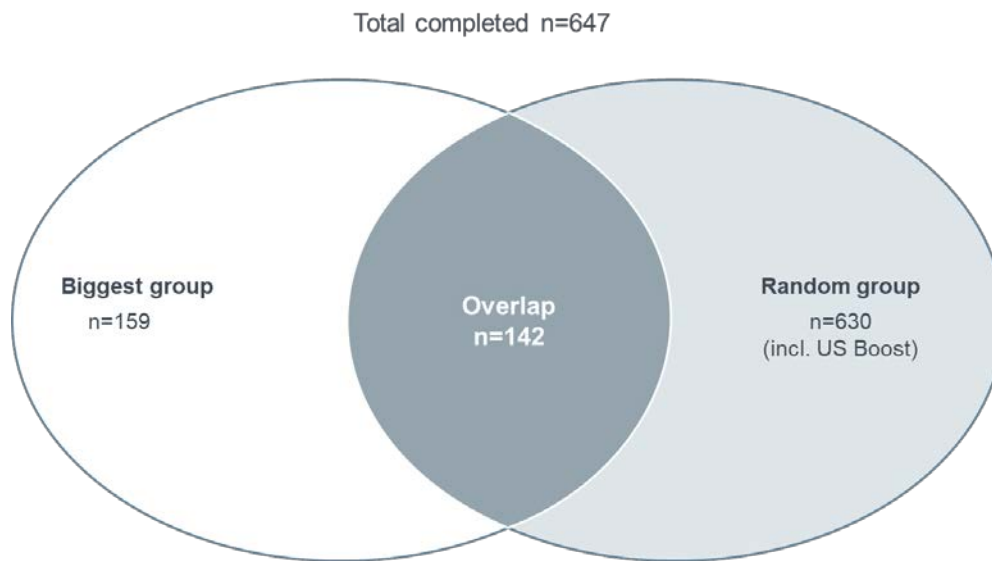


Figure 8: Response structure of this year's survey

The following table shows the total number of applicants that were selected for the survey, the number of applicants who dropped out for various reasons and the final number of responses received for the total net number of applicants:

	n	%
Total gross sample	3019	100%
Contact details not found	173	6%
Total contact details found	2846	100%
1) Dropouts in Contact Phase	911	32%
Adjusted sample	1935	68%
2) Dropouts in Interview Phase	1288	45%
Total responses / Response rate*	647	23%

1) Dropouts in contact phase: refusal to cooperate, eligible person was not found, contact terminated, language problem, contact was never available; company does not exist, etc.

2) Dropouts in interview phase: questionnaire not filled out.

*Response rate calculated over total contact details found.

Table 25: Overview of samples and responses received

During the fieldwork, respondents were contacted up to 5 times. Once the appropriate contact details had been confirmed by telephone, an email containing both the survey link and the EPO introductory letter was sent.

The next contact, where appropriate, was made between 2 - 4 weeks later by way of an email reminder.

The third contact 'reminder' phase was conducted by email and then eventually by telephone. This was done in order to ascertain the reasons for non-completion. It should be noted that, when, reminded by telephone, the respondents were generally fairly positive with varying reasons for having failed to participate up to that time. There was no cause for

concern shared about the questionnaire in general. As and when requested, interviewers gave the appropriate support and guidance to the respondent, thus enabling the questionnaire to be completed. Or if required, the interviewers collected the necessary information during the call, in order to complete the questionnaire on behalf of the respondent.

The fieldwork was conducted from BERENT's call centres located in Kassel and Vilnius. 389 interviews were received as a result of call centre activities in Vilnius, which have covered English, French, Italian and Spanish speaking sample parts. As an outcome of the fieldwork activities conducted by Kassel call centre, 258 interviews were received, which covered German speaking, Japanese, Chinese and Korean parts of the sample.

7.7 Experiences during fieldwork

Prior to the fieldwork, the complexities of company structures were considered in order to avoid data overlaps. Multiple contacts with one and the same department through different company subsidiaries were avoided as far as possible, e.g. by carefully checking the gross sample for companies with identical or similar names.

Fieldwork in 2017 started at the beginning of May. As respondents tend to take between 2 to 4 weeks to complete the questionnaires, a number of reminders (email and telephone) were implemented in order to encourage and speed up questionnaire completion. This action was required for about 50% of the respondents with up to 4 reminders being necessary. The reminders were mainly by way of emails with due consideration being given to ensure any likelihood of irritation or annoyance was kept to a minimum. It was the final reminder wave during September that included telephone reminders in support of the emails. It was encouraging that the majority of respondents who responded to the reminders did so after the first or second action. Therefore, only a small number of respondents received three or four reminders.

The contact phase was relatively problematic in the US, due to a variety of reasons such as:

- Name only policy, thus disabling the ability to pose searching questions
- Automated Answering Systems
- Dependence on Mailboxes/voicemails
- Obstructive and unhelpful gatekeepers
- Suspicion regarding the authenticity of the call

Appropriate efforts were made in dealing with these situations by acting professionally and courteously in order to circumvent the obstruction. It should be noted that a different result could sometimes be obtained on a different day with a different gatekeeper. Thus, there is always the need to employ a degree of polite persistence in order to achieve the aim.

Mid-sized and/or smaller companies tend to employ fewer barriers. But again, each call is made without preconceptions to ensure no opportunities to make contact are wasted.

Interviewers use all contact information that is widely available such as social and professional networks and associations. More use was made of the voicemail system in the US due to the high levels of calls being diverted to this facility. The message provided the target person with a brief but informative reason for the call together with the contact details for the response, which proved to be relative successful. The numbers of responses from the US were higher in 2017 compared to 2016: 22 US interviews in the Biggest group in 2017

compared to 18 interviews in 2016, and in the Random group 117 US interviews in 2017 compared to 82 interviews in 2016.

Similar difficulties in identifying the relevant target person were experienced in other countries, especially China and Japan. A further complication with regards to Japanese companies is that ever increasing data protection requirements do not allow for the front desk to divulge any information without validation of the contact (e.g. an official request by fax). Chinese companies tend to be very concerned about cyber security and the confidentiality of the data provided in written form.

The inability to identify the appropriate contact, as per the reasons notified above, increased to 524 cases in 2017, when compared to 288 in 2016 and 290 in 2014. However, the inability to make contact with the identified target showed significant improvement this year in that this accounted for 157 cases, in comparison to the 294 such cases in 2016, but similar to 151 cases in 2014.

Although the initial willingness to co-operate was high during the first contact phase, refusals after receiving the email were quite normal. The most common occurrence is that the respondents did not complete any part of the questionnaire and provided no reasons for this. This was the case particularly in the UK and the US.

Other circumstances leading to a refusal included the target person lacking either the time and/or the interest to complete the questionnaire, whilst others found it too difficult and time consuming to collect the necessary data.

More detailed non-response analysis is presented in Sections 7.11 to 7.13.

7.8 Data checks

Data were checked in detail and corrected in accordance with rules agreed with the EPO. The new online data collection method helped to minimise the possibility of errors as well as the need for technical data checks.

Missing general company information (e.g. number of employees, company size) was searched for, and copied from, web pages on the internet where available. All such modifications were recorded in the data file.

In the questionnaire, rules were set concerning the entry of zero, to distinguish between zero given as a figure or as an indicator of no change compared to the base year. Respondents were also instructed to enter "0" if they had no applications and "00" if they did not know or did not want to disclose.

Technical areas that were recorded in the "Others" field or details that were not allocated correctly by respondents were allocated to one of the 12 technical domains ex post. This was done by looking at the company's activities on the WIPO website (www.wipo.int/patentscope) or other sources (Google Patents, Espacenet) and selecting a matching EPO technical domain.

7.9 Plausibility rules

To ensure that the answers given in the questionnaire were logical and consistent, some plausibility rules were set up. In the 2017 survey, these rules covered the following topics:

General rules:

- It was assumed that first filings are mostly filed in the applicant's home country office. Thus, in addition to Euro-direct and/or PCT-IP first filings, there would be first filings at national offices.
- It was also assumed that when a respondent did not enter a number (including zero) for particular filings, leaving the box blank, this was seen as a respondent refusal for that filing and as such, was not included in forecasting calculations for the year in question.
- Furthermore, when a respondent submitted zero under a particular filing procedure, this meant that there will be a zero filing count for that particular procedure, and this was not included in forecasting calculations.

Specific rules for "critical codes" that can lead to removal from the analysis:

Plausibility checks resulted in some "critical codes" in the electronic database that identify certain answer scenarios as being dubious in cases where the following rules were not met:

- The numbers in any field under subsequent filings should be comparable to (i.e. no more than three times higher than) the number of total worldwide first filings in the previous year. This applies to all filing procedures. Comparison is made if the number of subsequent filings is equal to or more than 5 filings.
- The numbers for PCT-NP/Euro-PCT-RP applications (PCT applications that entered the national/regional phase) in any field for 2018(b) should be comparable to the combined figures under PCT-IP first filings and subsequent filings in 2016 and 2017 combined(a) For comparison purposes, a factor of 3/2/1.5/1.2 times is applied.
 - o If (a) is less than 10, then (b)/(a) must be less than 3;
 - o If (a) is in [10;19], then (b)/(a) must be less than 2;
 - o If (a) is in [20;49], then (b)/(a) must be less than 1.5;
 - o If (a) is in [50;+∞), then (b)/(a) must be less than 1.2

Comparison is made if the number of PCT-NP/Euro-PCT-RP applications in any field is equal to or more than 5 filings.

- The totals of the combined figures under Euro-direct first and subsequent filings or Euro-PCT-RP applications for 2016 should be comparable to the EPO database figures for the respective procedure and year. Depending upon the numbers reported for 2016, a certain tolerance was employed. Comparison was made only for cases where a respondent reported filings for a company or company part that was equivalent to what had been asked for.

Specific rules resulting in an analysis of combined filings only:

In addition, a check was made as to whether there was any evidence that respondents had failed to distinguish between first and subsequent filings. Such cases were analysed as combined filings only. This in accordance with the following rules:

- When a respondent indicated a significantly higher number of first filings for offices other than their home office, there should normally be subsequent filings in the

following year. If numbers are only provided in the first filings column, this may suggest that the respondent did not distinguish between first and subsequent filings but, in fact, combined them. Comparison is provided when the year of subsequent filings is not the base year (2016) and the total of first filings one year earlier is equal to or more than 10 filings.

- When a non-EPC respondent indicated subsequent filings at their home office (national office of applicant's residence), but no subsequent filings were made in other countries/procedures in any year, this may also suggest that both first and subsequent filings were combined. Comparison is provided where the respondent is resident of US, China, Japan and South Korea (but not for Other countries, where it may not be clear which the home office is).
- We presume that applicants rarely file PCT-IP as first filings only, without also making any subsequent PCT-IP filings. When a respondent indicated PCT-IP first filings for 2016, but no PCT-IP subsequent filings in any year, and the EPO filing database shows zero PCT-IP first filings for 2016, this may also suggest that both first and subsequent PCT-IP filings were combined.

In the above cases, there was a suspicion that answers were combined between classes and so should not be allocated or partitioned between first and subsequent filings. Therefore, unfortunately, they could not be used for the more detailed analysis, such as in Table 10 which provides the recommended forecasts. They were annotated with a comment code in the data set and were included only at a higher level of aggregation with first and subsequent filings combined.

The **Table 26** shows the distribution of such cases in total (Biggest and Random groups combined) and broken down by residence bloc.

	Total n=647		EPC n=383		US n=139		JP n=89		OT n=36	
	N	%	N	%	N	%	N	%	N	%
Cases without subsequent filings	24	4%	10	3%	6	4%	7	8%	1	3%
Cases with subsequent filings at home office	3	0%	0	0%	3	2%	0	0%	0	0%
Cases without PCT-IP subsequent filings	32	5%	25	7%	3	2%	3	3%	1	3%

Table 26: Distribution of cases that can be analysed at a higher level of aggregation only

7.10 Respondents' reactions to the questionnaire

The questionnaire required a high level of commitment from the respondents. Many respondents found the questionnaire complex and time-consuming. For some respondents, it was not possible to provide all the requested information for various reasons.

A small number of respondents stated that they are not so confident in how to proceed with the questionnaire. In such cases emails or calls were made to help and encourage them to complete the questionnaire, or to assist respondents with explanations about the required information.

In detail, applicants encountered the following problems in providing required information:

- No forecasts are available (current year and two future years) at all as no plans are available for this.
- The data requested is confidential.
- It is difficult to provide correct totals for first patent filings in 2016.
- Difficulty to separate first and subsequent filings (see Section 7.9).
- A relatively high number of respondents had difficulties allocating their organisation to one of the EPO technical domains (or were not willing to do so as, according to them, the EPO should have this data).

7.11 Non-response analysis and response rates

Address qualification

In the 2017 survey and as a result of the research procedure, telephone numbers for 601 of the 629 Biggest group were found, which equates to 96%. This is down by approximately 3% on the previous year of 2016. In the Random group (including target group overlap), the percentage of telephone numbers found was 94%, which is slightly lower than achieved in the Biggest group but replicated what had been achieved in 2016. The results for previous years were: 81% in 2015, 94% in 2014, 94% in 2013 and 96% in 2012.

Losses

During 2017, 17% of the addresses found for the Biggest group were either identical to, or duplicated with, other applicants in the sample; or had to be classified as dropouts for reasons such as non-availability, no appropriate contact found, unhelpful mailbox system, technical call problems, language problems or the company no longer exists.

In the Random group, this accounted for 25% of the cases.

When combining both groups, the main reasons for the losses were attributed to the inability to find the appropriate contact within the company, the identified contact person being continuously unavailable and the inability to navigate around or get responses from voicemail systems. As a result, a first contact could be established for 75% of the 601 Biggest group companies found (= "adjusted sample B"), which is relatively similar to 2016 (77%). In the Random group, this rate is lower than in the Biggest group with 68% of the 2,921 addresses being found.

7.12 Response Rates

The overall response rate was 23%. The response rate was slightly higher in the Biggest group than in the Random group.

In the following **Tables 27** and **28**, response rates are primarily given in terms of percentages against adjusted sample B (equivalent to "adjusted sample" in **Table 25**) ("response rate 1"). Alternative response rates against the numbers of addresses found ("response rate 2") include duplicates (according to names/addresses) and non-systematic losses in the denominator, and are therefore lower than response rate 1.

Referring to the adjusted sample B (response rate 1), the response rate was 35% in the Biggest group and 34% in the Random group. The response rate in the Biggest group seems to have declined compared to 47% in 2016 (2014: 47%, 2013: 45%, 2012: 44%) and in the Random group it remained stable (2016: 35%, 2014: 33%, 2013: 35%, 2012: 33%).

Response rate 2, which includes losses and identical cases and is calculated over addresses found, was 26% in the Biggest group and 23% in the Random group in 2017. This shows a significant decrease in the Biggest group (36% in 2016) and a small increase in Random group (22% in 2016).

The response rate decreased for the Biggest group and increased for the Random group in comparison to 2016. The number of losses observed in the Biggest group was surprisingly high in Japan with a significant increase in 2017 (80 cases when compared to only 2 cases in

2016). Generally, the fieldwork in Japan in 2017 has reflected a different picture, in terms of response, than that reported in previous years.

For the US, response rate 1 in the Biggest group declined from 30% in 2016 to 24% in 2017. In the Random group the response rate improved from 15% in 2016 to 24% in 2017. In terms of response rate 2, there is a difference in the Random group, where it increased from 7% to 14% whilst the Biggest group remained similar, only decreasing slightly from 16% in 2016 to 15% in 2017. There was a considerable increase of losses among US applicants in 2017 for both groups. The number of refusals for the Biggest group, however, remained at a similar level as in 2016. The boost sample that was used for US fieldwork was successful in 2017, with more interviews being achieved in the Random group than in 2016. This success could be attributed to the fact that an extensive and fresh database was available to the fieldwork team from other EPO user satisfaction surveys. Also, the more contemporary (online) data collection method that was offered to the respondents, is more in line with the digital orientation of communication in the US business environment.

For the group of Other countries, the response rate in the Biggest group showed an increase, whilst in the Random group it decreased. The response rate 1 in the Biggest group rose from 16% in 2016 to 24% in 2017 and the response rate 2 increased from 9% in 2016 to 15% in 2017. The Random group response rate 1 decreased from 24% in 2016 to 19% in 2017 with response rate 2 dropping from 16% in 2016 to 13% in 2017.

Table 27 illustrates the numbers of responses by origin from the combined samples. Reasons for non-response are explained in **Table 28** (combined sample in comparison to 2016).

Block, Biggest	Country	Addresses in gross sample	Address cleaning ¹	Adjusted sample A	Number of losses	Adjusted sample B	Number of refusals ²	Number of interviews ³	Response rate 1 ⁴	Response rate 2 ⁵
EPC	Austria	9	0	9	0	9	3	6	67%	67%
EPC	Belgium	14	0	14	0	14	5	9	64%	64%
EPC	Denmark	11	0	11	1	10	3	7	70%	64%
EPC	Finland	7	2	5	1	4	3	1	25%	20%
EPC	France	48	3	45	6	39	25	14	36%	31%
EPC	Germany	105	5	100	15	85	56	29	34%	29%
EPC	Italy	11	0	11	2	9	6	3	33%	27%
EPC	Netherlands	20	0	20	4	16	12	4	25%	20%
EPC	Sweden	15	0	15	1	14	7	7	50%	47%
EPC	Switzerland	39	1	38	7	31	20	11	35%	29%
EPC	United Kingdom	13	1	12	0	12	9	3	25%	25%
EPC	Others	8	1	7	1	6	6	0	0%	0%
EPC	EPC	300	13	287	38	249	155	94	38%	33%
JP	Japan	127	4	123	43	80	44	36	45%	29%
US	United States	147	4	143	50	93	71	22	24%	15%
OT	China	16	0	16	4	12	9	3	25%	19%
OT	South Korea	14	6	8	3	5	5	0	0%	0%
OT	Taiwan	5	0	5	0	5	4	1	20%	20%
OT	Others	20	1	19	12	7	4	3	43%	16%
OT	OT	55	7	48	19	29	22	7	24%	15%
Total	Total	629	28	601	150	451	292	159	35%	26%

1 Addresses not found or included in/identical with other applicant

2 This column refers to Dropouts (1) in Table 25

3 This column refers to Dropouts (2) in Table 25

4 Calculation: number of interviews over adjusted sample B

5 Calculation: number of interviews over adjusted sample A

Table 27: Non-response statistics – Biggest group (incl. overlapping members of the Random group)

Block, Random	Country	Addresses in gross sample	Adress cleaning ¹	Adjusted sample A	Number of losses	Adjusted sample B	Number of refusals ²	Number of interviews ³	Response rate 1 ⁴	Response rate 2 ⁵
EPC	Austria	37	1	36	2	34	21	13	38%	36%
EPC	Belgium	42	1	41	8	33	16	17	52%	41%
EPC	Denmark	35	0	35	2	33	17	16	48%	46%
EPC	Finland	32	13	19	2	17	11	6	35%	32%
EPC	France	166	25	141	38	103	59	44	43%	31%
EPC	Germany	430	14	416	85	331	201	130	39%	31%
EPC	Italy	100	0	100	21	79	53	26	33%	26%
EPC	Netherlands	73	2	71	12	59	41	18	31%	25%
EPC	Spain	43	0	43	10	33	18	15	45%	35%
EPC	Sweden	47	0	47	7	40	26	14	35%	30%
EPC	Switzerland	118	5	113	45	68	42	26	38%	23%
EPC	United Kingdom	105	4	101	23	78	56	22	28%	22%
EPC	Other	109	11	98	26	72	47	25	35%	26%
EPC	EPC	1337	76	1261	281	980	608	372	38%	30%
JP	Japan	262	9	253	64	189	104	85	45%	34%
US	United States	1001	30	971	450	521	382	139	27%	14%
OT	Australia	19	1	18	9	9	7	2	22%	11%
OT	Canada	41	0	41	19	22	16	6	27%	15%
OT	China	89	8	81	17	64	53	11	17%	14%
OT	Israel	32	24	8	2	6	4	2	33%	25%
OT	South Korea	61	14	47	9	38	31	7	18%	15%
OT	Singapore	6	0	6	4	2	2	0	0%	0%
OT	Taiwan	24	5	19	4	15	14	1	7%	5%
OT	Other	49	4	45	26	19	14	5	26%	11%
OT	OT	321	56	265	90	175	141	34	19%	13%
Total	Total	2921	171	2750	885	1865	1235	630	34%	23%

1 Addresses not found or included in/Identical with other applicant

2 This column refers to Dropouts (1) in Table 25

3 This column refers to Dropouts (2) in Table 25

4 Calculation: number of interviews over adjusted sample B

5 Calculation: number of interviews over adjusted sample A

Table 28: Non-response statistics – Random group (incl. overlapping members of the Biggest group)

Bloc	Country	Biggest (incl. target group overlap) ¹	Random (incl. target group overlap) ¹	Biggest & Random / net number of interviews ¹
EPC	Austria	6	13	16
EPC	Belgium	9	17	17
EPC	Denmark	7	16	17
EPC	Finland	1	6	6
EPC	France	14	44	44
EPC	Germany	29	130	133
EPC	Italy	3	26	27
EPC	Netherlands	4	18	19
EPC	Spain		15	15
EPC	Sweden	7	14	15
EPC	Switzerland	11	26	27
EPC	United Kingdom	3	22	22
EPC	Other	0	25	25
EPC	EPC	94	372	383
JP	Japan	36	85	89
US	United States	22	139	139
OT	Australia		2	2
OT	Canada	3	6	7
OT	China	3	11	12
OT	Israel		2	2
OT	South Korea	0	7	7
OT	Taiwan	1	1	1
OT	Other		5	5
OT	OT	7	34	36
Total	Total	159	630	647

1 Fully or partially completed interviews.

Table 29: Respondent structure survey 2017

The table below illustrates the comparative losses, performance and response rates calculated over gross samples compared between the surveys 2014, 2016 and 2017.

	2017		2016		2014	
No. of addresses in gross sample – TOTAL	3020	100%	2990	100%	2822	100%
Addresses not found or included in/Identical with other applicant	173	6%	417	14%	341	12%
No. of losses – TOTAL¹	911	30%	742	25%	540	19%
Contact never available	157	5%	294	10%	151	5%
Appropriate contact not found/mailbox system	524	17%	288	10%	290	10%
Company is never available	67	2%	47	2%	21	1%
Other Outcome	163	5%	107	4%	69	2%
No. of refusals – TOTAL¹	1289	43%	1199	40%	1290	46%
No. of completed interviews²	647	21%	638	21%	656	23%

1 The list is a selection of reasons only

2 Interviews, which are fully or partially completed

3 Data for 2015 not available

Table 30: Reasons for non-response for surveys compared between 2014-2017

7.13 Item non-response

Apart from the overall response rates, different sections of the questionnaire were filled in with varying degrees of completeness, i.e. there are different response rates for different parts of the questionnaire. The completion rates of Pages 1 to 3 of the questionnaire was 100%. This was achieved by setting a “required answer” prompt in the programmed questionnaire, preventing respondents from skipping the question. Respondents were instructed to enter “0” if they had no applications and “00” if they did not know or did not wish to disclose.

In **Table 31** below, the percentages reflecting the levels of completeness include the number of respondents with at least one answer in the respective part/question based upon the total number of interviews achieved.

	Total n=647		Biggest group (including overlap) n=159		Random group (including overlap) n=630	
	N	%	N	%	N	%
Euro-direct and PCT-IP ¹	647	100%	159	100%	630	100%
At least one Euro-direct or PCT-IP in 2017 (Page 1) ¹	647	100%	159	100%	630	100%
At least one Euro-direct or PCT-IP in 2018 (Page 1) ¹	602	93%	152	96%	586	93%
At least one Euro-direct or PCT-IP in 2019 (Page 1) ¹	590	91%	149	94%	574	91%
Answered all of Euro-direct and PCT-IP for 2017, 2018, 2019 (Page 1)	388	60%	96	60%	375	60%
At least one of PCT applications (Page 3) ¹	647	100%	159	100%	630	100%
First filings in 2016 by technical domains (Page 4) ^{1;2}	647	100%	159	100%	630	100%
European Patent Portfolio (Page 5): at least one figure in one year ^{1;2}	534	83%	137	86%	521	83%
R&D budget in 2016 (Page 6) ¹	503	78%	136	86%	490	78%

¹ Including responses “don’t know”

² Cases with zeros in all years are not counted as valid answers

Table 31: Partial response rates – Biggest and Random groups

Of the 647 completed interviews, the split was 159 (including overlap) being from the Biggest group and 630 from the Random group.

In total (Biggest and Random groups), out of the 647 completed interviews, all of them provided information for either Euro-direct or PCT-IP for at least one year for first or subsequent filings. A smaller number provided figures when forecasting years 2018 and 2019 for either Euro-direct or PCT-IP filings.

617 respondents provided information relating to their particular technical area with 503 providing information about their R&D budget in 2016.

In the Biggest group (including overlap), out of 159 completed interviews, 152 cases provided forecasts for 2018 for either Euro-direct or PCT-IP filings and 149 cases provided forecast information for 2019. Finally, out of the 159 completed cases, 136 provided information regarding their R&D budget in 2016.

In the Random group (including overlap), out of 630 completed interviews, 586 responses provided forecast information for either Euro-direct or PCT-IP for 2018 with 574 providing a similar forecast for 2019. From this total of 630, 490 provided information regarding their R&D budget in 2016.

In total, for the year 2016, 617 responses were received providing information concerning worldwide first filings in the various technical domains.

ANNEX II: VERBAL COMMENTS RECEIVED FROM PARTICIPANTS

8.1 Multiple comments

Table 32 below illustrates frequencies of the additional verbal comments that were received several times in the survey. Numbers refer to the number of individual comments.

	2017	
No. of completed interviews	647	100%
Comments on future patenting activities	67	10%
Comments on emerging technologies	185	29%
No answer / data not available / do not know	436	67%
Did not proceed until this question	144	22%

Table 32: Numbers of multiple verbal comments

Comments on most promising technology trends

Respondents were asked to share information of between 3-5 promising technological trends relating to their particular area of business with respect to both the medium and long-term future. This information is useful to the EPO in order to monitor the possible intentions of applicants and the technical direction their future patents may take.

185 companies responded accordingly. We do not report in detail on their comments as they were mostly either too general, too specific or of a confidential nature. Out of all answers, 35 respondents mentioned Internet of Things being a direction in their business area and 52 responses indicated automation / digitalisation being their main focus.

8.2 Individual comments (selection)

Individual comments on patenting activities

- Interest in cheaper searching and examination fees (Europe continues to be very expensive compared to other jurisdictions). Lots of upcoming software-related inventions being developed internally and the EPO's different examination practice with respect to software-related inventions compared to other jurisdictions like the USPTO is problematic as a lot of innovation in aircraft technology is software-driven.
- We have just begun to file with the EPO and expect to see an increase in filings both initial PCT and nationalization filings.
- Appreciate the work the IP5 nations have been doing to streamline global prosecution, but would be nice if they standardized their output into one website for the full complement of services; the first step toward a unified IP5 patent? May not live to see that, but can we at least get the UPC/UP up and running by the end of 2018.
- I believe that IPC classes are partly defined based on sophisticated thoughts but you struggle often to assign such classes to kind of products and hardware. Limits the

practical benefit. Maybe a thought to introduce midterm an additional classification like: Gas Turbine - Compressor - Blades/Vanes or Gas Turbine - Rotor – Disks.

- The expected filing figures are based on our current projections for budgeting purposes. We are, however, intending to shift to filing GB and DE national applications in lieu of EP applications from 2018 onwards due to the absurdly high renewal fees charged by the EPO during pendency of the applications, especially as the EPO is currently so slow that we often incur fees of €2k+ per application just waiting for the EPO to issue an examination report. The EPO is the only IPO we work with that charges us a fee for doing nothing. Unacceptable.
- We'll apply more for the European patent.
- Fees in the EPO can inhibit filing.
- In the future, our company's filing numbers are likely to be higher than stated, as all of the Group's portfolios are concentrated on our company. However, due to lack of information, this "artificial" increase at the expense of others is not included in the estimates provided. (Original language: German).
- Our company has a high level of interest in the Community patent, as we are currently validating our issued European patents in 20-25 countries and awaiting for the promising significant cost reductions from the Community patent. (Original language: German).
- I anticipate increasing our amount of searching/monitoring patent publications. If the EPO had a free search/alert type of functionality based upon claim language, then I would probably end up filing more. There are some commercial products that do searches but they are not tied to your own claim language.
- Number of validations for an EP patent is max. 3-5. That if unitary patent becomes too expensive, we may instead go for direct national patent applications. (Original language: German).
- Currently we are validating the major part of our EP patents in DK, DE and CH/LI. The outlook for the Unitary Patent and the UPC means that we may consider a national route instead of EPO.

Individual comments on EPC system / EPO quality

-the German/Japanese 7-8 year examination delay is good for slow inventions that need testing. Maybe something the EPO could consider.
- EPO has a very important position in our portfolio, so we ask EPO to speed up the examination of the patent's legitimacy earlier. (Original language: German).
- Can EPO simplify payment of yearly maintenance fees? A single platform to accept payments for all countries in EPO will reduce significant administrative work.
- We hope to shorten the examination period. I feel that the variation in waiting period is very large.
- Liberalization of patents in the field of software. It is unavoidable! Most innovations come from this technical area. It is therefore important that access to patent protection is easier.
- Pay attention to the divisional grant when the parent case is in opposition. (Original language: Italian).
- Payment of patent renewal fees must be made more straightforward. Some individual countries within the EU have a much better system for renewal of national patents and this should be enabled for the EU patents as well. At the moment it is impossible for companies to renew their patents online. A professional patent management service must be used and they charge extremely high commissions for such a simple job. It is impossible to find out what fees are due for what patents. In the US this service is much simpler and transparent and in the EU patent office we should have a similar service to USPTO.

9 ANNEX III: ANALYTICAL METHODOLOGY

This Annex explains the methodology used for forecasting growth in EPO filings. While different forecast approaches employing no breakdown or specific breakdown types (e.g. residence bloc breakdown or different filing types such as Euro-direct or PCT-IP) are shown within the report, the core methodology used remains the same.

9.1 Estimates of growth for the Biggest group via the Composite index

For the Biggest group, a growth index is constructed by dividing the sum of intended filings in a target year by the sum of filings made in the base year, summing over the respondents. Thus

$$CI = \frac{\sum_{i=1}^n x_{i,r}}{\sum_{i=1}^n A_i}$$

is the composite growth index for a group of applicants $i=1, \dots, n$ in the year r , where $x_{i,r}$ is the intended number of filings reported by the i -th respondent for the year r of interest, and A_i is the known number of filings made by the i -th respondent in the base year.

say that A is the total number of recorded filings in the base year. Then the forecast for year r is $CI \times A$.

9.2 Estimates of growth for the Random group via the Q-index

For the Random group, a weighted average is made of the individual growth rates determined per respondent after logarithmic transformation. The Q-index is the exponent of this weighted average.

If $x_{i,r}$ is the intended number of filings reported by the i -th respondent for the year r of interest, and A_i is the known number of filings made by the i -th respondent in the base year, then

$$l_{i,r} = \frac{x_{i,r}}{A_i}$$

is the individual growth index for applicant i in the year r . The Q-index averages these individual growth indices on a logarithmic scale using Poisson weights q_i (see following section), and is calculated as

$$Q_r = \exp \left[\frac{\sum_{i=1}^n q_i \log(l_{i,r})}{\sum_{i=1}^n q_i} \right].$$

The logarithmic transform was introduced in the Applicant Panel Survey 2002 report, Annex IV.

Then the forecast for year r is $Q_r \times A$.

9.3 Poisson weighting of Random group forecasting results

The established method used in this report to analyse the Random group involves Poisson weights that take account of the probability of inclusion of the respondent within the sample

asked, as measured via the number of filings made in the base year according to the EPO database.¹³

The Poisson weight for each respondent is calculated as

$$q_i = \frac{A_i}{1 - e^{-n^+ \left(\frac{A_i}{A}\right)}},$$

where n^+ is the number of extractions made for sampling purposes, A is the total number of recorded filings in the base year, and A_i is the known number of applications made by the i -th sampled applicant in the base year. Since sampling was done using database records of Total applications (Euro-direct + Euro-PCT-RP), the A_i and A values in this section refer to Total applications. For this year's sample, $A = 150,249$ (excluding divisional filings) and $n^+ = 4,400$. The US booster sample was treated as if they had been members of the main Random group, and they were weighted accordingly.

9.4 Assessing variability of estimates and calculating confidence intervals

The variability of $\log(Q_r)$ is given by its raw variance

$$Var(\log(Q_r)) = \frac{\sum_{i=1}^n (\log(l_{i,r}) - \log(Q_r))^2 q_i^2}{\left(\sum_{i=1}^n q_i\right)^2},$$

which is then corrected by applying a finite population correction based on the proportion $FPC = \frac{A_b}{A}$ of filings present in the sample, where A_b is the number of base year Total applications accounted for in the survey, and A is the known number of Total applications in the population at the EPO for the base year. Then

$$VAR_{FPC \text{ corrected}} = Var(\log(Q_r)) * (1 - FPC)$$

is the FPC-corrected variance, the square root of which is reported as the standard error of growth estimates in tables throughout this report. Depending on the breakdown employed for a specific forecast, either a global FPC or a residence-specific FPC is used to calculate this corrected variance.

Finite population correction (FPC) values were obtained from the EPO database counts of Total applications (Euro-direct and Euro-PCT-RP filings) of respondents in the Random group as follows:

Residence bloc	FPC
Total	0.26
EP	0.32
US	0.19
JP	0.27
OT	0.20

Table 33: Finite population correction values by residence bloc

¹³ See Applicant Panel Survey 2001 report: Annex III; and Applicant Panel Survey 2002 report: Section IV.1, Annex IV.

The FPC values shown here were used in the current analysis. This year's FPC values are similar to those in the 2016 survey, although residence blocs' FPC values are more evenly distributed than in the 2016 survey. FPC values for US (0.19) and OT (0.20) residence blocs are lower than average, but are higher than last year's 0.11 and 0.13 respectively. FPC values were calculated based on Total applications (Euro-direct + Euro-PCT-RP excluding divisional filings), since this was the population of filings on which the sampling mechanism was based.

Please see the Applicant Panel Survey 2006 report, Annex VI, for a more detailed explanation and derivation of the finite population correction applied throughout this report.

The corrected variance estimates are then used to estimate confidence intervals for the predicted number of filings $\widehat{A}_r = A_b * Q_r$, where A_b is the number of base year filings. A 95% confidence interval for $\widehat{A}_r$ is calculated as

$$\widehat{A}_r \pm 1.96 * \left(\widehat{A}_r * \sqrt{\exp(VAR_{FPC \text{ corrected}})^2 - \exp(VAR_{FPC \text{ corrected}})} \right).$$

For a detailed explanation of the derivation of confidence intervals for the predicted number of filings, please see the Applicant Panel Survey 2003 report, Annex IV.

Deviation (as a percentage of the forecast) is also provided in this report's forecasting tables based on data from the Random Group. It can be calculated as:

$$\frac{1.96 * \left(\widehat{A}_r * \sqrt{\exp(VAR_{FPC \text{ corrected}})^2 - \exp(VAR_{FPC \text{ corrected}})} \right)}{\widehat{A}_r} * 100$$

To compare the relative width of the confidence intervals among forecasting methods we use deviation calculated as

$$\Delta = \frac{\widehat{A}_r - 1.96 * \left(\widehat{A}_r * \sqrt{\exp(VAR_{FPC \text{ corrected}})^2 - \exp(VAR_{FPC \text{ corrected}})} \right)}{\widehat{A}_r}$$

9.5 Assessment of forecast quality using the Root Mean Squared Error of the Forecast (RMSEF)

As was introduced in the 2011 survey report, all forecast approaches with filings forecasts from the Random group are analysed in terms of the root mean squared error of the forecast (RMSEF), defined as

$$RMSEF(\hat{f}) = \sqrt{[bias(\hat{f})]^2 + Var(\hat{f})},$$

where $bias(\hat{f})$ is the difference between the forecast and the actual number of Total filings for year one (2017 in this survey), which is $\widehat{A}_r - A_r$; and $Var(\hat{f})$ is the variance of the forecast that is calculated as the Poisson weighted sum of squared differences from the actual number of Total filings.

$$Var(\hat{f}) = \frac{\sum_{i=1}^n q_i (\widehat{A}_r - A)^2}{\sum_{i=1}^n q_i}$$

9.6 Assessment of forecast accuracy for multiple surveys using the Mean Absolute Percentage Error (MAPE)

When assessing the performance of a specific forecast approach over multiple years, in addition to visual comparisons of true growth indices with predicted growth indices and corresponding confidence intervals, this report also calculates the mean absolute percentage error (MAPE) as a measure of predictive accuracy. If a specific forecast approach has been performed for y surveys, the MAPE of the forecast $\widehat{GI}$ can be calculated as

$$MAPE(\widehat{GI}) = 100 \frac{1}{y} \sum_{year=1}^y \frac{|\widehat{GI}_{year} - GI_{year}|}{GI_{year}},$$

with GI_{year} being the true growth index observed in a survey year. The MAPE can be interpreted as the average error in percent of the true value. Its lower bound is zero and there is no upper bound for the MAPE. The MAPE can also be interpreted and expressed as a summation of the absolute annual bias components which are a part of the RMSEF defined in **Section 9.5**. Thus

$$MAPE(\widehat{GI}) = 100 \frac{1}{y} \sum_{year=1}^y \frac{|bias(\widehat{f}_{year})|}{Z_{year}},$$

with Z_{year} being the total filings in that year.

9.7 Winsorization

Some of the forecast approaches in this survey were performed using a winsorized version of applicant responses.¹⁴ With this method, individual applicant growth indices are adjusted by reigning in the most extreme growth indices. Indices that fall below the 5% percentile and indices that lie above the 95% percentile are replaced by the growth index at the respective percentile. The adjusted data are then used for carrying out Q-index calculations according to the various breakdown scenarios.

When using winsorized data, standard errors of Q-index-based growth rate estimates are adjusted to take account of the winsorization by applying an inflation factor of

$$\frac{(n-1)}{(n-2k-1)},$$

where n is the number of sample cases overall, and k is the number of sample cases affected by the winsorization process at each end.¹⁵

9.8 Amalgamation of technical domains into mega clusters

¹⁴ Cf. Applicant Panel Survey 2005 report, Section 7.5.

¹⁵ Tukey and McLaughlin (1963): Less vulnerable confidence and significance procedures based on a single sample: Trimming and winsorization, *Sankhyā: The Indian Journal of Statistics, Series A*, vol. 25, no. 3, pp 331-352.

From 2018, operations at the EPO with respect to patent filings are organised according to three operational units. Prior to 2018, industry sectors were used that were known as *joint clusters*. In the questionnaire Part C (pages 4 to 6), respondents were asked to give some information broken down according to 12 technical domains that correspond to these former joint clusters. These filing estimates help the EPO anticipate industry-specific trends and dynamics. For purposes of aggregating enough sample responses to give better forecasts by technical areas, here the 12 joint clusters have been amalgamated into five larger groups. These *mega clusters* each define a hopefully fairly homogenous group of industries (see Annex VI). Through this amalgamation, each of the 12 joint clusters is assigned to just one of the mega clusters. The assignment is given in **Table 34**.

An applicant's growth estimate should retain the same overall leverage, regardless of the number of mega clusters that the applicant is active in. In order to ensure this, the total Poisson weight obtained for each respondent is distributed across all active mega clusters based on the proportion of filings per mega cluster as obtained from answers to questions on page 4 of this year's survey. Thus, even though a respondent's growth estimates may influence more than one mega cluster, the total weight, and thus influence, of a respondent is always equal to the original Poisson weight.

When deriving the standard error for mega-cluster-based analyses, a correction is made to avoid distortions caused by multiple mega cluster classifications. For the Random group, this correction takes into account the average multiplicity of mega clusters per responding applicant in this year's survey of 1.42^{16} , and widens the confidence limits by multiplying standard errors by 1.19 (the square root of 1.42). As previously for the calculation of standard errors, a finite population correction is also applied.

Growth estimates, broken down by mega cluster, are given in **Annex IV**. Additional analyses are also provided using mega cluster breakdowns in **Annex VI** and **Annex VII**.

Mega Clusters	Technical domains
Electricity	Electricity and Semiconductor Technology
	Electrical and Electronic Technology
	Applied Physics
Inorganic Chemistry	Technical Chemistry
ICT	Audio, Video and Media
	Computers and Telecommunications
Organic Chemistry	Biotechnology
	Pure and Applied Organic Chemistry
Traditional	Civil Engineering; Thermodynamics
	Handling and Processing
	Medical and Consumer Technology
	Vehicles and General Technology

Table 34: Amalgamation of technical domains into mega clusters

9.9 Normalised mutual information statistic (NMI)

Normalised mutual information statistic (NMI) indicates to what degree pairs of technical domains overlap. The NMI involves the numbers of respondents that indicated presence in

¹⁶ See Section 12.1 for some further explanation of this calculation.

both clusters compared to the total numbers of respondents that indicated either presence in the one or the other cluster. The NMI is calculated as

$$NMI_{ij} = \frac{[ab]}{\sqrt{(a * b)}}$$

where a is the number of occurrences of cluster i , b is the number of occurrences of cluster j , and $[ab]$ is the number of occurrences of both clusters i and j .

9.10 Extended structural weights

The weighting to estimate applicant population characteristics uses the extended structural weight approach. For each applicant the extended structural weight (SW) is calculated as follows:

$$SW = \frac{1}{1 - e^{-n^+ \left(\frac{A_j}{A} \right)}} * \frac{1}{SRSS_{A_j,bl}},$$

where A_j is the number of applications of applicant j in the base year, n^+ is the number of extractions, A is total number of applications in the base year, and $SRSS_{A_j,bl}$ is the sample response rate by size class (determined by size of applicant base year applications) in residence bloc bl (**Table 51**).

ANNEXES PART B: FURTHER RESULTS

10 ANNEX IV: FORECASTS BROKEN DOWN BY MEGA CLUSTERS

The forecasts for EPO filings were analysed with the primary breakdowns by mega cluster (see **Annex III, Section 9.8**). Composite indices were calculated for the Biggest group sample, with Q-indices being calculated for the Random group sample.

10.1 Total filings results broken down by mega cluster only

The forecasts of filings by filing type, filing route and mega cluster for the Biggest group are shown in **Table 35**. The analogous forecasts for the Random group, broken down by mega cluster, are given in **Table 36**.

This analysis is useful for business planning as it provides growth rate estimates for the groups of individual EPO examining departments of the various primary combinations of first, subsequent, Euro-direct, and PCT-IP filings.

Biggest group (including critical codes)
Breakdown by EPO mega clusters
Composite indices

Filing type	Filing route	Cluster	2017		2018		2019	
			Cases	Index	Cases	Index	Cases	Index
First	Euro-direct	Electricity	23	0.9927	21	1.0408	19	1.0528
		Inorganic Chemistry	12	0.9507	12	0.9962	11	1.0040
		ICT	8	0.8978	6	1.1705	6	1.1705
		Organic Chemistry	18	0.8708	16	0.9864	14	1.0127
		Traditional	33	0.9646	31	1.0152	29	1.0208
First	PCT-IP	Electricity	21	0.9306	20	0.9657	18	0.9997
		Inorganic Chemistry	17	0.8653	16	0.9339	14	0.9367
		ICT	11	0.9683	10	1.0027	9	1.0338
		Organic Chemistry	10	0.8973	9	0.9080	7	0.9118
		Traditional	28	0.8789	27	0.9093	24	0.9416
Subsequent	Euro-direct	Electricity	36	1.0288	31	1.0620	28	1.0699
		Inorganic Chemistry	14	0.9486	11	0.9961	11	0.9805
		ICT	14	1.0373	12	0.9443	12	0.9408
		Organic Chemistry	10	0.8399	7	1.0588	6	1.0172
		Traditional	43	0.9858	37	1.0017	35	1.0009
Subsequent	PCT-IP	Electricity	37	0.9772	33	1.0421	31	1.0556
		Inorganic Chemistry	18	0.8873	15	0.9870	15	0.9885
		ICT	14	0.9380	13	0.9590	13	0.9709
		Organic Chemistry	18	0.9683	16	0.9150	14	0.9238
		Traditional	54	0.9608	47	1.0359	45	1.0397

Table 35: Forecasts for EPO filings at the EPO – Biggest group, broken down by mega cluster

Random group (including critical codes)
Breakdown by EPO mega cluster
Q-indices

S.E. indicates standard error of logarithm

Filing type	Filing route	Cluster	2017			2018			2019		
			Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First	Euro-direct	Electricity	51	1.0113	0.0616	45	1.0897	0.0627	38	1.1353	0.0853
		Inorganic Chemistry	20	0.9574	0.0719	19	1.0033	0.0916	18	1.0089	0.0970
		ICT	17	1.1364	0.1021	13	1.3574	0.0619	13	1.3576	0.0618
		Organic Chemistry	33	0.9401	0.0731	28	1.0256	0.0884	27	1.1515	0.0807
		Traditional	82	1.0056	0.0503	76	1.0304	0.0481	63	1.0582	0.0540
First	PCT-IP	Electricity	33	1.0686	0.0568	31	1.0829	0.0590	28	1.0654	0.0370
		Inorganic Chemistry	23	0.9621	0.0757	21	0.9068	0.0810	19	0.9039	0.0695
		ICT	18	0.8862	0.1399	15	0.9805	0.0778	15	1.0050	0.0809
		Organic Chemistry	24	0.8978	0.1032	22	0.8722	0.0890	19	0.8424	0.0822
		Traditional	56	0.9987	0.0599	47	1.0530	0.0769	44	1.0359	0.0700
Subsequent	Euro-direct	Electricity	64	1.0909	0.0308	56	1.1586	0.0334	51	1.2580	0.0490
		Inorganic Chemistry	24	1.0790	0.1405	20	0.9972	0.0689	19	1.0171	0.0983
		ICT	28	1.1352	0.0762	25	1.0953	0.0854	25	1.1585	0.1125
		Organic Chemistry	24	1.0806	0.1986	21	1.2602	0.1518	19	1.1559	0.1533
		Traditional	101	1.0023	0.0463	88	1.0596	0.0381	81	1.0990	0.0466
Subsequent	PCT-IP	Electricity	87	0.9576	0.0508	79	1.0800	0.0350	74	1.1236	0.0370
		Inorganic Chemistry	47	0.8966	0.0446	41	0.9533	0.0301	39	0.9425	0.0457
		ICT	43	0.9671	0.0377	35	1.0218	0.0660	34	1.0361	0.0664
		Organic Chemistry	51	0.9511	0.0618	47	0.9661	0.0662	39	1.0386	0.0877
		Traditional	146	0.9581	0.039	127	1.0061	0.0371	123	1.0028	0.0438

Table 36: Forecasts for EPO filings at the EPO – Random group, broken down by mega cluster

Based on **Table 35** and **Table 36**, the biggest growth covering all periods at the EPO is likely to come from Electricity, ICT as well as the Traditional clusters. First filings are expected to grow quicker for Euro-direct than for PCT-IP filings.

10.2 Total filings results broken down by both mega cluster and residence bloc

The data of the Random group was also analysed with a simultaneous breakdown by mega cluster and residence bloc. The results are shown in **Table 37**.

Random group (including critical codes)

Breakdown by mega cluster and residence bloc ("Other" incorporated into EP)

Q-indices

First, Subsequent, Euro-direct and PCT-IP filings combined

Filing type	Filing route	Cluster	Res. Bloc	2017			2018			2019		
				Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First+	Euro-direct+	Electricity	EP/OT	78	0.9071	0.059	65	1.0089	0.0472	61	1.0333	0.0446
Subsequent	PCT-IP	Electricity	JP	22	1.0948	0.0599	20	1.0812	0.0606	18	1.0954	0.0706
		Electricity	US	25	0.9154	0.0784	20	0.9808	0.0657	19	1.0382	0.0687
First+	Euro-direct+	Inorganic Chemistry	EP/OT	28	0.9037	0.0634	23	0.9417	0.0575	22	0.9621	0.0556
Subsequent	PCT-IP	Inorganic Chemistry	JP	15	0.9939	0.0136	15	1.0036	0.0181	15	1.0158	0.0249
		Inorganic Chemistry	US	14	0.9157	0.0775	12	0.9716	0.0477	12	1.0228	0.0472
First+	Euro-direct+	ICT	EP/OT	29	0.9603	0.0507	25	1.0019	0.0450	25	1.0163	0.0513
Subsequent	PCT-IP	ICT	JP	8	1.2461	0.0546	7	1.1903	0.0826	7	1.1903	0.0826
		ICT	US	23	0.7635	0.1258	17	0.7722	0.0977	15	0.8369	0.0998
First+	Euro-direct+	Organic Chemistry	EP/OT	39	0.9283	0.0699	31	1.0015	0.0750	31	1.0677	0.0863
Subsequent	PCT-IP	Organic Chemistry	JP	10	1.0288	0.0123	10	1.0307	0.0125	9	1.0372	0.0144
		Organic Chemistry	US	20	0.9348	0.0712	15	1.0577	0.1044	13	0.8962	0.2720
First+	Euro-direct+	Traditional	EP/OT	131	0.9163	0.0403	106	1.0071	0.0381	99	0.9943	0.0453
Subsequent	PCT-IP	Traditional	JP	32	0.9540	0.0488	28	1.0091	0.0591	27	1.0268	0.0712
		Traditional	US	46	0.9041	0.0621	39	0.9332	0.0602	38	0.9485	0.0651

Table 37: Forecasts for EPO filings at the EPO – Random group, broken down by residence bloc and mega cluster

A clear one-year growth is forecast for the JP residence bloc in the Electricity, ICT and Organic Chemistry mega clusters. Two-year and three-year growth mainly concentrates on the EP/OT and JP residence blocs.

10.3 Forecasts for Total applications broken down by mega cluster

Growth rate estimates for Total applications at the EPO were also estimated, after breaking down by mega cluster and combining first filings with subsequent filings for Euro-direct filings. The results of this analysis are shown in **Table 38**.

Random group (including critical codes) Euro-direct and Euro-PCT-RP combined Q-indices			S.E. indicates standard error of logarithm Breakdown by EPO mega cluster								
Patent Office	Filing route	Cluster	2017			2018			2019		
			Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
EPO	Euro-Direct +	Electricity	91	1.0360	0.0368	76	1.1229	0.0347	71	1.1588	0.0464
		Inorganic Chemistry	43	1.0266	0.0605	35	1.0766	0.0320	34	1.0809	0.0500
	Euro-PCT-RP	ICT	46	1.0088	0.0394	36	1.0567	0.0336	35	1.0839	0.0439
		Organic Chemistry	65	0.9449	0.0626	50	1.0876	0.0647	47	1.1259	0.0662
		Traditional	170	0.9516	0.0289	136	1.0273	0.0342	125	1.0116	0.0436

Table 38: Forecasts for Total applications at the EPO – Random group (broken down by mega cluster)

One-year growth is positive for Electricity, Inorganic Chemistry and ICT. Growth for all mega clusters is positive for 2018 and 2019 (compared to 2016), with Electricity being the strongest.

The data of the Random group were also analysed with a simultaneous breakdown by mega cluster and residence bloc. The results are shown in **Table 39**.

Random group (including critical codes) Breakdown by mega cluster and residence bloc ("Other" incorporated into EP) Euro-direct and Euro-PCT-RP combined Q-indices												
Patent Office	Filing route	Cluster	Res. Bloc	2017			2018			2019		
				Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
EPO	Euro-Direct +	Electricity	EP/OT	78	1.0576	0.0409	66	1.1190	0.0401	63	1.1550	0.0543
		Electricity	JP	21	0.9757	0.0906	20	1.0772	0.0726	18	1.0469	0.0801
		Electricity	US	23	0.9122	0.0927	19	1.0719	0.0754	19	1.1726	0.1051
EPO	Euro-Direct +	Inorganic Chemistry	EP/OT	30	0.9942	0.0614	24	1.0998	0.0397	23	1.1342	0.0825
		Inorganic Chemistry	JP	16	1.0245	0.0654	15	1.0155	0.0618	15	1.0197	0.0630
		Inorganic Chemistry	US	14	1.3708	0.1939	12	1.2618	0.1526	12	1.3575	0.2040
EPO	Euro-Direct +	ICT	EP/OT	29	1.0310	0.0337	25	1.0923	0.0182	25	1.1059	0.0415
		ICT	JP	9	1.0762	0.0626	8	1.0348	0.0650	8	1.0348	0.0650
		ICT	US	23	0.8215	0.1329	17	0.6879	0.1604	16	0.7744	0.0997
EPO	Euro-Direct +	Organic Chemistry	EP/OT	45	0.9277	0.0868	35	1.0630	0.0588	34	1.1346	0.0700
		Organic Chemistry	JP	11	1.0202	0.0281	10	1.0121	0.0237	9	1.0143	0.0283
		Organic Chemistry	US	24	1.0174	0.0674	18	1.2228	0.1783	17	1.1803	0.1627
EPO	Euro-Direct +	Traditional	EP/OT	130	0.9578	0.0377	107	1.0450	0.0402	97	1.0295	0.0528
		Traditional	JP	31	0.9192	0.1014	27	1.0177	0.0860	25	1.0673	0.0990
		Traditional	US	46	1.0028	0.0557	37	0.9991	0.0706	38	1.0041	0.0878

Table 39: Forecasts for Total applications at the EPO – Random group (broken down by mega cluster and residence bloc)

Growth for all years (compared to 2016) is negative for US based ICT cluster as seen in **Table 39**. In all mega clusters, the results for the EP/OT Bloc (EPC countries combined with Other countries) are more positive for Total applications (in **Table 39**) than they were for Total filings (in **Table 37**).

11 ANNEX V: FORECASTS FOR APPLICATIONS AT VARIOUS PATENT OFFICES

11.1 Worldwide first filings

The applicants' intentions regarding their worldwide future patent filings were obtained from the questions on **Pages 2 and 4** of the questionnaire (**Annex I**). Since the 2012 survey, estimates of total worldwide first filings have been provided in this report, based on the worldwide first filings growth rate estimates obtained from the respondents. The sample that was employed in this survey, whilst representative of EPO applicants, does not match all of the applicants that apply at the various national and regional offices, because there are some that do not apply to the EPO. Therefore, care should be taken when interpreting these numbers. What is shown here is essentially the attitude of the EPO applicants towards their worldwide first filing expectations.

The 2016 Actual filings that are used as base year data for the projections are based on information that appeared in December 2017¹⁷. The definition that was chosen for first patent filings is a proxy equivalent to the one that is used in the IP5 Statistics Report¹⁸. An assumption is made that the count of the domestic national filings reported from each patent office is equivalent to the number of first filings. In order to estimate numbers of first filings from EPC states, domestic national filings from the national offices of all the 38 EPC contracting states are added up together with the numbers of Euro-direct first filings at the EPO received from residents. Certain simplifying assumptions are applied in order to calculate the 2016 base year counts from this source, so that numbers appearing in the next published version of the IP5 Statistics Report may vary from these numbers.

Table 40 shows the results without breakdown and **Table 41** shows the results broken down by residence bloc. Filings growth from 2016 to 2017 cannot be checked because the returns from the patent offices for 2017 have yet to be collected and published by the WIPO.

Estimates for 2017 that are based on a residence bloc breakdown for Japan and for Other countries are more optimistic than those without further breakdowns. Based on the recommended forecast method for breakdown by residence blocs, worldwide first filings are expected to grow +0.9% in 2017, by +1.2% in 2018 and by +5.8% in 2019, all in comparison to 2016. All of the growth is attributed to the 'Others' residence block, whilst the US and EPC residence blocs, are forecast to be the laggards in terms of worldwide filings for all of the three years under review.

The biggest source of worldwide first filings growth is China (with a +24% growth from 2015 to 2016). Such growth might not be very well captured by our estimate for the Others bloc, because there are few survey responses from China.

¹⁷ The data are extracted from the WIPO statistics data centre. See <http://www.wipo.int/ipstats/en/help/>

¹⁸ See Fig. 3.4 in the IP5 Statistics Report 2015 edition, at <http://www.fiveipoffices.org/statistics/statisticsreports/2016edition.html>

Random group (including critical codes)
Breakdown by residence bloc
Q-indices

S.E. indicates standard error of logarithm
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

Filing type	Res. Block	2016	2017				2018				2019			
		Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
Worldwide first filings	Total	2 085 884	397	0.9170	0.0420	1 912 756	339	0.9260	0.0475	1 931 529	307	0.9504	0.0498	1 982 424
	LCL					1 755 089				1 751 399				1 788 563
	UCL					2 070 423				2 111 659				2 176 285
Growth from 2016						-8.3%				-7.4%				-5.0%
Deviation in % of forecast						8.2%				9.3%				9.8%

Table 40: Forecast for worldwide first filings, no breakdown – Random group

Random group (including critical codes)
Breakdown by residence bloc
Q-indices

S.E. indicates standard error of logarithm
LCL/UCL indicates lower/upper 95% confidence limit
Deviation in % of forecast means (predicted filings - LCL)/predicted filings

Filing type	Res. Block	2016	2017				2018				2019			
		Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
Worldwide first filings	EP	136 128	236	0.9040	0.0648	123 060	209	0.8941	0.0714	121 712	187	0.9027	0.0766	122 883
	US	264 685	90	0.8403	0.0590	222 415	77	0.9238	0.0666	244 516	71	0.9969	0.0697	263 864
	JP	238 167	54	0.9743	0.0281	232 046	41	0.9761	0.0265	232 475	38	0.9887	0.0277	235 476
	OT	1 446 904	17	1.0555	0.0469	1 527 207	12	1.0458	0.0616	1 513 172	11	1.0959	0.0452	1 585 662
	Total	2 085 884	397			2 104 728	339			2 111 875	307			2 207 885
	LCL					1 960 340				1 924 708				2 060 881
	UCL					2 249 116				2 299 042				2 354 889
Growth from 2016						0.9%				1.2%				5.8%
Deviation in % of forecast						6.9%				8.9%				6.7%

Table 41: Forecast for worldwide first filings, broken down by residence bloc – Random group

11.2 Patent filings at specific national offices

The applicants' intentions regarding their future patent filings at specific national offices were obtained from **Pages 2-3** of the questionnaire (**Annex I**).

Estimated growth rates for national applications by country, based on the Random group, are presented in **Table 42**, with no subsidiary breakdown, and **Table 43**, with breakdown by residence bloc. The tables are limited to calculated growth rates with standard errors.

The filing intentions at national offices of those companies that applied at the EPO in 2016 vary considerably from country to country. In some countries, the growth index has high variability, as indicated by the estimated standard errors. Compared to last year, high variation is again associated with the growth rates of the Republic of Korea for first filings growth estimates for all the years. In terms of first filings, the Republic of Korea has the lowest expected growth rates, which is the opposite to what happened last year. Strong growth for subsequent filings is expected in most countries, with the highest growth expected in the Republic of Korea. However, this could be overestimated due to the small sample size. Rather flat filings growth is also expected at the United Kingdom Office, both for first and for subsequent filings.

Random group (including critical codes)

S.E. indicates standard error of logarithm

No breakdown

Q-indices

Filing type	Filing route	Country	2017			2018			2019		
			Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First	National	Germany	67	1.0115	0.0274	54	1.0118	0.0207	49	1.0255	0.0256
		United Kingdom	26	0.8015	0.0868	23	0.8783	0.0432	20	0.8797	0.0468
		Japan	53	1.0058	0.0189	41	1.0070	0.0317	41	1.0201	0.0341
		United States	135	1.0069	0.0256	107	1.0772	0.0249	99	1.1301	0.0270
		Republic of Korea	15	0.5115	0.2508	11	0.6680	0.2001	10	0.8107	0.1470
		China	45	0.8177	0.2169	39	1.1337	0.0220	36	1.1710	0.0286
		Other Countries	62	1.1158	0.0674	49	1.2401	0.0761	48	1.2830	0.0707
Subsequent	National	Germany	63	1.0563	0.0369	59	1.1036	0.0431	56	1.1257	0.0466
		United Kingdom	38	0.8296	0.1348	33	1.0215	0.0385	31	1.0333	0.0416
		Japan	66	1.1687	0.0784	60	1.2583	0.0657	55	1.2859	0.0674
		United States	129	1.0523	0.0188	105	1.1217	0.0187	96	1.1909	0.0286
		Republic of Korea	11	2.6999	0.3712	10	2.9934	0.3396	8	3.4538	0.3396
		China	101	1.1037	0.0668	87	1.1829	0.0601	84	1.1883	0.0614
		Other Countries	56	1.0132	0.0797	50	1.0751	0.0663	49	1.0534	0.0861

Table 42: Detailed forecasting results for national applications (excluding PCT), no breakdown – Random group

Random group (including critical codes) S.E. indicates standard error of logarithm
No breakdown For breakdowns with less than 6 cases, higher aggregation level growth index is used
Q-indices

				2017			2018			2019		
Filing type	Filing route	Country	Res. Bloc	Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First	National	Germany	EP	56	1.0003	0.0262	45	0.9957	0.0173	41	1.0022	0.0196
			JP	1	1.0115	0.0274	1	1.0118	0.0207	1	1.0255	0.0256
			OT	0	1.0115	0.0274	0	1.0118	0.0207	0	1.0255	0.0256
			US	10	1.0918	0.0704	8	1.1509	0.0968	7	1.2671	0.1434
		United Kingdom	EP	19	0.7689	0.0762	16	0.8508	0.0387	15	0.8526	0.0418
			JP	0	0.8015	0.0868	0	0.8783	0.0432	0	0.8797	0.0468
			OT	0	0.8015	0.0868	0	0.8783	0.0432	0	0.8797	0.0468
			US	7	1.0409	0.0971	7	1.0564	0.0581	5	0.8797	0.0468
		Japan	EP	9	0.9931	0.0349	8	0.9335	0.0493	7	0.9323	0.0500
			JP	35	1.0132	0.017	26	1.0481	0.0169	26	1.0590	0.0195
			OT	1	1.0058	0.0189	0	1.0070	0.0317	1	1.0201	0.0341
			US	8	1.0153	0.1444	7	1.1701	0.1117	7	1.3256	0.1035
		United States	EP	43	1.0295	0.0507	36	1.1191	0.0561	32	1.1691	0.0570
			JP	15	1.0755	0.0771	11	0.9944	0.0626	11	0.9944	0.0626
			OT	7	1.0164	0.0059	3	1.0772	0.0249	4	1.1301	0.0270
			US	70	0.9504	0.0404	57	1.0406	0.0337	52	1.1142	0.0397
		Republic of Korea	EP	6	0.4245	0.1897	5	0.6680	0.2001	3	0.8107	0.1470
			JP	3	0.5115	0.2508	2	0.6680	0.2001	2	0.8107	0.1470
			OT	1	0.5115	0.2508	0	0.6680	0.2001	1	0.8107	0.1470
			US	5	0.5115	0.2508	4	0.6680	0.2001	4	0.8107	0.1470
		China	EP	20	1.0766	0.0397	18	1.1566	0.033	16	1.1954	0.0472
			JP	7	0.9375	0.1043	5	1.1337	0.0220	5	1.1710	0.0286
			OT	5	0.8177	0.2169	4	1.1337	0.0220	4	1.1710	0.0286
			US	13	0.2397	0.6157	12	0.9743	0.0988	11	1.1007	0.0907
		Other Countries	EP	44	1.1182	0.1131	35	1.2350	0.1167	34	1.3043	0.1117
			JP	3	1.1158	0.0674	2	1.2401	0.0761	2	1.2830	0.0707
			OT	3	1.1158	0.0674	3	1.2401	0.0761	3	1.2830	0.0707
			US	12	1.0297	0.0591	9	1.0535	0.1111	9	1.0681	0.1197
Subsequent	National	Germany	EP	37	1.0362	0.0234	34	1.0860	0.0302	33	1.1097	0.0333
			JP	12	1.1741	0.2101	12	1.3008	0.2196	12	1.3288	0.2212
			OT	3	1.0563	0.0369	3	1.1036	0.0431	2	1.1257	0.0466
			US	11	1.2250	0.1342	10	1.2724	0.1349	9	1.3221	0.1425
		United Kingdom	EP	17	0.6756	0.1782	14	0.9836	0.0513	14	0.9868	0.0529
			JP	5	0.8296	0.1348	5	1.0215	0.0385	5	1.0333	0.0416
			OT	4	0.8296	0.1348	4	1.0215	0.0385	3	1.0333	0.0416
			US	12	1.0177	0.0739	10	1.1062	0.0791	9	1.1386	0.0864
		Japan	EP	32	1.1377	0.0438	30	1.2084	0.0592	27	1.2341	0.0754
			JP	17	1.0915	0.0391	16	1.1263	0.0575	16	1.1499	0.0717
			OT	5	1.1687	0.0784	5	1.2583	0.0657	4	1.2859	0.0674
			US	12	0.6397	0.3299	9	0.9806	0.1014	8	1.0015	0.1106
		United States	EP	65	1.0718	0.024	55	1.1219	0.0268	51	1.1960	0.0423
			JP	27	1.0601	0.0371	20	1.0859	0.0373	19	1.1016	0.0408
			OT	6	1.0292	0.0163	5	1.1217	0.0187	4	1.1909	0.0286
			US	31	1.0150	0.0665	25	1.1496	0.0652	22	1.1833	0.0754
		Republic of Korea	EP	4	2.6999	0.3712	4	2.9934	0.3396	3	3.4538	0.3396
			JP	3	2.6999	0.3712	2	2.9934	0.3396	2	3.4538	0.3396
			OT	0	2.6999	0.3712	0	2.9934	0.3396	0	3.4538	0.3396
			US	4	2.6999	0.3712	4	2.9934	0.3396	3	3.4538	0.3396
		China	EP	54	0.9645	0.0327	49	1.0742	0.0356	47	1.0914	0.0390
			JP	26	1.1811	0.0505	20	1.2041	0.0577	20	1.2228	0.0621
			OT	4	1.1037	0.0668	4	1.1829	0.0601	4	1.1883	0.0614
			US	17	0.9655	0.0692	14	1.0476	0.0366	13	0.9258	0.1667
		Other Countries	EP	24	0.9732	0.0608	23	1.0395	0.0555	22	0.9833	0.1191
			JP	16	1.0116	0.0511	16	1.0629	0.0835	16	1.0924	0.0801
			OT	5	1.0132	0.0797	4	1.0751	0.0663	4	1.0534	0.0861
			US	11	0.7593	0.2469	7	0.6904	0.4055	7	0.7053	0.4144

Table 43: Detailed forecasting results for national applications (excluding PCT), broken down by residence bloc – Random group

Forecasts based on the Random group for PCT-NP applications at DPMA (German Patent Office), JPO, KIPO SIPO, and USPTO, as well as Euro-PCT-RP applications at the EPO are displayed without further breakdown in **Table 44**, and with a residence bloc breakdown in **Table 45**. The tables are also limited to calculating growth indices in these cases¹⁹.

It should be noted that these growth rate estimates apply only to the population from which the sample was selected, namely applicants to the EPO for Euro-direct and Euro-PCT-RP filings in 2016.

PCT-NP applications from Japan, US and Others residents show strong growth rates to most of the Offices through to 2019, except to DPMA. Growth rates for PCT-NP to the DPMA up to 2019 are lower than those for Euro-PCT-RP, Euro-direct or Euro-direct + Euro-PCT-RP to the EPO, except for the US bloc in 2018 and 2019. This contrasts to some extent with the results in last year's survey.

Random group (including critical codes)

S.E. indicates standard error of logarithm

No breakdown

Q-indices

Patent Office	Filing route	2017			2018			2019		
		Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
DPMA	PCT-NP	73	0.9106	0.0655	61	0.9375	0.0646	55	0.9519	0.0665
EPO	Euro-direct	256	1.0143	0.0265	211	1.0671	0.0271	194	1.0986	0.0317
EPO	Euro-direct+Euro-PCT-RP	395	0.9892	0.0148	313	1.0563	0.0144	291	1.0768	0.0184
EPO	Euro-PCT-RP	364	1.0213	0.0159	299	1.0868	0.0187	277	1.1049	0.0240
JPO	PCT-NP	156	1.0420	0.0393	129	1.0825	0.0438	122	1.1097	0.0475
KIPO	PCT-NP	128	1.0036	0.0344	114	1.0800	0.0356	105	1.1483	0.0372
SIPO	PCT-NP	190	1.0622	0.0212	159	1.1212	0.0316	149	1.1534	0.0399
USPTO	PCT-NP	217	1.0539	0.0223	178	1.0849	0.0287	162	1.1091	0.0377

Table 44: Detailed forecasting results for PCT applications entering the national phase and Euro-PCT-RP applications at the EPO, without further breakdown – Random group

¹⁹ Counts for base year 2016 are also provided in some cases by the WIPO, which can be queried at <http://www.wipo.int/ipstats/en/help/> (similarly to worldwide first filings in Section 11.1 above). Forecasts in terms of absolute future levels of such filings are not given due to the possible lack of representativeness of the sample.

Random group (including critical codes)
Breakdown by residence bloc
Q-indices

S.E. indicates standard error of logarithm
For breakdowns with less than 6 cases,
higher aggregation level growth index is used

Patent Office	Filing route	Res. Bloc	2017			2018			2019		
			Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
DPMA	PCT-NP	EP	43	1.0174	0.0274	37	1.0194	0.0246	31	1.0288	0.0286
		JP	12	0.6831	0.2702	12	0.6784	0.2721	12	0.6784	0.2721
		OT	2	0.9106	0.0655	1	0.9375	0.0646	2	0.9519	0.0665
		US	16	0.8273	0.1798	11	1.1168	0.1787	10	1.3256	0.1466
EPO	Euro-direct	EP	185	0.9823	0.0221	153	1.0530	0.0184	137	1.0703	0.0212
		JP	25	1.0764	0.0957	22	1.0711	0.1005	21	1.0911	0.1036
		OT	6	1.1618	0.0654	3	1.0671	0.0271	4	1.0986	0.0317
		US	40	1.0031	0.0781	33	0.9818	0.0749	32	1.0770	0.1000
EPO	Euro-direct+ Euro-PCT-RP	EP	220	0.9910	0.0181	184	1.0604	0.0167	169	1.0716	0.0222
		JP	56	0.9718	0.0415	44	1.0370	0.0431	38	1.0666	0.0470
		OT	15	0.9908	0.0434	8	1.0755	0.0209	7	1.1281	0.0201
		US	104	0.9937	0.0394	77	1.0429	0.0494	77	1.0713	0.0544
EPO	Euro-PCT-RP	EP	189	1.0298	0.021	165	1.0764	0.0252	151	1.1014	0.0335
		JP	53	1.0064	0.043	39	1.0973	0.0509	34	1.1233	0.0546
		OT	16	1.0141	0.0295	10	1.1214	0.0294	8	1.1634	0.0265
		US	106	1.0118	0.0404	85	1.0904	0.0489	84	1.0742	0.0561
JPO	PCT-NP	EP	79	1.0659	0.0495	69	1.0714	0.061	63	1.1032	0.0656
		JP	30	1.0894	0.0413	27	1.1371	0.0550	26	1.1394	0.0581
		OT	6	0.9186	0.0396	2	1.0825	0.0438	3	1.1097	0.0475
		US	41	0.9701	0.117	31	1.0684	0.1041	30	1.1077	0.1167
KIPO	PCT-NP	EP	66	0.9509	0.0447	64	1.0290	0.0416	56	1.0897	0.0413
		JP	26	1.0535	0.0442	24	1.1347	0.0516	23	1.1674	0.0660
		OT	5	1.0036	0.0344	2	1.0800	0.0356	3	1.1483	0.0372
		US	31	1.1065	0.0676	24	1.1751	0.0805	23	1.3082	0.0762
SIPO	PCT-NP	EP	103	1.0547	0.0288	89	1.0867	0.0436	80	1.1316	0.0553
		JP	37	1.0700	0.0354	29	1.1512	0.0428	28	1.1625	0.0475
		OT	7	1.0283	0.0104	6	1.0002	0.0385	5	1.1534	0.0399
		US	43	1.0858	0.058	35	1.2577	0.0848	36	1.2447	0.0994
USPTO	PCT-NP	EP	128	1.0483	0.0244	108	1.0721	0.0379	96	1.1122	0.0496
		JP	38	1.0323	0.0362	29	1.0853	0.0413	28	1.0904	0.0442
		OT	11	0.9669	0.0855	6	1.0087	0.0372	6	1.0382	0.0530
		US	40	1.1577	0.1074	35	1.1647	0.0794	32	1.1326	0.1037

Table 45: Detailed forecasting results for PCT applications entering the national phase and Euro-PCT-RP applications, broken down by residence bloc – Random group

12 ANNEX VI: RESPONDENTS' PROFILES

In **Pages 4 to 6** of the questionnaire, respondents were asked to indicate the profile of the company, the technical domains that best describe the applicant's business along with the corresponding first filings patenting activity and the R&D expenditures. The number of persons employed and whether the applicant is one of the small and medium-sized enterprises (SME) were asked about on the telephone, during the initial contacting phase. The results from these questions are analysed in this Annex, together with the year of starting patenting activities at the EPO.

Section 12.1 provides an overview of the sample composition in terms of the EPO technical domains and mega clusters. In **Sections 12.2 to 12.4**, the distribution of numbers of employees per applicant are shown. Finally, **Section 12.5** provides summary statistics of the more extensive indicators for company size and economic activity in various breakdown scenarios.

12.1 EPO technical domains & mega clusters

All applicants in the survey were asked to describe their activities in terms of one or more of the EPO technical domains (questionnaire **Page 4**). The following Figure 9 and Figure 10 provide an overview of the sample composition in terms of technical domains for the Biggest and Random groups.

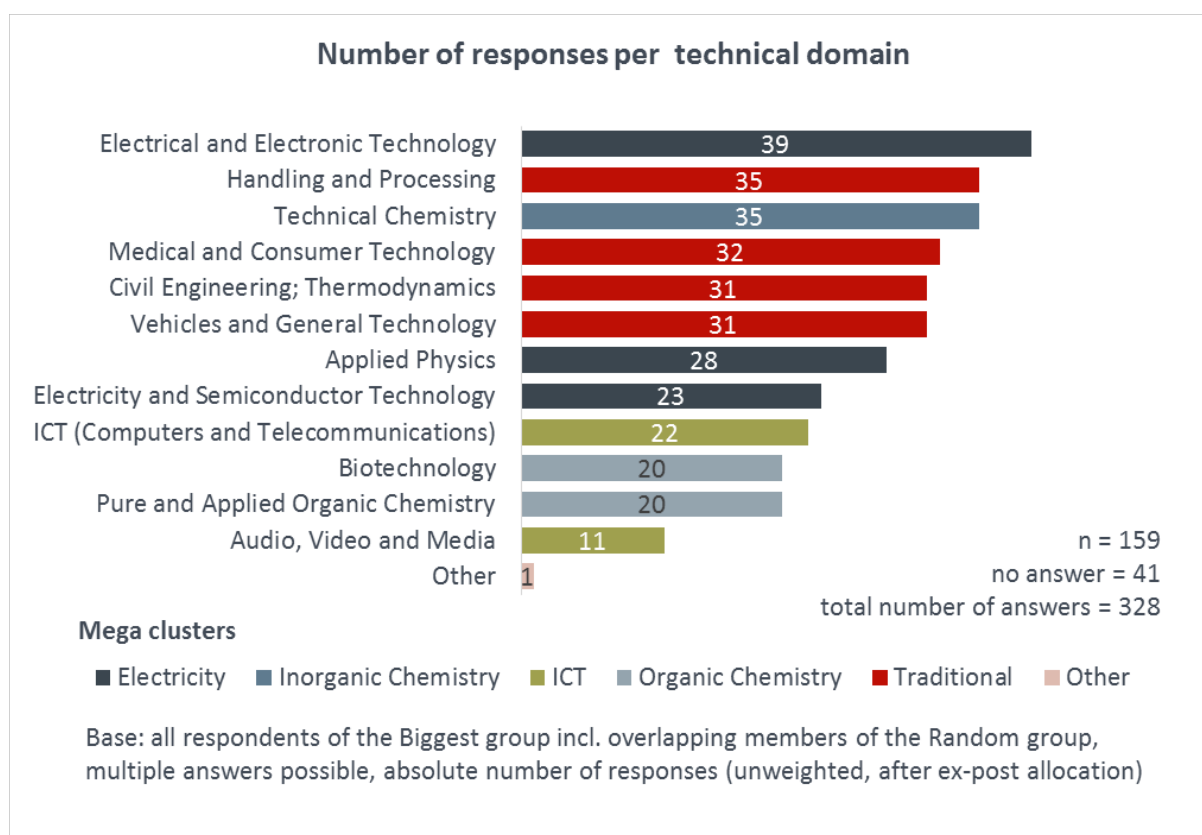


Figure 9: Number of responses per technical domain (Biggest group including overlapping members of the Random group)

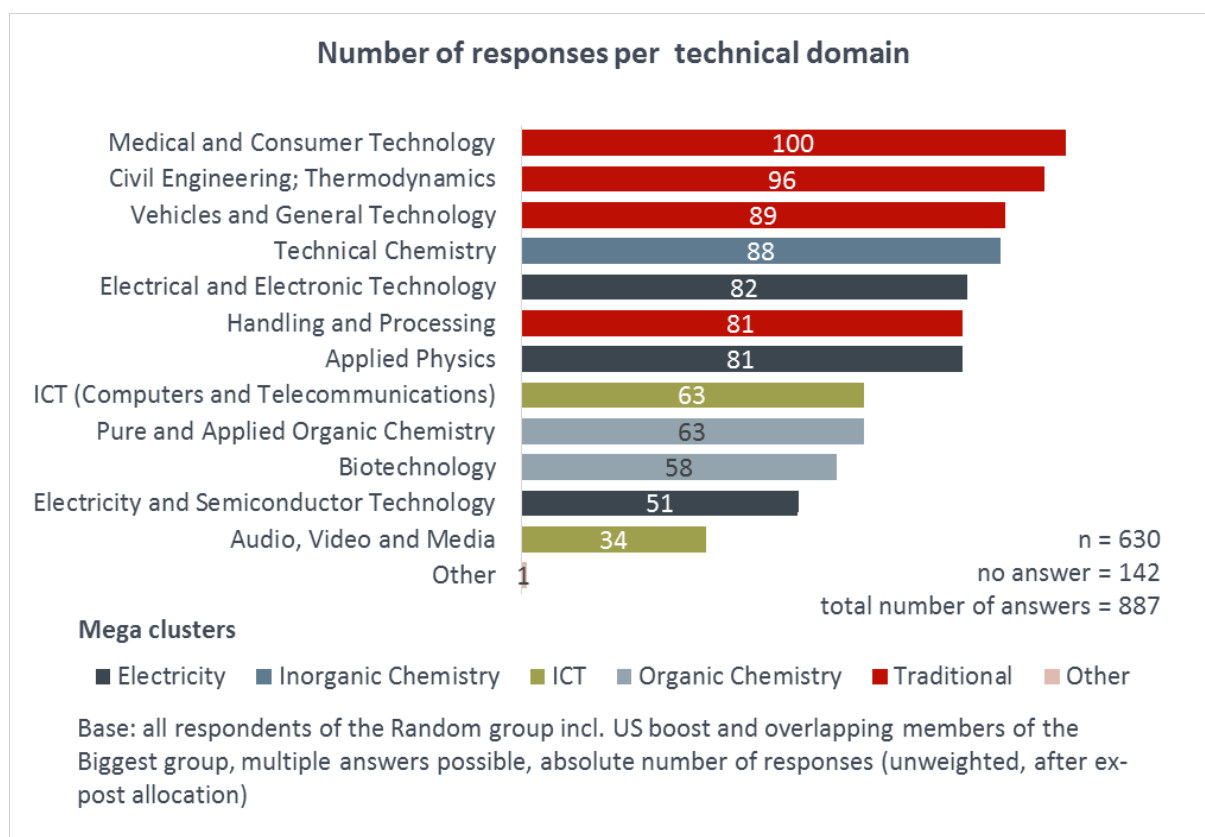


Figure 10: Number of responses per technical domain (Random group including overlapping members of the Biggest group)

Table 46 shows the residence blocs breakdown of the data for the Random group broken down by technical domains.

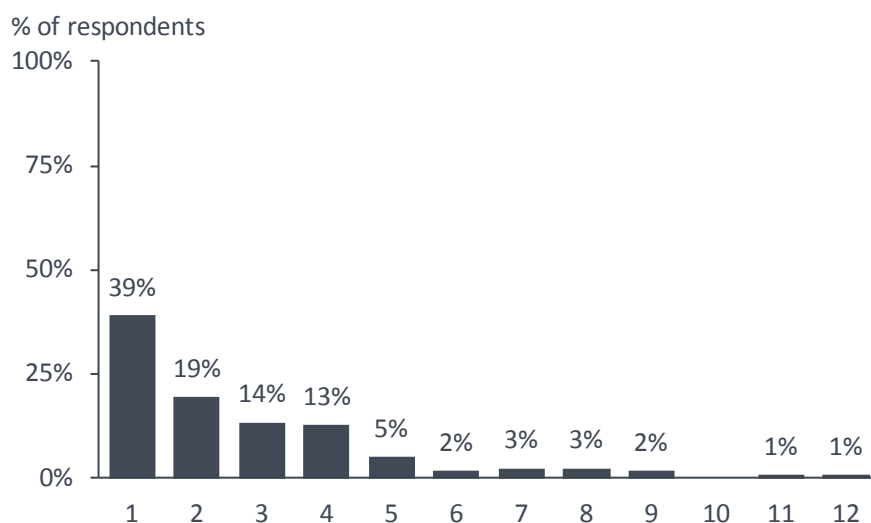
Mega cluster Technical domain	Bloc				Total
	EP	JP	OT	US	
Electricity	124	41	14	35	214
Applied Physics	53	14	4	10	81
Electrical and Electronic Technology	46	15	7	14	82
Electricity and Semiconductor Technology	25	12	3	11	51
ICT	42	15	9	31	97
Audio, Video and Media	13	6	3	12	34
Computers and Telecommunications	29	9	6	19	63
Inorganic Chemistry	40	20	7	21	88
Technical Chemistry	40	20	7	21	88
Organic Chemistry	56	19	13	33	121
Biotechnology	22	8	8	20	58
Pure and Applied Organic Chemistry	34	11	5	13	63
Traditional	213	68	12	73	366
Civil Engineering; Thermodynamics	66	9	2	19	96
Handling and Processing	49	19	3	10	81
Medical and Consumer Technology	50	18	4	28	100
Vehicles and General Technology	48	22	3	16	89
Other		1			1
Other		1			1
Total	475	164	55	193	887

Base: n = 372/85/34/139/630, corresponding to EP/JP/OT/US/total, all respondents of the Random group, including overlapping members of the Biggest group, absolute numbers of respondents (unweighted, including ex-post allocation)

Table 46: Number of responses per technical domain (Random group including overlapping members of the Biggest group), broken down by bloc

Figure 11 and **Figure 12** show the distribution of responses in both the Biggest and Random groups combined with the number of technical domains chosen. In terms of the five mega clusters (for details see **Annex III, Section 9.8**), the average number of mega clusters per respondent that gave information on technical domains, is 2.78 for the Biggest group respondents (1.80 in 2016) and 1.82 for the Random group respondents (1.52 in 2016).

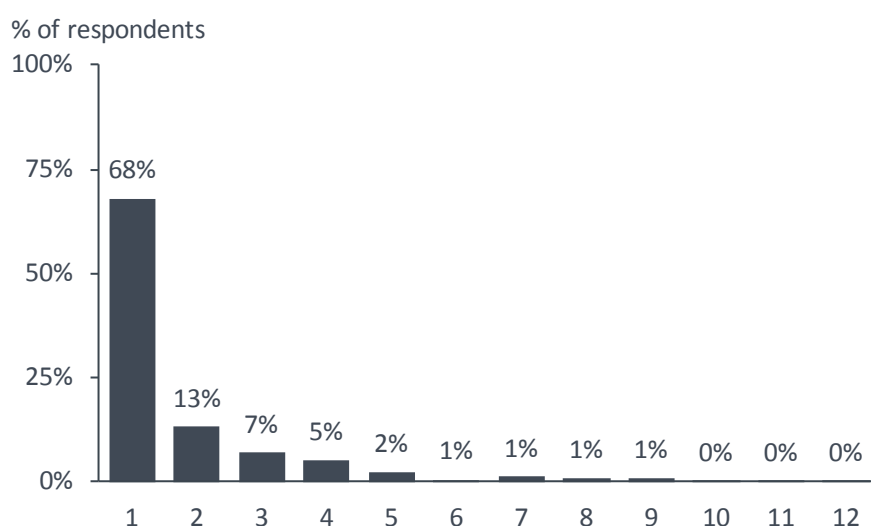
Number of technical domains per respondent
(Biggest incl. overlapping members of the Random group)



Base: n = 118, all respondents of the Biggest group incl. overlapping members of the Random group who provided domain information, percent numbers of respondents (unweighted, including ex-post cluster allocation)

Figure 11: Number of technical domains selected per respondent (Biggest group including overlapping members of the Random group)

Number of technical domains per respondent
(Random incl. overlapping members of the Biggest group)



Base: n = 488, all respondents of the Random group incl. overlapping members of the Biggest group who provided domain information, percent numbers of respondents (unweighted, including ex-post cluster allocation)

Figure 12: The number of technical domains selected per respondent (random group including overlapping members of the Biggest group)

Table 47 and **Table 48** below indicate which combinations of technical domains and mega clusters are cited most frequently. In each case, there is a two-way matrix describing the cluster combinations selected by the respondents. The upper right-hand triangle of each table shows absolute numbers of respondents that indicate the respective combination, while the lower left-hand triangle gives a normalised mutual information statistic (NMI) that indicates to what degree each pair of clusters overlaps (for details see **Section 9.9**).

Both tables indicate pairwise combinations, but this picture is not totally complete, as **Figure 11** and **Figure 12** show that respondents occasionally indicate activities in more than two technical domains.

Tables 47 and **48** reflect a similar picture to that seen over the past three years when this exercise was undertaken. There are relatively high degrees of overlap between technical domains that are grouped together in one and the same mega cluster. Within mega cluster NMIs are higher in the Biggest group. For both the Biggest and Random groups, this mostly applies to technical domain combinations within the four mega clusters: Electricity, Information Technology and Organic Chemistry. Within the Traditional mega cluster, this effect does show up in the Biggest group in some combinations of rather diverse technical domains.

However, there is a fairly high degree of overlap between the Electricity and ICT mega clusters. In addition, there are high degrees of overlap between some other pairs of technical domains that are allocated to different mega clusters. The Computers and Telecommunications technical domains overlap with Electrical and Electronic Technology. Medical and Consumer Technology has a high overlap with the Electrical and Electronic Technology technical domain and also with both Organic Chemistry technical domains. Vehicles and General Technology has a high overlap with Electrical and Electronic Technology. These effects are most prominent in the Biggest group table.

In general and as expected, overlapping scores turn out to be lower in the Random group than in the Biggest group, as smaller applicants are more likely to indicate activity in one technical domain only. It should be noted that no weighting has been applied to the Random group in **Table 48** in order to better emulate the distributions for the applicant population as a whole.

		Electricity			ICT		Inorg. Chem.	Organic Chemistry		Traditional			
Technical domain	#	1	2	3	4	5	6	7	8	9	10	11	12
Applied Physics	1	28	12	8	5	8	12	3	7	13	17	8	8
Electrical and Electronic Technology	2	0.36	39	13	7	13	14	7	6	15	19	17	14
Electricity and Semiconductor Technology	3	0.32	0.43	23	5	8	9	4	3	5	8	9	9
Audio, Video and Media	4	0.28	0.34	0.31	11	9	3	3	4	4	6	4	4
ICT (Computers and Telecommunications)	5	0.32	0.44	0.36	0.58	22	10	6	5	6	12	9	10
Technical Chemistry	6	0.38	0.38	0.32	0.15	0.36	35	10	8	12	20	14	12
Biotechnology	7	0.13	0.25	0.19	0.20	0.29	0.38	20	9	2	7	12	3
Pure and Applied Organic Chemistry	8	0.30	0.21	0.14	0.27	0.24	0.3	0.45	20	5	10	11	3
Civil Engineering; Thermodynamics	9	0.44	0.43	0.19	0.22	0.23	0.36	0.08	0.2	31	15	5	11
Handling and Processing	10	0.54	0.51	0.28	0.31	0.43	0.57	0.26	0.38	0.46	35	16	14
Medical and Consumer Technology	11	0.27	0.48	0.33	0.21	0.34	0.42	0.47	0.43	0.16	0.48	32	7
Vehicles and General Technology	12	0.27	0.4	0.34	0.22	0.38	0.36	0.12	0.12	0.35	0.43	0.22	31
Normalised Mutual Information (NMI)													

Absolute numbers of respondents (unweighted, without "other")

Base: n = 118, all respondents of the Biggest group, incl. overlapping members of the Random group, who provided domain information (including ex-post cluster allocation)

Table 47: Number of responses and overlap per technical domain combination (two-way matrix, Biggest group including overlapping members of the Random group)

		Electricity			ICT		Inorg. Chem.	Organic Chemistry		Traditional				
Technical domain	#	1	2	3	4	5	6	7	8	9	10	11	12	Absolute numbers of respondents (unweighted, without "other")
Applied Physics	1	81	23	14	9	15	28	8	20	15	24	16	16	
Electrical and Electronic Technology	2	0.28	82	20	13	27	22	12	11	25	27	25	23	
Electricity and Semiconductor Technology	3	0.22	0.31	51	12	12	16	10	10	7	12	15	13	
Audio, Video and Media	4	0.17	0.25	0.29	34	18	7	9	8	7	7	9	8	
ICT (Computers and Telecommunications)	5	0.21	0.38	0.21	0.39	63	16	11	10	11	15	15	14	
Technical Chemistry	6	0.33	0.26	0.24	0.13	0.21	88	20	25	22	28	25	19	
Biotechnology	7	0.12	0.17	0.18	0.20	0.18	0.28	58	21	5	11	19	7	
Pure and Applied Organic Chemistry	8	0.28	0.15	0.18	0.17	0.16	0.34	0.35	63	9	16	24	8	
Civil Engineering; Thermodynamics	9	0.17	0.28	0.1	0.12	0.14	0.24	0.07	0.12	96	20	11	17	
Handling and Processing	10	0.3	0.33	0.19	0.13	0.21	0.33	0.16	0.22	0.23	81	25	19	
Medical and Consumer Technology	11	0.18	0.28	0.21	0.15	0.19	0.27	0.25	0.3	0.11	0.28	100	15	
Vehicles and General Technology	12	0.19	0.27	0.19	0.15	0.19	0.21	0.1	0.11	0.18	0.22	0.16	89	
Normalised Mutual Information (NMI)														

Base: n = 488, all respondents of the Random group, incl. overlapping members of the Biggest group, who provided domain information (including ex-post cluster allocation)

Table 48: Number of responses and overlap per technical domain combination (two-way matrix, Random group including overlapping members of the Biggest group)

12.2 Respondents from the Biggest group

Figure 13 shows that only 3% of the respondents have less than 250 employees, while 74% have 5,000 employees or more. Broken down by residence bloc, the distribution of the number of employees in the Biggest group is shown in **Table 49**.

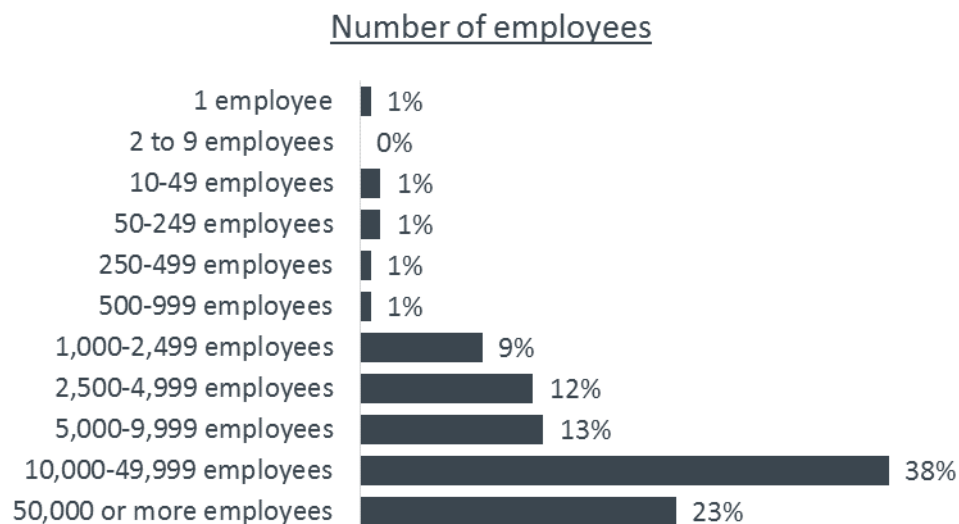


Figure 13: Biggest group by number of employees

	1	2 to 9	10-49	50-249	250-499	500-999	1,000-2,499	2,500-4,999	5,000 - 9,999	10,000 - 49,999	50,000 or more	Total	Number of cases
Total	1%	0%	1%	1%	1%	1%	9%	12%	13%	38%	23%	100%	137
EP	1%	0%	2%	2%	0%	1%	9%	15%	13%	32%	24%	100%	85
JP	0%	0%	0%	0%	3%	0%	0%	7%	17%	59%	14%	100%	29
OT	0%	0%	0%	0%	0%	0%	25%	25%	25%	0%	25%	100%	4
US	0%	0%	0%	0%	0%	0%	16%	5%	5%	42%	32%	100%	19

Table 49: Biggest group by number of employees and residence bloc

12.3 Respondents from the Random group

Figure 14 shows that 27% of the Random group applicants have a maximum of 249 employees, while 40% have 5,000 employees or more. Considering the sampling errors of surveys, the summary percentages from the unweighted Random group for a maximum of 249 employees are similar to those reported in the surveys conducted between 2014 and 2016. (The 2015 survey had shown an unusually high 40% proportion of Random group applicants with a maximum of 249 employees). Broken down by residence bloc, the distribution of number of employees in the Random group is shown in **Table 50**.

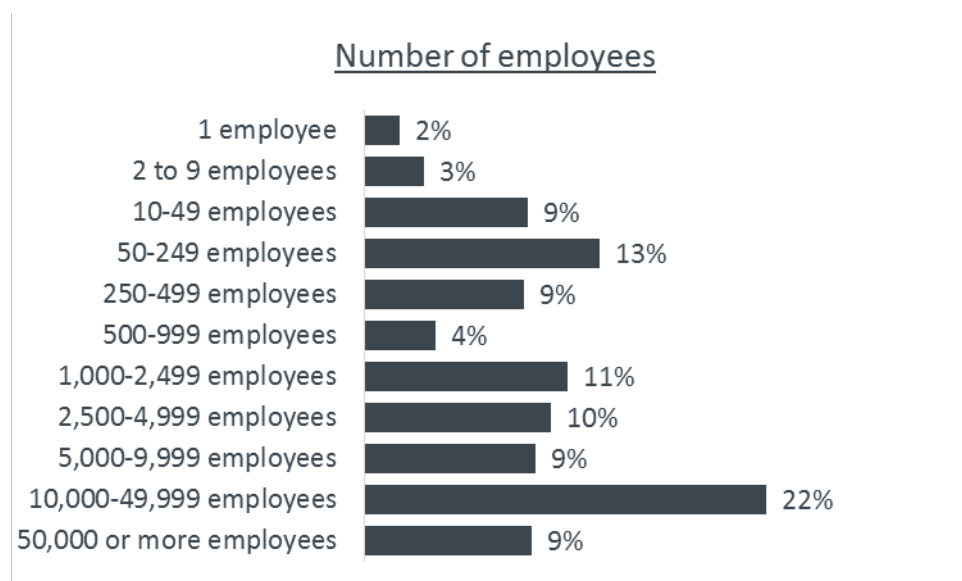


Figure 14: Random group by number of employees

Broken down by residence bloc, distributions of number of employees are shown in the following table:

	1	2 to 9	10-49	50-249	250-499	500-999	1,000-2,499	2,500-4,999	5,000 - 9,999	10,000 - 49,999	50,000 or more	Total	Number of cases
Total	2%	3%	9%	13%	9%	4%	11%	10%	9%	22%	9%	100%	466
EP	2%	4%	10%	14%	10%	5%	12%	10%	8%	14%	10%	100%	285
JP	0%	0%	0%	2%	4%	2%	17%	10%	12%	42%	12%	100%	52
OT	0%	0%	9%	14%	18%	9%	5%	9%	14%	18%	5%	100%	22
US	2%	5%	9%	13%	6%	2%	6%	10%	9%	32%	7%	100%	107

Table 50: Random group, broken down by persons employed and residence bloc

12.4 Estimated composition of the population of EPO applicants

Although the Random group is primarily designed to be a random sample drawn from the pool of applications, it can also be used to make inferences about the properties and composition of the population of EPO applicants, by using a weighting scheme.

The weighting to estimate applicant population characteristics uses the extended structural weight approach that was first introduced in the *Future Filings Survey 2010 report*²⁰. These weights are based on the denominator of the Poisson weight and then an adjustment to match the sample to the population by bloc and size classes. The adjustment is achieved by using the sample response rate by size class per bloc of residence (SRSS). For further details on SRSS, see **Section 9.10** (Annex III).

Table 51 shows bloc-wise SRSS values based on filing count class. Filing count classes are defined by a range of filing counts from lower bound ("lb") to upper bound ("ub"). Bloc-specific SRSS values are used since there are differences in sample response rates between blocs.

Class	lb	up	EP	JP	OT	US	Total
1	1	1	0.25	0.58	0.07	0.13	0.19
2	2	2	0.32	0.22	0.13	0.14	0.22
3	3	3	0.28	0.45	0.06	0.18	0.24
4	4	5	0.25	0.22	0.20	0.12	0.19
5	6	9	0.26	0.31	0.11	0.11	0.20
6	10	19	0.30	0.33	0.13	0.17	0.24
7	20	39	0.28	0.25	0.05	0.12	0.20
8	40	no limit	0.32	0.32	0.17	0.18	0.27
Total			0.28	0.32	0.11	0.14	0.22

Table 51: Bloc-wise SRSS values of the Random sample by filing count class

The results in **Table 51** are consistent with **Table 28**, which also shows that the highest response rates are found from applicants residing in Japan and the EPC.

Extended structural weights are applied for estimating distributions for the whole applicant population. Some statistics resulting from the answers of the respondents are given in **Tables 52, 53, 55, 57** below and also in **Annex VII**.

Regarding the number of employees, the weighted estimated distributions in the population are now shown as histograms.

²⁰ Cf. Future Filings Survey 2010 report, Section 11.4, p. 77.

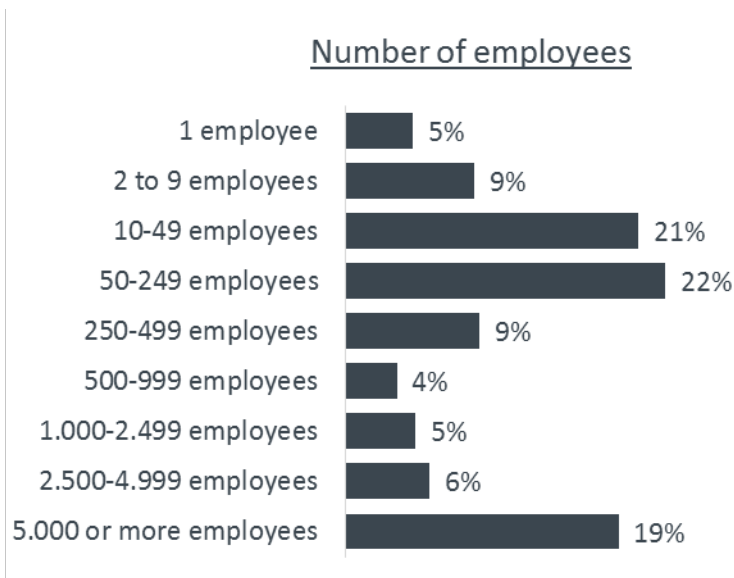


Figure 15: Estimated distribution of the EPO applicant population by number of employees

The inference for the whole applicant population is that 57% of applicants have a maximum of 249 employees, while only 20% have more than 5,000 employees. The corresponding estimates in the 2016 report were 63% and 5% respectively. The distribution in **Figure 15** shows a strong contrast to the data for the Biggest group in **Figure 12**.

Broken down by residence bloc, the inferred distributions of numbers of employees are shown in **Table 52**.

	1	2 to 9	10-49	50-249	250-499	500-999	1,000-2,499	2,500-4,999	5,000 - 9,999	10,000 - 49,999	50,000 or more	Total
Total	5%	9%	21%	22%	10%	3%	5%	6%	4%	14%	2%	100%
EP	6%	8%	22%	24%	12%	4%	7%	5%	2%	7%	2%	100%
JP	0%	0%	0%	8%	5%	1%	48%	8%	6%	19%	5%	100%
OT	0%	0%	20%	25%	12%	6%	0%	2%	7%	26%	2%	100%
US	5%	13%	20%	21%	7%	1%	1%	8%	5%	19%	1%	100%

Table 52: Estimated distribution of EPO applicants by number of employees and residence bloc

Notable differences can be inferred in company sizes of different residence blocs: 60% of applicants from the EP bloc, 59% from the US bloc, and 45% from the OT bloc have fewer than 250 employees, while the industrial concentration in Japan means that only 8% have fewer than 250 employees. While numbers for residence blocs EP, US, OT are similar to the 2016 report, the JP bloc this year has significantly less companies with fewer than 250 employees, 8% compared to 35% last year. Last year, 19% of companies from the OT bloc had 1 to 9 employees, while this year it is 0%.

12.5 Analysis of economic attributes

In **Pages 5-6** of the questionnaire, applicants were asked to provide information about their R&D budgets; numbers of staff; numbers of first patent filings throughout the world; and year the company started filing activities at the EPO Office. All responses given were in respect of activities during 2016 (except for starting year).

With regards to the questions about R&D budget, currencies had to be specified by the respondents. Therefore, before analysing, the numbers given for R&D budget and turnover were converted to euros. Interbank exchange rates, applicable as at the 30th September 2017, were applied accordingly.

The tables in this section contain two groups of attributes. The first group contains (from left to right): number of employees, the proportion of applicants that are SMEs²¹, and consequently, the proportion of applications that are made by SMEs. The second group contains the approximate R&D budget, the number of worldwide first patent filings, R&D budget by first patent filing and year the company started filing activities at the EPO Office.

The summary results for the attributes from the Biggest and Random groups are shown in **Table 53**. Bearing in mind the asymmetry of certain distributions among the population, particularly for the variables that measure quantities related to the size of applicant companies, and also when considering the robustness of the estimates, for the Random group it is considered more appropriate to compare the weighted medians rather than the weighted means. In order to convey the variability associated with the reported measures, 95% normal approximation confidence intervals for the weighted mean are given when reporting results for the Random group employing structural weights²². Also, for tables based on the Random group and employing structural weights, the "Weighted N" reported is the sum of the standardised structural weights²³.

Detailed tables are shown in unweighted and weighted versions for the Random group in **Table 54** to **Table 57**. These tables contain breakdowns by residence bloc and mega cluster.

For the analyses broken down by residence bloc, **Table 54** contains the unweighted analyses for the Random group, and **Table 55** contains the weighted results of the Random group. For the analyses itemised by mega cluster, **Table 56** contains the unweighted analyses for the Random group, and **Table 57** contains the weighted results of the Random group. The weights have large spans between respondents, so comparisons should be made with caution. The distribution of the measured quantities within the applicant population shifts slightly from year to year due to the sampling effects as well as the changes in economic circumstances of the applicants.

²¹ SME determination was made based on the applicant declaration as given by the answer to the question. SME status was set to "not available" if the respondent indicated that he is answering on behalf of a smaller or larger entity. Cases with missing information on SME status are not included in the analysis. For numbers of patent applications, these were the counts of Euro-direct + Euro-PCT-RP filings in 2016 from the EPO database, that were also used for calculating Poisson weights.

²² Calculation of confidence intervals is based on a normal approximation. Thus, the confidence interval is calculated as the weighted mean ± 1.96 standard error of the weighted mean. For the binary variable "Proportion of SMEs among applicants", a dummy coding (0="not an SME", 1="SME") was used. For further details, see Cochran, W.G., "Sampling Techniques", Wiley, 1977, chapter 3.

²³ Standardisation is performed so that the sum of standardised structural weights equals the unweighted sample size of the Random group. Since there are partial response rates to certain questions, this means that the sum of standardised structural weights is still not usually identical to the unweighted sample size.

Several of the columns in the tables report statistics about the same variables as in earlier reports. Consider the weighted results from the Random group as in **Table 53** (bottom part), **Table 55** and **Table 57**.

In the first group of attributes, the median number of employees has increased to 126 from 95 in the previous survey (see also **Figure 14** to **Figure 20**). This is highest number seen since the 2011 survey. The proportion of SMEs among applicants is considered to be better estimated by the mean proportion than by the median (not shown). In the current survey the mean proportion increased to 55% from 53% in the 2016 survey, with 95% confidence limits of 50% to 61%. It should be noted that this proportion is close to the mean proportion of applicants with less than 250 employees of approximately 57% that was shown in Figure 16. The estimates for the proportion of SMEs vary by residence bloc between Japan at 0%, Others at 48%, the US at 55%, and the EPC being the highest at 60%. The proportion of applications made by SMEs (Total applications in 2016, being the sum of Euro-direct and Euro-PCT-RP) were estimated from the weighted analysis as 17% overall (18% in 2016 and 26% in 2015) with 95% confidence limits ranging of 13% to 21%. The estimates vary by residence bloc between Japan at 0%, Others at 20%, EPC at 19% and the US at 19%. Given the variability of the estimates as indicated by the 95% confidence limits, the survey's estimates concerning the share of SME applicants at the EPO as well as the share of EPO applications made by SME applicants have been essentially stable for all surveys since 2012.

In the second group of attributes, the median R&D budget declined from EUR 0.8 million in the previous survey to EUR 0.5 million. The median number of first filings is 3 compared to 4 in 2016, 1 in 2015, and 3 in 2014. The median R&D expenditure per first filing was lower at EUR 150,000, compared to 250,000 EUR in the previous year's survey (EUR 200,000 in the 2015 survey).

Looking at the breakdowns of weighted results by mega clusters in **Table 57**, the median number of employees is highest in Organic Chemistry and lowest in Traditional. Traditional is the most variable class which contains both the minimum and maximum number of employees across the whole sample. The proportions of SMEs among applicants are highest in Traditional, but lowest in Organic Chemistry. The proportions of Total applications by SMEs are highest in Traditional and lowest in Inorganic Chemistry. Median R&D Budgets are highest (and close to each other) in Organic and Inorganic Chemistries, but lowest in Electricity. Median numbers of worldwide first filings are highest in Inorganic Chemistry and lowest in Traditional. Median R&D spend per first filing is highest in Organic Chemistry and lowest in Electricity.

This year additional analysis was done on the year of company starting patenting activities at the EPO. The overall median of the start of the patenting activities was year 2010, with OT residence bloc patenting activities being youngest and starting at median 2014. The oldest patenting activities were in JP residence bloc with median start year 1998. For Mega Clusters, the youngest median was 2013 for ICT and the oldest median was 1998 for Inorganic Chemistry.

All of the results are quite variable, and this is evidenced by the wide 95% confidence limits for most of the respective weighted means.

In **Section 12.4**, histograms were drawn to reflect the distributions represented by the weighted means and medians for numbers of employees. Similar histograms could also be constructed for the other measures described in this section.

Sample group	Statistic	Number of employees at the end of 2016	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2016[EUR]	Number of first patent filings throughout the world in 2016	R&D budget by first patent filing [EUR per first filing]	Year of starting patenting activities at EPO
Biggest Unweighted	N	138	103	103	69	145	68	138
	MIN	1			500,000	2	1,551	1982
	MAX	508,036			10,000,000,000	5,427	50,000,000	2014
	MEDIAN	15,881			157,176,000	119	1,074,239	1982
	MEAN	42,362	1%	0%	958,645,001	413	4,323,237	1988
Random Unweighted	N	466	335	335	219	491	188	519
	MIN	1			1,285	1	1,551	1982
	MAX	508,036			10,000,000,000	5,427	67,230,769	2016
	MEDIAN	2,399			6,060,800	10	500,000	1998
	MEAN	18,395	24%	1%	333,587,302	142	3,254,212	1998
Random Weighted	WEIGHTED N	391	288	288	207	458	170	525
	MIN	1			1,285	1	1,551	1982
	MAX	508,036			10,000,000,000	5,427	67,230,769	2016
	MEDIAN	126			500,000	3	150,000	2010
	MEAN	5,920	55%	17%	42,696,794	19	1,482,568	2006
	MEAN 95% LB	3,956	50%	13%	23,680,938	14	816,988	
	MEAN 95% UB	7,884	61%	21%	61,712,651	24	2,148,148	

Table 53: Main statistics for the various sample groups

Residence Bloc	Statistic	Number of employees at the end of 2016	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2016[EUR]	Number of first patent filings throughout the world in 2016	R&D budget by first patent filing [EUR per first filing]	Year of starting patenting activities at EPO
EP	N	285	196	196	132	287	111	310
	MIN	1			15,000	1	1,697	1982
	MAX	508,036			10,000,000,000	4,488	67,230,769	2016
	MEDIAN	1,400			2,500,000	8	500,000	1998
	MEAN	17,734	30%	1%	289,846,310	89	3,241,964	1998
JP	N	52	50	50	29	67	27	70
	MIN	242			7,576	1	1,894	1982
	MAX	375,000			2,272,800,000	1,990	43,183,200	2016
	MEDIAN	10,714			37,880,000	129	343,739	1988
	MEAN	31,294	0%	0%	278,680,384	360	2,666,961	1992
OT	N	22	13	13	16	23	13	25
	MIN	20			1,285	1	1,667	1982
	MAX	68,000			9,816,243,500	5,427	36,278,356	2016
	MEDIAN	962			3,158,600	16	514,971	2011
	MEAN	11,107	31%	0%	766,282,260	312	4,136,214	2008
US	N	107	76	76	42	114	37	114
	MIN	1			84,960	1	1,551	1982
	MAX	146,200			5,267,520,000	2,739	42,480,000	2016
	MEDIAN	3,850			22,744,000	8	637,200	2003
	MEAN	15,387	26%	1%	344,134,738	113	3,409,600	2000
Random Unweighted Total	N	466	335	335	219	491	188	519
	MIN	1			1,285	1	1,551	1982
	MAX	508,036			10,000,000,000	5,427	67,230,769	2016
	MEDIAN	2,399			6,060,800	10	500,000	1998
	MEAN	18,395	24%	1%	333,587,302	142	3,254,212	1998

Table 54: Main statistics for activities by residence bloc – Random group (unweighted)

Residence Bloc	Statistic	Number of employees at the end of 2016	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2016[EUR]	Number of first patent filings throughout the world in 2016	R&D budget by first patent filing [EUR per first filing]	Year of starting patenting activities at EPO
EP	WEIGHTED N	188	140	140	96	205	73	243
	MIN	1			15,000	1	1,697	1982
	MAX	508,036			10,000,000,000	4,488	67,230,769	2016
	MEDIAN	102			400,000	2	150,000	2010
	MEAN	4,790	60%	19%	28,626,315	14	1,523,539	2005
	MEAN 95% LB	2,713	52%	13%	11,704,372	9	799,847	
	MEAN 95% UB	6,867	68%	24%	45,548,258	18	2,247,231	
JP	WEIGHTED N	10	8	8	4	18	4	18
	MIN	242			7,576	1	1,894	1982
	MAX	375,000			2,272,800,000	1,990	43,183,200	2016
	MEDIAN	1,651			22,728,000	7	263,933	1998
	MEAN	14,822	0%	0%	147,440,471	101	2,019,426	2000
	MEAN 95% LB	3,097	0%	0%	28,725,341	54	0	
	MEAN 95% UB	26,546	0%	0%	266,155,600	147	4,983,062	
OT	WEIGHTED N	39	32	32	41	56	34	82
	MIN	20			1,285	1	1,667	1982
	MAX	68,000			9,816,243,500	5,427	36,278,356	2016
	MEDIAN	251			42,480	5	38,550	2014
	MEAN	11,464	48%	20%	60,106,837	33	987,226	2011
	MEAN 95% LB	0	31%	0%	0	3	0	
	MEAN 95% UB	25,112	65%	42%	124,959,994	62	2,100,858	
US	WEIGHTED N	154	108	108	66	179	59	182
	MIN	1			84,960	1	1,551	1982
	MAX	146,200			5,267,520,000	2,739	42,480,000	2016
	MEDIAN	126			1,274,400	3	283,200	2009
	MEAN	5,286	55%	19%	45,718,950	14	1,681,309	2007
	MEAN 95% LB	3,167	46%	10%	7,345,566	8	135,508	
	MEAN 95% UB	7,405	65%	28%	84,092,333	19	3,227,109	
Random Weighted Total	WEIGHTED N	391	288	288	207	458	170	525
	MIN	1			1,285	1	1,551	1982
	MAX	508,036			10,000,000,000	5,427	67,230,769	2016
	MEDIAN	126			500,000	3	150,000	2010
	MEAN	5,920	55%	17%	42,696,794	19	1,482,568	2006
	MEAN 95% LB	3,956	50%	13%	23,680,938	14	816,988	
	MEAN 95% UB	7,884	61%	21%	61,712,651	24	2,148,148	

Table 55: Main statistics for activities by residence bloc – Random group (weighted)

Mega Cluster	Statistic	Number of employees at the end of 2016	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2016[EUR]	Number of first patent filings throughout the world in 2016	R&D budget by first patent filing [EUR per first filing]	Year of starting patenting activities at EPO
Electricity	N	131	104	104	74	158	70	151
	MIN	1			7,576	1	1,551	1982
	MAX	360,000			9,816,243,500	5,427	67,230,769	2016
	MEDIAN	3,300			26,232,000	20	654,764	1993
	MEAN	18,339	13%	0%	385,511,815	205	4,132,896	1995
Inorganic Chemistry	N	77	55	55	42	84	40	79
	MIN	5			100,000	1	10,204	1982
	MAX	200,000			2,000,000,000	1,246	43,000,000	2016
	MEDIAN	7,000			33,808,000	31	568,600	1988
	MEAN	20,843	9%	0%	153,132,568	133	2,760,435	1990
ICT	N	60	45	45	29	73	27	72
	MIN	2			42,480	1	8,496	1982
	MAX	146,200			9,816,243,500	5,427	67,230,769	2016
	MEDIAN	4,500			99,800,000	15	761,905	1998
	MEAN	15,409	13%	0%	633,286,130	206	5,970,587	1998
Organic Chemistry	N	81	64	64	43	98	42	92
	MIN	5			10,000	1	1,667	1982
	MAX	146,200			4,248,000,000	1,588	43,000,000	2016
	MEDIAN	4,000			37,880,000	17	1,155,556	1998
	MEAN	15,500	14%	0%	259,506,857	106	5,257,968	1996
Traditional	N	213	171	171	109	262	98	259
	MIN	1			15,000	1	1,551	1982
	MAX	508,036			4,700,000,000	3,507	36,278,356	2016
	MEDIAN	3,100			4,248,000	12	277,964	1998
	MEAN	21,666	24%	1%	184,382,918	124	2,074,925	1997
Random Unweighted Total	N	466	335	335	219	491	188	519
	MIN	1			1,285	1	1,551	1982
	MAX	508,036			10,000,000,000	5,427	67,230,769	2016
	MEDIAN	2,399			6,060,800	10	500,000	1998
	MEAN	18,395	24%	1%	333,587,302	142	3,254,212	1998

Table 56: Main statistics for activities in various sectors – Random group (unweighted)

Mega Cluster	Statistic	Number of employees at the end of 2016	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2016[EUR]	Number of first patent filings throughout the world in 2016	R&D budget by first patent filing [EUR per first filing]	Year of starting patenting activities at EPO
Electricity	WEIGHTED N	71	52	52	51	112	48	104
	MIN	1			7,576	1	1,551	1982
	MAX	360,000			9,816,243,500	5,427	67,230,769	2016
	MEDIAN	300			169,920	4	38,550	2008
	MEAN	5,025	50%	9%	63,259,926	31	1,906,004	2004
	MEAN 95% LB	2,574	36%	4%	14,370,059	17	671,755	
	MEAN 95% UB	7,476	63%	15%	112,149,792	45	3,140,252	
Inorganic Chemistry	WEIGHTED N	45	35	35	24	51	22	47
	MIN	5			100,000	1	10,204	1982
	MAX	200,000			2,000,000,000	1,246	43,000,000	2016
	MEDIAN	400			8,000,000	7	637,200	1998
	MEAN	10,213	38%	6%	68,526,383	31	2,253,513	1996
	MEAN 95% LB	3,051	22%	0%	20,876,092	17	236,815	
	MEAN 95% UB	17,375	54%	13%	116,176,674	44	4,270,210	
ICT	WEIGHTED N	41	30	30	22	61	18	66
	MIN	2			42,480	1	8,496	1982
	MAX	146,200			9,816,243,500	5,427	67,230,769	2016
	MEDIAN	300			549,180	5	60,000	2013
	MEAN	4,673	44%	12%	96,003,760	30	1,049,853	2008
	MEAN 95% LB	1,852	26%	3%	0	10	0	
	MEAN 95% UB	7,494	62%	22%	206,684,296	50	2,329,840	
Organic Chemistry	WEIGHTED N	70	62	62	51	103	49	108
	MIN	5			10,000	1	1,667	1982
	MAX	146,200			4,248,000,000	1,588	43,000,000	2016
	MEDIAN	2,500			6,000,000	6	606,857	2010
	MEAN	10,409	33%	9%	72,889,423	23	2,743,320	2006
	MEAN 95% LB	2,970	21%	2%	20,169,202	12	668,755	
	MEAN 95% UB	17,849	44%	16%	125,609,643	35	4,817,885	
Traditional	WEIGHTED N	157	122	122	83	221	71	218
	MIN	1			15,000	1	1,551	1982
	MAX	508,036			4,700,000,000	3,507	36,278,356	2016
	MEDIAN	126			212,400	2	87,500	2010
	MEAN	6,614	63%	14%	32,511,770	17	1,048,466	2005
	MEAN 95% LB	3,734	55%	9%	5,409,916	12	356,906	
	MEAN 95% UB	9,495	72%	19%	59,613,624	23	1,740,026	
Random Weighted Total	WEIGHTED N	391	288	288	207	458	170	525
	MIN	1			1,285	1	1,551	1982
	MAX	508,036			10,000,000,000	5,427	67,230,769	2016
	MEDIAN	126			500,000	3	150,000	2010
	MEAN	5,920	55%	17%	42,696,794	19	1,482,568	2006
	MEAN 95% LB	3,956	50%	13%	23,680,938	14	816,988	
	MEAN 95% UB	7,884	61%	21%	61,712,651	24	2,148,148	

Table 57: Main statistics for activities in various sectors – Random group (weighted)

13 ANNEX VII: DEVELOPMENT OF EUROPEAN PATENT PORTFOLIOS

The 2017 survey included an additional question that had been asked in previous surveys between 2013 and 2015. The object of the question was to obtain the applicants' assessments of their European patent portfolios. The main difference between this year's survey and that of last year is that information was only sought as far back as the year 2005, whereas in 2016 it was from as far back as the year 2000. Therefore, this needs to be taken into account when comparing portfolio statistics between the reports.

The summary results from the Biggest and Random groups appear in **Table 58**, while **Tables 59** to **60** provide more detail on Random group results (both unweighted and weighted), as well as broken down by residence bloc and mega clusters.

Each table contains statistics on the proportion of the 2016 European patent portfolios that were non-existent in 2005, as well as the growth from 2005 to 2016 of those European patent portfolios that existed in 2005.

Among the Random group applicants, it is estimated that 76% of current European patent portfolios had not existed in 2005. The weighted median portfolio growth rate since the year 2005, for Random group applicants with patent portfolios in 2005, was 200%, which was within the same range as for the earlier surveys.

The reduced time lag from 2000 to 2005, should have led to a lower weighted proportion of current portfolios that were non-existent in 2005. But it is quite the opposite, in that the weighted proportion is 76% compared to 63% in the 2016 survey.

Sample group	Statistic	Proportion of 2016 European patent portfolios which were nonexistent in 2005	Growth of European patent portfolios from 2005 to 2016
Biggest Unweighted	N	114	48
	MIN		-50%
	MAX		5900%
	MEDIAN		148%
	MEAN	58%	621%
Random Unweighted	N	449	157
	MIN		-90%
	MAX		9300%
	MEDIAN		200%
	MEAN	65%	500%
Random Weighted	WEIGHTED N	464	111
	MIN		-90%
	MAX		9300%
	MEDIAN		200%
	MEAN	76%	365%
	MEAN 95% LB	72%	250%
	MEAN 95% UB	80%	480%

Table 58: Development of European Patent portfolios

Residence bloc	Statistic	Random group (unweighted)		Random group (weighted)	
		Proportion of 2016 European patent portfolios which were nonexistent in 2005	Growth of European patent portfolios from 2005 to 2016	Proportion of 2016 European patent portfolios which were nonexistent in 2005	Growth of European patent portfolios from 2005 to 2016
EP	N/WEIGHTED N	261	86	206	61
	MIN		-53%		-53%
	MAX		5900%		5900%
	MEDIAN		182%		200%
	MEAN	67%	438%	70%	373%
	MEAN 95% LB			64%	205%
	MEAN 95% UB			76%	541%
JP	N/WEIGHTED N	58	35	17	8
	MIN		-50%		-50%
	MAX		4800%		4800%
	MEDIAN		208%		88%
	MEAN	40%	459%	53%	362%
	MEAN 95% LB			30%	28%
	MEAN 95% UB			77%	696%
OT	N/WEIGHTED N	22	1	65	0
	MIN		2745%		2745%
	MAX		2745%		2745%
	MEDIAN		2745%		2745%
	MEAN	95%	2745%	100%	2745%
	MEAN 95% LB			99%	NaN
	MEAN 95% UB			101%	NaN
US	N/WEIGHTED N	108	35	175	42
	MIN		-90%		-90%
	MAX		9300%		9300%
	MEDIAN		254%		192%
	MEAN	68%	630%	76%	349%
	MEAN 95% LB			70%	178%
	MEAN 95% UB			82%	520%
Total	N/WEIGHTED N	449	157	464	111
	MIN		-90%		-90%
	MAX		9300%		9300%
	MEDIAN		200%		200%
	MEAN	65%	500%	76%	365%
	MEAN 95% LB			72%	250%
	MEAN 95% UB			80%	480%

Table 59: Development of European Patent portfolios by residence bloc – Random group (unweighted) and Random group (weighted)

Table 59 shows that there were notable differences in weighted median portfolio growth rates since 2005 between blocs. Japan has the lowest proportion of current portfolios that were non-existent in 2005. This is consistent with Japan having a high industrial concentration that led to a more persistent usage of the EPO during this period.

Mega Cluster	Statistic	Random group (unweighted)		Random group (weighted)	
		Proportion of 2016 European patent portfolios which were nonexistent in 2005	Growth of European patent portfolios from 2005 to 2016	Proportion of 2016 European patent portfolios which were nonexistent in 2005	Growth of European patent portfolios from 2005 to 2016
Electricity	N/WEIGHTED N	134	56	101	36
	MIN		-90%		-90%
	MAX		5900%		5900%
	MEDIAN		199%		173%
	MEAN	58%	508%	65%	344%
	MEAN 95% LB			55%	124%
	MEAN 95% UB			74%	564%
Inorganic Chemistry	N/WEIGHTED N	70	32	47	17
	MIN		-59%		-59%
	MAX		1929%		1929%
	MEDIAN		120%		200%
	MEAN	54%	361%	63%	333%
	MEAN 95% LB			49%	125%
	MEAN 95% UB			77%	541%
ICT	N/WEIGHTED N	68	28	65	16
	MIN		-59%		-59%
	MAX		9300%		9300%
	MEDIAN		355%		200%
	MEAN	59%	1043%	75%	634%
	MEAN 95% LB			64%	85%
	MEAN 95% UB			85%	1184%
Organic Chemistry	N/WEIGHTED N	83	28	92	23
	MIN		-59%		-59%
	MAX		1500%		1500%
	MEDIAN		94%		200%
	MEAN	66%	209%	75%	245%
	MEAN 95% LB			66%	100%
	MEAN 95% UB			84%	390%
Traditional	N/WEIGHTED N	236	84	207	56
	MIN		-50%		-50%
	MAX		2250%		2250%
	MEDIAN		180%		200%
	MEAN	64%	335%	73%	295%
	MEAN 95% LB			67%	201%
	MEAN 95% UB			79%	389%

Table 60: Development of European Patent portfolios in various sectors – Random group (unweighted) and Random group (weighted)

Table 60 indicates that ICT and Organic Chemistry mega clusters have the highest weighted proportions of those with current portfolios where the portfolio was non-existent in 2005. The weighted median growth rates for portfolios that have been in existence since 2005 are 200% for all mega clusters except for Electricity at 173%.

14 ANNEX VIII: ESTIMATING BIRTH & DEATH EFFECTS IN THE APPLICANT POPULATION

The method that is used to calculate correction factors was explained in Annex VIII of the 2007 survey report (with a revision in Annex X of the 2008 survey report). The data that were used in this survey are from database information in March 2017. Euro-direct applications that can be identified as divisionals were excluded from the counts.

The calculation is shown for Total Filings (ED + PCT-IP). The following table describes the carryover of all applicants from each year to all others considered in the period²⁴. Note that this representation is symmetric.

Recurrent applicants		(excluding divisionals)					Total Filings (Euro-direct + PCT-IP)					
		Also filed in										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Filers in												
	2006	54 781	18 048	15 326	13 021	11 766	11 055	10 352	9 707	9 279	8 504	8 027
	2007	18 048	57 180	18 455	15 095	13 556	12 447	11 522	10 741	10 172	9 425	8 823
	2008	15 326	18 455	56 566	17 561	15 314	13 850	12 757	11 786	11 123	10 037	9 520
	2009	13 021	15 095	17 561	53 668	17 518	15 346	13 771	12 525	11 727	10 690	10 086
	2010	11 766	13 556	15 314	17 518	56 213	18 369	15 874	14 213	13 246	11 941	11 123
	2011	11 055	12 447	13 850	15 346	18 369	56 853	18 557	15 909	14 632	13 112	12 114
	2012	10 352	11 522	12 757	13 771	15 874	18 557	56 928	18 726	16 492	14 563	13 277
	2013	9 707	10 741	11 786	12 525	14 213	15 909	18 726	57 637	19 423	16 353	14 621
	2014	9 279	10 172	11 123	11 727	13 246	14 632	16 492	19 423	60 871	19 837	16 720
	2015	8 504	9 425	10 037	10 690	11 941	13 112	14 563	16 353	19 837	61 432	19 745
	2016	8 027	8 823	9 520	10 086	11 123	12 114	13 277	14 621	16 720	19 745	59 577

A similar table follows to show the numbers of Total Filings that were made in each case by the re-filers and pre-filers. Note that representations of filings are not symmetric.

Recurrent filings		(excluding divisionals)					Total Filings (Euro-direct + PCT-IP)					
		Active in										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Filings in												
	2006	203 635	156 492	148 924	139 698	133 170	129 714	125 647	121 488	117 383	110 862	104 909
	2007	163 608	215 199	164 506	154 809	147 951	143 120	138 814	133 557	128 774	122 483	116 734
	2008	159 224	167 354	217 656	166 332	158 522	153 421	148 530	143 110	138 586	131 294	126 163
	2009	141 924	148 137	155 179	201 733	155 498	149 637	144 186	138 438	134 330	127 558	122 855
	2010	141 316	147 245	153 573	160 076	211 380	162 931	155 674	149 404	144 955	138 005	133 410
	2011	154 157	159 275	164 799	170 303	179 383	230 976	181 064	173 538	167 828	160 634	155 437
	2012	159 936	165 555	170 778	174 961	182 825	191 778	244 250	193 898	186 657	177 941	170 996
	2013	163 865	169 975	174 628	178 645	185 971	192 592	201 511	253 931	203 566	193 134	184 867
	2014	162 227	168 204	172 968	176 290	184 264	189 971	197 093	205 752	263 205	208 205	197 695
	2015	160 004	166 150	169 844	173 303	179 916	185 157	191 117	197 909	208 882	266 616	210 121
	2016	157 021	161 418	165 117	168 255	173 633	178 818	183 539	188 538	197 242	207 526	263 302

Unlike Total Applications, the number of applicants for Total Filings is not well known until about 2 years after filing. Some Total Filings that are not ascribed to applicant names are

²⁴ The data in this section were extracted from the database as at the time of analysis for the survey in January 2018. Capitalised names are used as identifiers for the applicants. Note that this Annex calculates effects for Total filings, while the comparable annexes in earlier reports calculated effects for Total applications.

excluded from the counts (less than 2% for years up to 2015 but 9% for 2016). Therefore it is suggested that rows and columns pertaining to 2016 are not dependable in the above tables because the database is not yet filled with information about the applicants and applicants for that year.

The following table shows the numbers of Total Filings that are made by applicants in the test year who did not file in the base year.

Non-recurrent filings		(excluding divisionals)				Total Filings (Euro-direct + PCT-IP)						
		Did not file in										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Filings in												
	2006	0	47 143	54 711	63 937	70 465	73 921	77 988	82 147	86 252	92 773	98 726
	2007	51 591	0	50 693	60 390	67 248	72 079	76 385	81 642	86 425	92 716	98 465
	2008	58 432	50 302	0	51 324	59 134	64 235	69 126	74 546	79 070	86 362	91 493
	2009	59 809	53 596	46 554	0	46 235	52 096	57 547	63 295	67 403	74 175	78 878
	2010	70 064	64 135	57 807	51 304	0	48 449	55 706	61 976	66 425	73 375	77 970
	2011	76 819	71 701	66 177	60 673	51 593	0	49 912	57 438	63 148	70 342	75 539
	2012	84 314	78 695	73 472	69 289	61 425	52 472	0	50 352	57 593	66 309	73 254
	2013	90 066	83 956	79 303	75 286	67 960	61 339	52 420	0	50 365	60 797	69 064
	2014	100 978	95 001	90 237	86 915	78 941	73 234	66 112	57 453	0	55 000	65 510
	2015	106 612	100 466	96 772	93 313	86 700	81 459	75 499	68 707	57 734	0	56 495
	2016	106 281	101 884	98 185	95 047	89 669	84 484	79 763	74 764	66 060	55 776	0

The modified correction factor (CF') for a future year is given as

$$CF' = \frac{(\# \text{ Total Filings year } i+j \text{ from applicants that did not file in year } i)}{(\# \text{ Total Filings year } i \text{ from applicants that did not file in year } i+j)} -$$

$$\frac{((\# \text{ Total Filings year } i \text{ from applicants that did not file in year } i+j) \times$$

$$((\# \text{ Total Filings in year } i+j \text{ in population})/(\# \text{ Total Filings in year } i \text{ in population}))$$

These correction factors can be used to augment the filings forecasts from a survey. However, a problem is that the future CF' values are not yet known when a survey is run. Therefore, it is suggested that CF's should be used retrospectively. In principle, the most dependable recently available one-year-ahead CF' is taken as the one year CF' for future projection, the most recently dependable available two-year-ahead CF' is taken as the two year CF' for future projection, etc. The resulting set of CF's are collected in the following table (which tracks data back to Survey Year 2009).

Correction factors CF'				
		Correction factors for Total filings (Euro-direct+PCT-IP)		
Survey Year	Base Year	Survey Year	Survey Year + 1	Survey Year + 2
2009	2008	-970	-46	6 698
2010	2009	-1 015	-3 015	-3 531
2011	2010	2 858	378	-1 920
2012	2011	-1 347	1 025	-1 989
2013	2012	-308	-2 943	-387
2014	2013	72	-1 807	-6 492
2015	2014	5 249	4 050	1 275
2016	2015	2 021	4 873	3 118
2017	2016	-17	526	3 151

The following table calculates another kind of correction factor, called forward correction factors, $CF_{forward}$, as experienced beyond base years due to the subsequent out-turns. Some data are missing on this for the most recent surveys. Since the out-turns here already take account of the growth of the overall numbers of Total filings in the population, the forward correction factors are this time calculated without the population growth terms.

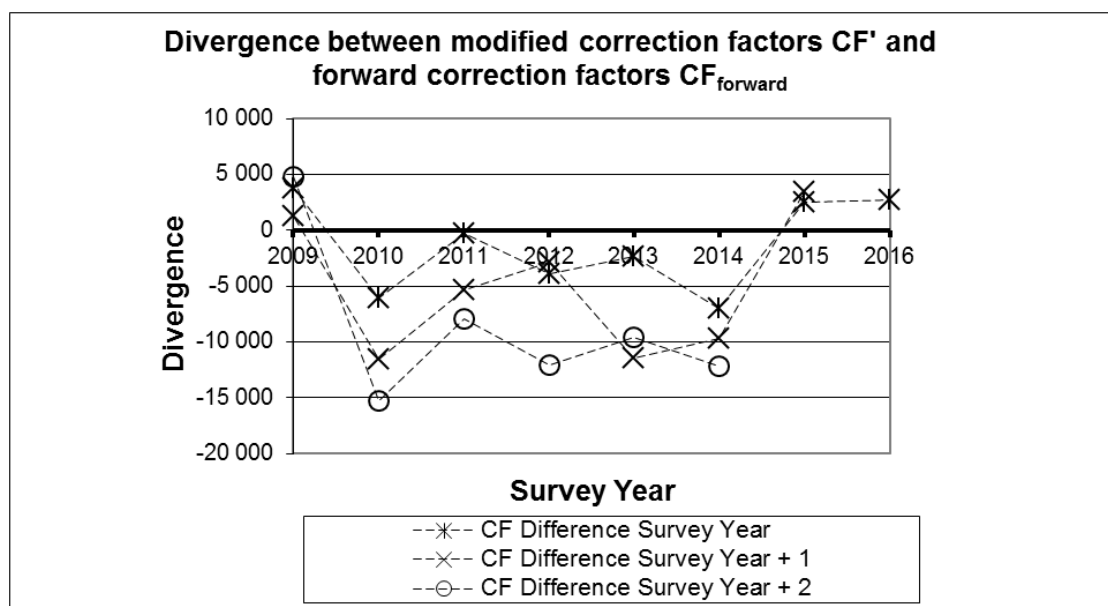
$$CF_{forward} = \frac{(\# \text{ Total Filings year } i+j \text{ from applicants that did not file in year } i) - (\# \text{ Total Filings year } i \text{ from applicants that did not file in year } i+j)}{(\# \text{ Total Filings year } i \text{ from applicants that did not file in year } i+j)}$$

(# Total Filings year i from applicants that did not file in year i+j)

Correction factors $CF_{forward}$				
		Correction factors for Total filings (Euro-direct+PCT-IP)		
Survey Year	Base Year	Survey Year	Survey Year + 1	Survey Year + 2
2009	2008	-4 770	-1 327	1 942
2010	2009	5 069	8 577	11 742
2011	2010	3 144	5 719	5 984
2012	2011	2 560	3 901	10 086
2013	2012	2 068	8 519	9 190
2014	2013	7 088	7 910	5 700
2015	2014	2 734	550	NA
2016	2015	-719	NA	NA
2017	2016	NA	NA	NA

The method described for creating correction factors depends on taking historical developments as a way to project into the future. In 2009 there was a disturbance in the system due to the recession that took place, in that numbers of Total Filings were reduced when compared to 2008, unlike the earlier years where continuous growth was experienced.

The following graph shows the divergences between the CF' values given earlier and the corresponding CF_{forward} values.



The divergences ($CF' - CF_{forward}$) are negative for 2010 to 2014, which suggests that in that period the CF' values may have underestimated the balance of applications coming from new applicants compared to drop-out of old applicants.

The correction factor for the survey year is usually the most accurate. The survey year divergence varies between +4 000 in 2009 and -7 000 in 2014. The survey year + 1 divergence behaves somewhat similarly to the survey year + 2 divergence, but is rather more mild over the period.

In the CF' table above, it is suggested not to use the final row that refers to Base year Total filings in 2016, due to incompleteness of database information for that year. The survey year + 1 and + 2 correction factors show larger divergences and so can only be taken on trust. If it is decided to trust them, this suggests that the CF' value for survey year 2016 can be used. This means adding 2 021 to the recommended forecast for 2017 to give $(285,159 + 2,021 =) 287,180$; adding 4,873 to the recommended forecast for 2018 to give $(298,312 + 4,873 =) 303,186$; and adding 3,118 from the recommended forecast for 2019 to give $(305,541 + 3,118 =) 308,659$.

Higher estimates for 2017 and 2018 can be generated by instead adding the CF' values to the results from the "knowledgeable" sample in Section 4.4. This gives 294,019 $(= 291,998 + 2,021)$ for 2017, 305,814 $(= 300,941 + 4,873)$ for 2018 and 308,659 $(= 305,541 + 3,118, \text{ as before})$ for 2019.

15 ANNEX IX: SIZES OF POPULATIONS AND SAMPLES FOR THE 2016 EPO PATENT FILINGS SURVEY

Table 61 provides an overview of the survey populations and sample counts of applications and applicants. In this year's survey, compared to 2016 survey, there were more applicants in Biggest group (601 compared to 411, +46%) that were considered to be asked to provide forecasts for their counts of filings. Biggest group applicants asked represented 23.2% of the populations Total filings (Direct + PCT-IP) and 50.4% of Total applications (Direct + Euro-PCT-RP), slightly higher than the 2016 report numbers (respectively 20.1% and 43%).

This year Random group size asked was slightly smaller than in 2016 survey (2 750 compared to 2 950, -7%), meanwhile counts of Total filings and Total applications were close to the last year survey.

The number of quantitative responses in the Random group for Total filings forecasts was 4 absolute percent points lower (24%) than last year (28%). But the counts of 2016 reported Total filings from the respondents were significantly lower this year at a coverage of 48% of the population total filings, compared to a coverage of 87% in the 2016 survey.

	Euro-applications in 2016 ^{&}					Euro-applicants in 2016 [*]				
	Direct	PCT-IP [#]	Total (Direct + PCT-IP [#])	Euro-PCT-RP	Total (Direct + Euro-PCT-RP)	Direct	PCT-IP [#]	Total (Direct + PCT-IP [#])	Euro-PCT-RP	Total (Direct + Euro-PCT-RP)
1. Population in 2016*	55 626	232 915	288 541	94 359	149 985					35 221
Sample group A: Biggest										
2. Number asked [§] as percentage of 1.	29 773 53.5%	37 239 16.0%	67 012 23.2%	45 869 48.6%	75 642 50.4%	489	530	594	557	601 1.7%
Number of quantitative responses (questionnaires) [@] as percentage of 1.	10 774 19.4%	19 409 8.3%	30 183 10.5%	13 604 14.4%	24 378 16.3%	108	113	131	128	142 0.4%
as percentage of 2.	36.2%	52.1%	45.0%	29.7%	32.2%	22.1%	21.3%	22.1%	23.0%	23.6%
Sample group B: Random (incl. US boost)										
3. Number asked [§] as percentage of 1.	32 625 58.7%	42 000 18.0%	74 625 25.9%	52 199 55.3%	84 824 56.6%	1 339	1 383	1 985	2 228	2 750 7.8%
Number of quantitative responses (questionnaires) [@] as percentage of 1.	12 749 22.9%	23 039 9.9%	35 788 12.4%	15 812 16.8%	28 561 19.0%	324	373	477	430	526 1.5%
as percentage of 3.	39.1%	54.9%	48.0%	30.3%	33.7%	24.2%	27.0%	24.0%	19.3%	19.1%

[&] All figures exclude divisional filings.

^{*} From the EPO database (EPASYS) and WIPO web site. (Applications are status February 2018, Applicants are status March 2017).

[§] The counts of numbers asked in the samples are status March 2017.

[#] At present information on PCT-IP filings enters the data more than one year late and is therefore undercounted here.

["] Based on a list of capitalised and de-duplicated applicant names from EPASYS at sampling time (status March 2017)

[@] Counts of applications and applicants are based on the survey respondents' self-reported amount of filings for particular filing routes.

Table 61: Sizes of populations and samples for the 2017 EPO Patent Filings Survey



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