



European Patent Office

PATENT FILINGS SURVEY 2018

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

Munich, April 2019

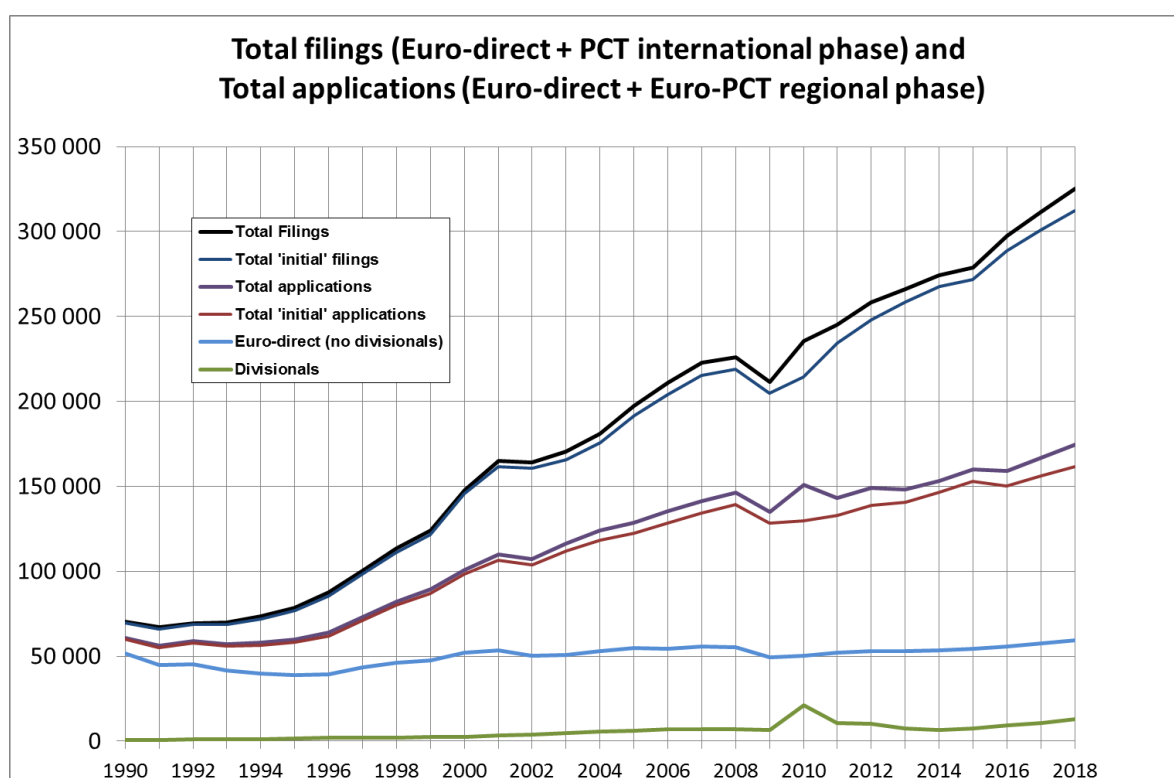
EXECUTIVE SUMMARY

- Based upon this survey, growth in Total filings (Euro-direct + PCT-IP), excluding divisional filings, at the European Patent Office for 2018 is estimated to be positive at +3.6% versus 2017 filings.
- The survey forecast predicted 311 670 Total filings for 2018, compared to 312 636 actual Total filings in 2018. This forecast slightly underestimates the observed filings growth of +3.9% from 2017 to 2018.
- The standard errors for the growth rates 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 filings from the US and with Euro-direct subsequent filings development in JP residence bloc, for all of the years in question.
- For Total filings in 2019, the survey predicts +10.8% growth versus 2018 (+7.0% year-on year), resulting in 333 523 Total filings at the EPO.
- For Total filings in 2020, the final year for which a forecast was made, +16.4% growth versus 2017 has been forecast (+5.1% year-on year), resulting in 350 386 Total filings at the EPO. The proportion of PCT-IP among Total filings is projected to increase marginally from 81.1% in 2018 to 81.4% in 2020.
- The growth of Total EPO applications (Euro-Direct and Euro-PCT-RP, excluding divisional filings) is estimated to be +3.3% in 2018, +9.1% in 2019, and +11.9% in 2020 versus 2017. Positive growth is therefore forecasted for the entire period. The predicted growth rate for 2018 is in-line with the actual one-year growth rate of +3.5%. The proportion of Euro-PCT-RP among Total applications is projected to increase marginally from 63.4% in 2018 to 63.5% in 2020.
- Based on analyses of some measured variables, it is estimated that 67% of EPO applicants for Total filings in 2017 were small and medium-sized enterprises (SMEs) according to the EU definition (with 95% confidence limits ranging from 63% to 71%). The proportion of the Total filings in 2017 that originated from such SMEs is estimated at 22% (with 95% confidence limits ranging from 19% to 25%). The estimated median R&D spent per first patent filing among EPO applicants for Total filings in 2017 is € 300 000.

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 2018 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 700 largest clients and a Random group of about 4 000 from the general population, with a random sampling method that preferentially selected larger applicants. The fieldwork period was May to October 2018. There were 686 responses, which is slightly more than in the previous year. The consultancy company for this survey continued to use an electronic form of questionnaire that was available online (CAWI, see Section 7.6).

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 assessed. The annexes describe the survey setup; fieldwork experiences and response rates; analytical methodology; forecasts broken down by Technical domains; forecasts for worldwide first filings and for filings at other offices; and a description of respondent profiles including company economic attributes. Then there is an analysis of future technology trends. The final two annexes of the report add further descriptions of the population and samples.



The diagram above shows the main types of European Patents that are forecasted. These are the numbers of total ‘initial’ filings, that are direct European route filings (Euro-direct, here 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. All the series described in the diagram increased fairly strongly in 2018 to levels that were not very well forecasted in the 2017 survey, except by a “knowledgeable sample”.

Largely because of this, a major change this year was to sample the Random group on the basis of Total filings (Euro-direct and PCT-IP) rather than Total applications (Euro-direct and Euro-PCT-RP) as had been done previously. In the current survey, the favoured forecasting scenario is determined using a technical criterion (see the column “RMSEF” in Table 2). This chooses a scenario from the Random group with sub-forecasts broken down by blocs of residence of the applicants (Europe, Japan, US, Others, see Table 10). It predicts the observed count of Total filings for 2018 quite well, which suggests that the new sampling method may give better results for Total filings than were obtained in earlier surveys. The scenario posits 16.4% growth from 2017 to 2020 (5.2% compound annual growth), indicating confidence among users for expansion of their activities. A standard method that enhances forecasts using correction factors does not seem to improve these forecasts.

The observed count for Total applications in 2018 increased by 3.5% compared to 2017. But there is a disadvantage in forecasting Total applications for the Random group after the change of sampling method from Total applications to Total filings. In order to compensate for this, User defined weights were applied (see Table 17). The favoured scenario for Total applications in terms of RMSEF was with no residence bloc breakdown but correction of the data by winsorization, which matches the observed count in 2018 quite well. This scenario posits 11.9% growth from 2017 to 2020 (3.8% compound annual growth). Thus it seems that the demand at EPO up to 2020, in terms of both Total filings and Total applications, may grow at a rather high rate compared to the immediately preceding years.

All the forecasts of actual filings numbers from the Random group give 95% confidence intervals for the forecasts in each coming year. This year, for the first time, 95% confidence intervals are also included for forecasted proportions of PCT (implied % PCT), where relevant. This is welcome because it gives further information on the realism of the selected scenarios among alternative scenarios for each type of projection. Mild further increases in proportions of PCT are likely over the forecasting period and these are indeed found. The increase that is projected for Total filings (implied % PCT just above 80% in Table 10) is less than that for Total applications (implied %PCT-RP just above 63% in Table 21). This is consistent with the proportions of PCT having almost reached their plateau for Total filings, but yet to reach a plateau for Total applications. The confidence limits were made by using a statistical bootstrapping technique that is explained in Section 9.11 in Annex III. This year is the first trial of this technique and it may be reviewed in future surveys to improve its precision.

EPO has reorganised itself into three Technical domains for carrying out its patent examinations work. So the questionnaire in this survey requested breakdown counts of first filings according to these domains. (These replace the mega clusters that were used in the previous survey reports). In Annex IV, forecasts appear for Total filings and for Total applications broken down by Technical domains alone and together with blocs of residence of the applicants. Some further information on respondents’ profiles in terms of Technical domains appears in Annex VI.

¹ Total applications constitute an important downstream workload item at EPO to be forecasted.

In Annex V, the forecasts for worldwide first filings growth by EPO applicants from the Random group are quite positive (6.7% annual compound growth). This level of growth is higher than that in the previous survey, which may also reflect the new sampling scheme because Total filings tend to be made nearer to the time of the First filing than Total applications are. Results also appear in Annex V for questions on filings at specific national patent offices. There is evidence for fairly strong continuing growth at the German office (DPMA), Republic of Korea (KIPO) and the People's Republic of China office (CNIPA) out to 2020. These tendencies apply to both the direct national office filings and their national phase PCT filings.

Annex VI analyses respondents' profiles in terms of several regular questions. Histograms appear (from Fig. 13 onwards) about the numbers of employees at these companies. Various features of the applicant population, including R&D expenditures and numbers of first filings broken down by residence blocs and main sectors areas, are shown in Tables 53 to 57. It should be recognised that the populations of EPO applicants that are described, that are now based on statistical inferences on a sample of Total filings, are not the same as those shown in the earlier surveys which were based on samples of Total applications.

In order to produce the estimates of population distributions for these quantities from the Random group, structural weights are used that depend on the response rates per application size class and bloc of residence of the respondents. Table 51 shows these contributions as so-called SRSS values. They reflect to some extent the company size based proclivities to respond among applicants for Total filings (this year) rather than applicants for Total applications (in previous surveys). As a technical comment, it is interesting that SRSS values are smaller this year than last year for size classes up to class 6. But they are higher this year for classes 7, 8 and 9 than they were last year for classes 7 and 8. The Total SRSS (bottom row) is the same as last year for EPC, but lower for all other blocs.

Many of the questions did not change since earlier recent surveys, which allows for survey-to-survey reproducibility and the differences between the two underlying populations to be noted. 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 for Total filings and their applications. The percentages that were estimated for SMEs (67% of applicants and 22% of Total filings, Table 53) are slightly higher than in the previous survey (55% and 17% respectively, in terms of Total applications). It seems logical that there may be a larger proportion of SMEs among applicants for Total filings than for Total applications, although sampling variations can also affect the results. Regarding Japan, where in the previous survey no responses at all were received from SMEs, this year a number of such responses were obtained. However, Table 50 suggests that these SMEs all had at least 50 employees, which remains somewhat similar to what was found last year.

The results on R&D expenditures differ to some extent from those found last year. Table 53 shows a weighted mean R&D expenditure per applicant of € 2 million, compared to an estimate of only € 0.5 million in the previous survey. The estimate of the median R&D expenditure per worldwide first patent filing increased to € 300 000 from € 150 000 in the previous survey. This is higher than the estimates that were obtained in the recent annual surveys since 2014, before which the estimate was higher than € 300 000 only in some years. The result this time may partly be due to the population approached via the new sampling method that was used for the Random group. It is strange that the R&D expenditure per first filing (this survey) seems to be higher with applicants for Total filings than with applicants for Total applications (in previous surveys). It remains to be more closely investigated why this is so. There are some other peculiarities, such as identical results for the weighted median R&D expenditure per applicant of € 107 059 for Others in Table 55

(from 2 observations) and for the ICT Technical sector in Table 57 (from 56 observations). This may be due to a high weighting for a particular case.

A previous question about European patent portfolio size was dropped this year. Instead in this report there is a description of the results of an open question about promising medium to long term technology trends (see Annex VII). This analysis suggests that leading technology trends among EPO applicants can be grouped into a few broad overlapping clusters, as is described from Table 58 onwards. These include a digital / IT-trend cluster, an artificial intelligence / big data cluster, an electromobility cluster, a construction & materials cluster and some others. This information is interesting for planning at the EPO.

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 if 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 2018 Patent Filings 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. The EPO uses these predictions when planning the allocation of its resources, in order to ensure that a high level of service is provided when processing future patent filings.

In 2018 the 23rd Annual Survey took place. 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 open questions on technology trends.

Data were collected on the basis of the industries that underlie three Technical domains that correspond to the current structure in which the EPO organises its search, examination and opposition departments. In former surveys, the data were collected on the basis of 12 Technical domains called *joint clusters*. These were merged into three Technical domains during internal EPO’s re-organisation in 2018.

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 2018, 2019 and 2020, 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 Technical domains.

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 2017, 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 future technology trends.

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 2018 survey.

1.3 The 2018 survey

For this survey, the data collection method was kept as an electronic form being available online.

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

The contact phase began in early May 2018, with interviews being completed by the mid of October. A total of 686 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. The total Biggest group sampling was based on Total Applications (TAs), while the Random group sampling was drawn for the first time based on Total Filings (TFs), in order to give a better sample coverage of the item that is the principal object to be forecasted.

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. All results that are shown below exclude divisional applications.

The total number of filers involved was 4 078, with most of the Biggest group also appearing in the Random group. The survey responses covered filers for more than 45% of the filings at the EPO (Euro-direct and PCT-IP filing numbers of the Random sample relating to population, see **Annex IX**).

The EPO provided two gross samples of applicants drawn from its database of applications (EPASYS) in March 2018.

- 'Biggest': This sample comprises the 662 largest applicants (in terms of TAs) and was designed to allow for separate analysis of the intentions of the biggest applicants.
- 'Random': This sample included 3 972 applicants for TFs and was designed to represent all applicants of the parent population. It was obtained from a simple random sample of TFs, with the effect of over-weighting large applicants due to their high number of applications. This sample included a booster sample of total 943 applicants, 650 being from the US and 293 from PR China in order to compensate for the low response rates previously experienced in earlier surveys. This was necessary due to the importance of these regions. The 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 2018:

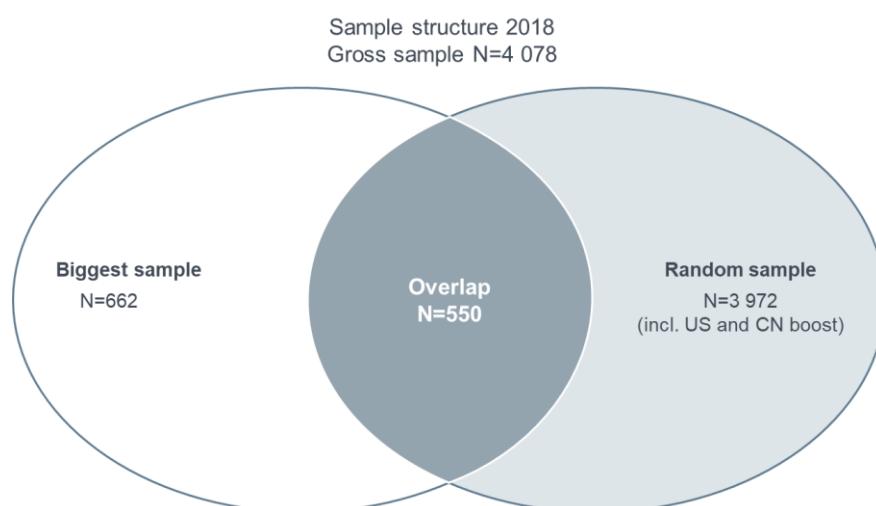


Figure 1: Sample structure of the 2018 survey

The samples were drawn separately for the Random and Biggest groups and, as a result, contained an overlap of 550 large applicants. Taking this into consideration, the total gross sample was 4 078 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 and PR China are over-represented in the gross addresses due to the additional boost sample. Other countries (apart from Europe, Japan, PR China and US) consist of a residual group for the rest of the world.

The questionnaire used for this data collection contained a matrix of questions on patent filings and expectations for patent filings for the base year 2017 and for the following three years, namely 2018, 2019, and 2020. 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 expenditures and first filings by three Technical domains that are relevant to EPO operations.

Descriptive information was also collected on company type and size in terms of persons employed, and classification into small and medium-sized enterprises (SME).

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 filings³.

Based on the recommended forecast method explained in Section 3, the estimated growth rates (with respect to 2017) for Total filings were calculated as **3.6%** for **2018**, **7.0%** for **2019**, and **5.1%** for **2020**. The **overall survey forecast** for Total filings in **2018** is **311 670**, with approximate 95% confidence limits of **297 799** and **325 541**, resulting in a deviation⁴ of 4.5%. This forecast slightly underestimates the currently assumed figure of **312 636** for actual 2018 filings, with the actual filing number being within the 95% confidence limits of the forecast. The estimated percentage of PCT-IP filings amongst Total filings for 2018 is 80.7%, which is slightly lower than the observed value of 81.1%, but within the 95% confidence limits of the forecasts (see **Section 9.11** for details on the new approach for the estimated percentage confidence limits). For **2019**, the recommended forecast method predicts **333 523** Total filings with approximate 95% confidence limits of **316 712** and **350 334**. For **2020**, the recommended method estimates **350 386** Total filings with approximate 95% confidence limits of **327 966** and **372 806**.

With regards to the Total filings estimates, forecasts for the Biggest group this year are less optimistic for both the two-year and three-year forecasts when compared to the Random group, with both estimates indicating clear year on year increase in filings from 2017 to 2018.

In summary, this year's survey predicts an increase in filing numbers for 2018 with a higher growth for 2019 and 2020. For the Random group, 2019 year-on-year growth forecasts are estimated as being between 5% and 9%, while 2020 year-on-year growth forecasts estimates are more, between 2% and 7% (see **Tables 1 and 2** below).

In terms of Total applications (Euro-direct + Euro-PCT-RP), growth rates based on the recommended forecast are estimated to be 3.6% in 2018, 4.3% in 2019, and 3.1% in 2020 vs. 2017. Total application and Total filing growth rates forecasts for 2018 are in line with the currently assumed figures for actual 2018 applications and filings.

³ 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.

⁴ 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 2017
Euro-direct and PCT-IP

			2018		2019		2020	
Critical	Group	Breakdown	Growth rate	Deviation	Growth rate	Deviation	Growth rate	Deviation
Included	Biggest	None	1.5%		3.1%		5.1%	
Included	Biggest	Residence bloc	5.3%		4.7%		7.6%	
Included	Random	None	2.9%	4.7%	8.6%	5.1%	11.2%	5.6%
Included	Random	None (winsorized)	2.1%	3.9%	8.3%	3.9%	11.3%	4.4%
Included	Random	None (Euro-direct and PCT-IP filings combined)	-6.9%	8.2%	-1.5%	12.6%	0.5%	13.4%
Included	Random	Residence bloc	3.6%	4.5%	10.8%	5.0%	16.4%	6.4%
Included	Random	Residence bloc (winsorized)	3.0%	6.7%	10.8%	10.7%	16.7%	15.3%
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	-0.9%	7.7%	3.9%	9.8%	10.0%	10.9%
Included	Random	Residence bloc (First and Subsequent filings combined)	0.7%	9.1%	9.9%	10.0%	16.6%	10.4%
Included	Random	Residence bloc (All filings combined)	0.7%	6.8%	9.9%	5.9%	17.7%	6.8%
Excluded	Biggest	None	-0.9%	0	2.1%	0	4.8%	0
Excluded	Biggest	Residence bloc	4.5%	0	8.4%	0	12.5%	0
Excluded	Random	None	3.3%	5.4%	8.0%	5.0%	12.5%	5.5%
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	-5.0%	7.4%	4.7%	6.4%	8.9%	6.9%
Excluded	Random	Residence bloc	5.5%	5.4%	11.0%	6.0%	17.7%	7.7%
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	0.9%	9.9%	10.5%	6.3%	17.6%	7.6%
Excluded	Random	Residence bloc (First and Subsequent filings combined)	9.4%	5.9%	19.7%	6.0%	28.2%	7.2%
Excluded	Random	Residence bloc (All filings combined)	1.1%	9.3%	13.0%	6.2%	20.4%	7.4%
			Actual growth		3.9%			

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

			2018				2019			2020		
Critical	Group	Breakdown	Predicted filings	LCL	UCL	RMSEF*	Predicted filings	LCL	UCL	Predicted filings	LCL	UCL
Included	Biggest	None	305 601				310 200			316 249		
Included	Biggest	Residence bloc	317 016				315 127			323 746		
Included	Random	None	309 554	295 063	324 045	8 010	326 781	310 072	343 490	334 766	315 906	353 626
Included	Random	None (winsorized)	307 263	295 197	319 329	8 171	325 862	313 241	338 483	335 023	320 151	349 895
Included	Random	None (Euro-direct and PCT-IP filings combined)	280 288	257 257	303 319	34 416	296 396	258 967	333 825	302 367	261 907	342 827
Included	Random	Residence bloc	311 670	297 799	325 541	7 143	333 523	316 712	350 334	350 386	327 966	372 806
Included	Random	Residence bloc (winsorized)	309 915	289 093	330 737	10 966	333 370	297 673	369 067	351 294	297 562	405 026
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	298 241	275 205	321 277	18 584	312 785	282 194	343 376	330 930	294 965	366 895
Included	Random	Residence bloc (First and Subsequent filings combined)	303 115	275 558	330 672	16 980	330 861	297 793	363 929	350 907	314 354	387 460
Included	Random	Residence bloc (All filings combined)	303 097	282 625	323 569	14 145	330 674	311 069	350 279	354 190	330 097	378 283
Excluded	Biggest	None	298 346				307 362			315 465		
Excluded	Biggest	Residence bloc	314 634				326 121			338 713		
Excluded	Random	None	310 754	293 928	327 580	8 789	325 108	308 809	341 407	338 718	319 961	357 475
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	285 915	264 704	307 126	27 864	315 161	295 055	335 267	327 657	305 072	350 242
Excluded	Random	Residence bloc	317 663	300 546	334 780	10 077	334 021	313 841	354 201	354 307	327 105	381 509
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	303 692	273 557	333 827	17 787	332 629	311 584	353 674	354 048	327 305	380 791
Excluded	Random	Residence bloc (First and Subsequent filings combined)	329 348	309 764	348 932	19 471	360 290	338 790	381 790	385 816	357 922	413 710
Excluded	Random	Residence bloc (All filings combined)	304 362	276 103	332 621	16 623	340 090	319 140	361 040	362 432	335 501	389 363
			Actual filings				312 636					

*) 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 counts of filings, since it only represents large entities. 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, in recent years' surveys the recommendation has been to use the one that minimises the 'root mean squared error of forecast' (RMSEF) and was based on the full sample including those cases with critical comments. This year we used RMSEF (See **Section 9.5** for an explanation of the RMSEF) supported by other good attributes of the forecast (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 2018. The filing estimates using the recommended prediction method are **311 670** for **2018**, **333 5523** for **2019**, and **350 386** for **2020**. For the two-year and three-year time horizon, our recommended forecast is one of the more optimistic of forecasts based on the Random group including cases with critical codes. The most optimistic forecast for the Random group is based on the scenario with a residence bloc breakdown where growth rates are calculated on first and subsequent filings combined without critical code cases (385 816 in 2020). The recommended forecast is more optimistic for two-year and three-year growth estimates than those that are based on the Biggest group.

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, as in last year's survey, correction factors were calculated based on Total filings dynamics, whilst in surveys prior to 2017, they were computed from Total applications dynamics. In order to remain consistent with recent reports, separate predictions including correction factors are not included in the main part of the report.⁵

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 tables. 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 2016 and 2017 surveys provided a relatively poor estimate of Total filings. This years' survey does a better job at predicting a one-year growth.

Concerning which sample to base estimates on, when going as far back as 2009, the estimates that were based on the Random group were more accurate than estimates based

⁵ But see Annex VIII.

on the Biggest group. The mean absolute percentage error (MAPE) of the recommended forecast based on the Random group was 2.7% for one-year, 2.9% for two-year, and 5.0% for three-year estimates. In contrast, for the Biggest group estimate without further breakdown, the MAPE is 4.0% for one-year, 4.8% for two-year, and 6.6% for three-year estimates. Please see **Section 9.6** for more details on the MAPE.

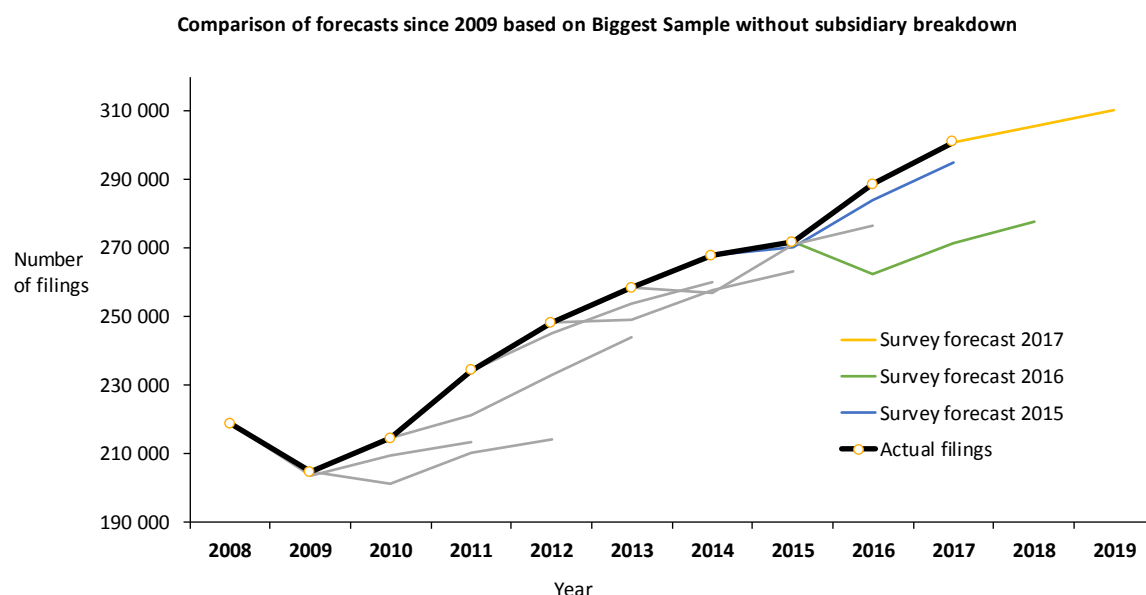


Figure 2: Comparison of forecasts since 2009 (Biggest group with no subsidiary breakdown)

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	2020
... 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 (89%)		
... 2017 survey (in % of actual filings)									288 541 (=actual)	286 372 (95%)	289 528 (93%)	293 886 (N/A)	
... 2018 survey (in % of actual filings)										300 966 (=actual)	305 601 (98%)	310 200 (N/A)	316 249 (N/A)
Actual filings	218 757	204 600	214 430	234 267	248 166	258 319	267 799	271 624	288 541	300 966	312 636	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

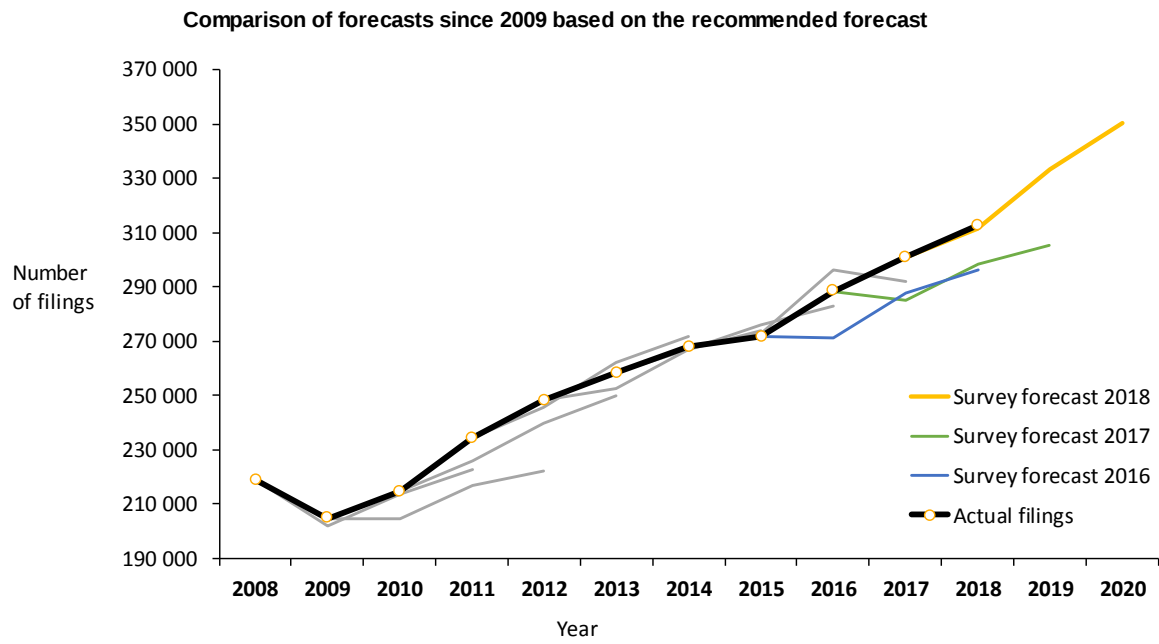


Figure 3: Comparison of recommended forecasts since 2009 (Random group)

Comparison of forecasts since 2009 based on the recommended forecast

Survey year	Recommended forecast method	Forecasting Year													
		Forecast *)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2009	Random group without subsidiary breakdown Euro-direct and PCT-IP filings combined	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit	218 757 (=actual)	202 063 (99%)	213 529 (100%)	222 822 (95%)									
				201 930 216 251	211 940 229 862	220 420 240 610									
2010	Random group without subsidiary breakdown Euro-direct and PCT-IP filings combined	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit		204 600 (=actual)	204 354 (95%)	216 620 (92%)	222 160 (90%)								
					199 117 209 591	210 324 222 915	215 126 229 195								
2011	Random group with residence bloc breakdown (winsorized)	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit			214 430 (=actual)	226 027 (96%)	239 711 (97%)	249 925 (97%)							
						212 517 239 536	223 930 255 492	232 328 267 522							
2012	Random group with residence bloc breakdown	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit				234 267 (=actual)	245 346 (99%)	262 090 (101%)	271 727 (101%)						
							238 788 251 903	251 178 273 003	256 786 286 668						
2013	Random group with residence bloc breakdown	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit					248 166 (=actual)	252 305 (98%)	266 948 (100%)	273 621 (101%)					
								241 921 262 689	255 429 278 467	258 522 288 721					
2014	Random group with residence bloc breakdown (winsorized)	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit						258 319 (=actual)	266 951 (100%)	275 872 (102%)	283 098 (98%)				
									256 951 276 952	268 194 283 550	273 938 292 257				
2015	Random group with residence bloc breakdown Euro-direct and PCT-IP filings combined	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit							267 799 (=actual)	272 993 (101%)	296 111 (103%)	291 927 (97%)			
										261 955 284 030	277 330 314 892	277 199 306 655			
2016	Random group with residence bloc breakdown	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit								271 624 (=actual)	271 072 (94%)	287 577 (96%)	296 266 (95%)		
											261 340 275 721	277 887 293 500	286 260 302 446		
2017	Random group with residence bloc breakdown	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit									288 541 (=actual)	285 159 (95%)	298 312 (95%)	305 541 (N/A)	
												275 074 295 248	289 077 307 553	295 233 315 853	
2018	Random group with residence bloc breakdown	Number of filings (in % of actual filings) Lower confidence limit Upper confidence limit										300 966 (=actual)	311 670 (100%)	333 523 (N/A)	350 386 (N/A)
													297 799 325 541	316 712 350 334	327 966 372 806
		Actual filings	218 757	204 600	214 430	234 267	248 166	258 319	267 799	271 624	288 541	300 966	312 636	N/A	N/A

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

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

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** and Section 5 detail special analysis with a set of so-called User defined weights for Total applications in 2018.

4.1 Methodology and structure of results

The main part of the survey covers the predictions of future patent filings. The basic prediction approach was the same as in the previous surveys, although the sampling frame has been changed to some extent in the current survey. 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 6 and 7** of the questionnaire⁶ 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 filings, 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. Finite population corrections (FPCs) were 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 Technical domain, 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

⁶ The questionnaire is presented in Annex I.

available level of aggregation (typically ignoring residence bloc or Technical domain breakdowns).

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 2017 base year in order to generate explicit forecasts. Data on Euro-direct, PCT-IP, and Euro-PCT-RP filings for 2017 and 2018 were supplied by the EPO on 6th March 2019. In many cases, the responses on growth forecasts in the questionnaire (**Pages 6-7**) 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. The definitions of reasons to set the critical codes were revised in this survey to make them more sensitive and aligned with changes to the questionnaire and the sampling frame. In this year's survey, **176** cases, or **25.6%**, of survey responses, were marked with a critical code. The number of cases marked with critical codes is significantly higher than in the 2017 report's **14.7%**. This difference is to be expected considering the changes that were made this year. There are also non-critical codes. For details, refer to the plausibility checks described in **Annex I, Section 7.9**.

As in previous years, the growth forecasts were made 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 Technical domains). 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 Technical domains are of some interest to look for variations between major industrial areas of patenting. Technical domain forecasts are shown for Total applications in Annex IV, with Total filings forecasts in terms of growth rates only.

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. Also there was a special analysis for a 'knowledgeable sample' in the 2017 report. But this year no such special analyses were needed.

4.2 Total filings - Biggest group

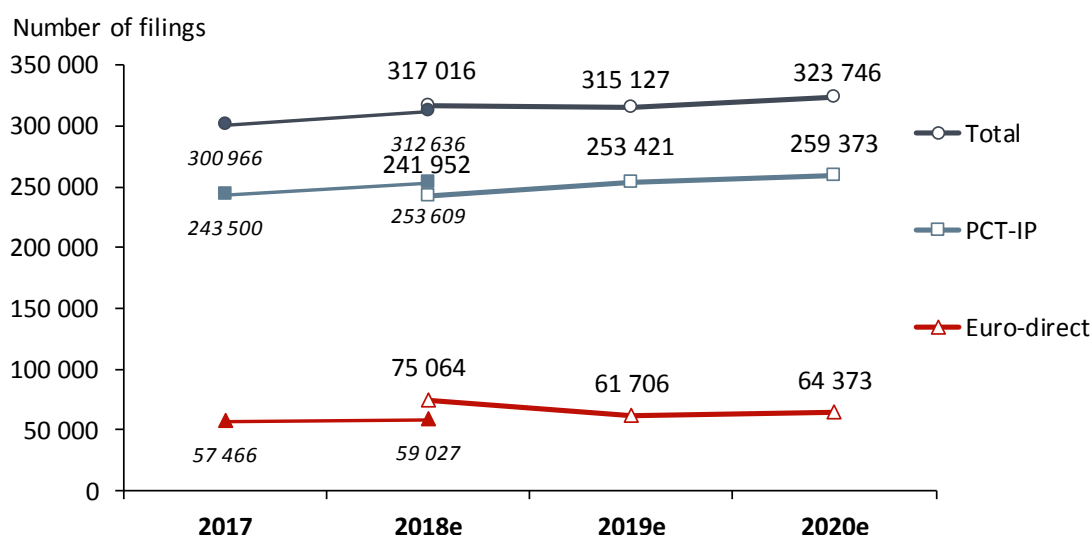
This year, the Biggest group is based on a sample of **662** total addresses (621 addresses found) for Euro-direct filings and Euro-PCT-RP filings, comprising applicants making at least **27** such applications (excluding divisionals) in 2017. From this group, **227** responded to the survey (**36.6%** 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 are more optimistic than last year. But, in general, they project lower two-year and three-year growth than forecasts based on the Random group. In total, four growth scenarios were calculated for Biggest group (two including critical codes and two excluding critical codes). See **Table 1** for details. While the actual growth was **3.9%** for 2018, the forecast scenarios are not so similar with the values ranging from **-0.9%** to **5.3%**. Including critical codes, the Tables below show that the Biggest group forecasts predict an increase of **1.5%** or **5.3%**. **Table 5**, with no subsidiary breakdown indicates that forecasts for 2018 Euro-direct filings are higher than actual numbers while PCT-IP are significantly lower than the actual numbers, with PCT-IP forecasts for 2018 falling short of actual development of PCT-IP filings quite heavily. The preferred Biggest group forecasting scenario is with a residence bloc breakdown (Fig. 4). **Table 6** sheds some additional light on the source of the 'missing' PCT-IP growth: subsequent PCT-IP filings from the EP, JP and OT residence blocs for 2018 are underestimated by almost 2 000, 5 000 and 8 000 filings, respectively. On the other hand, optimism in subsequent Euro-direct filings comes from US and OT respondents, where nearly 300% and 30% growth for 2018 are forecasted respectively. US residence bloc growth in Euro-direct filings comes from one respondent, therefore such growth is highly unlikely for the whole group, as confirmed by two additional scenarios where the Biggest group forecasts are calculated, both with and without residential block breakdowns. Latter scenarios are based on subset of respondents with the critical cases removed and show a growth of **-0.9%** and **4.5%** for 2018 respectively. For detailed Biggest group forecast scenario comparisons see **Table 1**.

The Random group respondents were sampled from the Total filings universe, while the Biggest group sample was based on the Total applications universe. So it is expected that the Biggest group performs better for forecasting Total applications, rather than when forecasting for Total filings, putting greater trust in the Random group for the Total filings forecasts.

The implied PCT-IP filings percentages of **78.2%** or **76.3%**, in **Tables 5** and **6** respectively, fall short of the actual percentage of PCT-IP filings of **81.1%** in 2018.



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, broken down by residence block (solid marks indicate actual numbers, outlined marks indicate estimates)

Biggest group (including critical codes)

No subsidiary breakdown

Composite Indices

			2017	2018				2019			2020		
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	24 528	92	0.9798	24 033	25 276	81	1.0139	24 870	79	1.0499	25 751
	PCT-IP	Total	35 697	61	1.1051	39 449	37 682	55	1.2161	43 411	53	1.1624	41 494
Subsequent	Euro-direct	Total	32 938	98	1.2963	42 698	33 751	84	1.1084	36 508	82	1.1943	39 338
	PCT-IP	Total	207 803	121	0.9597	199 421	215 927	111	0.9885	205 411	108	1.009	209 666
All	Euro-direct	Total	57 466			66 731	59 027			61 378			65 089
	PCT-IP	Total	243 500			238 870	253 609			248 822			251 160
Grand total			Total	300 966		305 601	312 636			310 200			316 249
Growth from 2017						1.5%	3.9%			3.1%			5.1%
Implied % PCT-IP				80.9%		78.2%	81.1%			80.2%			79.4%

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

			2017	2018				2019			2020		
		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	22 597	57	1.0415	23 535	23 017	51	1.0607	23 968	50	1.0939	24 719
		US	1 082	14	0.9230	999	1 148	10	1.3684	1 481	10	1.4912	1 614
		JP	312	5	1.0242	320	278	4	1.0673	333	4	1.1072	345
		OT	537	3	1.0242	550	833	3	1.0673	573	2	1.1072	595
		Total	24 528	79		25 404	25 276	68		26 355	66		27 273
First	PCT-IP	EP	5 314	22	1.3704	7 283	5 429	20	1.4627	7 773	19	1.5492	8 233
		US	5 273	9	1.1023	5 812	5 251	7	2.4129	7 095	6	1.3455	7 095
		JP	8 640	15	1.0407	8 992	8 963	14	1.0258	8 863	14	1.0258	8 863
		OT	16 471	0	1.2015	19 790	18 040	0	1.4133	23 278	0	1.3016	21 439
		Total	35 697	46		41 877	37 682	41		47 009	39		45 630
Subsequent	Euro-direct	EP	14 203	55	1.0561	14 999	14 624	49	1.1412	16 209	48	1.2489	17 738
		US	7 146	15	2.9485	21 070	7 449	12	1.0716	7 658	12	1.0435	7 457
		JP	5 196	20	1.0177	5 288	5 263	15	0.8444	4 388	15	0.8194	4 258
		OT	6 393	4	1.2988	8 303	6 415	4	1.1100	7 096	3	1.1962	7 647
		Total	32 938	94		49 660	33 751	80		35 351	78		37 100
Subsequent	PCT-IP	EP	55 421	60	0.9809	54 364	56 620	56	1.0341	57 309	55	1.0567	58 561
		US	51 401	19	0.9872	50 743	51 192	16	1.0445	53 690	15	1.1330	58 237
		JP	39 565	28	0.9030	35 727	41 043	25	0.8632	34 152	24	0.8674	34 320
		OT	61 415	2	0.9646	59 241	67 071	2	0.9975	61 261	2	1.0197	62 625
		Total	207 803	109		200 075	215 927	99		206 412	96		213 743
All	Euro-direct	EP	36 800			38 534	37 641			40 177			42 457
		US	8 228			22 069	8 597			9 139			9 071
		JP	5 508			5 608	5 541			4 721			4 603
		OT	6 930			8 853	7 248			7 669			8 242
		Total	57 466			75 064	59 027			61 706			64 373
All	PCT-IP	EP	60 735			61 647	62 049			65 082			66 794
		US	56 674			56 555	56 443			60 785			65 332
		JP	48 205			44 719	50 006			43 015			43 183
		OT	77 886			79 031	85 111			84 539			84 064
		Total	243 500			241 952	253 609			253 421			259 373
Grand total		EP	97 535			100 181	99 690			105 259			109 251
		US	64 902			78 624	65 040			69 924			74 403
		JP	53 713			50 327	55 547			47 736			47 786
		OT	84 816			87 884	92 359			92 208			92 306
		Total	300 966			317 016	312 636			315 127			323 746
Growth from 2017						5.3%	3.9%			4.7%		7.6%	
Implied % PCT-IP			80.9%			76.3%	81.1%			80.4%		80.1%	

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

4.3 Total filings - Random group

The Random group this year is based on a sample of **3 972** total addresses (3 615 addresses found) for Euro-direct filings and Euro-PCT-IP filings (including US and CN boost samples of **1 309** and **394** addresses respectively), of which **654** responded to the survey (**18.1%** 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 the differences between analyses including critical comments and those excluding critical comments are less clear, in terms of forecasting the 2018 observed filings. Forecasts for 2018 based on the reduced sample are **0.4% to 8.7%** absolute points **higher** than respective scenarios' forecasts based on the full sample. This is the opposite of the 2017 survey where said forecasts were **1.5% to 4.2%** absolute points **lower** than respective scenarios' forecasts based on the full sample. The deviations in % of forecasts (as reported in the tables) based on the reduced sample are mostly smaller than those for forecasts based on the full dataset. Such trends provide additional confirmation that updated critical codes do a better job removing extreme cases. There are three full sample scenarios with RMSEF values that are lower than the lowest RMSEF in the reduced sample scenarios. 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 as in Table 7, but now 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 are displayed in **Table 9**. This gives the lowest forecast for 2018 with the highest RMSEF and is therefore not a suitable approach 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 which has the best RMSEF value. 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 the results of the residence bloc breakdown when combining Euro-direct and PCT-IP filing routes.

As in previous reports, more filings scenarios were calculated, but they did not themselves show improvements to the recommended forecast scenario. For comparison see **Table 1** and **Table 2**.

Contrary to the 2017 survey, where forecasts underestimated the Total filings for 2017, this year's survey forecasts are very close to the Total filings number for 2018. **Table 10** and **Figure 7** shows more detail on the structure of the estimation. For PCT-IP filing routes, applicants from all the residence blocs got very close to the number of filings in 2018, but with higher discrepancies among the filing types – first filings were overestimated in all residence blocs, while subsequent filings were underestimated in JP and OT residence

blocs, with the biggest underestimation being in the JP residence bloc by more than 5,000 filings. On the other hand, forecasts for Euro-direct subsequent filing route are estimated to be close to the actual 2018 filing numbers, while first filings forecasts are slightly more optimistic than the actuals.

So the best forecast this year is as shown in **Table 10**, employing the breakdown by residence blocks and no winsorization. Also, it has one-year growth of **3.6%**, which is close to the actual 2018 filings growth of **3.9%**. The second lowest RMSEF has the forecast shown in **Table 7**, a scenario with no breakdown. This scenario was also second in the 2017 survey, but it falls short of the one-year growth forecast with **2.9%**.

In terms of the predicted ratio of PCT among Total filings (Implied % PCT), the forecasts in Table 10 are all slightly over 80% and support the selection of this scenario. The implied %PCT that is estimated for coming years is near enough to the actual values in 2017 and 2018 and increases (albeit mildly) from 2017 to 2020 in the forecasts. This is consistent with historical increases in the relative usage of PCT compared to Euro-directs. The 95% confidence limits on the implied %PCT in Table 10 suggest however that the prospective increases are not in themselves statistically significant in the light of the sample size that was analysed.

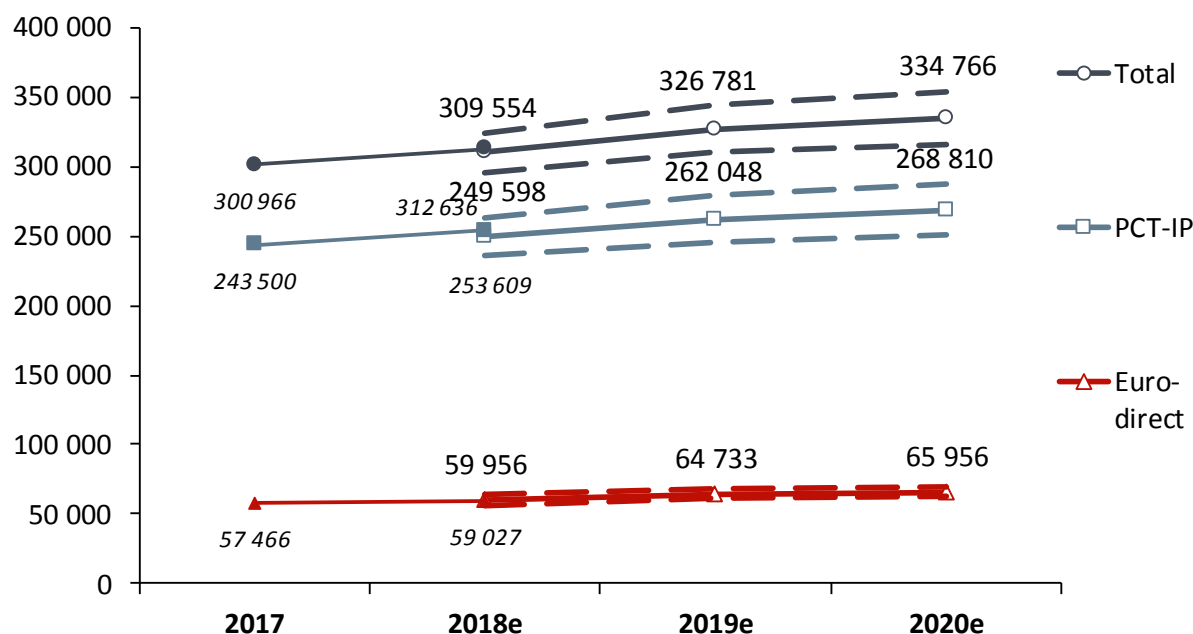
For most of the surveys in recent years, the recommended forecasts involved subsidiary breakdowns by blocs of residence of the applicants. But the analysis corresponding to **Table 7**, with no subsidiary breakdown, was used for the recommended filing forecasts in the 2005, 2007, and 2008 reports. This 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. Then, 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 survey year 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 and additionally wider confidence intervals were estimated.

Thus, despite the known deficiency in overestimating/underestimating PCT-IP filings by filing type from all the residence blocs, the recommended forecast approach this year is the Random group forecast based on the full sample and employing a residence bloc breakdown, as shown in **Table 10** and **Figure 6** and **Figure 7**. The main reasons for recommending this scenario are:

- RMSEF of the approach is the lowest among forecast scenarios.
- One-year future prediction is closest to the actual recorded 2018 filings growth.
- For two-year and three-year future predictions, this approach is in the middle of the various forecasted scenarios. The span of forecast growth rates (the difference between the most optimistic and most pessimistic forecast growth rate) based on the Random group is 3.3% for two-year and 5.1% for three-year growth.
- This approach also performs well in additional analyses with User defined weights (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

			2017	2018					2019				2020			
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	24 528	150	1.0408	0.0464	25 529	25 276	143	1.1393	0.0344	27 945	133	1.1835	0.0355	29 029
		LCL					23 204					26 059				27 007
		UCL					27 854					29 831				31 051
First	PCT-IP	Total	35 697	101	1.1487	0.058	41 005	37 682	95	1.1342	0.0464	40 488	90	1.1234	0.0372	40 102
		LCL					36 332					36 800				37 175
		UCL					45 678					44 176				43 029
Subsequent	Euro-direct	Total	32 938	142	1.0452	0.0473	34 427	33 751	127	1.1169	0.0301	36 788	124	1.1211	0.0422	36 927
		LCL					31 230					34 616				33 869
		UCL					37 624					38 960				39 985
Subsequent	PCT-IP	Total	207 803	230	1.0038	0.0321	208 593	215 927	211	1.0662	0.0369	221 560	203	1.1006	0.0407	228 708
		LCL					195 459					205 520				210 441
		UCL					221 727					237 600				246 975
All	Euro-direct	Total	57 466				59 956	59 027				64 733				65 956
		LCL					56 003					61 856				62 290
		UCL					63 909					67 610				69 622
All	PCT-IP	Total	243 500				249 598	253 609				262 048				268 810
		LCL					235 657					245 589				250 310
		UCL					263 539					278 507				287 310
Grand total		Total	300 966				309 554	312 636				326 781				334 766
		LCL					295 063					310 072				315 906
		UCL					324 045					343 490				353 626
Growth from 2017							2.9%	3.9%				8.6%				11.2%
Implied % PCT-IP	Total	80.9%					80.6%	81.1%				80.2%				80.3%
		LCL					79.0%					78.8%				78.7%
		UCL					82.7%					81.7%				82.0%
Deviation in % of forecast							4.7%					5.1%				5.6%

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

			2017	2018					2019				2020			
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	24 528	150	1.0538	0.0485	25 848	25 276	143	1.1637	0.0374	28 543	133	1.2016	0.0364	29 473
		LCL					23 386					26 446				27 371
		UCL					28 310					30 640				31 575
First	PCT-IP	Total	35 697	101	1.1475	0.0565	40 962	37 682	95	1.1401	0.0502	40 698	90	1.1374	0.0351	40 602
		LCL					36 415					36 688				37 804
		UCL					45 509					44 708				43 400
Subsequent	Euro-direct	Total	32 938	142	1.0310	0.049	33 959	33 751	127	1.1307	0.031	37 243	124	1.1482	0.0355	37 819
		LCL					30 690					34 980				35 185
		UCL					37 228					39 506				40 453
Subsequent	PCT-IP	Total	207 803	230	0.9937	0.0257	206 494	215 927	211	1.0557	0.0269	219 378	203	1.0930	0.0319	227 129
		LCL					196 094					207 816				212 917
		UCL					216 894					230 940				241 341
All	Euro-direct	Total	57 466				59 807	59 027				65 786				67 292
		LCL					55 715					62 701				63 922
		UCL					63 899					68 871				70 662
All	PCT-IP	Total	243 500				247 456	253 609				260 076				267 731
		LCL					236 105					247 838				253 246
		UCL					258 807					272 314				282 216
Grand total		Total	300 966				307 263	312 636				325 862				335 023
		LCL					295 197					313 241				320 151
		UCL					319 329					338 483				349 895
Growth from 2017							2.1%	3.9%				8.3%				11.3%
Implied % PCT-IP		Total	80.9%				80.5%	81.1%				79.8%				79.9%
		LCL					79.3%					78.6%				78.5%
		UCL					82.4%					81.1%				81.3%
		Deviation in % of forecast						3.9%					3.9%			

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

Euro-direct and PCI-IP filings combined			2017	2018					2019				2020			
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	60 225	247	1.0368	0.0399	62 441	62 958	235	1.1068	0.0345	66 657	221	1.1244	0.0317	67 717
		LCL					57 552					62 146				63 506
		UCL					67 330					71 168				71 928
Subsequent	All	Total	240 741	297	0.9049	0.0526	217 847	249 678	269	0.9543	0.0821	229 739	258	0.9747	0.087	234 650
		LCL					195 341					192 583				194 410
		UCL					240 353					266 895				274 890
Grand total		Total	300 966				280 288	312 636				296 396				302 367
		LCL					257 257					258 967				261 907
		UCL					303 319					333 825				342 827
Growth from 2017						-6.9%	3.9%				-1.5%				0.5%	
Deviation in % of forecast						8.2%						12.6%				13.4%

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

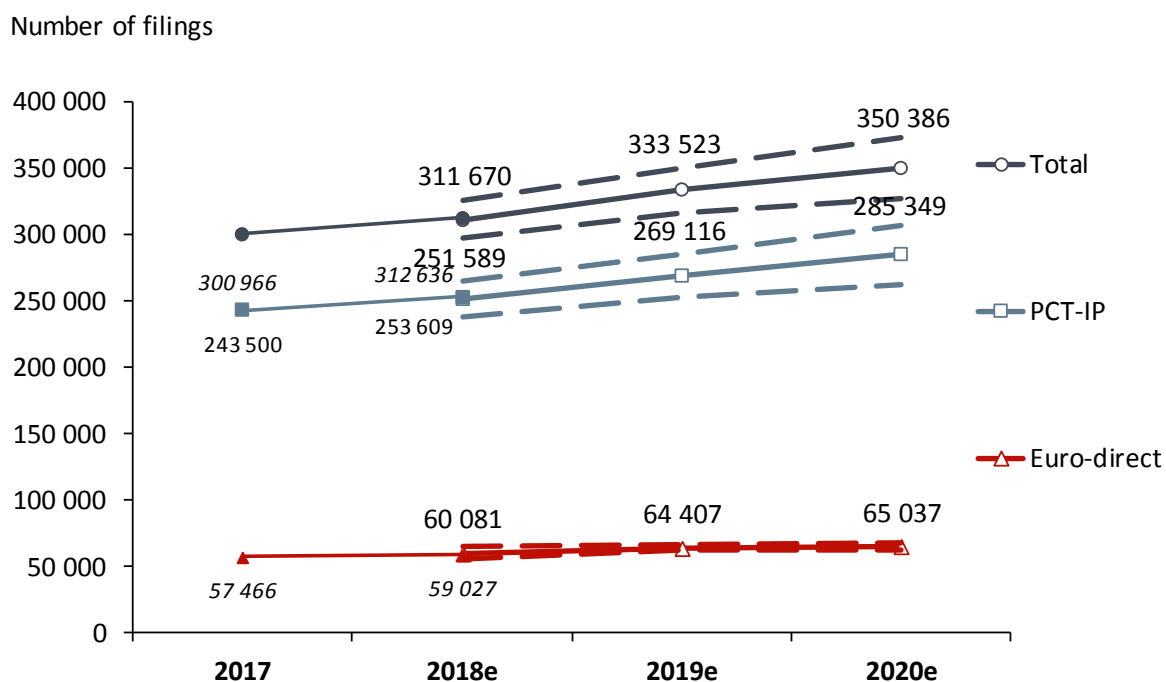
LCL/UCL indicates lower/upper 95% confidence limit

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

For breakdowns with less than 6 cases, higher aggregation level growth index is used (marked italic lines)

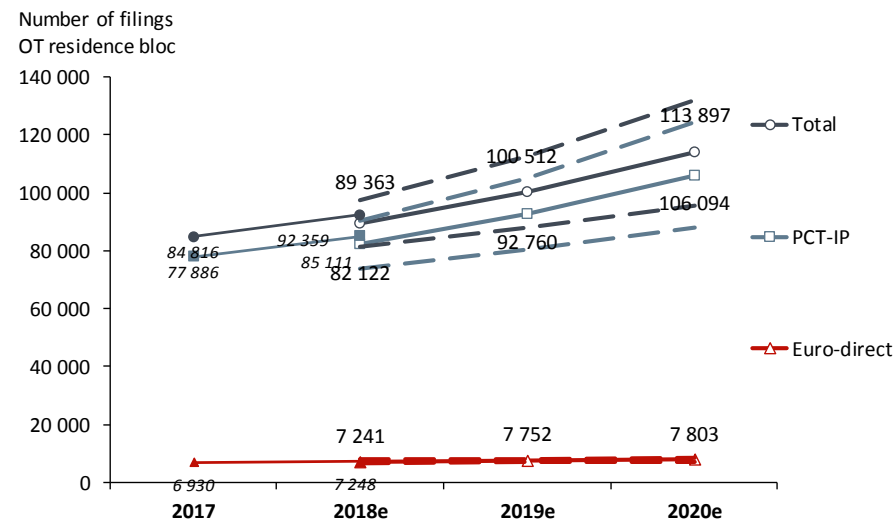
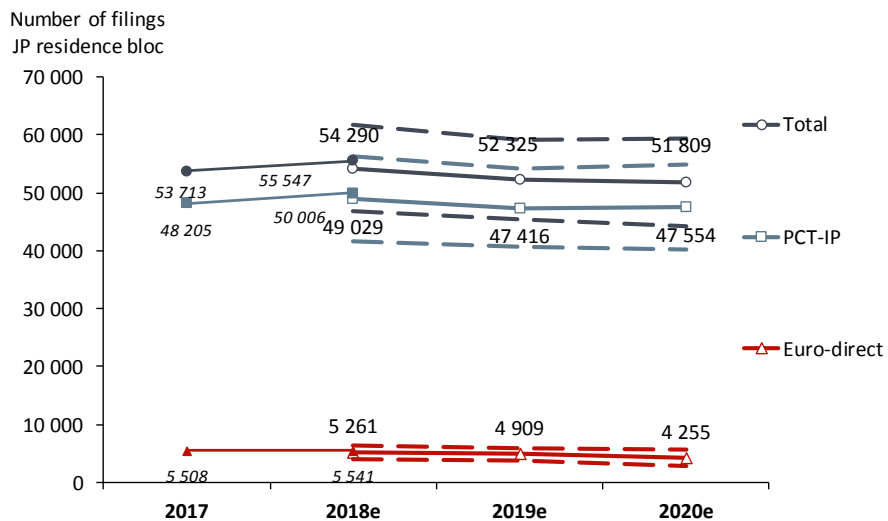
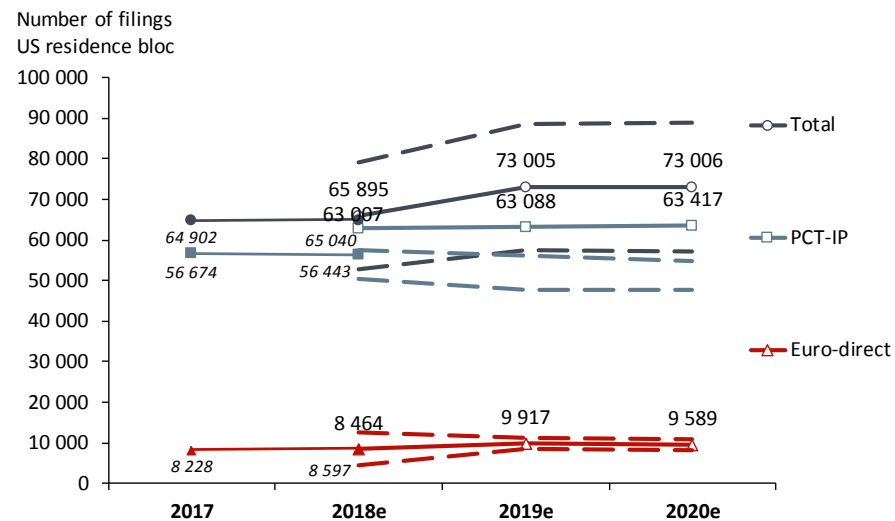
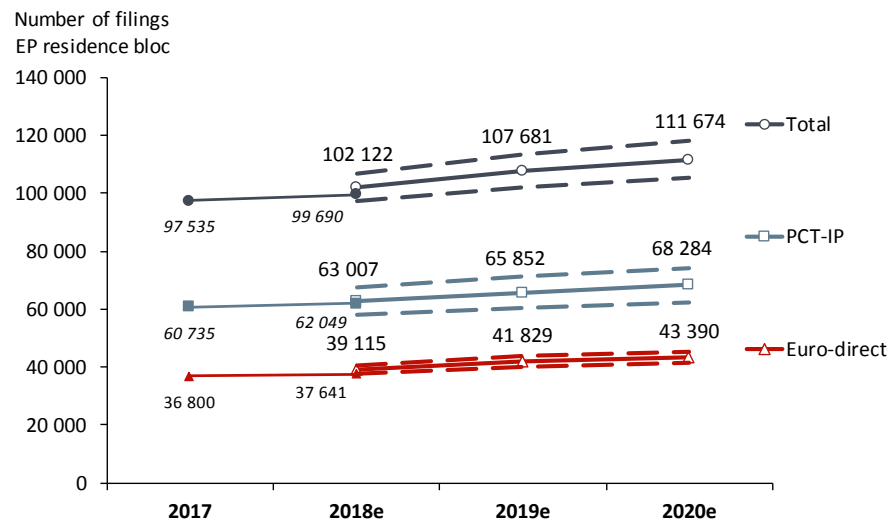
Q-indices			2017	2018					2019				2020			
Filing type	Filing route	Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
First	Euro-direct	EP	22 597	121	1.0601	0.0260	23 955	23 017	117	1.1185	0.0331	25 275	110	1.1545	0.0344	26 088
		US	1 082	23	0.9047	0.2229	979	1 148	19	1.3867	0.1164	1 500	18	1.4262	0.1203	1 543
		JP	312	4	1.0408	0.0464	325	278	5	1.1393	0.0344	355	4	1.1835	0.0355	369
		OT	537	2	1.0408	0.0464	559	833	2	1.1393	0.0344	612	1	1.1835	0.0355	636
		Total	24 528	150			25 818	25 276	143			27 742	133			28 636
	LCL					24 517					26 064				26 836	
UCL					27 119					29 420				30 436		
First	PCT-IP	EP	5 314	48	1.0970	0.0451	5 829	5 429	43	1.0941	0.0426	5 814	41	1.1222	0.0438	5 963
		US	5 273	34	1.0324	0.0499	5 444	5 251	34	1.2795	0.1376	6 747	32	1.1578	0.0740	6 105
		JP	8 640	17	1.5034	0.2079	12 989	8 963	16	1.0749	0.0922	9 287	15	1.0501	0.0941	9 073
		OT	16 471	2	1.1487	0.0580	18 920	18 040	2	1.1342	0.0464	18 681	2	1.1234	0.0372	18 504
		Total	35 697	101			43 182	37 682	95			40 529	90			39 645
	LCL					37 259					37 464				37 254	
UCL					49 105					43 594				42 036		
Subsequent	Euro-direct	EP	14 203	92	1.0674	0.0220	15 160	14 624	84	1.1655	0.0248	16 554	82	1.2182	0.0313	17 302
		US	7 146	23	1.0475	0.2596	7 485	7 449	20	1.1779	0.0843	8 417	20	1.1260	0.0809	8 046
		JP	5 196	22	0.9499	0.1249	4 936	5 263	18	0.8764	0.1208	4 554	18	0.7478	0.1765	3 886
		OT	6 393	5	1.0452	0.0473	6 682	6 415	5	1.1169	0.0301	7 140	4	1.1211	0.0422	7 167
		Total	32 938	142			34 263	33 751	127			36 665	124			36 401
	LCL					29 978					34 673				34 161	
UCL					38 548					38 657				38 641		
Subsequent	PCT-IP	EP	55 421	124	1.0317	0.0418	57 178	56 620	117	1.0833	0.0461	60 038	114	1.1245	0.0497	62 321
		US	51 401	60	1.0114	0.0538	51 987	51 192	53	1.0961	0.0608	56 341	50	1.1150	0.0747	57 312
		JP	39 565	38	0.9109	0.0691	36 040	41 043	34	0.9637	0.0873	38 129	32	0.9726	0.0946	38 481
		OT	61 415	8	1.0291	0.0629	63 202	67 071	7	1.2062	0.0835	74 079	7	1.4262	0.1048	87 590
		Total	207 803	230			208 407	215 927	211			228 587	203			245 704
	LCL					196 691					212 264				223 598	
UCL					220 123					244 910				267 810		
All	Euro-direct	EP	36 800				39 115	37 641				41 829				43 390
		US	8 228				8 464	8 597				9 917				9 589
		JP	5 508				5 261	5 541				4 909				4 255
		OT	6 930				7 241	7 248				7 752				7 803
		Total	57 466				60 081	59 027				64 407				65 037
	LCL					55 603					61 803				62 164	
UCL					64 559					67 011				67 910		
All	PCT-IP	EP	60 735				63 007	62 049				65 852				68 284
		US	56 674				57 431	56 443				63 088				63 417
		JP	48 205				49 029	50 006				47 416				47 554
		OT	77 886				82 122	85 111				92 760				106 094
		Total	243 500				251 589	253 609				269 116				285 349
	LCL					238 461					252 508				263 114	
UCL					264 717					285 724				307 584		
Grand total		EP	97 535				102 122	99 690				107 681				111 674
		US	64 902				65 895	65 040				73 005				73 006
		JP	53 713				54 290	55 547				52 325				51 809
		OT	84 816				89 363	92 359				100 512				113 897
		Total	300 966				311 670	312 636				333 523				350 386
	LCL					297 799					316 712				327 966	
UCL					325 541					350 334				372 806		
Growth from 2017						3.6%	3.9%				10.8%				16.4%	
Implied % PCT-IP	Total	80.9%				80.7%	81.1%				80.7%				81.4%	
		LCL					78.9%				79.5%				80.0%	
		UCL					82.5%				82.3%				83.4%	
Deviation in % of forecast						4.5%					5.0%				6.4%	

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



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 (marked italic lines)

Q-indices			2017	2018					2019				2020			
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	22 597	121	1.0579	0.0284	23 905	23 017	117	1.1434	0.0353	25 837	110	1.1712	0.0385	26 466
		US	1 082	23	1.1356	0.1044	1 229	1 148	19	1.3391	0.1137	1 449	18	1.3736	0.1167	1 486
		JP	312	4	1.0538	0.0485	329	278	5	1.1637	0.0374	363	4	1.2016	0.0364	375
		OT	537	2	1.0538	0.0485	566	833	2	1.1637	0.0374	625	1	1.2016	0.0364	645
	Total	24 528	150			26 029	25 276	143			28 274	133			28 972	
	LCL					24 674					26 454				26 944	
	UCL					27 384					30 094				31 000	
First	PCT-IP	EP	5 314	48	1.1107	0.0525	5 902	5 429	43	1.0915	0.0379	5 800	41	1.1286	0.0386	5 997
		US	5 273	34	1.0685	0.0385	5 634	5 251	34	1.3035	0.1577	6 873	32	1.2047	0.0735	6 352
		JP	8 640	17	1.4172	0.2148	12 245	8 963	16	1.0756	0.1148	9 293	15	1.0508	0.1205	9 079
		OT	16 471	2	1.1475	0.0565	18 900	18 040	2	1.1401	0.0502	18 779	2	1.1374	0.0351	18 734
	Total	35 697	101			42 681	37 682	95			40 745	90			40 162	
	LCL					36 899					37 173				37 438	
	UCL					48 463					44 317				42 886	
Subsequent	Euro-direct	EP	14 203	92	1.0677	0.0249	15 165	14 624	84	1.1633	0.0280	16 522	82	1.2131	0.0359	17 230
		US	7 146	23	1.0201	0.3749	7 290	7 449	20	1.1796	0.0939	8 429	20	1.1121	0.0843	7 947
		JP	5 196	22	0.9488	0.1921	4 930	5 263	18	0.8846	0.1503	4 596	18	0.7891	0.1914	4 100
		OT	6 393	5	1.0310	0.0490	6 591	6 415	5	1.1307	0.0310	7 229	4	1.1482	0.0355	7 340
	Total	32 938	142			33 976	33 751	127			36 776	124			36 617	
	LCL					27 647					34 463				34 173	
	UCL					40 305					39 089				39 061	
Subsequent	PCT-IP	EP	55 421	124	1.0141	0.0275	56 202	56 620	117	1.0707	0.0266	59 339	114	1.1132	0.0293	61 695
		US	51 401	60	1.0066	0.0577	51 740	51 192	53	1.1019	0.0667	56 639	50	1.1204	0.0829	57 590
		JP	39 565	38	0.9080	0.0666	35 925	41 043	34	0.9278	0.0775	36 708	32	0.9590	0.1066	37 943
		OT	61 415	8	1.0317	0.1358	63 362	67 071	7	1.2194	0.2232	74 889	7	1.4380	0.2829	88 315
	Total	207 803	230			207 229	215 927	211			227 575	203			245 543	
	LCL					188 302					192 179				191 974	
	UCL					226 156					262 971				299 112	
All	Euro-direct	EP	36 800				39 070	37 641				42 359				43 696
		US	8 228				8 519	8 597				9 878				9 433
		JP	5 508				5 259	5 541				4 959				4 475
		OT	6 930				7 157	7 248				7 854				7 985
	Total	57 466				60 005	59 027				65 050				65 589	
	LCL					53 533					62 107				62 413	
	UCL					66 477					67 993				68 765	
All	PCT-IP	EP	60 735				62 104	62 049				65 139				67 692
		US	56 674				57 374	56 443				63 512				63 942
		JP	48 205				48 170	50 006				46 001				47 022
		OT	77 886				82 262	85 111				93 668				107 049
	Total	243 500				249 910	253 609				268 320				285 705	
	LCL					230 120					232 744				232 067	
	UCL					269 700					303 896				339 343	
Grand total		EP	97 535				101 174	99 690				107 498				111 388
		US	64 902				65 893	65 040				73 390				73 375
		JP	53 713				53 429	55 547				50 960				51 497
		OT	84 816				89 419	92 359				101 522				115 034
	Total	300 966				309 915	312 636				333 370				351 294	
	LCL					289 093					297 673				297 562	
	UCL					330 737					369 067				405 026	
Growth from 2017 Implied % PCT-IP	Total					3.0%	3.9%				10.8%				16.7%	
			80.9%			80.6%	81.1%			80.5%			81.3%			
		LCL				78.9%			79.2%			79.8%				
		UCL				82.5%			82.1%			83.2%				
Deviation in % of forecast							6.7%				10.7%				15.3%	

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

			2017	2018					2019				2020			
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	EP	27 911	155	1.0344	0.0381	28 871	28 446	148	1.0724	0.0384	29 932	140	1.1057	0.0384	30 861
		US	6 355	61	0.9473	0.1176	6 020	6 399	56	1.2768	0.0879	8 114	53	1.2175	0.0561	7 737
		JP	8 952	24	1.1809	0.0806	10 571	9 241	24	1.0254	0.0627	9 179	22	1.0505	0.0559	9 404
		OT	17 008	7	1.4273	0.1254	24 276	18 873	7	1.5944	0.1172	27 118	6	1.959	0.1453	33 319
	Total	60 225	247			69 738	62 958	235			74 343	221			81 321	
	LCL					62 964					67 418				71 315	
	UCL					76 512					81 268				91 327	
Subsequent	All	EP	69 624	166	0.9940	0.0385	69 206	71 244	154	1.0878	0.0440	75 737	149	1.1313	0.0472	78 766
		US	58 547	73	0.7481	0.1624	43 799	58 641	64	0.7012	0.3060	41 053	61	0.6839	0.3290	40 040
		JP	44 761	47	0.8476	0.0694	37 939	46 306	41	0.8657	0.0660	38 750	39	0.8523	0.0716	38 150
		OT	67 808	11	1.1438	0.0987	77 559	73 486	10	1.2226	0.0677	82 902	9	1.3664	0.0988	92 653
	Total	240 741	297			228 503	249 678	269			238 442	258			249 609	
	LCL					206 485					208 646				215 064	
	UCL					250 521					268 238				284 154	
Grand total		EP	97 535				98 077	99 690				105 669				109 627
		US	64 902				49 819	65 040				49 167				47 777
		JP	53 713				48 510	55 547				47 929				47 554
		OT	84 816				101 835	92 359				110 020				125 972
	Total	300 966				298 241	312 636				312 785				330 930	
	LCL					275 205					282 194				294 965	
UCL					321 277					343 376				366 895		
Growth from 2017							-0.9%	3.9%				3.9%				10.0%
Deviation in % of forecast							7.7%					9.8%				10.9%

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

4.4 Total filings - Random group with User defined weights

Analysis of this year's survey data revealed that the forecasts for 2018 growth mostly agree well with observed growth. For Random group forecasts, so called Poisson weights are used (See **Section 9.3**). This year weights are based on Total filings counts of respondents as recorded in the EPO database. In previous years, recorded Total applications counts were used. Total application counts are in full extent attributed to applicants and are known at time of sampling. On the other hand, at the moment of sample extraction not all Total filings are attributed to fillers. At the time of sample extraction, the rate of unknown Total filings was around 30% of all Total filings made in 2017, with the unknown cases mainly taking place in the second half of the year. It could not easily be established whether there was bias induced by the Poisson weights due to Total filings being assigned to the respondents in this non-random way. In order to make a check, an additional Random group analysis was done with User defined weights, which are Poisson weights based on the number of Total filings made in 2017 as reported by the respondent as opposed to the number taken from EPO database.

Table 13 summarises the results of forecasting approaches applied on the dataset, as was already shown in **Table 1**, but where User defined weights are used. The observed one-year growth rate for the selected scenario (Included / Random / Residence blocs) is, at 4.1%, higher than in the equivalent standard case scenario (3.6%). **Table 14** shows forecast filing numbers, confidence intervals and the RMSEF for the 2018 forecast by the forecasting approaches, corresponding to **Table 2** for the full data set.

RMSEFs of both standard and User defined weights cases' for recommended scenarios are nearly identical, with the User defined case scenario having slightly more conservative two-year and three-year predictions. Implied % PCT values are also similar.

Predicted growth rates for Total filings by forecasting method
Comparison of forecasts: growth from 2017
Euro-direct and PCT-IP

Critical	Group	Breakdown	2018		2019		2020	
			Growth rate	Deviation	Growth rate	Deviation	Growth rate	Deviation
Included	Random	None	1.8%	3.6%	5.0%	3.6%	6.9%	3.7%
Included	Random	None (winsorized)	2.0%	3.2%	6.1%	3.2%	8.2%	3.3%
Included	Random	None (Euro-direct and PCT-IP filings combined)	-1.7%	5.9%	2.6%	5.2%	4.7%	5.6%
Included	Random	Residence bloc	4.1%	4.4%	8.8%	4.5%	13.9%	5.3%
Included	Random	Residence bloc (winsorized)	4.0%	7.1%	9.7%	10.8%	14.9%	13.4%
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	4.7%	7.0%	9.0%	5.1%	15.7%	6.7%
Included	Random	Residence bloc (First and Subsequent filings combined)	5.5%	4.6%	14.0%	4.6%	20.7%	5.2%
Included	Random	Residence bloc (All filings combined)	3.0%	6.3%	9.0%	4.6%	15.8%	6.2%
Excluded	Random	None	2.6%	4.6%	5.3%	4.5%	8.7%	4.8%
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	-3.3%	6.5%	2.2%	7.1%	5.4%	7.4%
Excluded	Random	Residence bloc	5.3%	5.1%	8.4%	6.1%	13.6%	6.8%
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	3.3%	8.8%	8.3%	6.8%	14.2%	7.7%
Excluded	Random	Residence bloc (First and Subsequent filings combined)	8.8%	5.2%	16.3%	5.4%	23.2%	6.6%
Excluded	Random	Residence bloc (All filings combined)	2.6%	8.3%	9.0%	6.5%	15.1%	7.7%
Actual growth			3.9%					

Table 13: Predicted growth rates for Total filings based on User defined weights

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

Critical	Group	Breakdown	2018				2019			2020		
			Predicted filings	LCL	UCL	RMSEF*	Predicted filings	LCL	UCL	Predicted filings	LCL	UCL
Included	Random	None	306 425	295 375	317 475	8 388	315 944	304 611	327 277	321 778	309 733	333 823
Included	Random	None (winsorized)	306 869	297 004	316 734	7 654	319 301	309 092	329 510	325 653	314 766	336 540
Included	Random	None (Euro-direct and PCT-IP filings combined)	295 986	278 392	313 580	18 916	308 783	292 824	324 742	315 042	297 484	332 600
Included	Random	Residence bloc	313 324	299 529	327 119	7 072	327 528	312 799	342 257	342 726	324 416	361 036
Included	Random	Residence bloc (winsorized)	312 974	290 771	335 177	11 333	330 133	294 592	365 674	345 939	299 498	392 380
Included	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	314 977	293 017	336 937	11 446	328 110	311 540	344 680	348 290	324 953	371 627
Included	Random	Residence bloc (First and Subsequent filings combined)	317 412	302 929	331 895	8 798	343 120	327 404	358 836	363 145	344 227	382 063
Included	Random	Residence bloc (All filings combined)	309 869	290 275	329 463	10 373	328 114	313 181	343 047	348 618	327 121	370 115
Excluded	Random	None	308 865	294 703	323 027	8 150	317 053	302 928	331 178	327 167	311 347	342 987
Excluded	Random	None (Euro-direct and PCT-IP filings combined)	291 086	272 104	310 068	22 600	307 644	285 937	329 351	317 130	293 554	340 706
Excluded	Random	Residence bloc	316 824	300 794	332 854	9 188	326 178	306 418	345 938	342 026	318 895	365 157
Excluded	Random	Residence bloc (Euro-direct and PCT-IP filings combined)	310 790	283 363	338 217	14 115	325 882	303 594	348 170	343 656	317 103	370 209
Excluded	Random	Residence bloc (First and Subsequent filings combined)	327 533	310 615	344 451	17 217	349 932	331 049	368 815	370 832	346 484	395 180
Excluded	Random	Residence bloc (All filings combined)	308 642	283 048	334 236	13 655	327 940	306 573	349 307	346 495	319 947	373 043
Actual filings			312 636									

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

Table 14: Predicted Total filings based on User defined weights

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 (marked italic lines)

Q-indices			2017	2018					2019				2020			
		Res. Block	Actual filings	Cases	Index	S.E.	Predicted filings	Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
Filing type	Filing route															
First	Euro-direct	EP	22 597	121	1.0735	0.0282	24 258	23 017	117	1.1353	0.0393	25 654	110	1.1703	0.0384	26 445
		US	1 082	23	1.0853	0.0899	1 174	1 148	19	1.225	0.1252	1 325	18	1.2393	0.1318	1 341
		JP	312	4	1.0743	0.0290	335	278	5	1.1371	0.0378	355	4	1.1728	0.0381	366
		OT	537	2	1.0743	0.0290	577	833	2	1.1371	0.0378	611	1	1.1728	0.0381	630
	Total	24 528	150			26 344	25 276	143			27 945	133			28 782	
	LCL					24 985					25 939				26 758	
UCL					27 703					29 951				30 806		
First	PCT-IP	EP	5 314	48	1.1044	0.0386	5 869	5 429	43	1.1060	0.0293	5 877	41	1.1372	0.0271	6 043
		US	5 273	34	1.0171	0.0426	5 363	5 251	34	1.2389	0.1600	6 533	32	1.0533	0.0588	5 554
		JP	8 640	17	1.5558	0.1924	13 442	8 963	16	1.1415	0.1051	9 863	15	1.1288	0.1073	9 753
		OT	16 471	2	1.1302	0.0446	18 616	18 040	2	1.1488	0.0514	18 922	2	1.1186	0.0282	18 424
	Total	35 697	101			43 290	37 682	95			41 195	90			39 774	
	LCL					37 792					37 684				37 359	
UCL					48 788					44 706				42 189		
Subsequent	Euro-direct	EP	14 203	92	1.0981	0.0208	15 596	14 624	84	1.1642	0.0269	16 535	82	1.2180	0.0349	17 299
		US	7 146	23	1.4095	0.3126	10 072	7 449	20	1.0670	0.0543	7 625	20	1.0323	0.0477	7 377
		JP	5 196	22	1.0985	0.1098	5 708	5 263	18	1.0666	0.1241	5 542	18	1.0413	0.1481	5 411
		OT	6 393	5	1.1491	0.0624	7 346	6 415	5	1.1371	0.0271	7 269	4	1.1677	0.0336	7 465
	Total	32 938	142			38 722	33 751	127			36 971	124			37 552	
	LCL					31 876					35 119				35 391	
UCL					45 568					38 823				39 713		
Subsequent	PCT-IP	EP	55 421	124	0.9879	0.0289	54 750	56 620	117	1.0239	0.0295	56 746	114	1.0534	0.0309	58 380
		US	51 401	60	0.9991	0.0335	51 355	51 192	53	1.0441	0.0368	53 668	50	1.0594	0.0464	54 454
		JP	39 565	38	0.8692	0.0656	34 390	41 043	34	0.8766	0.0693	34 683	32	0.8819	0.0753	34 892
		OT	61 415	8	1.0498	0.0663	64 473	67 071	7	1.2427	0.0812	76 320	7	1.4474	0.0914	88 892
	Total	207 803	230			204 968	215 927	211			221 417	203			236 618	
	LCL					194 415					207 376				218 711	
UCL					215 521					235 458				254 525		
All	Euro-direct	EP	36 800				39 854	37 641				42 189				43 744
		US	8 228				11 246	8 597				8 950				8 718
		JP	5 508				6 043	5 541				5 897				5 777
		OT	6 930				7 923	7 248				7 880				8 095
	Total	57 466				65 066	59 027				64 916				66 334	
	LCL					58 086					62 186				63 373	
UCL					72 046					67 646				69 295		
All	PCT-IP	EP	60 735				60 619	62 049				62 623				64 423
		US	56 674				56 718	56 443				60 201				60 008
		JP	48 205				47 832	50 006				44 546				44 645
		OT	77 886				83 089	85 111				95 242				107 316
	Total	243 500				248 258	253 609				262 612				276 392	
	LCL					236 359					248 138				258 323	
UCL					260 157					277 086				294 461		
Grand total		EP	97 535				100 473	99 690				104 812				108 167
		US	64 902				67 964	65 040				69 151				68 726
		JP	53 713				53 875	55 547				50 443				50 422
		OT	84 816				91 012	92 359				103 122				115 411
	Total	300 966				313 324	312 636				327 528				342 726	
	LCL					299 529					312 799				324 416	
UCL					327 119					342 257				361 036		
Growth from 2017						4.1%	3.9%				8.8%				13.9%	
Implied % PCT-IP	Total	80.9%				79.2%	81.1%				80.2%				80.6%	
		LCL					75.9%				79.0%				79.0%	
		UCL					80.9%				81.6%				82.5%	
Deviation in % of forecast						4.4%					4.5%				5.3%	

Table 15: Forecasts for Total filings based on User defined weights – Random group, broken down by residence bloc

5 FORECASTS FOR TOTAL EPO APPLICATIONS

As in previous surveys, the data 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. 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**). This year additional cases of User defined weights scenarios were generated for forecasts based on the Random group.

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 dataset and User defined weights (**Table 20**), as well as a winsorized version (**Table 21**). This is followed by analysis of Total applications with breakdown by residence bloc using the full Random group dataset (**Table 22**).

From **Table 16** it can be seen that estimates based on the scenarios without subsidiary breakdowns are generally somewhat less optimistic than corresponding estimates based on the scenarios with subsidiary breakdowns. This applies to all years' growth of Total EPO applications for the Random group across both standard and User defined weights cases.

Comparing the RMSEF values of all Total EPO applications forecasts for the Random group, the User defined weights case of Random group forecasts with no subsidiary breakdown (with winsorization) has the best RMSEF value and has similar point estimates of forecasted applications close to the actual Total application numbers observed in 2018. The User defined weights Random group based estimate without subsidiary breakdown, as shown in **Table 21**, is the preferred estimate for Total EPO applications.

While we see some improvement in Total EPO application forecasts accuracy in some scenarios when switching to used defined weights, this exercise did not provide extra accuracy for the preferred Total filing forecasting method, although it did but confirms the chosen scenario (see **Section 4.4**).

For the scenario in Table 21, the forecasts for implied % PCT-RP are slightly over 63% and are increasing over the period, more so than for Total Filings in Table 10. However the trend here is still indicative rather than statistical, because the 95% confidence limits for 2018 up to 2020 overlap with each other.

Comparison of forecasts: Growth from 2017
Euro-direct and Euro-PCT-RP combined

Case of weights	Critical	Group	Breakdown	2018		2019		2020	
				Growth rate	Deviation	Growth rate	Deviation	Growth rate	Deviation
Standard	Included	Biggest	None	2.2%		3.4%		7.2%	
Standard	Included	Biggest	Residence bloc	1.5%		2.8%		5.7%	
Standard	Included	Random	None	0.8%	5.4%	3.4%	10.2%	4.0%	14.0%
Standard	Included	Random	None (winsorized)	1.1%	5.3%	7.5%	7.6%	9.2%	7.9%
Standard	Included	Random	Residence bloc	3.3%	6.2%	7.0%	11.1%	8.9%	14.7%
Standard	Included	Random	Residence bloc (winsorized)	4.1%	9.4%	11.0%	13.9%	14.4%	20.7%
User defined	Included	Random	None	3.6%	4.4%	8.0%	4.7%	11.4%	5.7%
User defined	Included	Random	None (winsorized)	3.3%	4.4%	9.1%	5.1%	11.9%	6.3%
User defined	Included	Random	Residence bloc	6.4%	5.7%	12.8%	8.6%	19.6%	12.9%
User defined	Included	Random	Residence bloc (winsorized)	6.5%	8.4%	13.9%	16.2%	20.2%	32.1%
Standard	Excluded	Biggest	None	-6.2%		2.0%		6.0%	
Standard	Excluded	Biggest	Residence bloc	-8.2%		2.3%		5.4%	
Standard	Excluded	Random	None	-1.1%	7.4%	11.2%	7.3%	15.6%	8.4%
Standard	Excluded	Random	Residence bloc	-1.1%	7.3%	13.3%	7.3%	18.5%	7.8%
User defined	Excluded	Random	None	1.8%	5.1%	10.0%	6.2%	14.1%	7.5%
User defined	Excluded	Random	Residence bloc	2.9%	5.3%	12.2%	6.0%	17.0%	6.6%
Actual Growth				3.5%					

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

Case of weights	Critical	Group	Breakdown	2018				2019			2020		
				Predicted apps.	LCL	UCL	RMSEF	Predicted apps.	LCL	UCL	Predicted apps.	LCL	UCL
Standard	Included	Biggest	None	159 302				161 131			167 160		
Standard	Included	Biggest	Residence bloc	158 245				160 209			164 729		
Standard	Included	Random	None	157 153	148 708	165 598	6 014	161 252	144 798	177 706	162 202	139 532	184 872
Standard	Included	Random	None (winsorized)	157 563	149 276	165 850	5 675	167 562	154 830	180 294	170 201	156 730	183 672
Standard	Included	Random	Residence bloc	161 095	151 083	171 107	5 243	166 844	148 264	185 424	169 748	144 757	194 739
Standard	Included	Random	Residence bloc (winsorized)	162 344	147 134	177 554	7 824	173 022	148 914	197 130	178 301	141 382	215 220
User defined	Included	Random	None	161 467	154 362	168 572	3 627	168 387	160 458	176 316	173 650	163 738	183 562
User defined	Included	Random	None (winsorized)	161 024	153 976	168 072	3 610	170 134	161 382	178 886	174 403	163 394	185 412
User defined	Included	Random	Residence bloc	165 856	156 465	175 247	6 756	175 875	160 782	190 968	186 494	162 477	210 511
User defined	Included	Random	Residence bloc (winsorized)	166 104	152 093	180 115	8 586	177 537	148 859	206 215	187 372	127 164	247 580
Standard	Excluded	Biggest	None	146 258				159 092			165 183		
Standard	Excluded	Biggest	Residence bloc	143 164				159 541			164 258		
Standard	Excluded	Random	None	154 165	142 790	165 540	9 235	173 380	160 773	185 987	180 273	165 185	195 361
Standard	Excluded	Random	Residence bloc	154 153	142 909	165 397	9 202	176 643	163 796	189 490	184 754	170 364	199 144
User defined	Excluded	Random	None	158 696	150 524	166 868	4 941	171 442	160 786	182 098	177 945	164 656	191 234
User defined	Excluded	Random	Residence bloc	160 424	151 869	168 979	4 462	174 962	164 539	185 385	182 448	170 386	194 510
Actual Total Applications				161 348									

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

No subsidiary breakdown
Composite Indices

Patent Office	Res. Filing route	Block	2017		2018		2019		2020	
			Actual apps.	Predicted Cases	Actual apps.	Predicted Index	Predicted Cases	Predicted Index	Predicted Cases	Predicted Index
EPO	Euro-direct	Total	57 466	122	1.1336	65 143	59 027	108	1.0589	60 851
EPO	Euro-PCT-RP	Total	98 435	123	0.9566	94 159	102 321	109	1.0187	100 280
Grand total			155 901			159 302	161 348			161 131
Growth from 2017						2.2%	3.5%			3.4%
Implied % PCT-RP			63.1%			59.1%	63.4%			62.2%

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 Breakdown by residence bloc
Composite indices

Composite indices			2017	2018				2019			2020		
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	EP	36 800	79	1.0118	37 233	37 641	73	1.0589	38 967	72	1.1240	41 362
		US	8 228	18	1.9377	15 943	8 597	14	1.1520	9 478	14	1.1569	9 519
		JP	5 508	20	1.0439	5 750	5 541	16	0.8901	4 902	16	0.8665	4 773
		OT	6 930	5	1.1336	7 856	7 248	5	1.0589	7 338	4	1.1194	7 757
		Total	57 466	122		66 782	59 027	108		60 685	106		63 411
EPO	Euro-PCT-RP	EP	38 470	64	0.9972	38 363	40 191	57	1.0123	38 943	57	1.0398	40 000
		US	29 385	21	0.7999	23 505	29 104	17	0.9936	29 198	16	0.9887	29 054
		JP	15 086	34	0.9792	14 773	15 712	31	1.0340	15 599	30	1.0657	16 077
		OT	15 494	4	0.9566	14 822	17 314	4	1.0187	15 784	3	1.0447	16 187
		Total	98 435	123		91 463	102 321	109		99 524	106		101 318
Grand total		EP	75 270			75 596	77 832			77 910			81 362
		US	37 613			39 448	37 701			38 676			38 573
		JP	20 594			20 523	21 253			20 501			20 850
		OT	22 424			22 678	24 562			23 122			23 944
		Total	155 901			158 245	161 348			160 209			164 729
Growth from 2017						1.5%	3.5%			2.8%			5.7%
Implied % PCT-RP						57.8%				62.1%			61.5%

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 LCL/UCL indicates lower/upper 95% confidence limit
No subsidiary breakdown Deviation in % of forecast means (predicted filings - LCL)/predicted filings
Q-indices, user defined Poisson weights

Q-indices, user defined Poisson weights			2017	2018					2019				2020			
Filing type	Filing route	Res.	Actual	Predicted			Actual	Predicted			Predicted			Predicted		
		Block	apps.	Cases	Index	S.E.	apps.	apps.	Cases	Index	S.E.	apps.	Cases	Index	S.E.	apps.
EPO	Euro-direct	Total	57 466	229	1.0722	0.0398	61 615	59 027	214	1.0715	0.0258	61 575	205	1.1040	0.0280	63 442
		LCL					56 803					58 460				59 958
		UCL					66 427					64 690				66 926
EPO	Euro-PCT-RP	Total	98 435	229	1.0144	0.0267	99 852	102 321	210	1.0851	0.0348	106 812	207	1.1196	0.0429	110 208
		LCL					94 624					99 520				100 928
		UCL					105 080					114 104				119 488
Grand total		Total	155 901				161 467	161 348				168 387				173 650
		LCL					154 362					160 458				163 738
		UCL					168 572					176 316				183 562
Growth from 2017							3.6%	3.5%				8.0%				11.4%
Implied % PCT-RP		Total	63.1%				61.8%	63.4%				63.4%				63.5%
		LCL					59.3%					61.4%				61.0%
		UCL					64.4%					66.7%				67.2%
Deviation in % of forecast							4.4%					4.7%				5.7%

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

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

			2017	2018					2019				2020			
Filing type	Filing route	Res. Block	Actual apps.	Cases	Index	S.E.	Predicted apps.	Actual apps.	Cases	Index	S.E.	Predicted apps.	Cases	Index	S.E.	Predicted apps.
EPO	Euro-direct	Total	57 466	229	1.0686	0.0381	61 408	59 027	214	1.0882	0.0241	62 535	205	1.1087	0.0305	63 713
		LCL					56 814					59 583				59 905
		UCL					66 002					65 487				67 521
EPO	Euro-PCT-RP	Total	98 435	229	1.0120	0.0274	99 616	102 321	210	1.0931	0.039	107 599	207	1.1245	0.0475	110 690
		LCL					94 271					99 360				100 361
		UCL					104 961					115 838				121 019
Grand total			Total	155 901			161 024	161 348				170 134				174 403
			LCL				153 976					161 382				163 394
			UCL				168 072					178 886				185 412
Growth from 2017							3.3%	3.5%				9.1%				11.9%
Implied % PCT-RP			Total	63.1%			61.9%	63.4%				63.2%				63.5%
			LCL				59.2%					61.3%				61.0%
			UCL				64.0%					67.0%				67.7%
Deviation in % of forecast							4.4%					5.1%				6.3%

Table 21: Forecasts for Total applications at the EPO – Random group (no subsidiary breakdown) employing winsorization, User defined weights

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

			2017	2018					2019				2020			
Filing type	Filing route	Res. Block	Actual apps.	Cases	Index	S.E.	Predicted apps.	Actual apps.	Cases	Index	S.E.	Predicted apps.	Cases	Index	S.E.	Predicted apps.
EPO	Euro-direct	EP	36 800	164	1.0180	0.0267	37 462	37 641	157	1.0589	0.0273	38 968	150	1.1021	0.0295	40 557
		US	8 228	34	1.2914	0.1763	10 626	8 597	30	1.162	0.0671	9 561	29	1.1641	0.0679	9 578
		JP	5 508	25	1.0898	0.1069	6 003	5 541	21	1.0254	0.1104	5 648	21	1.008	0.1115	5 552
		OT	6 930	6	1.1398	0.1144	7 899	7 248	6	1.1738	0.0864	8 134	5	1.104	0.0280	7 651
		Total	57 466	229			61 990	59 027	214			62 311	205			63 338
		LCL					57 217					59 248				60 368
		UCL					66 763					65 374				66 308
EPO	Euro-PCT-RP	EP	38 470	119	1.0030	0.0293	38 585	40 191	109	1.0526	0.0404	40 494	110	1.0728	0.0468	41 271
		US	29 385	59	0.9989	0.0621	29 353	29 104	53	1.0912	0.0479	32 065	52	1.1306	0.0630	33 223
		JP	15 086	42	1.0392	0.0703	15 677	15 712	38	1.1512	0.0819	17 367	36	1.2284	0.1055	18 532
		OT	15 494	9	1.3070	0.1619	20 251	17 314	10	1.5256	0.2812	23 638	9	1.9446	0.3523	30 130
		Total	98 435	229			103 866	102 321	210			113 564	207			123 156
		LCL					95 778					98 785				99 323
		UCL					111 954					128 343				146 989
Grand total			EP	75 270			76 047	77 832				79 462				81 828
			US	37 613			39 979	37 701				41 626				42 801
			JP	20 594			21 680	21 253				23 015				24 084
			OT	22 424			28 150	24 562				31 772				37 781
			Total	155 901			165 856	161 348				175 875				186 494
			LCL				156 465					160 782				162 477
			UCL				175 247					190 968				210 511
Growth from 2017							6.4%	3.5%				12.8%				19.6%
Implied % PCT-RP			Total	63.1%			62.6%	63.4%				64.6%				66.0%
			LCL				59.8%					61.7%				62.8%
			UCL				65.5%					68.8%				71.8%
Deviation in % of forecast							5.7%					8.6%				12.9%

Table 22: Forecasts for Total applications at the EPO – Random group (broken down by residence bloc), User defined weights

6 CONCLUSIONS AND OUTLOOK

In terms of Total filings (Euro-direct + PCT-IP), the 2018 survey predicts an increase for 2018, with a growth rate of 3.6%. This forecast is close to the observed growth from 2017 to 2018, which was 3.9%. This is much better than last year's discrepancy between predicted and observed growth in 2017, which happened because respondents from all residence blocks provided conservative forecasts for subsequent PCT-IP filings growth in 2017. The improvement this year might be due to the new sampling procedure where this year's sample for the Random group was based on the Total filings population, rather than on Total applications. The observed number of 2018 Total filings is within the confidence limits of the forecasted point estimate for 2018. For 2019 and 2020, the recommended survey scenario anticipates optimistic Total filings growth with a year-on-year growth of 7.0% followed by 5.1%, respectively. The recommended scenario's forecasted 311 670 Total filings for 2018 is a bit lower than the observed 312 636 Total filings in 2018.

The variability of this year's forecasts in terms of deviation is higher than last year for two-year and three-year forecasts, indicating higher uncertainty due to a lower level of agreement level on expectations between respondents. In previous years, when the sample was drawn out of the Total applications applicants' universe, similarities between forecasts and actual out-turn for Total applications were better. But this year there is better agreement than before between the Total filings forecast and the actual number of Total filings in 2018. This might be additional confirmation of last year's suggestion that respondents might have less knowledge about expected filings for a specific route (PCT-IP or Euro-PCT-RP) if they are sampled from the universe of other applicant routes. Indeed, some of the sampled Total filings applicants may not be intending to make any Euro-direct or Euro-PCT-RP filings for the years in question.

Estimates of EPO Total applications appear to be well aligned with the actual growth in 2018 in the same way as for forecasts for Total filings, but with wider confidence intervals, thus providing a less robust indicator for expected EPO workload. To compensate, User defined weights scenarios were constructed for the preferred method, as opposed to standard Poisson weights based on EPO database numbers. Total EPO applications are forecasted to increase by 3.3% from 2017 to 2018, compared to the actual observed increase of 3.5%. Forecasts for Total EPO applications then increase further, with year-on-year growth of 5.7% in 2019 and 2.5% in 2020.

The EPO uses the forecasts of this survey to allocate its resources and capacities in order to optimise the patent examination process. We would 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.

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 Technical domains (Annex IV); respondents' profiles and analyses of company economic attributes, such as R&D budget, numbers of first filings, and SME status (Annex VI). 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 2017. 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 23** shows the distribution of the applicant population for Total Filings and Total applications in 2017, broken down by residence bloc (applicants for Euro-direct and PCT-IP, here excluding divisional filings). When taking into consideration the sampling method change implemented in the 2018 survey, there are significant differences among the population by residence blocs. The EPC countries population decreased by 15% while the proportion of Other countries residence bloc grew by 12% compared to the 2016 applicant population. There is only a minor difference to the population of USA, with the proportion increasing by just 2%. The applicant population for Total filings differs in some of the residence blocs, in particular the EPC bloc, which is 14% smaller than the applicant population for Total Applications while the Other countries bloc for Total filings is 11% larger. The size of Japan residence bloc applicant population is comparable for both samples.

Applicant population for Total Filings			Applicant population for Total Applications		
Residence bloc	Applicants (population)	%	Residence bloc	Applicants (population)	%
EPC countries	24 023	40%	EPC countries	19 916	54%
Japan	3 714	6%	Japan	1 987	5%
USA	14 459	24%	USA	8 280	23%
Other countries	17 486	29%	Other countries	6 482	18%
Total	59 682	100%	Total	36 665	100%

Table 23: Population size (applicants for Euro-direct and Euro-PCT-RP in 2017)

The following **Table 24** shows the probability distributions of the same applicant population for Total filings, 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	0,52	0,71	0,68	0,67
2	2	2	0,14	0,14	0,13	0,13	0,14
3	3	3	0,05	0,06	0,05	0,06	0,06
4	4	5	0,05	0,07	0,04	0,05	0,05
5	6	9	0,03	0,06	0,03	0,03	0,03
6	10	19	0,02	0,06	0,02	0,03	0,03
7	20	39	0,01	0,03	0,01	0,01	0,01
8	40	no limit	0,01	0,05	0,01	0,01	0,01

Table 24: Grouped bloc-wise probabilities of existence of specific filing counts in 2017

The probability values in this table are almost the same as those in the previous survey. Whilst the individual bloc columns show small changes, the Total column is identical. Surprisingly, applicant population structure in terms of number of filings made per applicant in 2017 is close to 2016 survey applicant population structure in terms of number of applications per applicant.

Details of each selected applicant were provided by the EPO, including the name of the company/person, address, and additional information from the EPO database, such as number of filings at the EPO in 2017.

The target persons within companies are generally 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 also turn out 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** split by - First and subsequent filings - Different procedures: Euro-direct, PCT international and national/regional phase, and national procedures - Different countries: Germany, Japan, the US, Republic of Korea, People's Republic of China, and Other countries.
- **Research and Development budget.**
- **Patenting activities** split by 3 Technical domains that were equivalent to the organisational groupings used for examinations at the EPO. There is also a 4th box for 'Other area(s)'.
- **Company details**, such as organisation type, number of employees, and whether company is Small and Medium Enterprise (SME)⁷.
- **Comments regarding estimations** of the numbers or reasons for making numerical estimates in order to help the data interpretation.
- **General comments** regarding the future patenting activities, how the forecasts were calculated and emerging technologies.

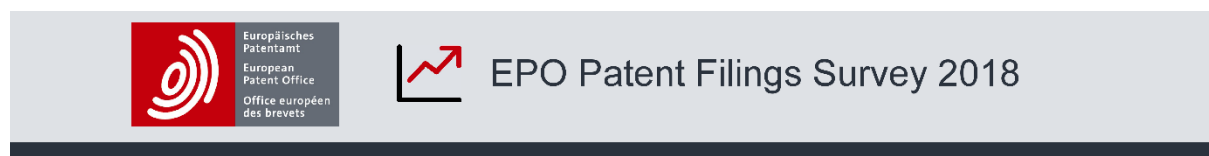
An introductory letter from the EPO was sent to respondents together with the survey link. The introductory letter contained information on the background of the study, the target group and data protection, a contact person at the EPO in cases of doubt, and stated that the report of the general results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

To meet 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 by way of an electronic 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.

⁷ The official European Union definition of an SME: http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en

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



First of all, we would like to ask you for some basic information about you and your company.

Please provide us with your contact information.

Your contact details will not be shared with the EPO without your consent.

Contact Name:
E-mail-Address:
Phone Number:

What position do you hold within your organisation?

- ☐ Patent Attorney
- ☐ Head or member of Patent department
- ☐ Head or member of R&D department
- ☐ Head or member of Legal Department
- ☐ Inventor
- ☐ General Manager, Senior Executive, Engineer
- ☐ Other (please specify):

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Please respond only in respect of the company ♦♦, e.g. your branch or subsidiary.
If, however, this is not possible, we would welcome your responses in respect of whatever larger or smaller company part that you can speak for.

For which company or branch or subsidiary do you intend to answer the questionnaire?

- ☒ The company ♦♦
- ☐ Smaller company / branch or subsidiary
- ☐ Bigger company / branch or subsidiary

Please specify name(s) of entity (entities) for which you will be answering the questionnaire:

250 characters left

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Please indicate which class best describes the nature of the entity:

- ☐ Private enterprise/commercial sector
- ☐ Higher educational sector
- ☐ Government-performed R&D
- ☐ Other (please specify):

Please state the current size of your organisation in approximate number of employees:

- ☐ 1 employee, or individual inventor
- ☐ 2 to 9 employees
- ☐ 10 to 49 employees
- ☐ 50 to 249 employees
- ☐ 250 to 499 employees
- ☐ 500 to 999 employees
- ☐ 1 000 to 4 999 employees
- ☐ 5 000 to 9 999 employees
- ☐ 10 000 to 19 999 employees
- ☐ 20 000 or more employees
- ☐ Don't know

Is your company one of the Small and Medium sized Enterprises (SMEs) under the EU definition?¹

- ☐ Yes
- ☐ No
- ☐ Don't know

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1 Essentially, the European Union defines a SME as follows: A private enterprise with a headcount less than 250, AND: EITHER a turnover less than or equal to 50 million Euro OR a balance sheet total less than or equal to 43 million Euro. The entity should not cross these limits after taking account of other enterprises that it controls or is controlled by.

Your company's business address is ♦♦.

Do you make patent filings at the national patent office in ♦♦?

- ☒ Yes
- ☐ No

While this survey concentrates on patent filings that create workload for the European Patent Office, we would also like you to provide some information about your local patenting activity.

Firstly, please indicate as far as possible the numbers of first filings¹ and subsequent filings in 2017 in the Patent Office in ♦♦².

 Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell. Please count your first filings and subsequent filings separately as far as possible.

Filed 2017	
First filings	Subsequent filings

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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 The reason we are asking for this information is that the European Patent Office is a supranational office that receives subsequent filings that follow on up to one year after the first filing is made at a patent office. First filings information is therefore especially relevant to the EPO because it often receives subsequent filings that are based on them.

Please forecast as far as possible the numbers of first filings¹ and subsequent filings in 2018 - 2020 in the Patent Office in ♦♦².

- ① Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.
Please count your first filings and subsequent filings separately as far as possible.

Filed 2017		Expected 2018		Expected 2019		Expected 2020	
First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings
♦♦	♦♦						

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 The reason we are asking for this information is that the European Patent Office is a supranational office that receives subsequent filings that follow on up to one year after the first filing is made at a patent office. First filings information is therefore especially relevant to the EPO because it often receives subsequent filings that are based on them.

The European Patent Office (EPO) works with Patent Convention treaty (PCT) based applications as well as direct filings that are made under the European Patent Convention (EPC).

Please indicate which of these types of applications you filed in 2017:

- ☒ Direct European patent applications under the EPC (excluding PCT and divisional applications)
☒ International applications under the PCT (International Phase)
☐ None of the above

Firstly, please indicate how many of the following types of applications you made in 2017.¹

- ① Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.

	Filed 2017	
	First filings ²	Subsequent filings
Direct European patent applications under the EPC, excluding PCT and divisional applications		
International applications under the PCT (International Phase)		

1 PCT applications entering the regional phase at the EPO will be asked about later in this survey.

2 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.

Please indicate which type of applications are you going to file at the European Patent Office (EPO) in 2018 - 2020?

- ☒ Direct European patent applications under the EPC (excluding PCT and divisional applications)
☒ International applications under the PCT (International Phase)
☐ None of the above

Please indicate the numbers of first filings¹ and subsequent filings (claiming priority of an earlier application), that you are going to file at the European Patent Office (EPO) in 2018 - 2020. If you cannot provide exact numbers, you are welcome to present rough estimations.

- ① Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.

	Filed 2017 ²		Expected 2018		Expected 2019		Expected 2020	
	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings
Direct European patent applications under the EPC, excluding PCT and divisional applications	♦♦	♦♦						
International applications under the PCT (International Phase)	♦♦	♦♦						

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 a previous question.

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Please indicate in which of the following countries you have filed first or subsequent (claiming priority of an earlier application) filings in 2017.

- ☒ Germany
☒ Japan
☒ United States of America
☒ Republic of Korea
☒ People's Republic of China
☒ Other countries (please specify):
☐ None

Firstly, 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 2017. If you cannot provide exact numbers, you are welcome to present rough estimations.

¹ Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.

National applications (excluding EPC and PCT) to the Patent Offices of these countries:	Filed 2017	
	First filings	Subsequent filings
Germany		
Japan		
United States ³		
Republic of Korea		
People's Republic of China		
Other countries		

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.

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 in which of the following countries you are going to file first or subsequent (claiming priority of an earlier application) filings in 2018 - 2020.

- ☒ Germany
☒ Japan
☒ United States of America
☒ Republic of Korea
☒ People's Republic of China
☒ Other countries (please specify):
☐ None

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 are going to file in 2018 - 2020. If you cannot provide exact numbers, you are welcome to present your rough estimations or guesses.

¹ Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.

National applications (excluding EPC and PCT) to the Patent Offices of these countries:	Filed 2017 ²		Expected 2018		Expected 2019		Expected 2020	
	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings	First filings	Subsequent filings
Germany	♦♦	♦♦						
Japan	♦♦	♦♦						
United States ³	♦♦	♦♦						
Republic of Korea	♦♦	♦♦						
People's Republic of China	♦♦	♦♦						
Other countries	♦♦	♦♦						

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.

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 in which of the listed offices your PCT applications entered the regional/national phase in 2017.

- ☒ European Patent Office (EPO)
- ☒ German Patent and Trade Mark Office (DPMA)
- ☒ Japan Patent Office (JPO)
- ☒ United States Patent and Trademark Office (USPTO)
- ☒ Korean Intellectual Property Office (KIPO)
- ☒ China State Intellectual Property Office (SIPO)
- ☐ None of the above

Firstly, please indicate the numbers of your PCT applications that entered the regional/national phase at selected offices in 2017.

^① Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.

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

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Please indicate in which of the listed offices your PCT applications will enter the regional/national phase in 2018 - 2020?

- ☒ European Patent Office (EPO)
- ☒ German Patent and Trade Mark Office (DPMA)
- ☒ Japan Patent Office (JPO)
- ☒ United States Patent and Trademark Office (USPTO)
- ☒ Korean Intellectual Property Office (KIPO)
- ☒ China State Intellectual Property Office (SIPO)
- ☐ None of the above

Please forecast as far as possible the numbers of your PCT applications that will enter the regional/national phase at selected offices in 2018 - 2020.

^① Please enter "0" if you have no applications in a year/procedure, and "00" if you do not know or do not want to tell.

PCT applications entering the regional / national phase at:	Entered ¹ 2017	Expected 2018	Expected 2019	Expected 2020
European Patent Office (EPO)	♦♦			
German Patent and Trade Mark Office (DPMA)	♦♦			
Japan Patent Office (JPO)	♦♦			
United States Patent and Trademark Office (USPTO)	♦♦			
Korean Intellectual Property Office (KIPO)	♦♦			
China State Intellectual Property Office (SIPO)	♦♦			

¹ Displayed number of applications you indicated in a previous question.

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Please tell us something about how you estimated the numbers for 2018 - 2020. Are the numbers for 2018 – 2020 based on:

- ☒ well founded expectations
- ☒ on continuing past trends
- ☒ informed guesswork
- ☒ other (please specify)

Any relevant comments on your reasons for making the numerical estimates that you have given will be welcomed to help the interpretation of your data as we combine it with others' responses in order to give the best estimates that we can for future patent filings demand at the EPO.

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You entered in previous questions that total number of your worldwide total first patent filings are ♦♦ first filings.

Please indicate how many of these total worldwide first patent filings were made in each of the technical sectors?

① Count each filing only once.
Please enter "00" if you do not know or do not want to tell.

Technical sectors *In the report called 'Technical domains'	The number of first patent filings made per sector in 2017 throughout the world.
Healthcare, biotechnology & chemistry (HBC) ¹	
Information & communications technology (ICT) ²	
Mobility and mechatronics (M&M) ³	
Other technical area(s), please specify: 	
TOTAL	0

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Please state the approximate size of your R&D budget 2017:
Please enter "00" if you do not know or do not want to tell.

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

Page 15

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

1000 characters left

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

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This survey is conducted by BERENT on behalf of the EPO

 BERENT

www.berent.com • [Survey background information](#) • [Glossary](#)

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 14 experienced interviewers, were either multilingual or native speakers. They received a project briefing prior to the commencement of the fieldwork, which involved representatives 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 and the patent filings survey.

The telephone contact phase and the sending of survey links to the participants started on 4th May 2018.

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 much 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 360 applicants, which is higher than 173 applicants in 2017 survey. Due to the sampling method change in 2018, the TFs sample included an increased number of records in 'Other countries' residence bloc which led to this higher number of applicants that could not be found during the contact search phase.

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 1 373 email invitations were sent, although there were cases where emails were sent to more than one person within the same organisation). Compared to the previous survey, there were less email invitations sent without prior agreement of the target person. There were also less emails sent requesting receptionists to forward the email to the responsible person in the company, as this has proven to be inefficient compared to the outcome when an email invitation followed the target person's verbal acceptance to participate or at least review the questionnaire, when given during the telephone conversation.

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 1 case (in Japan), the questionnaire and the EPO letter were sent to the respondent by fax.

7.6 Data collection modes

The data collection method in 2018 was CAWI (*Computer Assisted Web Interview*).

The questionnaire structure was changed in that the matrix questions were split and simplified into a step-by-step questionnaire controlled by filter questions, i.e. respondents had to provide the data only for the filing routes they are actually using by clicking on the relevant choices. For more details, see pages 5 – 11 of the survey snapshots.

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 28th September 2018. Then, in order to maximise the number of responses, all completed questionnaires received by 10th November 2018 were included in the final analysis.

Only 14 of all questionnaires completed were done so by using the PDF paper version.

A number of questionnaires were completed over the phone during reminder calls between interviewers and respondents. However, the answers were input by either interviewer or the respondent into the online questionnaire. The telephone interviews accounted for about 30 cases.

The following table shows the distribution of responses received by the EPO and research agencies for the period 2014-2018:

Return Type	Questionnaires sent to Ipsos/GfK			BERENT web questionnaires	
	2014	2015	2016	2017	2018
E-Mail	603	212	546	5	14
Fax/letter	25	18	66	0	0
Phone	28	121	26	50	30
CAWI	0	0	0	592	642
Total	656	351	638	647	686

Table 25: The distribution of responses received for surveys between 2014-2018

In total, 686 questionnaires were completed in 2018 which is higher than the numbers of responses that were achieved in the four previous surveys.

As shown in Figure 8, of the 686 respondents, 654 were part of the Random group sample and 227 were part of the Biggest group sample, with 195 cases overlapping.

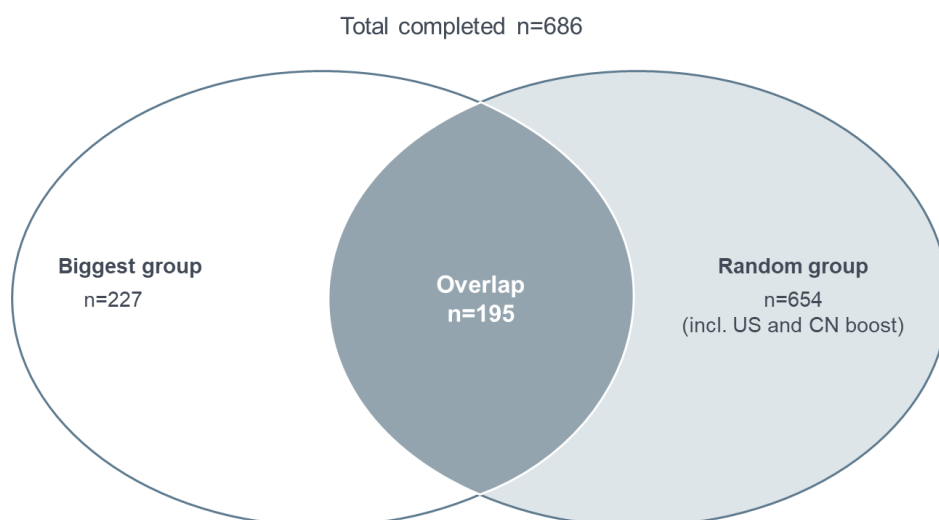


Figure 8: Response structure of this year's survey

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	4 078	100%
Contact details not found	360	9%
Total contact details found	3 718	100%
1) Dropouts in Contact Phase	2 380	64%
Adjusted sample	1 338	36%
2) Dropouts in Interview Phase	652	18%
Total responses / Response rate*	686	18%

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 26: Overview of samples and responses received

The resulting higher number of Dropouts in the Contact Phase experienced during the 2018 survey can be attributed to the more efficient approach performed by the fieldwork team, which drew from their experience and lessons learned from the previous year's survey. More time and effort were spent in order to gain direct access to the target person as opposed to being reliant upon the co-operation of receptionists. It should be noted that this approach has led to increased response rates among the recruited sample.

During the fieldwork, potential respondents were contacted up to five 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. 403 interviews were received as a result of call centre activities in Vilnius, which covered the English, French, Italian, Spanish and a share of the German speaking sample parts. As an outcome of the fieldwork activities conducted by Kassel call centre, 283 interviews were received, which covered German, Japanese, Chinese and Korean speaking 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 2018 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 four reminders being made. 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 erect fewer barriers. But again, each call was made without preconceptions to ensure no opportunities to make contact were wasted.

Interviewers used 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 relatively successful. The numbers of responses from the US were significantly higher in 2018 compared to both 2017 and 2016: 45 US interviews in the Biggest group in 2018 compared to 22 interviews in 2017 and 18 interviews in 2016; and in the Random group 154 US interviews in 2018 compared to 117 interviews in 2017 and 82 interviews in 2016.

Similar difficulties in identifying the relevant target person were experienced in other countries, especially China and Japan. An additional difficulty 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. A further complication with regards to Chinese, Japanese and Korean companies appeared to be the fact that a certain share of companies do not perceive themselves as being 'customers' of the EPO and consequently reject revealing any details about their future filings. The increased number of such users' lack of knowledge about their filings at the EPO might be caused by the changed sampling method, which included more companies that are choosing the PCT IP route via WIPO.

The inability to identify the appropriate contact, as per the reasons notified above, increased to a total of 1214 in 2018, when compared to the 524 cases in 2017 and the 288 cases in 2016. The inability to make contact with the identified target person increased significantly

this year too in that this accounted for 614 cases, in comparison to the 157 cases in 2017 and 294 such cases in 2016.

Although the initial willingness to co-operate was high during the first contact phase, refusals did often then happen after receiving the email. The most common occurrence was that the respondents did not complete any part of the questionnaire and provided no reasons for this. This was the case particularly in the US but also in Japan and Other bloc.

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

The data were checked in detail and corrected in accordance with the rules agreed with the EPO. The online data collection method helped to reduce the potential for 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 wish to disclose.

Technical domains that were recorded in the 'Others' field or details that were not allocated correctly by respondents were allocated to one of the 3 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 then by 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 2018 some of the logical filters were implemented in the questionnaire. The 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.
- 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.
- An additional set of rules were introduced to mark cases where respondents reported counts that were significantly different to those reported in the EPO database.

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:

- 1) 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.
- 2) If respondents EPO database Total filings count is equal or more than 20 filings, there should be non-zero worldwide first filings in 2017 to 2019.
- 3) There should be non-zero worldwide first filings in 2017 to 2019, if respondent reported at least 5 subsequent filings over target years.
- 4) The numbers for PCT-NP/Euro-PCT-RP applications (PCT applications that entered the national/regional phase) in any field for 2020 should be comparable to the combined figures under PCT-IP first filings and subsequent filings in 2017 and 2018 combined. For comparison purposes, a factor of 3/2/1.5/1.2 times is applied.
 - a. If (a) is less than 10, then (b)/(a) must be less than 3;
 - b. If (a) is in [10;19], then (b)/(a) must be less than 2;
 - c. If (a) is in [20;49], then (b)/(a) must be less than 1.5;
 - d. If (a) is in [50;+∞), then (b)/(a) must be less than 1.2
 - e. Comparison is made if the number of PCT-NP/Euro-PCT-RP applications in any field is equal to or more than 5 filings.
- 5) The totals of the combined figures under Euro-direct first and subsequent filings or Euro-PCT-RP applications for 2017 should be comparable to the EPO database figures for the respective procedure and year. Depending upon the numbers reported for 2017, 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.
- 6) There should be non-zero number Euro-direct first and subsequent filings reported, if EPO database counts for Euro-direct first and subsequent filings are greater than 20.
- 7) There should be non-zero number Euro-PCT-RP first and subsequent filings reported, if EPO database counts for Euro-PCT-RP first and subsequent filings are greater than 20.
- 8) There should be non-zero counts for 2017 filings over Euro-direct, PCT-IP and Euro-PCT-RP, if respondent expressed intention to report above routes' filing counts.

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 marked to be analysed as combined filings only. This was done in accordance with the following rules:

- 1) 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 (2017) and the total of first filings one year earlier is equal to or more than 10 filings.
- 2) 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).

- 3) 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 27** shows the distribution of 'critical codes' cases and cases marked to be analysed as combined filings only and broken down by residence bloc and sample.

	Total n=686		EPC n=405		US n=157		JP n=85		OT n=39	
	N	%	N	%	N	%	N	%	N	%
Cases marked with "critical codes"	176	26%	86	21%	46	29%	35	41%	9	23%
Cases marked to be analysed with combined filings only	43	6%	18	4%	16	10%	6	7%	3	8%

Table 27: Distribution of cases that were marked with critical codes or 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 time-consuming. For some respondents, it was not possible to provide all the requested information for various reasons.

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 2017.
- 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 three EPO Technical domains (or were not willing to do so).

7.11 Non-response analysis and response rates

Address qualification

In the 2018 survey and as a result of the research procedure, telephone numbers for 621 of the 662 Biggest group were found, which equates to 94%. This is down by approximately 2% on the previous year of 2017. In the Random group (including target group overlap), the percentage of telephone numbers found was 91%, which is slightly lower than achieved in the Biggest group and also lower than 94% achieved in 2017. The results for previous years were: 94% in 2016, 81% in 2015, 94% in 2014.

Losses

During 2018, 6% of the addresses found for the Biggest group were either identical to, or duplicated with, other applicants in the sample; 36% 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, identical addresses found accounted for 9% of the cases; 64% 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.

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 63% of the 621 Biggest group companies found (= 'adjusted sample B'), which is lower when compared to 2017 (75%). In the Random group, this rate is much lower than in the Biggest group with 32% of the 3,972 addresses being found and significantly lower than in 2017 (64%).

7.12 Response Rates

The overall response rate was 18%. The response rate was considerably higher in the Biggest group (37%) than in the Random group (18%).

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 26**) ('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 58% in the Biggest group and 51% in the Random group. The response rate in the Biggest group increased compared to 34% in 2017 and 47% in 2016 (2014: 47%, 2013: 45%, 2012: 44%) and in the Random group it shows an increase to 51% in 2018 from 35% in 2017 (2016: 35%, 2014: 33%, 2013: 35%, 2012: 33%). The increased response rate is explained by the change of the recruiting approach in the fieldwork. A slightly different approach was adopted for this survey in that the interviewers were less accepting of some of the front-line responses such as: they would forward the email to the target person or provide a possible email address for the survey materials to be sent, without actually speaking to that named person. It was evident that, by speaking to the relevant person, once they have agreed to receiving the invitation, they are more likely to co-operate in the survey.

Response rate 2, which includes losses and identical cases and is calculated over addresses found, was 37% in the Biggest group and 18% in the Random group in 2018. This shows a significant increase in the Biggest group (26% in 2017) and a small decrease in the Random group (23% in 2017).

The response rate increased for the Biggest group and decreased for the Random group in comparison to 2017. The number of losses observed in the Biggest group was again high in Japan where a significant increase started in 2017 (80 cases when compared to only 2 cases in 2016) and 82 cases in 2018. Generally, the fieldwork in Japan in 2018 maintained a similar picture as in 2017 and again reflected a different picture, in terms of response, than that reported in previous years.

For the US, response rate 1 in the Biggest group increased from 24% in 2017 to 58% in 2018. In the Random group the response rate improved from 27% in 2017 to 51% in 2018. In terms of response rate 2, in the Random group it remained similar in 2018 (12%) to 2017 (14%), whilst the Biggest group showed a significant increase to 29% (from 15% in 2017). There was a considerable increase of losses among US applicants in 2018 for both groups. The number of refusals for the Biggest group, however, declined in 2018, resulting in a higher number of completed interviews. The boost sample that was used for US fieldwork was again successful in 2018, with more interviews being achieved in the Random group than in previous surveys. This success could be attributed to the fact that interviewers had relevant experience from some other large-scale EPO surveys, which already provided an extensive and up-to-date database to the fieldwork team. It is likely that offering more contemporary (online) data collection methods corresponds to the digital orientation of communication in the US business environment, and so encouraged responses.

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 24% in 2017 to 100% in 2018 and the response rate 2 increased from 16% in 2017 to 29% in 2018. The Random group response rate 1 increased from 26% in 2017 to 36% in 2018 and the response rate 2 dropped from 11% in 2017 to 6% in 2018.

The response rate among users from non-EPC countries (Japan, US and Other blocs) is usually much lower when compared to the response from users of the EPC bloc. This applies to all of the EPO's user surveys. The low response rate is mainly due to lower cooperation levels and some respondents not seeing any real benefit in participating. Data confidentiality is also an important reason for not providing the required information.

The EPO took pro-active steps in order to increase the awareness of the survey by way of publishing it in their Newsletter. They also provided additional 'links' on their website for the first time making the survey information available in both the Japanese and Chinese language. This is a very important tool to direct Asian respondents to the appropriate page in order to address any issues they had with regards authenticity and to quell their initial suspicion. These links can be found at the following addresses:

In Japanese:

[http://documents.epo.org/projects/babylon/eponet.nsf/0/904DEA5C579DD61DC12582F0003DFD7F/\\$FILE/patent_filings_survey_2018_jp.pdf](http://documents.epo.org/projects/babylon/eponet.nsf/0/904DEA5C579DD61DC12582F0003DFD7F/$FILE/patent_filings_survey_2018_jp.pdf).

In Chinese:

[http://documents.epo.org/projects/babylon/eponet.nsf/0/904DEA5C579DD61DC12582F0003DFD7F/\\$FILE/patent_filings_survey_2018_ch.pdf](http://documents.epo.org/projects/babylon/eponet.nsf/0/904DEA5C579DD61DC12582F0003DFD7F/$FILE/patent_filings_survey_2018_ch.pdf).

Table 28 illustrates the numbers of responses by origin from the combined samples. Reasons for non-response are explained in **Table 29** (combined sample in comparison to 2017).

Block, Biggest	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	9	1	8	2	6	1	5	83%	63%
EPC	Belgium	15	1	14	4	10	2	8	80%	57%
EPC	Denmark	13	0	13	5	8	2	6	75%	46%
EPC	Finland	5	0	5	0	5	4	1	20%	20%
EPC	France	43	0	43	9	34	29	5	15%	12%
EPC	Germany	117	7	110	27	83	36	47	57%	43%
EPC	Italy	9	0	9	3	6	1	5	83%	56%
EPC	Netherlands	20	1	19	3	16	7	9	56%	47%
EPC	Sweden	16	0	16	4	12	5	7	58%	44%
EPC	Switzerland	32	0	32	12	20	9	11	55%	34%
EPC	United Kingdom	14	0	14	4	10	4	6	60%	43%
EPC	Other	10	1	9	5	4	3	1	25%	11%
EPC	EPC (Total)	303	11	292	78	214	103	111	52%	38%
JP	Japan	139	22	117	35	82	19	63	77%	54%
US	United States	163	8	155	77	78	33	45	58%	29%
OT ⁶	China	23	0	23	17	6	3	3	50%	13%
OT ⁶	South Korea	13	0	13	7	6	6	0	0%	0%
OT ⁶	Taiwan	7	0	7	5	2	1	1	50%	14%
OT ⁶	Other ⁷	14	0	14	10	4	0	4	100%	29%
OT ⁶	Other (Total)	57	0	57	39	18	10	8	44%	14%
Total	Total	662	41	621	229	392	165	227	58%	37%

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 – 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	55	3	52	15	37	17	20	54%	38%
EPC	Belgium	45	4	41	18	23	8	15	65%	37%
EPC	Denmark	39	1	38	20	18	6	12	67%	32%
EPC	Finland	27	1	26	13	13	10	3	23%	12%
EPC	France	159	55	104	33	71	52	19	27%	18%
EPC	Germany	458	17	441	188	253	98	155	61%	35%
EPC	Italy	84	7	77	45	32	11	21	66%	27%
EPC	Netherlands	66	1	65	21	44	23	21	48%	32%
EPC	Spain	57	7	50	22	28	12	16	57%	32%
EPC	Sweden	44	2	42	18	24	9	15	63%	36%
EPC	Switzerland	122	5	117	58	59	24	35	59%	30%
EPC	United Kingdom	118	3	115	64	51	24	27	53%	23%
EPC	Other	98	6	92	59	33	11	22	67%	24%
EPC	EPC (Total)	1 372	112	1 260	574	686	305	381	56%	30%
JP	Japan	364	55	309	183	126	45	81	64%	26%
US	United States	1 448	140	1 308	1 008	300	146	154	51%	12%
OT ⁶	China	397	3	394	287	107	91	16	15%	4%
OT ⁶	South Korea	142	18	124	110	14	10	4	29%	3%
OT ⁶	Australia	29	3	26	22	4	4	0	0%	0%
OT ⁶	Canada	47	7	40	31	9	3	6	67%	15%
OT ⁶	Israel	39	0	39	27	12	7	5	42%	13%
OT ⁶	Singapore	9	0	9	7	2	1	1	50%	11%
OT ⁶	Taiwan	33	4	29	25	4	3	1	25%	3%
OT ⁶	Other ⁷	92	15	77	63	14	9	5	36%	6%
OT ⁶	Other (Total)	788	50	738	572	166	128	38	23%	5%
Total	Total	3 972	357	3 615	2 337	1 278	624	654	51%	18%

- 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 29: 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	5	20	21
EPC	Belgium	8	15	16
EPC	Denmark	6	12	13
EPC	Finland	1	3	3
EPC	France	5	19	20
EPC	Germany	47	155	163
EPC	Italy	5	21	24
EPC	Netherlands	9	21	23
EPC	Spain	0	16	16
EPC	Sweden	7	15	16
EPC	Switzerland	11	35	38
EPC	United Kingdom	6	27	30
EPC	Other	1	22	22
EPC	EPC (Total)	111	381	405
JP	Japan	63	81	85
US	United States	45	154	157
OT ²	China	3	16	16
OT ²	South Korea	0	4	4
OT ²	Canada	3	6	6
OT ²	Israel	1	5	5
OT ²	Singapore	0	1	1
OT ²	Taiwan	1	1	2
OT ²	Other ³	0	5	5
OT ²	Other (Total)	8	38	39
Total	Total	227	654	686

1 Fully or partially completed interviews.

Table 30: Respondent structure survey 2018

The table below illustrates the comparative losses, performance and response rates calculated over gross samples compared between the surveys 2016, 2017 and 2018. The percentages for the various classes changed in 2018, which may be due to the sampling of Total filings in 2018 rather than Total applications as previously.

	2018		2017		2016	
No. of addresses in gross sample – TOTAL	4 078	100%	3 020	100%	2 990	100%
Addresses not found or included in/Identical with other applicant	360	9%	173	6%	417	14%
No. of losses – TOTAL¹	2 380	58%	911	30%	742	25%
Contact never available	614	15%	157	5%	294	10%
Appropriate contact not found/mailbox sy	1 214	30%	524	17%	288	10%
Company is never available	279	7%	67	2%	47	2%
Other Outcome	273	7%	163	5%	107	4%
No. of refusals – TOTAL¹	652	16%	1 289	43%	1 199	40%
No. of completed interviews²	686	17%	647	21%	638	21%

1 The list is a selection of reasons only

2 Interviews, which are fully or partially completed

Table 31: Reasons for non-response for surveys compared between 2016-2018

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 were different response rates for different parts of the questionnaire. Setting a 'required answer' prompt in the programmed questionnaire, prevented 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 the 2018 survey, the questionnaire structure was changed in that the matrix questions were split and simplified into a step-by-step questionnaire, controlled by filter questions, i.e. respondents had to provide the data only for the filing routes they are actually using by clicking on the relevant choices.

In **Table 32** 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		Biggest group		Random group	
	n	%	n	%	n	%
Euro-direct and PCT-IP (Page 6,7) ¹	647	94%	221	97%	616	94%
At least one Euro-direct or PCT-IP in 2018-2020 (Page 7) ¹	547	80%	215	95%	516	79%
All of Euro-direct and PCT-IP for 2018-2020 (Page 7) ¹	261	38%	134	59%	243	37%
At least on of PCT applications (Page 10) ¹	507	74%	217	96%	622	95%
First filings in 2017 by technical domain (Page 13) ¹	641	93%	212	93%	609	93%
R&D Budget 2017 (Page 14) ¹	639	93%	212	93%	607	93%

1 Including responses 'don't know'

Table 32: Partial response rates – Biggest and Random groups

Of the 686 completed interviews, the split was 227 (including overlap) being from the Biggest group and 654 from the Random group.

In total (Biggest and Random groups), out of the 686 completed interviews, 647 of them provided information for either Euro-direct or PCT-IP for at least one year for first or subsequent filings. Lower numbers provided figures when forecasting years 2018 and 2019 for either Euro-direct or PCT-IP filings.

641 respondents provided information relating to their particular Technical domain with 169 providing information about their R&D budget in 2017, which is a slightly lower number of answers compared to 231 answers in 2017 survey.

In the Biggest group (including overlap), out of 227 completed interviews, 221 cases provided forecasts for 2018 for either Euro-direct or PCT-IP filings and 215 cases provided forecast information for 2019 - 2020. Finally, out of the 227 completed cases, 69 provided information regarding their R&D budget in 2017.

In the Random group (including overlap), out of the 654 completed interviews, 616 responses provided forecast information for either Euro-direct or PCT-IP for 2018 with 516 providing a similar forecast for 2019 - 2020. From this total of 654, 158 provided information regarding their R&D budget in 2017.

In total, for the year 2017, 641 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 33 below illustrates frequencies of the additional verbal comments that were received in the survey. Numbers refer to the number of individual comments.

	2018		2017	
No. of completed interviews	686	100%	647	100%
Comments on future patenting activities	78	11%	67	10%
Comments on emerging technologies	265	39%	185	29%
Comments on filing estimations	122	18%		

Table 33: Numbers of multiple verbal comments

Comments on most promising technology trends

Respondents were asked to share information regarding up to 3 of the most 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 direction their future patents may take. 265 companies responded accordingly.

Further analysis is included in Annex VII.

8.2 Individual comments (selection)

Individual comments on patenting activities

- Our R&D expenditures and the resulting patent applications primarily concern the topic of digitization in a wide variety of application areas. For this, the patentability of computer-implemented inventions is an essential prerequisite.
- The trend will be towards CII due to the networking of machines and systems. (Original language: German).
- Expected to have more activity at the EPO in the future and even fewer national filings, especially when UPC comes into force. (Original language: German).
- Will strengthen Priority filings in US and CN in response to local research and development activities. (Original language: German).
- If EP unitary patent becomes too expensive, dodge national post-registration in two or three countries besides DE priority application. (Original language: German).
- In the medium term, the registration scope remains constant. In the long run, the registration scope will slightly increase. (Original language: German).
- We are trying to adopt cost and time efficient strategy for patent filings, in a combination of procedures where we can get a reliable feedback on the prior art as soon as possible and having sufficient time to decide for subsequent patent applications. Patent filing strategy also depends on the support that we can get from the external patent attorneys.
- More effort to protect R&D investments via patents.

- The changes in US patent law for biomarkers makes filing abroad and not in the US more attractive.
- Continued use of PCT for inventions with global application.
- Reducing the number of validations in Europe due to extreme cost.
- We expect to continue only nationalizing in the EU, rather than filing an initial application in the EU.
- Interested to know the fee structure for the new Unitary Patent.
- Just an expected strong increase in filing numbers in electronic cigarette and heat-not-burn reduced risk product technologies generally.
- We've found that PCT filing is usually not worth it, as we rarely nationalize in more than 5 countries. We will therefore register in the future directly in the countries under priority claim. Also, we will increasingly make first national filings in the countries. (Original language: German).
- Reduction in filing in EP if the lead time to patent remains several years long. By the time of EP grant, the technology is being phased out. Disappointing long prosecution phase at EPO, especially for the very high cost for EPO filings.

Individual comments on EPO quality

- I prefer national offices. The EPO is too formal for me. (Original language: German).
- We list some 'technical' problems we encounter in our daily activities, for EPO evaluation: difficulty to obtain unity of inventions when different fragments/portion of sequences (DNA, RNA and protein) are claimed: we suggest they should be deemed by EPO as substituents of chemical entities in order to obtain unity of invention.
- Increasing defensive strategy: filing systematic application for new developments to avoid obtaining patents by competitors and opposition to competing patents. The increase in the number of patents granted by the Office after a rapid examination is problematic for freedom of operation. (Original language: French).
- We appreciate speed and high quality from EPO.
- Our scientists believe in positive effect of the Unitary Patent.
- EPO has a very important position in our portfolio. Therefore, for the earlier registration we ask for the higher speed of the examination process.
- Technological trends can be very well recognized by patent applications. Studies such as 'Patents and the 4th industrial revolution' of the European Patent Office are very valuable and helpful. Such evaluations, also with regard to mega trends such as digitization, Industry 4.0, should also be pursued in the future. (Original language: German).
- Easy follow-up of the status of all filed applications would be helpful (e.g. when are they planned to be examined by the EPO). Continue to improve the online patent translations.
- The delay in examination, and the annual annuity fees before a patent issues, reduce the likelihood that I will file applications in Europe. The delay is incredibly frustrating, because I have had to abandon cases where a large annuity payment was due and no patent had yet issued - years and years after the US patent issued. It's also very annoying that divisional applications cost so much to file. Often, you don't know whether you will file a divisional until a first patent issues, but my understanding is that, somehow, the cost of the divisional or a continuation of some sort depends on when the original European application was filed. Finally, I am interested in whether my existing EP patents, which I normally nationalize only in Germany lately, will someday under the unified patent system be enforceable against products sold in all

of the participating unified countries, or only against sales in Germany. No one seems to know the answer, and I have asked several European lawyers.

- For a small company IP is an important part of the market strategy. The long timeline from application to protection enables other competitors to enter the market while the patents are pending. As a small company, this is critical to our ability to grow and survive, it would be helpful if small companies could be put on a fast track for time it takes to convert an application to a patent. It would be very helpful if this timeline could be reduced to 12 months for small start-up companies.
- There is a trend of companies increasingly making disingenuous patent applications covering items known within the industry (but not necessarily documented in a form readily discoverable by the patent examiner) or claiming 'improvements' from 'inventions' which are merely alternative presentations of industry standards in a form such that they are not recognised as such by the examiner. These applications are granted but then easily overturned at opposition, but the initial granting of the patent, the timetable of the opposition and the subsequent appeal - coupled with the reinstatement of the patent during appeal - means that there is significant advantage to companies who make such disingenuous applications. Even companies that consider the aforementioned to be an abuse of the patent system are therefore being 'encouraged' to make similar applications, in order to maintain a level playing field.
- Reduce the differences in patent application procedures between China and Europe.
- In general, we have been quite dissatisfied with the experience at the EPO. While the search quality is quite good, the examination delays are significant and predictability of outcomes is very low. In particular, EPO's oral proceedings and appeal procedures are costly and are biased heavily against the applicant. We've also noticed that cases that have been pending for some time have a very low chance of being allowed and seem to be hurried toward the oral proceedings stage in order to reach a final disposition in the case. Given the delays, high cost, and overall unpredictability of prosecution outcomes, we are moving away from EPO prosecution. We've had much better success rates dealing with national patent offices directly.
- Time for examination getting pretty long versus USPTO, JPO, CNIPA.

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 $CI \times A$.

Data for a respondent are included in the calculation when counts above zero are given for either the base year or for the target year.

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 $Q_r \times A$.

Data for a respondent are included in the calculation when counts above zero are given for both the base year and for the target year.

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.⁸ (This year User defined Poisson weights were also calculated, as measured via the number of filings made in the base year according to the respondent).

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 filings (Euro-direct + PCT-IP), the A_i and A values in this section refer to Total filings. For this year's sample, $A = 202\,015$ (excluding divisional filings) and $n^+ = 6\,000$ as measured at the time of sample extraction, which was March 2018. The US and China booster samples were 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

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

This 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 filings accounted for in the survey, and A is the known number of Total filings 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 filings (Euro-direct and PCT-IP filings) of respondents in the Random group as follows:

⁸ See Applicant Panel Survey 2001 report: Annex III; and Applicant Panel Survey 2002 report: Section IV.1, Annex IV.

Residence bloc	FPC
Total	0.23
EP	0.35
US	0.22
JP	0.27
OT	0.05

Table 34: Finite population correction values by residence bloc

The FPC values shown here were used in the current analysis. This year's FPC values are similar to those in the 2017 survey, although OT residence blocs' FPC value is significantly lower than in the 2017 survey. FPC values were calculated based on Total filings, since this was the population of filings on which the sampling mechanism was based.

See the Applicant Panel Survey 2006 report, Annex VI, for a more detailed explanation and derivation of the finite population correction applied in 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

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

For a detailed explanation of the derivation of confidence intervals for the predicted number of filings, 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:

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

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

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

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 (2018 in this survey), which is $\hat{A}_r - A_r$; 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.

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

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.⁹ 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

⁹ Cf. Applicant Panel Survey 2005 report, Section 7.5.

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

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.¹⁰

9.8 Treatment of Technical domains

From 2018, operations at the EPO with respect to patent filings are organised according to three Technical domains. (Prior to 2018, industry sectors were used that were known as *joint clusters*.) In the questionnaire (Page 13) respondents were asked to give information broken down according to these Technical domains that correspond to the EPO units. The filing estimates help the EPO anticipate industry-specific trends and dynamics. The *Technical domains* each define a hopefully fairly homogenous group of industries (see Annex VI). An explanation of the contents of the Technical domains is given in **Table 35**.

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

When deriving the standard error for Technical domain based analyses, a correction is made to avoid distortions caused by multiple Technical domain classifications. For the Random group, this correction takes into account the average multiplicity of Technical domains per responding applicant in this year's survey of 1.35¹¹, and widens the confidence limits by multiplying standard errors by 1.16 (the square root of 1.35). As previously for the calculation of standard errors, a finite population correction is also applied.

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

¹⁰ 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.

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

Technical domains	
Healthcare, biotechnology & chemistry (HBC)	Technical areas related to chemistry and to health. The domain pure chemistry encompasses innovations relating to new chemical entities (e.g. chemical compounds and compositions) and their preparations that find applications and uses in a large variety of fields. These applications and uses are in turn covered by the fields of applied chemistry and technical chemistry. Cosmetics, pharmaceuticals, food, detergents, petro-chemistry, polymers, metallurgy and electro-chemistry to name but a few prominent areas illustrate the wide-ranging coverage of chemicals. A further prominent pillar of HBC consists of healthcare related fields such as medical use, biotechnology, medical technology and informatics. Advancements in biotechnology and pharmaceuticals (e.g. genome editing technology based on CRISPR/Cas9, cancer therapy based on CAR-T technology) have received worldwide attention in the scientific and public health domains. Other biologicals, diagnostics, vaccines, gene therapy, plants and animals, industrial microbiology and the growing field of bioinformatics and medical informatics are important parts of the sector HBC. The health, biotechnology and chemical areas have developed very important applications for the daily life. From small chemical entities with novel pharmaceutical properties to new carbon fibres with improved properties, from batteries with long autonomy to new biodegradable polymeric material, from new microorganisms involved in biodegradation to anti-cancer biologicals, biotech and chemical industry have improved the living conditions and extended the life expectancy of the world population. Future developments will be able to solve the urgent problems of the industrial and urban residues creating new recyclable material, develop new plants resistant to drought and high temperatures, produce healthy feeding compositions and produce antibiotics that overcome microbial resistance. Fighting the climate change is the future production of low carbon emission biofuel which will mitigate warming up of the atmosphere.
Information & communications technology (ICT)	All areas that are related to computers, information and telecommunications. Including, but not limited to, basic electromechanical components, information storage, printed circuits, cabinets for electrical apparatus, mass spectrometers, ion beam and discharge tubes, traffic control, magnetic and electrostatic separation of solid materials, control engineering, switching, pattern recognition, speech synthesis, electro-acoustics, video games, image processing, coding, light emitting diodes, semiconductors with handling apparatus, plasma processing, photolithography, lasers, nuclear fusion reactors, data packet networks, wireless networks, radio transmission, telephonic communication, line transmission (power lines), mobile applications, cryptography, computer and telecommunications security, processors, systems software, graphical user interfaces.
Mobility and mechatronics (M&M)	Vehicles, cycles, aerospace, naval engineering, belonging to the larger area of mechanics. A variety of technical areas in mechanics such as textile machinery, packaging, packaging, plastic processing, composites, elevators, cranes, washing machines and 3D printing, ceramic processing, paper and cardboard processing. A variety of fields of classical physics, measuring and testing, investigating or analysing materials by determining their chemical or physical properties, dimensional measurements, sensing speed, acceleration or movement, imaging and nano technologies, photography, projectors and xerography, direct or indirect measurement of electric variables. A variety of fields in the construction areas, drilling, mining, foundation, building & water management, engines, pumps, air conditioning, heating systems, hinges, locks, compressors, gas and wind turbines, the fields of agriculture machinery, defence, footwear, furniture and travel equipment.

Table 35: Technical domains

9.9 Normalised mutual information statistic (NMI)

Normalised mutual information statistic (NMI) indicates to what degree pairs of Technical domains overlap. (See Section 12.1) The NMI involves the numbers of respondents that indicated presence in 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 Technical domain i , b is the number of occurrences of Technical domain j , and $[ab]$ is the number of occurrences of both Technical domains i and j .

A similar approach via NMIs is used to analyse for the future technology trends this year in Annex VII.

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

9.11 Bootstrap Confidence Intervals for estimating proportions of PCT.

Estimation of confidence intervals for proportions of PCT filings is based on method of Monte Carlo approximation to the bootstrap distribution as discussed by Bradley Efron¹² and bias-corrected percentile confidence intervals¹³.

Estimation of confidence intervals for each Random group forecasting method was done following these steps:

¹² Efron (1979): Bootstrap methods: another look at the jackknife, The Annals of Statistics, Vol. 7, No. 1, pp. 1-26.

¹³ For overview of bootstrap confidence intervals and detailed description on how to calculate bias-corrected percentile confidence intervals, please see – Carpenter and Bithell (2000): Bootstrap confidence intervals: when, which, what? A practical guide for medical statisticians, Statistics in Medicine 19, p 1141-1164

1. No assumption is made concerning the distribution of the data and observations are considered to be independent.
2. Bootstrap sample of 686 observations is drawn from the whole sample data with replacement to obtain bootstrap data set.
3. Proportion of PCT-IP filings amongst Total filings is calculated for the Random group part of the bootstrap data set.
4. Steps 1 to 3 are repeated 1 000 times and estimate of bootstrap distribution of the proportion is obtained.
5. The bootstrapped distribution is used to calculate bias-corrected percentile confidence intervals.

Bias-corrected percentile confidence intervals are calculated following these steps.

Mean rank is used to estimate bias b_p in standard deviation norms based on p -th quantile of the normal distribution.

$$Cond_i^1 = \begin{cases} 1 & \text{if } \hat{\theta}_i > \theta \\ 0 & \text{if } \hat{\theta}_i \leq \theta \end{cases},$$

$$Cond_i^2 = \begin{cases} 1 & \text{if } \hat{\theta}_i = \theta \\ 0 & \text{if } \hat{\theta}_i \neq \theta \end{cases},$$

where $\hat{\theta}_i$ is estimate of proportions of PCT-IP filings amongst Total filings for i -th bootstrap sample, θ is observed proportion of PCT-IP filings amongst Total filings, $n = 1\ 000$ is number of bootstrap samples and p -th quantile is

$$p = \frac{\sum_{i=1}^n Cond_i^1 + \frac{\sum_{i=1}^n Cond_i^2}{2}}{n}.$$

Afterwards $Z_{0.05,0.95}$ -scores are bias corrected

$$Z^* = \pm 1.96 - 2 * b_p,$$

converted into proportions and used as quantiles on $\hat{\theta}_i$ set to estimate confidence intervals limits.

A similar approach is taken when considering the proportion of Euro-PCT among Total applications.

ANNEXES PART B: FURTHER RESULTS

10 ANNEX IV: FORECASTS BROKEN DOWN BY TECHNICAL DOMAINS

The forecasts for EPO filings were analysed with the primary breakdowns by Technical domains. Composite indices were calculated for the Biggest group sample, with Q-indices being calculated for the Random group sample. These forecasts are given in terms of growth rates in Sections 10.1 and 10.2 below.

Similar calculations were made for Total applications broken down by Technical domains. Since the counts of Total applications are already available for the base year 2017, quantitative counts forecasts are also included for Total applications in Sections 10.3 and 10.4 below.

10.1 Total filings results broken down by Technical domain only

The forecasts of filings by filing type, filing route and Technical domain for the Biggest group are shown in **Table 36**. The analogous forecasts for the Random group, broken down by Technical domain, are given in **Table 37**.

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

Biggest group (including critical codes)
Breakdown by EPO technical domains
Composite indices

Filing type	Filing route	Technical domain	2018		2019		2020	
			Cases	Index	Cases	Index	Cases	Index
First	Euro-direct	Healthcare, biotechnology & chemistry (HBC)	45	0.9336	38	0.9778	38	1.0062
		Information & communications technology (ICT)	35	0.8324	31	0.8364	30	0.8805
		Mobility and mechatronics (M&M)	41	0.9122	38	0.9750	36	1.0142
First	PCT-IP	Healthcare, biotechnology & chemistry (HBC)	32	1.0301	29	1.0469	29	1.0671
		Information & communications technology (ICT)	27	1.0659	25	1.2356	24	1.0746
		Mobility and mechatronics (M&M)	32	1.1905	28	1.2486	27	1.2880
Subsequent	Euro-direct	Healthcare, biotechnology & chemistry (HBC)	37	1.0460	33	1.0713	33	1.0914
		Information & communications technology (ICT)	45	1.0587	35	1.2052	34	1.4342
		Mobility and mechatronics (M&M)	50	1.0440	45	1.1284	43	1.2255
Subsequent	PCT-IP	Healthcare, biotechnology & chemistry (HBC)	57	0.9987	53	1.0122	52	1.0265
		Information & communications technology (ICT)	52	0.9286	46	0.9658	44	0.9781
		Mobility and mechatronics (M&M)	62	0.9777	59	1.0194	57	1.0349

Table 36: Forecasts for EPO filings at the EPO – Biggest group, broken down by Technical domain

Random group (including critical codes)

S.E. indicates standard error of logarithm

Breakdown by EPO technical domain

Q-indices

Filing type	Filing route	Technical domain	2018			2019			2020		
			Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First	Euro-direct	Healthcare, biotechnology & chemistry (HBC)	63	1.0683	0.0490	57	1.1359	0.0545	56	1.1756	0.0572
		Information & communications technology (ICT)	53	1.0634	0.0715	48	1.1313	0.1024	45	1.1792	0.1114
		Mobility and mechatronics (M&M)	79	1.0168	0.1006	79	1.1579	0.0603	71	1.2098	0.0626
First	PCT-IP	Healthcare, biotechnology & chemistry (HBC)	58	1.1253	0.0536	51	1.1553	0.0552	48	1.1885	0.0575
		Information & communications technology (ICT)	47	1.0188	0.0840	46	1.1979	0.1942	45	1.0030	0.0857
		Mobility and mechatronics (M&M)	51	1.2356	0.1185	50	1.1110	0.0648	49	1.1391	0.0674
Subsequent	Euro-direct	Healthcare, biotechnology & chemistry (HBC)	56	0.9943	0.0496	52	1.0521	0.0346	52	1.0639	0.0444
		Information & communications technology (ICT)	63	1.0848	0.0985	54	1.1544	0.0712	52	1.2228	0.0840
		Mobility and mechatronics (M&M)	83	0.9994	0.0766	77	1.1267	0.0518	74	1.1007	0.0868
Subsequent	PCT-IP	Healthcare, biotechnology & chemistry (HBC)	111	1.0230	0.0402	100	1.0771	0.0455	96	1.1047	0.0471
		Information & communications technology (ICT)	88	1.0213	0.0623	81	1.0833	0.0680	77	1.1276	0.0925
		Mobility and mechatronics (M&M)	123	1.0179	0.0541	117	1.0956	0.0617	113	1.1316	0.0663

Table 37: Forecasts for EPO filings at the EPO – Random group, broken down by Technical domain

Based on **Table 36** and **Table 37**, M&M is likely to grow fastest over the years. Other domains deliver more or less mixed signals depending on what sample you look at. The Biggest group showed the highest growth on Subsequent Euro-direct filings, while the Random group provides evidence of higher First filings growth than Subsequent.

10.2 Total filings results broken down by both Technical domain and residence bloc

The data of the Random group were also analysed with a simultaneous breakdown by Technical domain and residence bloc. The results are shown in **Table 38**.

Random group (including critical codes)

Breakdown by technical domain and residence bloc ("Other" incorporated into EP)

Q-indices

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

Filing type	Filing route	Technical domain	Res. Bloc	2018			2019			2020		
				Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First+	Euro-direct+	Healthcare, biotechnology & chemistry (HBC)	EP/OT	88	1.0403	0.0313	79	1.0879	0.0390	78	1.1236	0.0447
Subsequent	PCT-IP	Healthcare, biotechnology & chemistry (HBC)	JP	29	0.9231	0.0663	28	0.9625	0.0653	25	0.9497	0.0625
		Healthcare, biotechnology & chemistry (HBC)	US	50	1.0545	0.0749	46	1.1747	0.0941	44	1.1828	0.0963
First+	Euro-direct+	Information & communications technology (ICT)	EP/OT	82	0.9394	0.1408	76	1.0423	0.1516	74	1.1094	0.1501
Subsequent	PCT-IP	Information & communications technology (ICT)	JP	28	0.7752	0.1566	23	0.7504	0.1829	21	0.7435	0.1858
		Information & communications technology (ICT)	US	43	0.7383	0.1452	40	0.8388	0.1784	38	0.9104	0.1343
First+	Euro-direct+	Mobility and mechatronics (M&M)	EP/OT	123	1.0511	0.0572	121	1.1111	0.0626	113	1.1584	0.0705
Subsequent	PCT-IP	Mobility and mechatronics (M&M)	JP	26	0.8847	0.1112	24	0.9365	0.0867	22	0.9272	0.0984
		Mobility and mechatronics (M&M)	US	44	0.7711	0.1989	40	1.1764	0.0694	40	1.2030	0.0834

Table 38: Forecasts for EPO filings at the EPO – Random group, broken down by residence bloc and Technical domain

A clear all-year growth is forecasted for the EP/OT and US residence blocs in the HBC Technical domain. The same blocs are also expected to grow significantly for two-year and three-year periods in M&M Technical domain.

10.3 Total applications results broken down by Technical domain

Growth rate estimates for Total applications at the EPO were also estimated, after breaking down by Technical domain and combining first filings with subsequent filings for Euro-direct filings. The results of this analysis are shown in **Table 39**.

Random group (including critical codes)			S.E. indicates standard error of logarithm													
Euro-direct and Euro-PCT-RP			LCL/UCL indicates lower/upper 95% confidence limit													
No subsidiary breakdown			Deviation in % of forecast means (predicted filings - LCL)/predicted filings													
Q-indices																
Filing type	Filing route	Technical domain	2017	2018				2019				2020				
			Actual apps.	Cases	Index	S.E.	Predicted apps.	Actual apps.	Cases	Index	S.E.	Predicted apps.	Cases	Index	S.E.	Predicted apps.
EPO	Euro-Direct + Healthcare, biotechnology & chemistry (HBC)		53 077	154	1.0178	0.0379	54 022	54 969	144	1.0485	0.0462	55 651	141	1.0682	0.0491	56 697
	Euro-PCT-RP Information & communications technology (ICT)		47 699	138	0.9527	0.0835	45 443	49 713	129	0.8214	0.1043	39 180	123	0.8511	0.1121	40 597
	Mobility and mechatronics (M&M)		53 987	182	0.9852	0.0567	53 188	55 895	176	1.0989	0.0337	59 326	165	1.1322	0.0385	61 124

Table 39: Forecasts for Total applications at the EPO – Random group (broken down by Technical domain)

One-year growth is positive for the HBC Technical domain and the actual 2018 filings count is close to that forecasted. ICT and M&M show a decrease in the filings count, while in reality there was growth in 2018. The decreases for ICT persist, but with large standard errors.

10.4 Total applications results broken down by both Technical domain and residence bloc

The data of the Random group were also analysed with a simultaneous breakdown by Technical domain and residence bloc. The results are shown in **Table 40**.

Random group (including critical codes)			For breakdowns with less than 6 cases, higher aggregation level growth index is used													
Euro-direct and Euro-PCT-RP			LCL/UCL indicates lower/upper 95% confidence limit													
Breakdown by technical domain and residence bloc ("Other" incorporated into EP)			Deviation in % of forecast means (predicted filings - LCL)/predicted filings													
S.E. indicates standard error of logarithm																
Q-indices																
Filing type	Filing route	Res. Block	2017	2018					2019				2020			
			Actual apps.	Cases	Index	S.E.	Predicted apps.	Actual apps.	Cases	Index	S.E.	Predicted apps.	Cases	Index	S.E.	Predicted apps.
EPO	Euro-direct + Healthcare, biotechnology & chemistry (HBC)	EP/OT	32 103	80	1.0323	0.0505	33 140	33 793	76	1.0757	0.0541	34 533	75	1.0995	0.0584	32 103
	Euro-PCT-RP Healthcare, biotechnology & chemistry (HBC)	JP	6 845	30	1.0236	0.0694	7 007	6 947	28	1.0366	0.0839	7 096	26	1.0584	0.0936	6 845
	Healthcare, biotechnology & chemistry (HBC)	US	14 129	44	0.9722	0.0884	13 736	14 229	40	0.9831	0.1399	13 890	40	0.9901	0.1418	13 989
	Total		53 077	154			53 883	54 969	144			55 519	141			52 937
	LCL						49 706					50 062				47 392
		UCL					58 060					60 976				58 482
EPO	Euro-direct + Information & communications technology (ICT)	EP/OT	28 197	72	0.8727	0.1526	24 608	30 021	69	0.9125	0.1418	25 730	67	0.9895	0.1355	28 197
	Euro-PCT-RP Information & communications technology (ICT)	JP	6 397	28	0.9305	0.0660	5 952	6 493	24	0.8170	0.1830	5 226	22	0.8332	0.1857	6 397
	Information & communications technology (ICT)	US	13 105	38	1.0671	0.1024	13 105	13 199	36	0.7298	0.1775	13 105	34	0.7074	0.1890	13 105
	Total		47 699	138			43 665	49 713	129			44 061	123			47 699
	LCL						35 682					35 218				38 306
		UCL					51 647					52 904				57 092
EPO	Euro-direct + Mobility and mechatronics (M&M)	EP/OT	36 822	116	1.0210	0.0433	37 595	38 552	115	1.0895	0.0389	40 118	106	1.1423	0.0451	36 822
	Euro-PCT-RP Mobility and mechatronics (M&M)	JP	7 164	25	1.0364	0.0828	7 425	7 270	23	1.0426	0.0906	7 469	21	0.9933	0.1093	7 164
	Mobility and mechatronics (M&M)	US	10 001	41	0.7994	0.2341	10 001	10 073	38	1.2415	0.0888	10 001	38	1.2719	0.0855	10 001
	Total		53 987	182			55 021	55 895	176			57 588	165			53 987
	LCL						49 144					53 816				50 004
		UCL					60 898					61 359				57 999

Table 40: Forecasts for Total applications at the EPO – Random group (broken down by Technical domain and residence bloc)

Growth for nearly all years (compared to 2017) is negative for ICT Technical domain as seen in **Table 40**. This pessimism is not seen in actual filing counts that grew by 4% in 2018. On the other hand, breakdown by residence bloc for the M&M Technical domain results in a scenario that is close to reality with continued growth in the two-year period, and a modicum of pessimism in JP for three-year growth. The US bloc shows a clear decrease that does not match actual minor growth in the one-year period in the HBC Technical domain.

11 ANNEX V: FORECASTS FOR APPLICATIONS AT VARIOUS PATENT OFFICES

11.1 Worldwide first filings

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 is representative of applicants for Total filings at the EPO. But they do 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 filers towards their worldwide first filing expectations.

The 2017 Actual filings that are used as base year data for the projections are based on information that appeared in December 2018¹⁴. The definition that was chosen for first patent filings is a proxy equivalent to the one that is used in the IP5 Statistics Report¹⁵. 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 2017 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 41 shows the results broken down by residence bloc as this is the preferred forecasting method this year. In previous years, worldwide first filings forecasts were done on all cases, including those with critical codes and marked as to be analysed as combined filings only. This year in the preferred forecast method we do not use cases marked to be analysed as combined filings only. It is assumed that counts of worldwide first filings are more accurate in cases where the respondent could clearly differentiate among first and subsequent filings. Filings growth from 2017 to 2018 cannot be checked because the returns from the patent offices for 2018 have yet to be collected and published by the WIPO.

Based on the recommended forecast method for breakdown by residence blocs, worldwide first filings are expected to grow +8.0% in 2018, by +18.4% in 2019 and by +21.4% in 2020, all in comparison to 2017. All of the one-year growth is attributed to the 'Others' residence block, whilst the JP and US residence blocs, are forecast to be the laggards in terms of worldwide filings. Two-year and three-year growth is negative in JP residence bloc.

The biggest source of worldwide first filings growth is OT bloc with expected 30% three-year growth.

It is evident that this year's survey forecasts for worldwide first filings are more optimistic, than in the 2017 survey. That could probably be attributed to a switch into the Total filings-based sample. This year's new approach could be a better one than in previous surveys, because the sample is now based on Total filings, which come closer in time to first filings than Total applications do, regarding their PCT component.

¹⁴ The data are extracted from the WIPO statistics data centre. See <http://www.wipo.int/ipstats/en/help/>

¹⁵ See Fig. 3.4 in the IP5 Statistics Report 2017 edition, at <http://www.fiveipoffices.org/statistics/statisticsreports/2017edition.html>

Random group (including critical codes) S.E. indicates standard error of logarithm
Breakdown by residence bloc LCL/UCL indicates lower/upper 95% confidence limit
Excluding cases to be analysed as combined filings Deviation in % of forecast means (predicted filings - LCL)/predicted filings
Q-indices

Filing type	Res. Block	2017	2018				2019				2020			
		Actual filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings	Cases	Index	S.E.	Predicted filings
Worldwide first filings	EP	138 920	163	0.9939	0.0377	138 073	155	1.0590	0.0492	147 116	146	1.1012	0.0537	152 979
	US	293 904	59	0.8723	0.1181	256 372	55	1.1475	0.1055	337 255	53	1.1208	0.0674	329 408
	JP	260 290	27	0.8669	0.0852	225 645	27	0.8628	0.0902	224 578	24	0.8680	0.0924	225 932
	OT	1 495 816	14	1.1659	0.0916	1 743 972	13	1.2590	0.1076	1 883 232	12	1.3031	0.1311	1 949 198
	Total	2 188 930	263			2 364 062	250			2 592 181	235			2 657 517
	LCL					2 040 932				2 183 221				2 146 365
	UCL					2 687 192				3 001 141				3 168 669
Growth from 2017						8.0%				18.4%				21.4%
Deviation in % of forecast						13.7%				15.8%				19.2%

Table 41: Forecast for worldwide first filings, broken down by residence bloc – Random group (including critical codes and excluding cases to be analysed as combined filings only)

11.2 Patent filings at specific national offices

The applicants' intentions regarding their future patent filings at specific national offices were also obtained from the survey 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 offices¹⁶ of those companies that applied at the EPO in 2017 vary considerably from country to country. In some countries, the growth index has high variability, as indicated by the estimated standard errors, like Germany for Subsequent Nationals. In terms of first filings, the Republic of Korea and People's Republic of China have the highest expected growth rates, followed by Germany. Strong growth for subsequent filings is expected in most countries, with the highest growth expected in Germany. Rather flat filings growth is expected at the Other Countries Offices, both for first and for subsequent filings.

¹⁶ United Kingdom office was excluded from this year's survey due to expected uncertainty in light of political events.

Random group (including critical codes)

S.E. indicates standard error of logarithm

No breakdown

Q-indices

Filing type	Filing route	Country	2018			2019			2020		
			Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First	National	Germany	18	1.0994	0.0804	19	1.1258	0.0711	19	1.1289	0.0713
		Japan	18	0.9821	0.0225	19	1.0158	0.0357	18	1.0216	0.0393
		United States	78	1.0313	0.0547	69	1.0551	0.0681	66	1.0997	0.0719
		Republic of Korea	18	1.1647	0.0932	18	1.2320	0.0752	17	1.2552	0.0721
		People's Republic of China	51	1.0584	0.0431	49	1.1436	0.0452	49	1.2420	0.0551
		Other Countries	38	0.9225	0.0564	33	0.9927	0.0628	32	1.0296	0.0785
Subsequent	National	Germany	55	1.2276	0.0723	49	1.2846	0.0912	47	1.4058	0.1063
		Japan	82	1.0244	0.0189	76	1.0529	0.0290	73	1.0794	0.0356
		United States	140	1.0343	0.0268	131	1.1062	0.0324	127	1.1594	0.0387
		Republic of Korea	95	1.1176	0.0631	89	1.2095	0.0719	84	1.2626	0.0769
		People's Republic of China	152	1.0834	0.0410	140	1.1552	0.0470	134	1.1817	0.0439
		Other Countries	89	0.9141	0.0505	82	1.0504	0.0255	78	1.0795	0.0310

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

Random group (including critical codes)

No breakdown

Q-indices

S.E. indicates standard error of logarithm

For breakdowns with less than 6 cases, higher aggregation level growth index is used (marked italic lines)

Filing type	Filing route	Country	Res. Bloc	2018			2019			2020		
				Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
First	National	Germany	EP	7	1.1448	0.1202	8	1.1034	0.084	8	1.1098	0.0845
			JP	0	1.0994	0.0804	0	1.1258	0.0711	0	1.1289	0.0713
			OT	0	1.0994	0.0804	0	1.1258	0.0711	0	1.1289	0.0713
			US	11	1.0618	0.0993	11	1.1466	0.1080	11	1.1466	0.1080
		Japan	EP	9	0.9855	0.0221	10	1.0092	0.0327	9	1.0094	0.0335
			JP	0	0.9821	0.0225	0	1.0158	0.0357	0	1.0216	0.0393
			OT	0	0.9821	0.0225	0	1.0158	0.0357	0	1.0216	0.0393
			US	9	0.9645	0.0722	9	1.0514	0.0973	9	1.0871	0.1111
		United States	EP	58	1.0507	0.0469	53	1.0311	0.0695	50	1.0784	0.0738
			JP	10	0.9106	0.2443	7	1.3553	0.2008	7	1.3553	0.2008
			OT	9	1.0049	0.0926	8	1.0745	0.1323	8	1.1056	0.1510
			US	1	1.0313	0.0547	1	1.0551	0.0681	1	1.0997	0.0719
		Republic of Korea	EP	8	1.1993	0.0934	8	1.2816	0.0673	7	1.3069	0.0628
			JP	3	1.1647	0.0932	3	1.2320	0.0752	3	1.2552	0.0721
			OT	0	1.1647	0.0932	0	1.2320	0.0752	0	1.2552	0.0721
			US	7	1.0887	0.1326	7	1.1675	0.1414	7	1.2343	0.1545
		People's Republic of China	EP	23	1.1287	0.0496	22	1.2150	0.0503	22	1.3414	0.0631
			JP	8	0.7836	0.1278	7	0.7591	0.1413	7	0.7591	0.1413
			OT	1	1.0584	0.0431	1	1.1436	0.0452	1	1.2420	0.0551
			US	19	1.0271	0.0335	19	1.0947	0.0518	19	1.1610	0.0635
		Other Countries	EP	18	0.9861	0.0443	16	1.0241	0.0645	15	1.0598	0.0838
			JP	5	0.9225	0.0564	3	0.9927	0.0628	3	1.0296	0.0785
			OT	2	0.9225	0.0564	2	0.9927	0.0628	2	1.0296	0.0785
			US	13	0.8224	0.1121	12	0.9327	0.1126	12	1.0034	0.1240
Subsequent	National	Germany	EP	15	1.6852	0.1836	14	1.7886	0.1863	14	2.1046	0.1755
			JP	16	1.0975	0.0786	12	1.2318	0.1481	11	1.3127	0.1749
			OT	0	1.2276	0.0723	0	1.2846	0.0912	0	1.4058	0.1063
			US	24	1.1686	0.0921	23	1.0497	0.0838	22	1.0962	0.1138
		Japan	EP	51	1.0325	0.0174	49	1.0511	0.03	47	1.0716	0.0350
			JP	0	1.0244	0.0189	0	1.0529	0.0290	0	1.0794	0.0356
			OT	2	1.0244	0.0189	1	1.0529	0.0290	1	1.0794	0.0356
			US	29	0.9762	0.066	26	1.0483	0.0604	25	1.1089	0.0846
		United States	EP	97	1.0513	0.0304	95	1.1161	0.0348	94	1.1754	0.0422
			JP	36	0.9953	0.0508	30	1.0466	0.0618	27	1.0710	0.0705
			OT	6	1.0971	0.1134	5	1.1062	0.0324	5	1.1594	0.0387
			US	1	1.0343	0.0268	1	1.1062	0.0324	1	1.1594	0.0387
		Republic of Korea	EP	37	1.0523	0.0373	37	1.1348	0.0486	37	1.2085	0.0529
			JP	32	1.2323	0.1628	28	1.3780	0.2041	24	1.3402	0.2196
			OT	3	1.1176	0.0631	3	1.2095	0.0719	3	1.2626	0.0769
			US	23	1.0509	0.0558	21	1.0708	0.0595	20	1.1081	0.0986
		People's Republic of China	EP	75	1.0749	0.0349	72	1.1567	0.0452	72	1.2456	0.0555
			JP	37	0.9906	0.0756	31	1.0341	0.0926	27	1.0142	0.0966
			OT	3	1.0834	0.041	3	1.1552	0.0470	3	1.1817	0.0439
			US	37	1.3250	0.1734	34	1.3286	0.1755	32	1.1618	0.0607
		Other Countries	EP	38	0.9464	0.0719	37	1.0883	0.0296	35	1.1140	0.0370
			JP	24	0.8826	0.0544	21	1.0028	0.0308	19	1.0248	0.0294
			OT	5	0.9141	0.0505	5	1.0504	0.0255	5	1.0795	0.0310
			US	22	0.8777	0.0846	19	1.0365	0.0878	19	1.0987	0.1183

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, CNIPA, and USPTO, as well as Euro-PCT-RP applications at the EPO and all Euro-direct filings 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 cases¹⁷.

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 PCT-IP filings in 2017.

PCT-NP/RP applications from EP, Japan, US and Others residents show strong growth rates to most of the Offices for two-year and three-year periods. Growth rates for PCT-NP to the DPMA in 2018 are lower than those for Euro-PCT-RP, Euro-direct or Euro-direct + Euro-PCT-RP to the EPO, except for the JP bloc. The US bloc indicates negative Euro-PCT-RP applications growth rates for two-year and three-year periods.

Random group (including critical codes)

S.E. indicates standard error of logarithm

No breakdown

Q-indices

Patent Office	Filing route	2018			2019			2020		
		Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
CNIPA	PCT-NP	192	1.0880	0.0324	176	1.1948	0.0445	173	1.2168	0.0526
DPMA	PCT-NP	53	0.9999	0.065	47	1.1382	0.0559	46	1.1498	0.0579
EPO	Euro-direct	228	1.0410	0.0352	214	1.0551	0.0332	205	1.0843	0.0344
EPO	Euro-direct+Euro-PCT-RP	347	1.0180	0.0264	328	1.0025	0.0347	315	1.0337	0.0368
EPO	Euro-PCT-RP	242	1.0330	0.0285	222	1.0222	0.0806	219	1.0148	0.1127
JPO	PCT-NP	158	1.0790	0.0346	143	1.1460	0.0460	138	1.1941	0.0548
KIPO	PCT-NP	139	1.1124	0.0328	132	1.1560	0.0473	129	1.2124	0.0582
USPTO	PCT-NP	210	1.0518	0.0281	192	1.1395	0.0406	185	1.1760	0.0466

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

¹⁷ Counts for base year 2017 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 (italic text)

			2018			2019			2020		
Patent Office	Filing route	Res. Bloc	Cases	Q-index	S.E.	Cases	Q-index	S.E.	Cases	Q-index	S.E.
CNIPA	PCT-NP	EP	91	1.1060	0.0435	84	1.2118	0.0626	83	1.2226	0.0739
		JP	44	1.1047	0.0635	40	1.2113	0.0759	39	1.2561	0.0797
		OT	8	0.9486	0.1201	7	1.1737	0.1587	7	1.0692	0.2608
		US	49	1.0191	0.0538	45	1.1145	0.0630	44	1.1524	0.0744
DPMA	PCT-NP	EP	23	0.9437	0.072	19	1.1641	0.0466	19	1.1641	0.0466
		JP	18	1.0750	0.1072	16	1.0713	0.1349	16	1.0869	0.1406
		OT	2	0.9999	0.065	2	1.1382	0.0559	1	1.1498	0.0579
		US	10	1.0522	0.1418	10	1.1085	0.1452	10	1.1456	0.1524
EPO	Euro-direct+ Euro-PCT-RP	EP	164	1.0034	0.0347	157	1.0446	0.0344	150	1.0864	0.0352
		JP	25	0.9982	0.1092	21	0.9481	0.1103	21	0.9135	0.1131
		OT	6	1.2015	0.1395	6	1.2189	0.0883	5	1.0843	0.0344
		US	33	1.3799	0.1135	30	1.2922	0.0786	29	1.3046	0.0797
EPO	Euro-direct+Eu	EP	202	0.9899	0.0326	193	1.0420	0.0307	185	1.0875	0.0311
		JP	52	0.9971	0.0427	47	0.9590	0.0654	45	0.9555	0.0698
		OT	13	1.1911	0.0864	14	1.2408	0.1171	13	1.4081	0.1313
		US	80	1.1035	0.0626	74	0.9021	0.1139	72	0.9113	0.1242
EPO	Euro-PCT-RP	EP	123	1.0395	0.0379	112	1.1112	0.0532	113	1.1409	0.0625
		JP	45	1.0139	0.0653	41	1.0869	0.0762	39	1.1077	0.0798
		OT	10	1.2967	0.146	11	1.5209	0.2552	10	1.8043	0.2935
		US	64	1.0070	0.0372	58	0.7280	0.2784	57	0.6102	0.4188
JPO	PCT-NP	EP	73	1.0920	0.0481	67	1.1793	0.0686	66	1.2480	0.0809
		JP	40	1.1397	0.0539	37	1.1278	0.0556	35	1.1486	0.0569
		OT	7	1.1732	0.0971	6	1.4239	0.1994	5	1.1941	0.0548
		US	38	0.9095	0.0671	33	1.0011	0.0696	32	1.0027	0.0844
KIPO	PCT-NP	EP	56	1.1399	0.045	54	1.1726	0.0689	54	1.2445	0.0846
		JP	41	1.0789	0.0615	38	1.1007	0.0704	37	1.1295	0.0755
		OT	9	1.2368	0.1238	9	1.4814	0.1905	8	1.6183	0.2624
		US	33	1.0388	0.0465	31	1.1212	0.0557	30	1.1557	0.0752
USPTO	PCT-NP	EP	101	1.0686	0.0359	93	1.1377	0.0563	91	1.1874	0.0650
		JP	46	1.0125	0.0491	43	1.0800	0.0545	40	1.0988	0.0570
		OT	10	1.5394	0.2454	10	1.7393	0.2431	9	1.7705	0.2756
		US	53	0.9769	0.0619	46	1.1431	0.0686	45	1.1648	0.0715

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

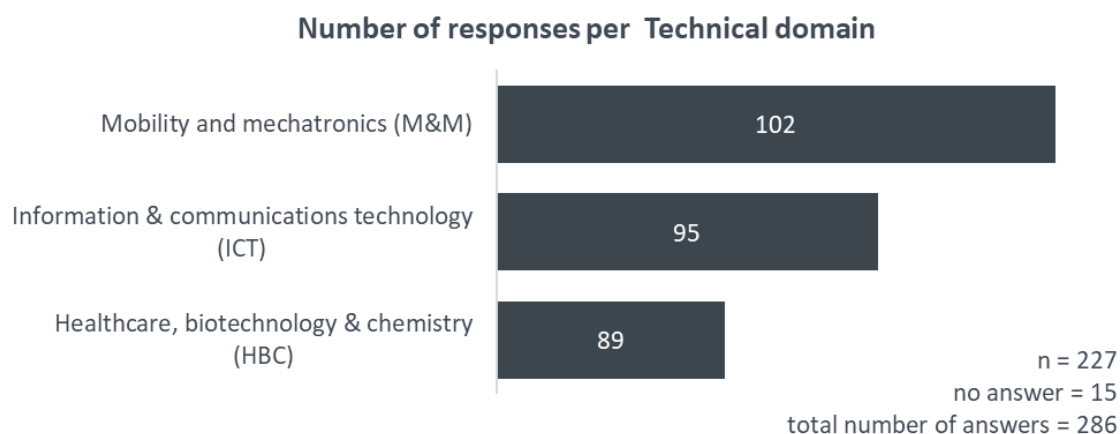
12 ANNEX VI: RESPONDENTS' PROFILES

In the questionnaire, respondents were asked to indicate Technical domains that best describe the applicant's business along with the corresponding first filings patenting activity, R&D expenditures, the number of persons employed and whether the applicant is one of the small and medium-sized enterprises. The results from these questions are analysed in this Annex.

Section 12.1 provides an overview of the sample composition in terms of the EPO Technical domains. 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

All applicants in the survey were asked to describe their activities in terms of one or more of the EPO Technical domains by stating worldwide first filings counts made in 2017 in each sector. Additionally, extra research was done to evaluate the Technical domains of activities for respondents that did not state the aforementioned filing counts. This year the number of Technical domains was reduced to 3, thus average respondents-based count statistics are not comparable across the years. 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.



Base: all respondents of the Biggest group incl. overlapping members of the Random group, multiple answers possible, absolute number of responses (unweighted, after ex-post allocation)

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

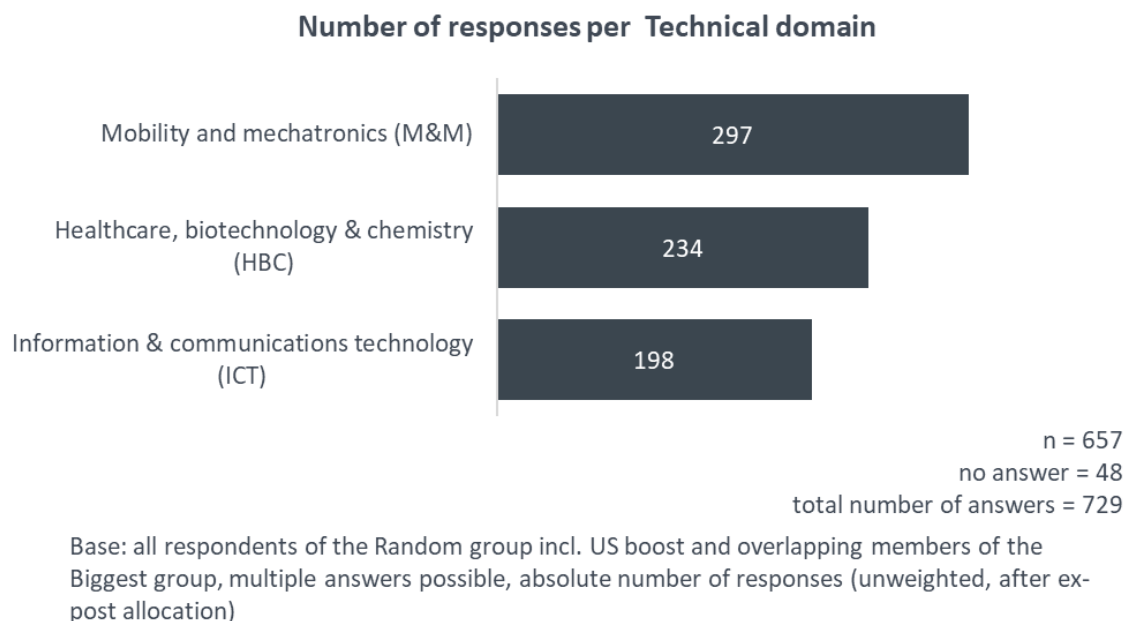


Figure 10: Number of responses per Technical domain (Random group including overlapping members of the Biggest group)

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

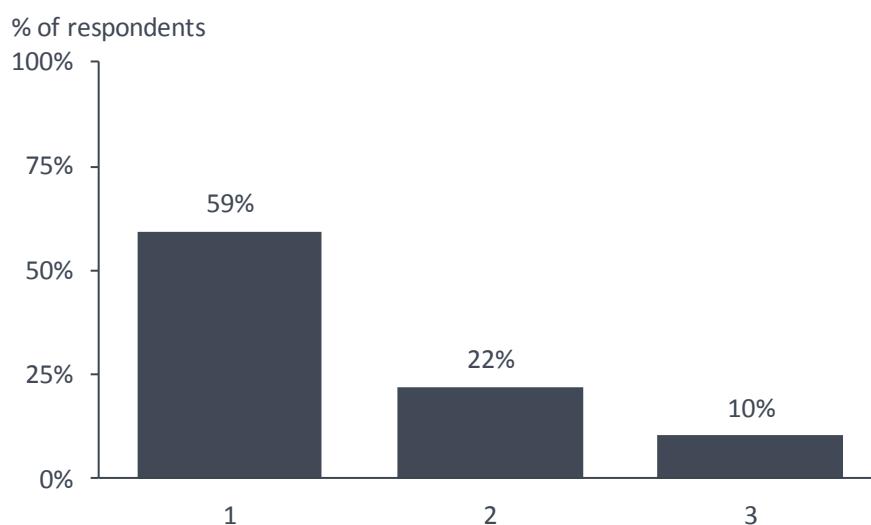
Residence bloc	EP		JP		OT		US		Total	
	N	%	N	%	N	%	N	%	N	%
Healthcare, biotechnology & chemistry (HBC)	110	29%	37	34%	13	31%	74	38%	234	32%
Information & communications technology (ICT)	90	23%	37	34%	15	36%	56	29%	198	27%
Mobility and mechatronics (M&M)	183	48%	36	33%	14	33%	64	33%	297	41%
Total	383	100%	110	100%	42	100%	194	100%	729	100%

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. The average number of Technical domains per respondent that gave information on Technical domains is 1.47 for the Biggest group respondents and 1.35 for the Random group respondents.

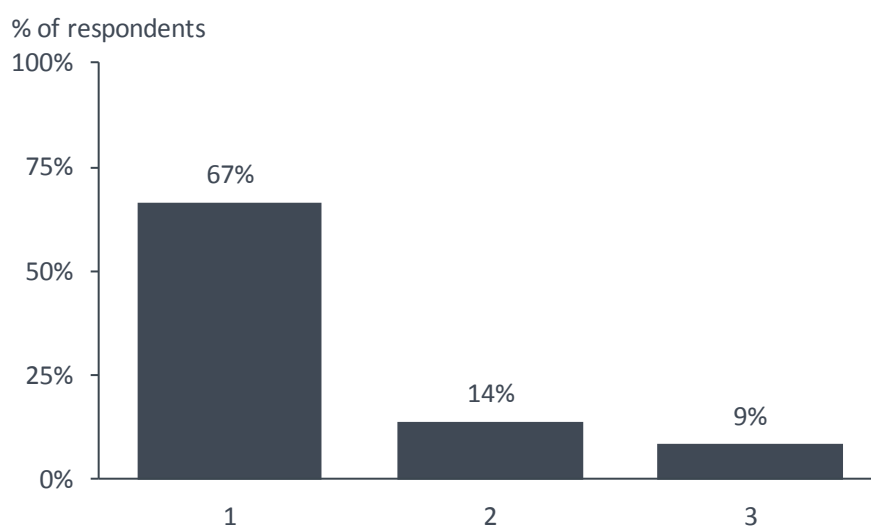
Number of Technical domains per respondent
(Biggest incl. overlapping members of the Random group)



Base: n = 212, 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 = 606, 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 are cited most frequently. In each case, there is a two-way matrix describing the domain 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 domains 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 different picture to that seen over the past three years when this exercise was undertaken, primarily because of small number of domains. In both Biggest group and Random group samples, the highest degree of overlap is between the Information & communications technology (ICT) and Mobility and mechatronics domains (M&M). In addition, there are fairly high degrees of overlap between other pairs of Technical domains.

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.

Technical domain	#	1	2	3	Absolute numbers of respondents (unweighted, without "other" mentions)
Mobility and mechatronics (M&M)	1	102	31	50	
Healthcare, biotechnology & chemistry (HBC)	2	0.33	89	32	
Information & communications technology (ICT)	3	0.51	0.35	95	
		Normalised Mutual Information (NMI)			

Base: n = 212, 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)

Technical domain	#	1	2	3	Absolute numbers of respondents (unweighted, without "other" mentions)
Mobility and mechatronics (M&M)	1	297	73	101	
Healthcare, biotechnology & chemistry (HBC)	2	0.28	234	67	
Information & communications technology (ICT)	3	0.42	0.31	198	
		Normalised Mutual Information (NMI)			

Base: n = 606, 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 1% of the respondents have less than 250 employees, while 65% 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**.

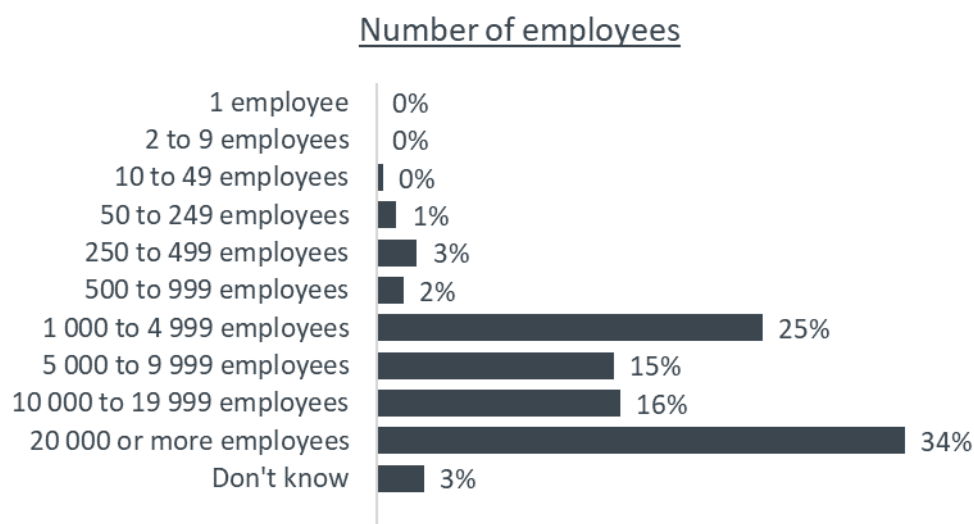


Figure 13: Biggest group by number of employees

	1	2 to 9	10 to 49	50 to 249	250 to 499	500 to 999	1 000 to 4 999	5 000 to 9 999	10 000 to 19 999	20 000 or more	Don't know	Total	Number of cases
Total	0%	0%	0%	1%	3%	2%	25%	15%	16%	34%	3%	100%	227
EP	0%	0%	0%	3%	3%	3%	23%	16%	18%	33%	2%	100%	111
JP	0%	0%	0%	0%	3%	2%	32%	19%	19%	25%	0%	100%	63
OT	0%	0%	0%	0%	13%	0%	38%	13%	0%	38%	0%	100%	8
US	0%	0%	2%	0%	0%	0%	20%	9%	9%	49%	11%	100%	45

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

12.3 Respondents from the Random group

Figure 14 shows that 30% of the Random group applicants have a maximum of 249 employees, while 36% 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 2017. (The 2015 survey had shown an unusually high 40% proportion of Random group applicants with a maximum of 249 employees). But it should be noted that the population that is represented by the Random group differs from the previous surveys, because it is now

based on filers rather than applicants. Broken down by residence bloc, the distribution of number of employees in the Random group is shown in **Table 50**.

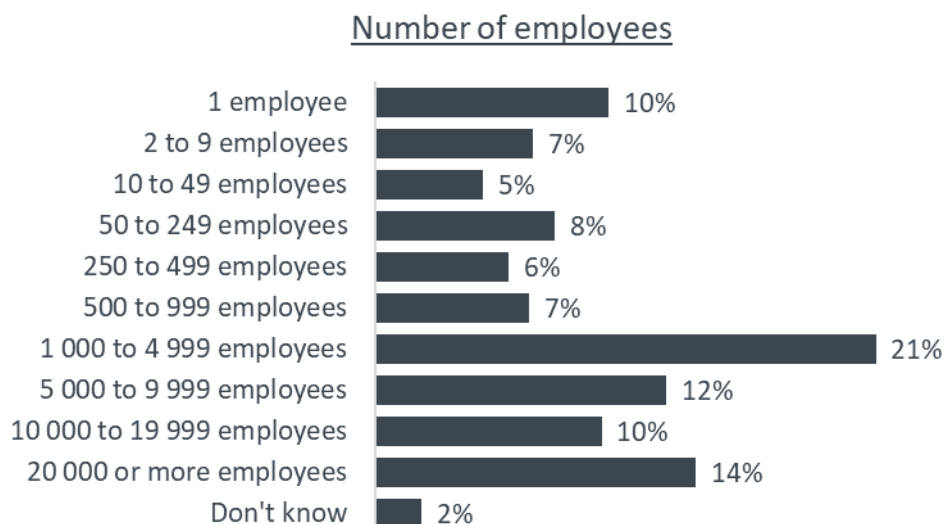


Figure 14: Random group by number of employees

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

	1	2 to 9	10 to 49	50 to 249	250 to 499	500 to 999	1 000 to 4 999	5 000 to 9 999	10 000 to 19 999	20 000 or more	Don't know	Total	Number of cases
Total	10%	7%	5%	8%	6%	7%	21%	12%	10%	14%	2%	100%	654
EP	13%	9%	5%	9%	7%	7%	21%	10%	7%	10%	1%	100%	381
JP	0%	0%	0%	4%	5%	6%	28%	22%	17%	17%	0%	100%	81
OT	11%	3%	5%	16%	13%	0%	21%	11%	11%	8%	3%	100%	38
US	7%	5%	6%	3%	2%	7%	18%	14%	11%	21%	5%	100%	154

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 filings, it can also be used to make inferences about the properties and composition of the population of filers at EPO, 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*¹⁸. 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). This year the number of classes has been extended by splitting the previous 8th class to give new 8th and 9th classes.

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. For further details on SRSS, see Section 9.10 (Annex III).

Class	lb	ub	EP	JP	OT	US	Total
1	1	1	0.29	0.03	0.03	0.04	0.12
2	2	2	0.15	0.00	0.02	0.02	0.06
3	3	3	0.17	0.00	0.05	0.12	0.11
4	4	5	0.29	0.09	0.07	0.05	0.14
5	6	9	0.26	0.12	0.07	0.12	0.16
6	10	19	0.28	0.18	0.03	0.21	0.20
7	20	39	0.35	0.19	0.09	0.27	0.27
8	40	59	0.35	0.41	0.11	0.15	0.28
9	60	no limit	0.37	0.43	0.13	0.32	0.35
Total			0.28	0.22	0.05	0.11	0.16

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.

Regarding the number of employees, the weighted estimated distribution in the population is now shown as a histogram.

¹⁸ Cf. Future Filings Survey 2010 report, Section 11.4, p. 77.

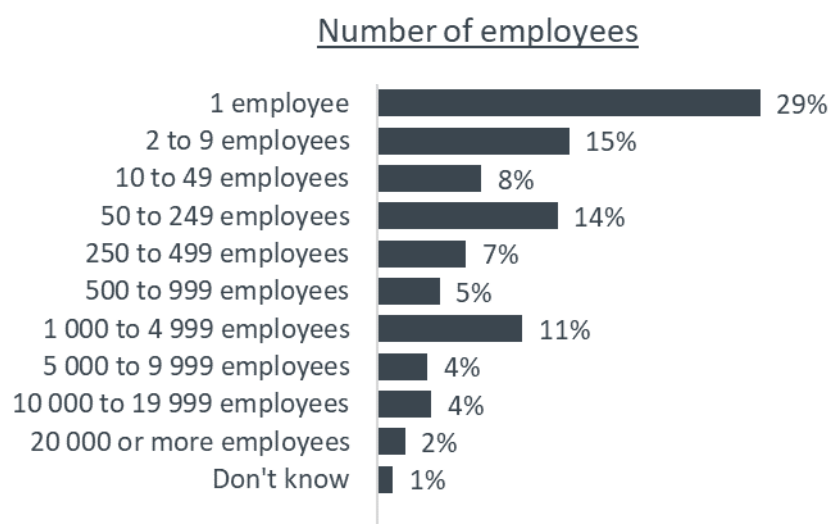


Figure 15: Estimated distribution of the EPO applicant population by number of employees

The inference for the whole applicant population is that 66% of applicants have a maximum of 249 employees, while only 10% have more than 5,000 employees. 29% of the applicants have only a single employee. The distribution in **Figure 15** shows a strong contrast to the data for the Biggest group in **Figure 12**.

In Total (as in Fig. 15) and also broken down by residence bloc, the inferred distributions of numbers of employees are shown in **Table 52**.

	1	2 to 9	10 to 49	50 to 249	250 to 499	500 to 999	1 000 to 4 999	5 000 to 9 999	10 000 to 19 999	20 000 or more	Don't know
Total	29%	15%	8%	14%	7%	5%	11%	4%	4%	2%	1%
EP	29%	18%	9%	15%	7%	8%	9%	2%	1%	1%	2%
JP	0%	0%	0%	66%	8%	6%	7%	10%	2%	2%	0%
OT	27%	1%	7%	27%	15%	0%	11%	2%	8%	0%	2%
US	34%	22%	8%	1%	2%	5%	13%	6%	4%	4%	1%

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: 70% of applicants from the EP bloc, 65% from the US bloc, and 61% from the OT bloc have fewer than 250 employees. JP is close but with all 66% of applicants falling in 50 to 249 employees' range. This continues some observed fluctuations in JP companies' size for survey to survey, as in last year survey there were 8% of applicants with employee count below 249, while in 2016 survey it was 35%. This year EP, OT, US blocs have similar company size distributions, last year 0% of companies from the OT bloc had 1 to 9 employees, while this year it is 27%. But such comparisons to previous surveys are difficult to interpret because of the different sampling frame in the current survey.

12.5 Analysis of economic attributes

In the questionnaire, applicants were asked to provide information about their R&D budgets, numbers of first patent filings throughout the world and SME status. All responses given were in respect of activities in 2017.

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 12th October 2018, were applied accordingly.

The tables in this section contain two groups of attributes. The first group contains (from left to right): the proportion of applicants that are SMEs¹⁹, 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 and R&D budget by first patent filings.

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 weights²⁰. Also, for tables based on the Random group and employing structural weights, the 'Weighted N' reported is the sum of the standardised structural weights²¹.

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 Technical domains.

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 Technical domain, **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.

Several of the columns in the tables report statistics about the same variables as in earlier reports. However, it should be born in mind that these attributes pertain to the population of

¹⁹ 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 2017 from the EPO database, that were also used for calculating Poisson weights.

²⁰ 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.

²¹ 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.

Total filers, while in previous reports the population of Total applicants was described. 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 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 was 67% with 95% confidence limits of 63% to 71% (55% in the 2017 survey). It should be noted that this proportion is close to the mean proportion of applicants with less than 250 employees of approximately 64% that was shown in **Figure 15**. The estimates for the proportion of SMEs are more or less stable across residence blocs, Japan at 67%, Others at 63%, the US at 66%, and the EPC being the highest at 71%. The proportion of applications made by SMEs (Total applications in 2017, being the sum of Euro-direct and Euro-PCT-RP) were estimated from the weighted analysis as 22% overall (17% in 2017 and 18% in 2016) with 95% confidence limits ranging of 19% to 25%. The estimates vary by residence bloc between Japan at 34%, Others at 29%, EPC at 21% and the US at 15%.

In the second group of attributes, the median R&D budget that is estimated for the filers in 2017 is EUR 2 million. This is far higher than the median value of EUR 0.5 million that was found in the 2017 survey of applicants rather than filers. This high increase might be due to the fact that sample generation population this year was changed to Total filings, thus resulting in different applicant structure. The median number of first filings is 3 and did not change since last year (4 in 2016, 1 in 2015, and 3 in 2014). The median R&D expenditure per first filing was 2 times higher at EUR 300 000, compared to 150 000 EUR in the previous year's survey and more in-line with 2016 survey's 250 000 EUR.

Looking at the breakdowns of weighted results by Technical domains in **Table 57**, the proportions of SMEs among applicants are highest in ICT and lowest in HBC. The proportions of Total applications by SMEs are highest in ICT and three times less in Mobility & mechatronics (M&M). Median R&D Budgets are highest in HBC, but in the context no surprise that it is lowest in ICT, which has the highest ratio of SMEs. Median numbers of worldwide first filings are highest in HBC and lowest in M&M. Median R&D spend per first filing is highest in M&M, but lowest in ICT Technical domain.

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	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2017[EUR]	Number of first patent filings throughout the world in 2017	R&D budget by first patent filing [EUR per first filing]
Biggest Unweighted	N	183	183	68	206	68
	MIN			192 247	2	2 548
	MAX			9 057 667 200	6 842	86 260 000
	MEDIAN			256 719 450	157	1 258 089
	MEAN	1%	0%	1 168 713 514	459	6 253 560
Random Unweighted	N	583	583	149	579	143
	MIN			9 612	1	2 381
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			34 222 912	26	736 015
	MEAN	30%	1%	538 266 265	212	3 638 570
Random Weighted	WEIGHTED N	619	619	149	553	138
	MIN			9 612	1	2 381
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			2 000 000	3	300 000
	MEAN	67%	22%	63 501 266	81	1 934 773
	MEAN 95% LB	63%	19%	26 715 932		742 771
	MEAN 95% UB	71%	25%	100 286 601	191	3 126 775

Table 53: Main statistics for the various sample groups

Residence Bloc	Statistic	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2017[EUR]	Number of first patent filings throughout the world in 2017	R&D budget by first patent filing [EUR per first filing]
EP	N	342	342	81	330	75
	MIN			9 612	1	2 381
	MAX			9 057 667 200	4 702	41 470 660
	MEDIAN			13 698 000	11	1 010 101
	MEAN	39%	2%	402 454 701	95	2 867 881
JP	N	71	71	32	75	32
	MIN			769 400	2	53 224
	MAX			8 187 954 800	6 842	85 488 889
	MEDIAN			206 968 600	368	494 124
	MEAN	1%	0%	702 732 364	723	3 632 446
OT	N	35	35	2	28	2
	MIN			3 747 060	1	107 059
	MAX			1 257 919 700	4 254	25 158 394
	MEDIAN			630 833 380	38	12 632 726
	MEAN	29%	1%	630 833 380	355	12 632 726
US	N	135	135	34	146	34
	MIN			43 130	1	10 783
	MAX			6 038 200 000	5 774	57 159 935
	MEDIAN			34 504 000	44	1 415 265
	MEAN	21%	0%	701 580 598	185	4 815 315
Random Unweighted Total	N	583	583	149	579	143
	MIN			9 612	1	2 381
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			34 222 912	26	736 015
	MEAN	30%	1%	538 266 265	212	3 638 570

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

Residence Bloc	Statistic	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2017[EUR]	Number of first patent filings throughout the world in 2017	R&D budget by first patent filing [EUR per first filing]
EP	WEIGHTED N	207	207	66	170	55
	MIN			9 612	1	2 381
	MAX			9 057 667 200	4 702	41 470 660
	MEDIAN			350 000	2	171 225
	MEAN	71%	21%	39 894 664	12	988 425
	MEAN 95% LB	65%	17%	9 880 923	8	370 187
	MEAN 95% UB	77%	26%	69 908 405	16	1 606 662
JP	WEIGHTED N	21	21	4	21	4
	MIN			769 400	2	53 224
	MAX			8 187 954 800	6 842	85 488 889
	MEDIAN			146 186 000	5	437 870
	MEAN	67%	34%	583 872 111	95	17 937 981
	MEAN 95% LB	46%	23%	62 436 662		
	MEAN 95% UB	87%	45%	1 105 307 560	214	46 786 545
OT	WEIGHTED N	137	137	6	121	6
	MIN			3 747 060	1	107 059
	MAX			1 257 919 700	4 254	25 158 394
	MEDIAN			3 747 060	7	107 059
	MEAN	63%	29%	98 269 187	307	1 995 081
	MEAN 95% LB	55%	14%			
	MEAN 95% UB	71%	45%	440 870 760	799	8 838 339
US	WEIGHTED N	253	253	73	240	73
	MIN			43 130	1	10 783
	MAX			6 038 200 000	5 774	57 159 935
	MEDIAN			4 313 000	2	1 797 083
	MEAN	66%	15%	53 573 326	14	1 766 204
	MEAN 95% LB	60%	9%	1 680 092	9	674 913
	MEAN 95% UB	72%	21%	105 466 559	19	2 857 494
Random Weighted Total	WEIGHTED N	619	619	149	553	138
	MIN			9 612	1	2 381
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			2 000 000	3	300 000
	MEAN	67%	22%	63 501 266	81	1 934 773
	MEAN 95% LB	63%	19%	26 715 932		742 771
	MEAN 95% UB	71%	25%	100 286 601	191	3 126 775

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

Technical Domain	Statistic	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2017[EUR]	Number of first patent filings throughout the world in 2017	R&D budget by first patent filing [EUR per first filing]
ICT	N	174	174	56	198	56
	MIN			40 000	1	2 548
	MAX			8 187 954 800	6 842	57 159 935
	MEDIAN			163 170 505	79	982 615
	MEAN	16%	0%	686 874 167	400	3 188 416
HBC	N	203	203	67	232	67
	MIN			34 864	1	3 077
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			107 716 000	32	909 091
	MEAN	21%	1%	782 141 481	240	4 911 465
M&M	N	268	268	79	297	79
	MIN			30 000	1	2 381
	MAX			8 187 954 800	6 842	57 159 935
	MEDIAN			34 864 000	26	699 080
	MEAN	24%	1%	510 975 858	242	3 294 358
Random Unweighted Total	N	583	583	149	579	143
	MIN			9 612	1	2 381
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			34 222 912	26	736 015
	MEAN	30%	1%	538 266 265	212	3 638 570

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

Technical Domain	Statistic	Proportions of SMEs among applicants	Proportion of applications made by SMEs	Approximate R&D budget in 2017[EUR]	Number of first patent filings throughout the world in 2017	R&D budget by first patent filing [EUR per first filing]
ICT	WEIGHTED N	151	151	47	164	47
	MIN			40 000	1	2 548
	MAX			8 187 954 800	6 842	57 159 935
	MEDIAN			900 000	5	107 059
	MEAN	66%	30%	93 375 145	245	1 031 890
	MEAN 95% LB	59%	23%	5 847 720		103 334
	MEAN 95% UB	74%	37%	180 902 570	604	1 960 445
HBC	WEIGHTED N	183	183	57	187	57
	MIN			34 864	1	3 077
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			12 939 000	8	909 091
	MEAN	51%	13%	112 039 053	43	3 121 891
	MEAN 95% LB	43%	8%	20 947 708	11	632 564
	MEAN 95% UB	58%	17%	203 130 399	75	5 611 218
M&M	WEIGHTED N	260	260	60	266	60
	MIN			30 000	1	2 381
	MAX			8 187 954 800	6 842	57 159 935
	MEDIAN			4 313 000	2	1 000 000
	MEAN	60%	10%	79 808 444	150	1 830 807
	MEAN 95% LB	54%	6%	22 256 140		1 069 273
	MEAN 95% UB	66%	13%	137 360 749	375	2 592 341
Random Weighted Total	WEIGHTED N	619	619	149	553	138
	MIN			9 612	1	2 381
	MAX			9 057 667 200	6 842	85 488 889
	MEDIAN			2 000 000	3	300 000
	MEAN	67%	22%	63 501 266	81	1 934 773
	MEAN 95% LB	63%	19%	26 715 932		742 771
	MEAN 95% UB	71%	25%	100 286 601	191	3 126 775

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

13 ANNEX VII: ANALYSIS OF FUTURE TECHNOLOGY TRENDS

All applicants in the survey were asked to state three most promising (medium to long term) technology trends in their area of business as open comments (questionnaire **Page 15**).

All the mentioned technology trends were classified into 16 classes grouping them by the closest technology. The sector of economic activity is an ex-post allocation based on the main economic activity respondents are doing business in.

The following tables show the technology trends. Note that percentages add to more than 100% because of the multiple answers that were allowed. **Table 58** displays the unweighted raw data, broken down by sector of economic activity and by residence bloc. **Table 59** as well as **Table 60**, which provides a further overview of the main statistics regarding the technology trends according to breakdowns by filing power and by company size, present the results for the Random group based on the structural weight approach (see Section **9.10** (Annex III)). For tables based on the Random group and employing structural weights, the 'Weighted N' reported is the sum of the standardised structural weights.

	Total	Sector				Bloc			
		M&M	HBC	ICT	University / Research Centre	EPC	JP	OT	US
N (unweighted):	256	133	81	21	21	156	20	22	58
IoT, Industry 4.0, ICT, blockchain	27%	26%	17%	62%	33%	26%	30%	41%	24%
Circular economy, new energy sources	22%	25%	21%	-	33%	26%	20%	14%	17%
Digitalisation, automation, integration	21%	28%	16%	10%	5%	28%	5%	5%	14%
Mechanical engineering, materials, packaging	16%	20%	16%	5%	10%	17%	15%	23%	12%
Biotech, Gene, Cell, Enzymes, Nano technologies	15%	1%	32%	-	57%	14%	15%	9%	21%
Electromobility, hybrid, autonomous drive	14%	24%	2%	10%	-	17%	10%	14%	7%
Artificial intelligence	10%	6%	10%	29%	14%	6%	20%	5%	19%
5G, wireless communication	6%	5%	2%	29%	-	6%	10%	9%	3%
Additive manufacturing	6%	8%	5%	-	-	6%	-	14%	3%
Electronics	6%	8%	1%	5%	10%	6%	10%	9%	2%
Diagnostics, personalized medicine, digital health, pharma	6%	-	14%	5%	19%	4%	10%	14%	7%
Broader technology mix	5%	6%	4%	-	14%	4%	5%	9%	9%
Medical devices	5%	2%	6%	-	19%	4%	-	9%	5%
LED, OLED, lighting systems	4%	6%	1%	5%	5%	4%	5%	5%	3%
Big data, data analytics	3%	3%	4%	5%	-	4%	-	5%	-
Chemical substances	3%	2%	5%	-	5%	4%	-	-	2%
Other	7%	11%	4%	-	-	6%	5%	5%	10%

Table 58: Technology trends - Biggest group and Random group (unweighted; broken down by sector of economic activity and residence bloc)

	Total	Sector				Bloc			
		M&M	HBC	ICT	University / Research Centre	EPC	JP	OT	US
Weighted N:	206	100	67	24	15	58	2	65	80
Mechanical engineering, materials, packaging	26%	28%	19%	44%	10%	18%	4%	25%	32%
IoT, Industry 4.0, ICT, blockchain	24%	21%	23%	47%	16%	23%	6%	37%	16%
Circular economy, new energy sources	23%	28%	22%	-	24%	25%	8%	4%	37%
Biotech, Gene, Cell, Enzymes, Nano technologies	12%	0%	31%	-	25%	13%	38%	18%	6%
Electromobility, hybrid, autonomous drive	10%	18%	0%	6%	-	14%	2%	1%	14%
Additive manufacturing	9%	15%	4%	-	-	6%	-	18%	4%
Digitalisation, automation, integration	6%	6%	9%	5%	1%	19%	-	0%	2%
5G, wireless communication	6%	1%	17%	1%	-	2%	2%	18%	0%
Broader technology mix	6%	3%	0%	-	60%	3%	1%	1%	13%
Chemical substances	6%	9%	4%	-	2%	5%	-	-	11%
Artificial intelligence	3%	2%	2%	6%	8%	3%	3%	2%	3%
Electronics	3%	3%	2%	0%	3%	6%	3%	2%	0%
Medical devices	3%	3%	3%	-	11%	8%	-	2%	1%
Diagnostics, personalized medicine, digital health, pharma	3%	-	9%	2%	3%	6%	21%	3%	2%
Big data, data analytics	2%	2%	2%	-	-	5%	-	0%	-
LED, OLED, lighting systems	2%	5%	0%	0%	1%	7%	22%	0%	0%
Other	5%	7%	4%	-	-	9%	22%	0%	5%

Table 59: Technology trends - Random group (structural weighted; broken down by sector of economic activity and residence bloc)

	Total	Filing Power				Company Size			SME	
		1-2 filings	3-9 filings	10-39 filings	more than 39 filings	1-249 employees	250-2499 employees	2500 or more employees	Yes	No
Weighted N:	206	153	41	9	2	84	95	27	81	124
Mechanical engineering, materials, packaging	26%	28%	22%	16%	11%	9%	38%	35%	8%	38%
IoT, Industry 4.0, ICT, blockchain	24%	26%	16%	35%	27%	32%	10%	49%	32%	19%
Circular economy, new energy sources	23%	24%	20%	20%	12%	31%	11%	39%	30%	18%
Biotech, Gene, Cell, Enzymes, Nano technologies	12%	10%	18%	22%	8%	4%	20%	8%	4%	17%
Electromobility, hybrid, autonomous drive	10%	10%	8%	9%	24%	15%	7%	2%	16%	6%
Additive manufacturing	9%	8%	9%	15%	3%	14%	7%	1%	14%	5%
Digitalisation, automation, integration	6%	5%	9%	12%	28%	6%	7%	5%	6%	6%
5G, wireless communication	6%	7%	2%	16%	8%	1%	1%	40%	1%	10%
Broader technology mix	6%	7%	3%	9%	4%	3%	10%	2%	3%	8%
Chemical substances	6%	7%	1%	3%	1%	12%	2%	-	13%	2%
Artificial intelligence	3%	1%	8%	9%	12%	2%	3%	3%	2%	3%
Electronics	3%	2%	5%	4%	12%	3%	2%	1%	3%	2%
Medical devices	3%	2%	5%	9%	-	3%	4%	1%	3%	3%
Diagnostics, personalized medicine, digital health, pharma	3%	2%	10%	6%	4%	3%	3%	7%	3%	4%
Big data, data analytics	2%	2%	1%	1%	7%	3%	1%	0%	2%	0%
LED, OLED, lighting systems	2%	2%	2%	3%	5%	-	5%	1%	-	4%
Other	5%	2%	12%	5%	11%	6%	4%	1%	7%	3%

Table 60: Technology trends - Random group (structural weighted; broken down by Filing Power, Company Size and SME Information)

Table 61 below indicates which pairwise combinations of technology trends are mentioned most frequently. In each case, there is a two-way matrix describing the technology combinations selected by the respondents. It should be noted that no weighting has been applied in Table 61 in order to better emulate the distributions for the applicant population as a whole. The upper right-hand triangle of the 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 technologies overlaps (for details see **Section 9.9**).

The picture in this table is not complete, because respondents occasionally indicate more than two technology trends. The average number of technology trends given per respondent is 1.76.

Technology trends	#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Absolute numbers of responses (unweighted, without "other")
Digitalisation, automation, integration, networking	1	53	0	5	12	6	2	9	2	2	13	2	7	1	0	0	0	
5G, wireless communication	2	0,00	15	1	8	3	1	0	1	0	0	0	0	0	0	0	0	
Additive manufacturing, 3D print, digital, inkjet print	3	0,18	0,07	15	1	0	1	2	0	1	0	1	2	0	1	0	0	
IoT, Industry 4.0, ICT, blockchain	4	0,20	0,25	0,03	69	10	5	8	4	1	11	6	3	6	1	5	3	
Artificial intelligence	5	0,16	0,15	0,00	0,24	25	0	0	0	0	1	0	1	5	0	0	2	
Big data, data analytics	6	0,10	0,09	0,09	0,21	0,00	8	1	1	0	0	0	0	0	0	0	0	
Electromobility, hybrid, autonomous drive	7	0,21	0,00	0,09	0,16	0,00	0,06	36	2	4	12	1	2	0	1	1	0	
Electronics	8	0,07	0,07	0,00	0,12	0,00	0,09	0,09	15	1	2	0	1	2	0	0	1	
LED, OLED, electricity	9	0,08	0,00	0,08	0,04	0,00	0,00	0,20	0,08	11	2	0	1	0	0	1	0	
Circular economy, energy saving solutions, new energy sources, energy producing technics	10	0,24	0,00	0,00	0,18	0,03	0,00	0,26	0,07	0,08	57	4	13	4	2	2	1	
Broader technology mix	11	0,07	0,00	0,07	0,19	0,00	0,00	0,04	0,00	0,00	0,14	14	2	0	0	1	0	
Construction, mechanical engineering, materials, packaging	12	0,15	0,00	0,08	0,06	0,03	0,00	0,05	0,04	0,05	0,27	0,08	42	2	0	1	0	
Biotech, Gene, Cell, Enzymes, Nano	13	0,02	0,00	0,00	0,12	0,16	0,00	0,00	0,08	0,00	0,08	0,00	0,05	39	2	2	3	
Chemical substances	14	0,00	0,00	0,10	0,05	0,00	0,00	0,06	0,00	0,00	0,10	0,00	0,00	0,12	7	0	0	
Medical devices, tools	15	0,00	0,00	0,00	0,17	0,00	0,00	0,05	0,00	0,09	0,08	0,08	0,04	0,09	0,00	12	2	
Diagnostics, personalized medicine, digital health, related equipment, pharmaceuticals	16	0,00	0,00	0,00	0,09	0,10	0,00	0,00	0,06	0,00	0,03	0,00	0,00	0,12	0,00	0,14	16	
Normalised Mutual Information (NMI)																		

Base: n = 253, all respondents who provided information about technology trends

Table 61: Number of responses and overlap per Technology trend (two-way matrix, Biggest group and Random group)

Table 61 shows that some technology trends are overlapping and forming broader cluster-like trends that are in some extent related to the economic sector. There are relatively often overlaps between the technology trend 'IoT, Industry 4.0, ICT, blockchain' and '5G, wireless communication', 'Artificial intelligence' and 'Big data, data analytics', forming a digital/ IT-trend cluster. There are also significant overlaps between 'Circular economy, energy saving solutions, new energy sources, energy producing technics' and 'Electromobility, hybrid, autonomous drive', 'Construction, mechanical engineering, materials, packaging', as well as 'Digitalisation, automation, integration, networking'. The latter forms additional pairs with some other trends which indicates the broader impact of this technology base. As expected, the technology trends 'LED, OLED, electricity' and 'Electromobility, hybrid, autonomous drive' cluster too.

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 period²². Note that this representation is symmetric.

Recurrent applicant (excluding divisionals)					Total Filings (Euro-direct + PCT-IP)							
Filers in	Also filed in				2010	2011	2012	2013	2014	2015	2016	2017
	2007	2008	2009									
2007	57 297	18 493	15 147	13 606	12 492	11 572	10 773	10 208	9 444	8 924	8 287	
2008	18 493	56 672	17 598	15 358	13 894	12 804	11 807	11 157	10 065	9 612	8 829	
2009	15 147	17 598	53 806	17 562	15 380	13 837	12 592	11 789	10 738	10 208	9 467	
2010	13 606	15 358	17 562	56 415	18 434	15 945	14 275	13 323	12 006	11 258	10 335	
2011	12 492	13 894	15 380	18 434	57 078	18 625	15 989	14 743	13 194	12 286	11 310	
2012	11 572	12 804	13 837	15 945	18 625	57 162	18 775	16 559	14 622	13 524	12 217	
2013	10 773	11 807	12 592	14 275	15 989	18 775	57 882	19 480	16 430	14 902	13 322	
2014	10 208	11 157	11 789	13 323	14 743	16 559	19 480	61 172	19 908	17 052	14 855	
2015	9 444	10 065	10 738	12 006	13 194	14 622	16 430	19 908	61 658	20 179	16 760	
2016	8 924	9 612	10 208	11 258	12 286	13 524	14 902	17 052	20 179	63 497	20 338	
2017	8 287	8 829	9 467	10 335	11 310	12 217	13 322	14 855	16 760	20 338	60 022	

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)							
Filings in	Active in				2010	2011	2012	2013	2014	2015	2016	2017
	2007	2008	2009									
2007	215 199	164 464	154 719	147 911	143 057	138 853	133 520	128 720	122 358	116 473	113 551	
2008	167 292	217 656	166 243	158 445	153 349	148 533	143 044	138 522	131 195	125 902	121 889	
2009	148 072	155 076	201 734	155 382	149 554	144 237	138 439	134 337	127 588	122 644	118 793	
2010	147 187	153 504	159 951	211 380	162 852	155 663	149 356	144 956	138 054	133 141	128 967	
2011	159 250	164 831	170 278	179 300	230 976	180 907	173 413	167 747	160 611	155 318	150 358	
2012	165 627	170 841	175 124	182 781	191 665	244 250	193 741	186 493	177 918	171 092	164 666	
2013	170 029	174 599	178 917	185 840	192 549	201 394	253 931	203 371	193 152	185 213	177 906	
2014	168 303	172 894	176 728	184 100	189 925	197 183	205 608	263 205	208 050	198 080	188 766	
2015	166 272	169 988	173 776	179 927	185 233	191 343	198 118	208 947	266 618	210 914	199 953	
2016	167 182	170 792	174 321	179 919	185 741	190 729	196 453	206 457	217 644	281 672	218 811	
2017	160 637	163 379	166 430	171 843	177 925	181 121	185 160	190 920	198 580	210 063	265 562	

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 excluded from the counts. Therefore it is suggested that rows and columns pertaining to 2017 are not dependable in the above tables because the database is not yet filled with information about the applicants and applicants for that year.

²² The data in this section were extracted from the database in November 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.

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 filing (excluding divisionals)					Total Filings (Euro-direct + PCT-IP)						
Did not file in											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Filings in											
2007	0	50 735	60 480	67 288	72 142	76 346	81 679	86 479	92 841	98 726	101 648
2008	50 364	0	51 413	59 211	64 307	69 123	74 612	79 134	86 461	91 754	95 767
2009	53 662	46 658	0	46 352	52 180	57 497	63 295	67 397	74 146	79 090	82 941
2010	64 193	57 876	51 429	0	48 528	55 717	62 024	66 424	73 326	78 239	82 413
2011	71 726	66 145	60 698	51 676	0	50 069	57 563	63 229	70 365	75 658	80 618
2012	78 623	73 409	69 126	61 469	52 585	0	50 509	57 757	66 332	73 158	79 584
2013	83 902	79 332	75 014	68 091	61 382	52 537	0	50 560	60 779	68 718	76 025
2014	94 902	90 311	86 477	79 105	73 280	66 022	57 597	0	55 155	65 125	74 439
2015	100 346	96 630	92 842	86 691	81 385	75 275	68 500	57 671	0	55 704	66 665
2016	114 490	110 880	107 351	101 753	95 931	90 943	85 219	75 215	64 028	0	62 861
2017	104 925	102 183	99 132	93 719	87 637	84 441	80 402	74 642	66 982	55 499	0

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

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

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 2010).

Correction factors CF'				
		Correction factors for Total filings (Euro-direct+PCT-IP)		
Survey Year	Base Year	Survey Year	Survey Year + 1	Survey Year + 2
2010	2009	-994	-3 034	-3 522
2011	2010	2 861	372	-1 901
2012	2011	-1 351	954	-2 097
2013	2012	-361	-2 912	-489
2014	2013	26	-1 902	-6 418
2015	2014	5 190	3 783	1 228
2016	2015	1 801	4 684	2 868
2017	2016	5 179	5 521	8 994
2018	2017	-3 767	581	-464

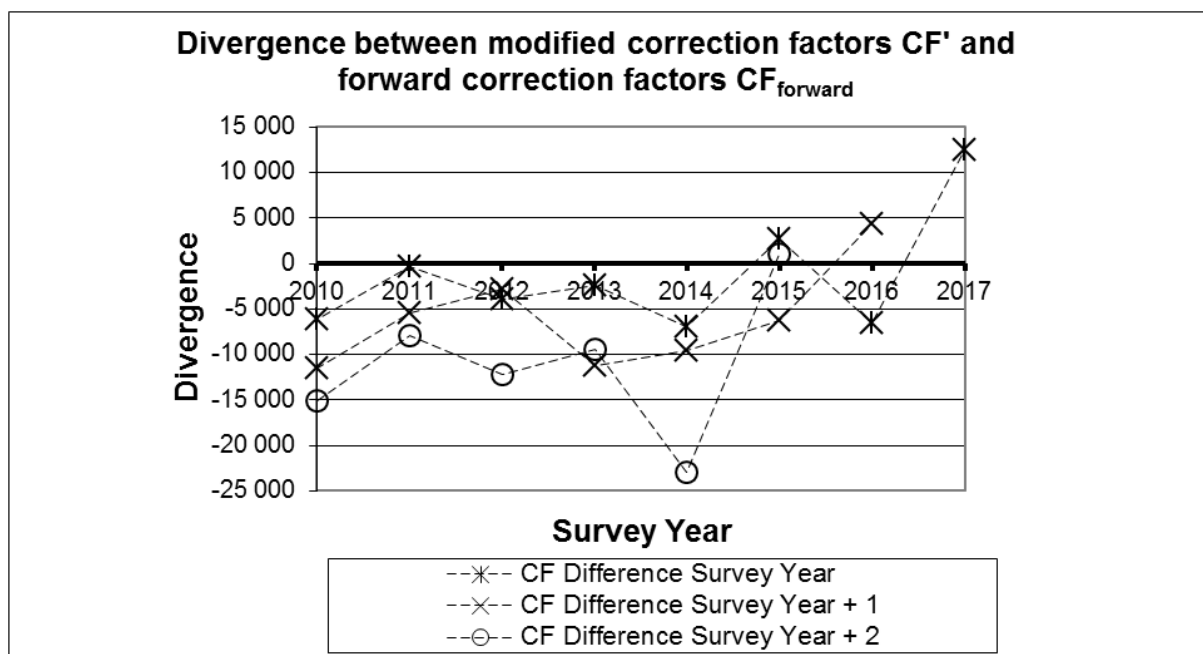
The following table calculates another kind of correction factor, called forward correction factors, CF_{forward}, as experienced beyond base years due to the subsequent out-turns. Some data are missing on this for the most recent surveys. Since the out-turns here already take account of the growth of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

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

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
2010	2009	5 077	8 518	11 629
2011	2010	3 148	5 752	6 067
2012	2011	2 516	3 819	10 051
2013	2012	2 028	8 265	8 943
2014	2013	7 037	7 721	16 501
2015	2014	2 516	10 090	203
2016	2015	8 324	317	NA
2017	2016	-7 362	NA	NA
2018	2017	NA	NA	NA

The method described for creating correction factors depends on taking historical developments as a way to project into the future.

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



The divergences ($CF' - CF_{\text{forward}}$) 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 +12 500 in 2017 and -6 500 in 2016.

In the CF' table above, it is suggested not to use the final row that refers to Base year Total filings in 2017, 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 2017 can be used. This means adding 2 021 to the recommended forecast for 2018 to give $(311\,670 + 5\,179 =) 316\,849$; adding 5 521 to the recommended forecast for 2019 to give $(333\,523 + 5\,521 =) 339\,044$; and adding 8 994 to the recommended forecast for 2020 to give $(350\,386 + 8\,994 =) 359\,380$.

15 ANNEX IX: SIZES OF POPULATIONS AND SAMPLES FOR THE 2018 EPO PATENT FILINGS SURVEY

Table 62 provides an overview of the survey populations and sample counts of applications and applicants. In this year's survey, compared to 2017 survey, there were more applicants in Biggest group (695 compared to 601, +16%) that were considered to be asked to provide forecasts for their counts of filings. Biggest group applicants asked represented 24.3% of the populations' Total filings (Direct + PCT-IP) and 50.2% of Total applications (Direct + Euro-PCT-RP), similar to the 2017 report numbers (respectively 23.2% and 50.4%).

With the change of sample frame to Total filings this year, the Random group size asked effectively doubled compared to 2017 survey and reached 4 057: Meanwhile the counts of Total filings and Total applications were close to those in last year's survey.

The sample frame change to Total filings also positively impacted Random group coverage of the Total filings population. This reached 30.6% – which is an increase of 4.7 percentage points compared to last year's survey. On the other hand, there was a reduction of Random group coverage of the Total applications population to 52.5% - which is a decrease of 4.1 percentage points compared to last year's survey. These changes should have had a positive effect since the primary goal of the survey is to forecast Total filings rather than Total applications.

	Euro-applications in 2017 ^{&}					Euro-applicants in 2017 ^{\$"}				
	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)
	57 466	243 500	300 966	98 435	155 901			59 682		36 622
1. Population in 2017*										
Sample group A: Biggest										
2. Number asked ^{\$} as percentage of 1.	30 803 53.6%	42 357 17.4%	73 160 24.3%	47 440 48.2%	78 243 50.2%	552	611	686 1.1%	639	695 1.9%
Number of quantitative responses (questionnaires) as percentage of 1.	12 816 22.3%	21 182 8.7%	33 998 11.3%	12 054 12.2%	24 870 16.0%	149	173	195 0.3%	144	189 0.5%
as percentage of 2.	41.6%	50.0%	46.5%	25.4%	31.8%	27.0%	28.3%	28.4%	22.5%	27.2%
Sample group B: Random (incl. US and CN boosts)										
3. Number asked ^{\$} as percentage of 1.	32 795 57.1%	59 253 24.3%	92 048 30.6%	49 082 49.9%	81 877 52.5%	1 469	3 455	4 057 6.7%	1 812	2 446 6.7%
Number of quantitative responses (questionnaires) as percentage of 1.	15 280 26.6%	26 272 10.8%	41 552 13.8%	13 103 13.3%	28 383 18.2%	326	443	539 0.9%	301	452 1.2%
as percentage of 3.	46.6%	44.3%	45.1%	26.7%	34.7%	22.2%	12.8%	13.3%	16.6%	18.5%

[&] All figures exclude divisional filings.

^{*} From the EPO database (EPASYS) and WIPO web site. (Applications are status March 2019, Applicants are status March 2018).

^{\$} The counts of numbers asked in the samples are status March 2018.

[#] 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 applicant names from EPASYS at sampling time (status March 2018)

Table 62: Sizes of populations and samples for the 2018 EPO Patent Filings Survey



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