

Assessing the quality of European patents

by Claudia Tapia



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Europe's major patent offices are often lauded for the quality of the patents that they issue, but is the praise justified?

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Patents are often lauded for bringing economic prosperity and continuous innovation. Nevertheless, this positive impact has been questioned by some academics (eg, Lemley, Shapiro and Cohen), who warn about patents and the litigation resulting from enforcing them being (mis)used to extract excessive royalty fees from users of the technology, to the detriment of innovation. In particular, these academics see a problem with alleged infringers being forced to pay a licence for a weak patent.

On the other hand, analysing over 45,000 patent applications filed by US start-ups with the US Patent and Trademark Office (USPTO), *Mensa et al* concluded that patent approvals help start-ups to “create jobs, grow their sales, innovate, and eventually succeed”. This is not a trivial issue, as start-ups and small and medium-sized enterprises (SMEs) are the engine (99% of all businesses) of the European Union. In general, patents are indispensable for many (if not most) companies to obtain a return on investment. What is often left aside in the discussion is that patenting is by its nature a risky business, as one needs to invest upfront (for drafting and filing a patent application) and it is entirely possible that no patent will be granted due to prior art (if the invention is already in the public domain). By filing a patent application, the applicant automatically permits the disclosure of its intellectual property to the public after 18 months, thus giving up the possibility of protecting the invention as a trade secret, without knowing whether he or she will ultimately obtain patent protection. Even if a patent is granted, its scope may not provide sufficient coverage either to exclude competitors or to gain licensing income. Still, companies often choose to file patent applications for their inventions (often the result of large investments in R&D), as the benefits – if a patent is obtained with the right scope – usually outweigh the risks.

Indeed, some consider patents to be the pillar of our economy. They encourage inventors to share the results of their R&D investments more openly (since they hope for later protection and do not need to rely on a non-disclosure agreement) in exchange for the possibility of obtaining fair remuneration for their contribution to innovation.

High-quality patents and examiners

In general, there is a common understanding that weak patents are not beneficial to the market since a patent conveys a (temporary) monopoly right which has an

impact in a (social) market economy. Therefore, the aim should be to deliver, or at least maintain, only strong or high-quality patents. However, the meaning of ‘quality’ lies in the eye of the beholder. Companies may identify different elements to determine the quality or the strength of their patents, depending on their own business model. Bearing this in mind, some elements closely related to quality include the following.

Infringement

Ideally, patents should cover the product that the company is planning to manufacture (in order to exclude others from the patented solution and thus gain a competitive advantage) or even other parties’ products (for which it may obtain licensing fees). However, product coverage is a dynamic parameter; for instance, the updated version of a product may no longer be covered by the company’s patent, which may cause the patent to lose value in the company’s eyes. For this reason, some argue that a high-quality patent should enjoy broad coverage in the patent claims, which define the matter for which protection is sought. This requires a risk-benefit analysis on the part of the applicant. On the positive side, the broader the claim, the more products may infringe it (and the more potential licensees the patent holder may find). On the other hand, a broader claim can make it more difficult to map the patent with a specific product before court. It also increases the chances that the alleged infringer will find prior art against the patent.

Invention quality

If the invention provides (in the perception of the market) significant improvements over known solutions, it is more likely that it will be used or desired. Consequently, a patent covering this solution will be more valuable.

Robustness

It is desirable that granted patents be and remain valid (ie, novel and inventive) over the existing state of the art – in other words, that they can survive possible validity attacks. Companies are highly dependent on investment, and investment decisions (external or internal) are often made based on the strength of a technology indicated by the coverage with patents and by their associated strength (eg, in terms of enforceability).

In general, patent offices aim to assure the quality of

the patent with the quality of their work. This is reflected in the following criteria:

- **Timeliness** – how long a patent office takes to analyse a patent application (ie, to grant or reject a patent). According to academics such as Cohen and Merrill, the prolongation of the uncertainty about property rights reduces the value of patents to their owners. Also, the public or other investors suffer due to lack of certainty; this is because whether a patent will be granted to the applicant affects the decision to license the patent, to implement the solution or to find an alternative solution. In fact, looking at company outcomes and based on the fact that applications are assigned to examiners independently of the quality, Mensa *et al* established that a two-year delay would have the same negative impact on the growth and success of a start-up as if the patent application had been rejected.
- **Quality of examination** – this consists of two elements: a high-quality search that finds the right prior art (thus only granting robust patents) and the right application of the legal provisions. A good-quality examination leads to the presumption of legal validity (robustness), which is a substantive but crucial element, as trust in the patent system plays a fundamental role for the economy in general and for the business of the company in particular. The presumption of legal validity has two aspects. On the one hand, based on patent law, the patent (being a right granted by an official authority) is considered valid as long as it is not revoked or declared invalid by a competent authority (patent office or appropriate court). On the other hand, users may assume that the right granted by the patent office should hold on all possible challenges through different (court) instances. This presumption (or lack thereof) is mainly made based on the interpretation of statistics.

In theory, when analysing a patent application, the examiner should identify and consider all prior art in whatever language created and wherever published or made available to the public. Understanding that this challenge is not feasible in practice, the system has built in a set of checks and balances. For instance, some patent offices allow any third party to file an opposition (eg, the EPO against a European patent and the German Patent and Trademark Office against a German patent, in both cases only during the nine-month period from the publication of notice that the patent has been granted). Parties can also file nullity actions in, for example, the bifurcation system in Germany and isolated revocation actions in the United Kingdom. Finally, some countries offer an invalidity defence; although this may not lead to the patent being revoked, the judge can reject the infringement action if he or she finds the patent invalid.

Interpreting invalidity rates

Since the 1970s, academics have analysed the success rate with regard to invalidating patents. In particular, some have focused on court decisions in Germany, where the question of whether the patent should have been granted in the first place (validity) is treated separately (before the Federal Patent Court) from the question of whether the invention is used (eg, because the product in suit is said to incorporate the patented technology

without the producer having assured a licence, a question which is heard before the district court). For instance, Hess, Müller-Story and Wintermeier – analysing revocation cases from 2010 to 2013 in Germany dealing with German patents and German parts of European patents – concluded that 44% of the first-instance cases resulted in full revocation and 35% in partial revocation.

At first glance these seemingly high invalidity percentages have led to the conclusions defended by, among others, Henkel and Zischka that:

- there is a problem in the patent system – “most patents are invalid”; and
- in order to solve that problem, patent offices should raise significantly (and courts slightly) the standard of the so-called ‘inventive step’.

In other words, patent offices should be notably stricter when examining whether the new invention is not obvious to the expert in the field at the time the patent protection was requested.

But are these conclusions the right ones? Let us examine what can be derived from the available statistics on invalidity rates.

Are most patents invalid?

The conclusion that there is a problem that needs to be addressed, which is that many patents are latently invalid, somehow seems to assume that partially and fully invalid patents have equal negative effects. Many authors do not even distinguish between fully invalidated and partially invalidated patents when scrutinising invalidity cases. At first glance (with the exception of France), invalidity rates around the globe seem to be quite high.

Understanding the framework of the data is essential in order to draw the right conclusions. For instance, assuming that fully invalidated patents have the same negative impact as partially invalidated patents would lead to an incorrect outcome. After all, 44% (fully invalidated patents in Germany) is around half of ‘almost 80%’ (resulting from adding 44% to the percentage of partially invalidated patents – that is, 35%).

However, a partially invalid patent means that the court has partially confirmed the validity of the patent for the amended scope (ie, for the maintained claims, whereas another part has been invalidated). This cannot be compared with fully invalidated patents, which should never have been granted. As the German Federal Patent Court pointed out, partially invalidated cases

TABLE 1. Invalidity rates around the world

Author	Period	Country	Fully invalidated	Partially invalidated	Maintained
Hess <i>et seq</i>	2010-2013	Germany	43.62%	35.46%	20.92%
Jensen/Weatherall	1997-2003	Australia	41%	21%	38%
Oyama	2002-2011	Japan	79.3%*	4.1%	16.6%
Helmers/McDonagh	2000-2008	United Kingdom	33.85%**		66.15%
Véron	2000-2009	France	27%		73%
Mann/Underweiser	2003-2009	United States	59.8%		40.2%

* Oyama justifies this high rate due to the fact that Japanese courts do not require a heightened standard of proof for patent invalidation in infringement suits

** Revoked patents’ average (42% in revocation and 25.7% in infringement cases)

TABLE 2. Germany 2015 – validity challenged before court (217 cases)*

Federal Patent Court	Fully invalidated	Partially (in)validated	Maintained	Other (settlement, complaint withdrawal etc)
	16% (34)	19% (42)	8% (17)	57% (124)

*The 217 cases include the revocation cases which are related to infringement cases as well as those not tied to any infringement case

imply “frequently, only minor restrictions to one or more patent claims”, not necessarily entailing an economic disadvantage for the patent holder. Quite the opposite, a partially (in)validated patent may even be more valuable than it was before, since it is then stronger (confirmed not only by the patent office, but also by the court); and it may even target the infringing product (it being easier to prove infringement and less likely to find prior art). This may be the main reason why patent holders decide in most cases to renew the patents which have been partially (in)validated, despite the high renewal fees.

Subsequently, we should evaluate the rates of fully invalidated patents. At first glance, these figures (44% in Germany) still appear high, especially considering that these patents should not have been granted in the first place. However, these numbers also need to be put into context:

- According to Kühnen and Claessen, in approximately 50% of the cases in Germany where one party accuses the other of infringing its patent, validity is not even contested. Since the alleged infringer has a high motivation to invalidate the patent, the logical conclusion is that it did not even try because it could find no relevant prior art.
- Of the 50% of cases in which validity is challenged, in around half (54% in Germany between 2000 and 2012, according to Henkel and Zischka) the parties settle before the court decision. In the United Kingdom, according to Helmers and McDonagh, half of all cases do not lead to a final judgment 75% of the time because there is a settlement between the parties. Settlement can occur on different grounds. For example, it may be the case that none of the parties sees a clear chance to win, or that one or both parties have used litigation as a tool to put the other party under pressure in the licensing negotiation by creating a risk – through a cease and desist order or damage fee payment – and then withdraws the case once the licensing agreement is signed. Another possibility is that the alleged infringer finds prior art and the patent holder is encouraged to settle or refrain from filing suit. However, according to Hüttermann, the latter occurs in a maximum of 20% of cases only. These scenarios show that a settlement is by no means an indicator of poor-quality patents.
- According to Hess *et al*, in almost two-thirds of the cases where the Federal Court of Justice (appeal court and last instance) did not follow the first-instance decision, it decided in favour of the patent holder.

The Federal Patent Court 2014 annual report shows that an average of 1,200 patent infringements are filed in Germany annually. According to the statistics above, this would mean that validity would be challenged in around 600 cases (Kühnen and Claessen), of which 276 would end in judgment (Henkel and Zischka). Of those 276 first-instance decisions, patents would be fully invalidated in 121 cases, partially (in)validated in 96 and maintained in 58 (Hess *et al*).

As per figures published by the Patent and Trademark Office for 2015 (BIPMZ 2016), validity was challenged at the Federal Patent Court in only 217 cases. This includes revocation cases which are related to infringement cases (eg, filed in response to an infringement case) and those not tied to any infringement case (eg, where the claimant alleges that the patent holder has stolen its invention). Of those cases, in only 34 did the court conclude that the patent should not have been granted (full invalidation). In 42 cases the court partially (in)validated the patent and in 17 cases it dismissed the invalidity request (ie, the patent was maintained without any amendment). In the other cases (127), there was no court decision, mainly because the complaint was withdrawn or the parties settled.

This author knows of no statistics showing how many of the cases in which validity was challenged at the Federal Patent Court were tied to infringement. However, it is reasonable to assume that most were motivated by a pending, past or expected infringement action in Germany or elsewhere (whether in Europe or not). This is because an invalidity challenge is the defence in an infringement action. Moreover, compared to an opposition, a German nullity action can provide a significant risk of costs, as the losing party must bear the other party’s costs (essentially, attorneys’ fees and court fees, both according to a given table based on the value of dispute) if it loses. Thus, the filing of a nullity action is usually supported by a particularly strong business case. It is therefore unlikely that a nullity action would be filed unless it were tied to infringement. In conclusion (and assuming that the quality of all revocation actions is equal, independent of whether they are tied to infringement), a challenged patent was fully invalidated by the court (in first instance) in less than 2.8% of the (average yearly 1,200) infringement cases in 2015. The percentage is even lower if second-instance decisions are considered.

The courts are not the only forum in which patents can be challenged. They can be opposed up to nine months after publication of the grant of a European patent (or a German patent). If opposed, a patent may be revoked by the patent office. In Germany, parties are entitled to request the Federal Patent Court to invalidate a patent only after the opposition period is over or opposition proceedings are finally concluded. Therefore, the 2.8% does not include infringement cases where patents are in opposition proceedings. According

“The Federal Patent Court 2014 annual report shows that an average of 1,200 patent infringements are filed in Germany annually”

to *Cremers et al*, only 44.3% of infringement cases from 2000 to 2008 ended with parallel invalidity proceedings or oppositions, and of those only 31.6% of validity challenges were oppositions. Applying these figures, this would imply that 532 patents for 2015 (44.3% of 1,200) ended in court and opposition proceedings, and 168 of those (31.6% of 532) in oppositions. According to statistics from the European Patent Office (EPO), in 2015 barely 31% of opposed patents were fully revoked (and only 4.4% of granted patents were opposed in the first place); in 38% of cases the patent was upheld with amendments, while in 31% the opposition was rejected (ie, the patent was maintained without amendments).

Applying the same opposition invalidation rates (which have not varied much over the last few years), we would come to 31% of 168 patents (ie, 52 patents) being revoked in opposition. However, it remains to be seen whether the revocation rate of patents opposed which were part of infringement proceedings is higher or lower than 31% or similar to this figure. In any case, this preliminary 4.3% (full) invalidation rate in opposition out of 1,200 infringement cases is far from alarming.

Should patent offices or courts raise standards for inventive step?

Although the percentage of patents that are declared fully or partially invalid by a court and opposition is low, the question remains as to whether there is a mismatch between the patent offices and the courts, and whether it is advisable that either one or both of them should change their way of working.

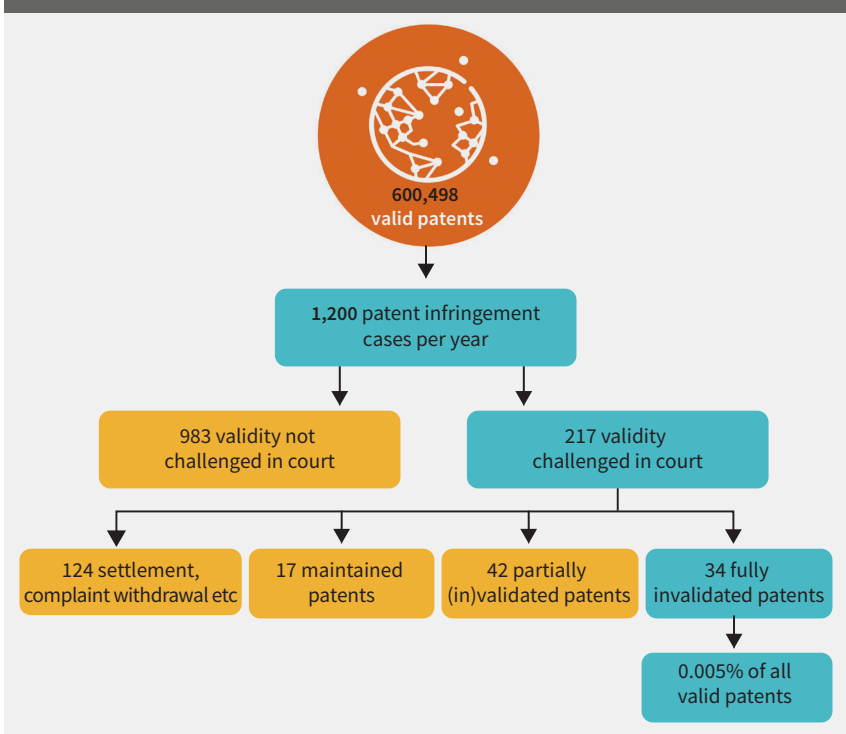
The reasons for invalidity include the following.

Prior art

Among other things, an invention needs to be 'new' (novel over the prior art) in order to be patented. In general, prior art – according to patent law – is anything that has been made available to the public before a patent's filing or priority date. This applies not only to published patent applications, printed documents such as books or scientific articles and internet publications, but also to oral disclosures such as presentations or speeches at a conference. If the complete combination of features in a claim is disclosed in such prior art, the subject matter of this claim is considered not new. As a result, the invention may lack novelty. Prior art also applies in the context of inventive step, as the claimed features can be rendered obvious considering the prior art. As a consequence, the applicant or rights holder will not obtain (or, if granted, will lose) a patent for that invention.

In practice, an alleged infringer which is highly motivated to challenge the validity of the patent in question may find and present to the court (or in opposition) prior art that the examiner missed in the evaluation. This is not *per se* an indicator of bad-quality work performed by the patent office, as the examiner in question has only a limited amount of time to spend searching for prior art. In litigation it is not unusual for a team of searchers, technical experts, patent attorneys and lawyers working for the alleged infringer to spend significantly more time than a patent office examiner can afford to find relevant prior art. For this reason, it is unsurprising that, according to *Hess et al*, patents in Germany lose (totally or partially) their validity due to unavailable or unconsidered prior art in around 20% of cases.

FIGURE 1. Germany 2015



Data on patent protection in Germany and invalidity rates at the Federal Patent Court (BIPMZ 2016). The 217 cases also include cases not tied to patent infringement cases.

Inventive step

Inventiveness is considered to be a tricky question – that is, no matter which approach is applied, the result should ideally be the same provided that the same facts (prior art) are present, although it has been argued that patent offices and courts apply different standards when examining whether the patent is obvious to the so-called 'skilled person'. This is difficult to measure as it would, for example, require that different bodies judge an inventive step differently based on the same prior art. However, as explained above, in invalidity proceedings new prior art can be brought up. This can be used to determine not only novelty, but also inventive step.

On the other hand, determining inventive step is a value judgement, which takes into account the capabilities of a skilled person in the field and his or her interpretation of the prior art disclosure. In other words, when a court determines whether an invention is inventive (ie, not obvious) and whether the patent holder deserves a patent which a patent office granted in, for example, 2005 based on a patent application filed in 2001, it must first put itself in the shoes of a person specialised in that field and make the following reflection: what is the knowledge that I had in 2001 regarding this technological area and would I consider this invention obvious in 2001 in view of that knowledge and the prior art disclosure? Such a skilled person is not even an actual expert whom judges can interview or whose expertise they can assess based on past papers published at that time, but rather an artificial figure which is supposed to represent the average engineer or scientist in the respective field. This valuation may yield different results, depending on which capabilities one

assigns to a skilled person; one judge can easily have a different perception from another of what an expert in the field would have known at a certain point in time and some judges consider that a skilled person is more creative than others.

In many cases the EPO and its boards of appeal (which are integrated, but independent of it) apply the problem and solution in order to assess inventive step in an objective and predictable manner. This involves three main stages:

- determining the closest prior art;
- establishing the objective technical problem to be solved; and
- considering whether the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to a skilled person.

There is no agreement between academia on which approach (ie, the value judgement often used by German courts or the problem and solution approach applied by the EPO) provides the most accurate results. However, the fact that there is a divergence between courts and the EPO on how to apply the inventive step requirement may explain that, according to Hess *et al*, over 52% of (full or partial) invalidity cases result from lack of an inventive step.

Lack of enablement, inadmissible extension and miscellaneous (eg, declarations of invalidity for lack of defence)

These reasons, which include the working errors of patent examiners, do not seem sufficiently significant to make any assessment of the patent offices, as according to Hess *et al* they appear in only around 2% (lack of enablement), 11% (inadmissible extension) and 12% (miscellaneous) of all fully and partially invalidated cases.

What can be done to reduce invalidity rates further?

As we have seen, the most common reasons for invalidity are the identification of prior art (20%) and lack of inventive step (52%).

In order to find prior art in the examination process at the patent office instead of later on in court, it does not appear advisable to extend the time for prior art search. Calling for a longer prosecution time (for search and examination) at the patent office might negatively affect the time to grant. As explained above, the longer the uncertainty when the patent is not granted, the higher the negative impact for companies (in particular for start-ups). Moreover, it is doubtful whether patent users would be willing to bear the economic consequences of an increase in the fees for longer patent examination. This again would be especially harmful for SMEs and start-ups with a limited budget.

TABLE 3. Decisions in opposition cases (opposed 4.4% of all granted patents)

	Patent revoked	Patent upheld in amended form	Opposition rejected
2015	31%	38%	31%
2014	30%	39%	31%

The EPO was recently judged to be the office which delivers the highest patent quality worldwide (*IAM* survey 2016). Some measures applied by the EPO to maintain and increase patent quality include the following.

Highly qualified examiners

The EPO has successfully attracted engineers and scientists with extensive education qualifications, who speak three or more languages and are experienced in the field of technology they examine. This high degree of specialisation makes examiners more aware of definition issues and more efficient in finding prior art. Some of the reasons for the EPO's success in attracting and retaining such personnel include comfortable salaries, multicultural environment, flexible working time and good social packages. Although some recent changes at the EPO have caused discomfort among some staff members, leading to several strikes, the EPO still enjoys a very low staff turnover – 3.7% in 2015, with the primary reason for ending active service being retirement. This implies that investments in training stay in-house and expertise matures and concentrates over time.

Intensive training for examiners

During their three to four years, examiners mainly train on the job – that is, they perform regular work while receiving some extra theoretical training. One of the main reasons for this is the relevance of teaching the best strategy to select the precise scope of the search. Examiners learn where, what and how to search in order to retrieve the best prior art in the shortest time possible. There is also a strong focus on legal training, to teach examiners to correctly apply the European Patent Convention (EPC). Individual mistakes, quality management observations and input from the auditing department are registered on a regular basis and used for training programmes. Moreover, the EPO has incorporated e-training, which examiners are required to complete in addition to their regular training.

Quality management system

This includes a list of items that examiners need to check when examining a patent. This way the management process is followed without forgetting any relevant step.

Quality audit department

The Directorate Quality Audit at the EPO audits randomly selected searches and grants across all technical areas. This allows the EPO to retrieve the case, if a correction is necessary, before sending notification to the applicant. The quality audit department also evaluates whether the EPO is complying with International Organisation for Standardisation (ISO) procedures.

Three-member examining and opposition divisions

Each patent is evaluated by three examiners: first examiner, second examiner and chairman. The first examiner is in charge of the main examination, while the other two review the examination. For more complex legal cases, a division may be extended by a fourth (legal) member.

Directors accountable for quality

The necessary checks allow the directors to stay constantly aware of areas where extra support is needed.

Action plan



- Given that there is still no Unified Patent Court system in Europe, we must rely on individual courts in order to find more predictability. Therefore, it is wise that judges not only exchange views among themselves (which they regularly do), but also actively include the boards of appeal in their discussions. Patent offices should be invited to regular and intensive debates with patent courts. In practice, some German courts are quite reluctant to accept positions from the European Patent Office (EPO) Board of Appeal, claiming the need to remain independent. However, independence should be compatible with agreeing with other patent offices on which standards should apply. For instance, courts could adopt the problem-and-solution approach where applicable, or could develop and use a different approach in collaboration with the patent offices, provided that this yields a clear structure resulting in good predictability of the outcome.
- Patent offices should aim for a good selection of examiners, automated and more sophisticated search tools, extensive training, accountability of directors for the review of examinations conducted by their teams, an auditing system and consideration of the results from and close collaboration with other offices.
- The EPO should expand its capabilities with respect to translation machines and sophisticated search engines, and collaborate more closely with other patent offices. This will allow it to cope with the increasing volume of non-European prior art (in particular from Asia), which is likely to arise frequently in nullity proceedings.
- Investors can continue to rely on the high quality of patents, as statistics show that most remain (totally or partially) valid.
- Decision makers must not intervene by limiting the enforcement of patents – for instance, while reviewing the EU Enforcement Directive – without proof of a systemic problem, as patent quality so far is not proven to be low.

Continuous investment in search tools

Automatic pre-searching saves time by narrowing a set of areas or documents where the examiner should focus his or her search. In other words, it recommends a limited set of ranked prior art documents to the examiner, while leaving full control with him or her.

EPOQUE is a tool which allows examiners to search the EPO databases according to certain parameters, priorities, document citations and keywords. EPOQUE contains more than 90 million patent documents relating to inventions and technological advances, and is used by patent offices in over 45 countries worldwide.

ANSERA is a new tool, comparable to Google search in its functionality, which complements EPOQUE. ANSERA uses reference sign relative positions in a drawing and ranks results according to the number of common concepts (or features), as well as according to their occurrences in the full text. It finds similar searches based on selected text of a patent application.

Industry outreach

The EPO maintains strong outreach to industry and in particular drafters, in order to enhance the quality of applications. Examples include the Search Matters and Examination Matters events.

ISO certification

The EPO has obtained ISO 9001 certification, which certifies the patent process – from filing to grant and publication, including opposition, limitation or revocation.

Engagement with other patent offices

The EPO takes into account the results of other offices and for some years has been working closely within the IP5 initiative, which also includes the Japanese Patent Office, the Korean Intellectual Property Office, China's State Intellectual Property Office and the US Patent and Trademark Office.

Such close dialogue is increasingly needed as the major challenge becomes identifying the prior art in non-European languages, in particular Asian languages. The EPO reports that its examiners read around 500,000 Korean patents, 1.5 million Chinese patents and 4.5 million-plus Japanese patents annually. Currently, the EPO databases include over 35 million Asian patent documents. Still, the main challenge is non-patent Asian prior art. For this, highly sophisticated translation tools (which provide more than just a general understanding of the text) will be required, as judgements about the technical disclosure of a document depend on the details. The EPO seems to have recognised this challenge and has included mandatory training for all examiners on Asian documentation, the latest tools, search tips and tricks. Nonetheless, search tools will need to be updated to quickly identify patent and also non-patent Asian literature. Machine translation must also continue to mature to allow for not only a cursory overview (complemented by human translation of short passages), but also a correct translation of whole papers (to identify prior art in time).

Quality of patents not at risk

A careful evaluation of statistics on invalidity rates and the relevant factors at play would suggest that there is no problem with poor-quality patents in Europe. In fact, statistics indicate the opposite.

“The EPO reports that its examiners read around 500,000 Korean patents, 1.5 million Chinese patents and 4.5 million-plus Japanese patents annually”

In fewer than 2.8% of the (average yearly 1,200) infringement cases in Germany in 2015, the patents should not have been granted in first place (ie, these patents were declared fully invalid by the first-instance court). Put another way, this is 34 patents (fully) invalidated in 2015 out of 600,498 valid patents – or 0.005% of all valid patents in Germany in 2015. This percentage is extremely low, especially considering that anyone can file a nullity action in Germany during the patent's term, even once the opposition period has expired. The percentage of fully invalidated patents is even lower when second-instance decisions are considered.

Although it has been pointed out that a partially invalidated patent does not necessarily imply weakness (on the contrary, the patent may even be more valuable than it was previously), one could be highly critical and conclude that half of the patents were no longer robust after partial invalidation. However, this would lead only to an additional 1.75% (of 1,200) patents (ie, 0.003% of all valid patents in Germany) being added to the 2.8% mentioned above.

Although the results of opposition cases involving patents used in infringement cases still need to be analysed, the figures are expected to be very low (an estimate of 52 fully revoked patents in opposition

can be derived from applying some academic research and EPO statistics for 2015). This would amount to barely 0.008% of all valid patents. Looking at 2015, only 4.4% of granted patents were opposed, of which 31% of were fully revoked. Moreover, although 82,461 patents were granted in Germany (67,666 European patents were granted by the EPO in 2015 and validated in Germany and 14,795 German patents granted by the German Patent and Trademark Office) only 34 patents were fully invalidated. This is just 0.04% fully invalidated patents and 0.05% partially invalidated (42) patents.

These figures support the argument of robust patents in our system. While the positive trend will have global benefits, it will be particularly valuable for Europe as it prepares for the Digital Single Market, which will require an estimated \$4 trillion in R&D and capital expenditure by 2020. Europe is set to grow more competitive as companies are able to share their results of R&D investments, relying on robust patents and a strong patent system in exchange for a return on investment. **iam**

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