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Using patent valuation methods to assess damages in patent infringement cases under the Unified Patent Court

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ABSTRACT

We illustrate how publicly sanctioned IP valuation guidelines prevailing in Europe can be applied to assess damages as foreseen under the provisions of the UPC Agreement. With the help of a hypothetical example, we then evaluate if and to what extent the various ways proposed by European institutions to value IP fit with the provisions of the UPCA. We find that in situations where courts have all the necessary information required to determine damages, the IP valuation methods are a very useful tool in determining damages. It can however be expensive to obtain the necessary data to adequately determine damages.

1. Introduction

1.1. The UPC is a game changer where damages need to be correctly assessed

With the introduction of the Unified Patent Court (UPC), European Intellectual Property (IP) will no longer lack teeth. Rightholders will be in a position to enforce their rights in a multitude of countries in a swift and uncomplicated manner, leading thus to major efficiencies gains in the European patent system. Assuring an adequate assessment of damages will thus be an important element of Europe's newly evolving litigation environment. If indemnification is too high, then the rightholder will have an incentive to litigate rather than exercise the technology or license it on a reasonable rate. If to the contrary, indemnification is too low, this will not dissuade infringing conduct [1]. Remedies would not be attributed in an equitable manner, making thus one party to the dispute systematically better off than the other. This situation is unsatisfactory and illustrates the importance of coming to grips with the adequate calculation of damages.

To assure quality of the enforcement system, this paper illustrates how existing IP valuation methods sanctioned by the EU itself or by its Member States can be applied to the principles of damage awards set forth under the Agreement on a Unified Patent Court ("UPCA"). In doing so, our paper is the first of its kind to have pulled together the host of different publicly sanctioned IP valuation approaches and rationales available in the EU and illustrate how these can be used as tools to assess damages under the UPC.

2. IP valuation in a European context

The need to provide better guidelines on how to value IP has been recognized with reference to Europe's innovation strategy 2020 [2], Europe's Single Market Act (II) [3] and the industrial policy communication update of the European Commission [4].

Against this background, various European National Patent Offices, the European Patent Office as well as the European Commission have sought to provide better insights on how to value IP. Equally, standardization organizations have issued standards on IP valuation. The UK Intellectual Property Office for example recommends the use of the cost, income and market method. In doing so, it stresses that the income method is the most insightful method to value IP. That is because it is a dynamic method that allows to

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establish a relationship between the future revenues generated by IP and risk rates associated with doing so. As to the cost and market method, the UKIPO offers a series of checklists that help firms establish either the historic costs or the replacement costs of their IP [5]. Equally, the Hungarian Patent Office offers insights on how to value IP. Like the UKIPO it stresses that the income method is the most reliable method to determine the value of IP. It even defines the value of IP through the lens of the income method as 'the ability of patented technology to generate future income.' To do so, it is necessary to estimate the useful life of the IP and consider IP specific risk factors. Furthermore, one needs to consider the availability of data and the purpose of the IP valuation [6]. The Danish Patent and Trademark Office likewise recognizes the market, cost and income method as the three core principles of IP valuation and makes just like the UKIPO and Hungarian Patent Office clear that the income method is the most reliable method for determining the value of IP; primarily because it allows to focus on the future economic benefits deriving from IP rights [7].

The European Patent Office again offers with 'IP Score' an entire IP valuation guide which allows to determine the value of IP online. 'IP Score' can be accessed online for free. Accompanied by a booklet fleshing out the rationale for IP valuation under the IP Score, it is probably the most comprehensive publicly sanctioned IP valuation instrument in Europe. IP Score offers not only a comprehensive checklist that helps to grasp the value of IP, but also explains in great detail how to value IP with reference to the cost, income and market method. Commensurate with the findings of the national Patent Offices, the EPO argues that the income method is the most reliable method for determining the value of IP [8].

Based on IP Score the European Commission has issued a manual on IP valuation, the 'IP4Inno Students' Handbook,' which discusses in great detail the nature of IP valuation [9]. Lastly, the European Commission launched an expert consultation to assess the various types of IP valuation available. Equally, the E.C. expert report found that the income method and the various sub methods it comprises is the most 'widely used and most relevant' method for valuing IP [10]. An overview of the various public initiatives to value IP can be found in the table below.

The emphasis on the income, cost and market approach as instruments of IP valuation is also reflected in the academic literature on which publicly sanctioned IP valuation guidelines rely on. The Role of IP valuation has furthermore been reflected in sector specific contexts. In the context of Nanotechnology it is for example cautioned that patent landscapes, which can constitute a technical element in an IP valuation could lead to the overvaluation of IP. The article looks however at a forward looking technology field where patents may not even be in use yet. This is different from assessing the value of patents in litigation, where there has obviously been a usage of the IP and it can be associated with a cash flow. Equally, the work of Grid Thoma is of moderate importance to the point made in our article. Renewal fees, alongside forward citations, which Thoma ignores, have been frequently cited as a means to circumscribe patent value. The shortcoming of this easily found information is that it says fairly little about how the IP is being applied, which is of relevance in the context of an IP valuation undertaken for litigation purposes. I is only the cost, market and income method that allows to portray value in a dynamic manner. Hence, the studies of Gorden and Parr as well as Dubiansky are of greater relevance to the issues discussed here. The World Intellectual Property Office again offers a very helpful overview of work undertaken by key authors in the field and these equally suggest the cost, market and income method are the 'standard' for IP valuation [11].

With respect to patent portfolio valuation, it can be quite challenging to assess each single patent in a portfolio with respect to its cost, market and income value. To overcome this challenge OxFirst uses proprietary methods, which cannot be publicly disclosed, but equally here, the cost, market and income method apply.

Standard setting organizations have also sought to establish a practice of IP valuation in Europe. Most importantly, the German Institute for Standardization (DIN) has a standard on IP valuation 'DIN 77100' which was issued in 2010 and sets out the general principles on patent valuation. Also, here the IP valuation is hinged on the cost, market and income method, whereby the income method is seen as the most important instrument to determine the value of IP [12]. This is echoed in the Austrian Standard 'A 6801 – Method for Patent Valuation', which by and large reflects the German standard and hence also considers the income method as the most important instrument for IP valuation [13]. In the area of brand/trademark valuation, the British Standards Institution (BSI) offers a standard on brand valuation, BS ISO 10668:2010 [14]. More general reference to the valuation of intangibles is made by the Institute of German Controller (IDW) and the international standard for the valuation of intangible assets [15]. At the international level, there is equally a standard for the valuation of intangibles available [16] (Table 1).

A review of these host of sources shows that there is a convergence of opinions that valuing IP is feasible with reference to the income, cost and market method and that the income method and the various sub methods it comprises is the most insightful method. Furthermore we observed that the principles upon which damage awards are to be based upon determine the scope of the IP valuation. That is, one needs to carefully decide which method to select.

2.1. Income method

> *'The income approach is a method to value patents and their corresponding royalty rates based on the net present value of the future income stream generated by those patents.'* [17]

The income approach assumes that the value of a patent is based on the future returns that are expected to be generated by that patent. Because future returns are uncertain and depend not only on the economic life of the patent, but also on expected future cash flows, the future returns of a patent are worth less than the returns a patent can generate in the immediate time. Therefore future revenue streams must be discounted so to determine the net present value of potential future revenue streams. The income approach generates a metric that seeks to offer an estimate of potential future revenue streams that a patent may generate throughout the period of time that protection is granted. Thus the income approach offers an indication of today's value of tomorrow's additional revenues generated by a patent. The income approach is the most commonly used approach by economists, financial analysts, accountants, appraisers, courts and regulators. The income approach is used not only to value patents, but also to value other assets, thus, the nature of the asset does not alter the methods for valuing an asset [18].

While the mathematics of the method are quite straight forward, it is crucial to determine the right discount rate and to pull together the necessary contextual information to construct adequate revenue streams over the useful life of the patent. Contrary to the market and cost approach the income approach allows the incorporation of risk in the model. Yet, also this method has its shortcomings. The income approach does not allow to capture the value of those patents that have an indirect impact on a firm's cash flow. Patents are often composite assets and value is realized in combination with other assets. For example, patents often provide a firm exclusivity in the relevant market and/or the freedom to

Table 1
Overview of publicly sanctioned IP valuation methods.

Source	Definition from the source	Explanation	Factors	Limitations	Comments
UK Intellectual Property Office	The stage of development of the IPR, the availability of information and the aim of the valuation all have a bearing on the method used.	Focuses on the revenue IP rights may generate for your business in the future.	• the strength of the IPR • the size of the potential market • the nature of the competition • changes in the economic climate • the cost of registering, enforcing and defending the IPR need to be taken into account.	• it is difficult to estimate the economic life of the IPR • it is difficult to estimate the income over several years	No mention of Cash Flow as the nominator
Hungarian Patent Office As well as Danish Patent Office	IP value is the ability of technology to generate future Income	Measure IP value thorough measuring the potential future benefits of the subject IP	Potential future revenue from IP (Cash Flow) Discount factors include: Risk factor Time value of money	Estimation of IP useful life Difficult to estimate IP-specific risk factor	Consider the availability of data, and the purpose of the valuation
European Patent Office/ IP Score - Ip4inno Student's Handbook	Income-based approaches seek to consider the value that is actually being realized by a business as a result of its ownership of the IP.	Discounted Cash Flow Determine the value of the IP by computing the present value of future cash flows from the IP, over its useful life.	Key Factors of Discounted Cash Flow (DCF): time value of money and riskiness of the forecasted cash flows	All risks are lumped together and are assumed to be appropriately adjusted for in the discount rate and the probabilities of success	"DCF is the most fundamental and widespread method"
European Commission (Final Report from the Expert Group on IP Valuation)		Methods under income-based approach - royalty savings method - premium profits method, sometimes referred to as incremental income method - excess earnings method.	Discount Rate can be determined by: Weighted Average Cost of Capital (if the IP has similar risk profit to the business)	Assume the future use of IP. The value can only be an estimate. Need for more transparency in IP markets	"Income based methods are the most relevant and widely used methods for valuing IP."

operate; these competitive advantages are however not associated with direct revenue streams.

2.2. The cost method

The cost approach seeks to value patents based on the costs that are associated with the underlying invention and determine their worth based on an estimate of how much it would cost to replace them with a new patented technology rather than use the existing one. The cost method looks at historic costs and therefore avoids speculation. It is most commonly used for accounting purposes. However, as a valuation method, the cost approach has a couple of shortcomings. The value of a patent is more than the sum of its parts. In the absence of adequate ways to invent around the patent, thus in the absence of determining opportunity costs, the backward looking nature of the historic cost approach may not allow to capture the full value an existing patent has to a given business.

The cost method tends to be a much more conservative method of determining value and involves determining either the replacement cost of the portfolio or, as patents are by definition irreplaceable, either the initial cost of creating the portfolio or the cost of engineering around it. Here the value was determined by considering the cost of creating it as the total investment in cash or deferred costs and subtracting the value of current physical and financial assets and any amortization. Further, the cost method is inflexible to the level of infringement, as it is unaffected by the extent of the infringement.

Also, innovation is spontaneous by character. The amount of resources spent on creating a patentable invention may not necessarily be in a linear correlation to the output produced. While one can easily determine the costs of chopping wood by factoring in the amount of time a wood chopper needs to chop it, the relationship between outcome and input is far less obvious in the context of creating new insights on existing processes. Sometimes, thought-breaking technologies are created by coincidence. The discovery of penicillin was a mere coincidence.

Innovation can also be the result of some unplanned side effects. When 3M introduced 'post its' the product was developed based on a glue that did not stick. However, the original research of the firm was aimed at developing exactly the opposite! Current accounting principles reflect partially these anomalies by asking firms to write off R&D costs as expenses immediately as they occur, rather than consider them as an investment. While this rationale makes innovative companies appear less attractive on the balance sheet, it avoids any speculation on the balance sheet and assures that the information provided is accurate. The cost method has been discussed as one of the three methods for valuing IP for various use cases by the IP Valuation expert group of the European Commission [19]. This expert group comprised the key figures in IP valuation in the E.U. and is hence a strong indication that those firms are likely to apply the cost method, alongside the market and income method in practice. A short review of online sources on IP valuation equally suggests that the cost method is cited as one of the three methods for valuing IP [20]. Last but not least, the international bureau of the World Intellectual Property Organization assembled key sources on IP valuation. We checked the website it maintains and all of the sources it refers to on IP valuation mention the cost method, alongside the market income method as the three ways of IP valuation. Those sources that did not mention the cost method did not address IP valuation per se, but discussed more the broader picture of technology commercialization [21].

2.3. Market method

The market approach determines value by using a benchmark approach, assuming that the market is best to judge the value of a given patented technology. The catch is however that a benchmark approach towards patent valuation stands in strong opposition to

the very criteria of patentability, which ask that a patent must be novel and non-obvious to a person skilled in the art. A benchmark may also tell little about the value a given patent has in a specific firm context. Because the value of patents depends on the context in which they are used, the business strategy, a simplistic 'one size fits all' benchmark helps not necessarily understand the value a patent may have in a given business context. Finally, markets for patents are opaque, inactive and underdeveloped. Not only are adequate trading platforms for patents just about to evolve, but also are details of licensing arrangements at most instances kept confidential.

2.4. Determining portfolio value from weighted average of methodologies

To reflect the strength and weaknesses of each method, in practice a weighted average of the different methodologies is often undertaken. The income method is considered throughout the publicly sanctioned IP valuation methods as well as the academic literature as the most reliable valuation method. In the context of assessing damages under the UPC it is also only the income method that allows for the counterfactual assessment that the law requires. This is why it can be weighted most heavily. The cost method on the other side only brings a floor value based on objective accounting information and hence tends to be underweighted in multi method approaches. The market method again is not very granular in that for business competitive reasons the details of these transactions are generally not made public, except for public companies where some details can be inferred from reports to regulators. As a result, it tends to be a reflection of the average value of a patent (or family) and of course not all patents are equal. Hence it also tends to be weighted moderately.

Using different approaches is a way to use as much information as possible. The errors of each approach do not cancel each other out when looking at the average, but the weighting can minimize them and can produce a more accurate result than any of the individual approach taken separately. This is the same as portfolio diversification: Holding different assets minimizes the idiosyncratic risk. Standard econometrics tell us that the optimal weights given to each estimate depend on their volatility. This weighting is the best, in the sense that it minimizes the variance of the result. The most precise estimates, with the smallest variance, are the most informative, and should be given more weight. Of course it is almost impossible to know the exact variance of each estimate and derive the exact weights to use. Nevertheless, if we have a good reason to believe that one estimate is more precise or plausible than another, this implies that we must give it a higher weight because we trust it more.

3. Assessing damages under the UPCA

The UPCA [22] covers 25 countries, all of which are in the EU, and its interpretation is bound by EU law, cf. UPCA article 20. Ignoring for now the fundamental principles of EU law, this in particular means that the UPCA's damages provisions have to be interpreted in accordance with the Intellectual Property Rights Enforcement Directive, Directive 2004/48/EC (IPRED) [23]. Of main relevance in the IPRED is article 13, of which the UPCA's article 68 is close to a facsimile. However, it is also relevant to point out Article 3, which states several principles such as the principle of proportionality, i.e. that the legal remedies to infringement should be proportionate to the harm caused, and the Directive's Recital 26, which, amongst others, posits that damages should be calculated based on objective criteria.

According to section 1 of article 68, damages are always due if the infringer has known, or had reasonable grounds to know, that he infringed the rightholder's patent. Further, damages should be appropriate to the harm actually suffered by the rightholder because of the infringement, thereby echoing the principle of proportionality.

Section 2, which is a new addition compared to the IPRED, states:

> *The injured party shall, to the extent possible, be placed in the position it would have been in if no infringement had taken place. The infringer shall not benefit from the infringement. However, damages shall not be punitive.*

The first sentence brings to mind the general principle of compensation, i.e. that damages should be re-establishing for the rightholder. The second sentence brings to mind the general principle of deterrence, i.e. that damages should be dissuasive for the Infringer, which is explicitly mentioned in article 3 (2) of the IPRD, although focus is limited to the Infringer's *benefit* from the infringement in question. Benefit should be interpreted as encompassing more than merely the Infringers unfair profits. As unfair profits are explicitly accounted for in section 3(a) of article 68 of the UPCA.

It does not seem that either one of the principles is intended to reign supreme, rather it would seem that damages should be allowed to go somewhat above the rightholders loss (section 1 states that damages shall be *appropriate* to the harm actually suffered by the rightholder), but that they cannot go too high above. In fact, the last sentence of section 2 states that damages cannot be punitive. Punitive damages are currently not defined, and national authorities do not agree on an interpretation, but it would seem obvious that damages are only punitive, if they exceed the rightholders loss. This of course gives the Court a fairly wide scope for calculating damages [24].

Section 3 of the UPCA sets out at least four approaches to calculating damages. According to litra a, the court shall set damages by taking into account all appropriate economic and moral aspects. This includes the *rightholder's lost profits, the Infringer's unfair profits, and the moral prejudice* suffered by the rightholder. According to litra b, in appropriate cases, the court may use an alternative, and set damages as a lump sum that is at least equivalent to the *royalties or* fees that would have been due if the Infringer had requested authorization to use the patent in question.

Although the wording of section 3(b) indicates that the rightholder can only get damages based on either her economic and moral loss, and the infringers profits, or a hypothetical license, some European case law does not necessarily support this. In a recent CJEU case, C-99/15 Liffers, it was found that litras (a) and (b) are not alternatives, but methods to be applied together in order to identify the full actual prejudice (loss) that the rightholder has suffered [25]. Thereby, the Court can take into account negative consequences, such as the rightholder's economic loss, the moral prejudice suffered by the rightholder or the Infringer's unfair profits. But it can also determine a lump sum based on at least a hypothetical license.

3.1. The rightholder's economic loss

Central to determining the rigtholder's loss is the principle of compensation. Such loss is focused on the economic loss in value that the rightholder has suffered due to the infringement. The analysis to be applied is counterfactual, as Article 68(2) of the UPCA asks the Court to place the rightholder in the position, she would have been in, if not for the infringement.

At the core for the rigtholder's economic loss are her direct

losses, or loss of profits. In theory, this is fairly straight forward if the rightholder and the infringer operate in the same market. However, this apparent simplicity is lost under two common and important modifications: The first is when the rightholder and infringer do not operate in the same market. It is then unclear what one can reasonably say to be the rigtholder's loss, but it seems to hinge on the concrete circumstances. If, for instance, the infringer beat the rightholder to the market, the market might have been lost to the rightholder, and the rightholder has then lost monopoly profits to that market. On the other hand, if the rightholder also licenses her technology, her loss might just be her foregone license fee (which is of course the basis for the hypothetical license discussed below) plus any drop in license fees received from her other licensees who will have experienced competition form the Infringer. The second modification is if the patent only is a minor part of the rightholder's total product. It can be argued that the rightholder should only receive damages for the loss per missed sale that is attributable to the patent.

Other than the direct losses suffered by the rightholder, plenty of indirect losses can also occur. For instance, a decrease in sales resulting from the infringement and the expenses incurred as a result of the infringement, such as a necessary increase in marketing costs; provided that those costs can be directly related to the infringement. These also need to be taken into account when calculating damages.

3.2. Moral prejudice

Under the UPCA, the rightholder is not only compensated for her economic, but also her moral loss. The authors are not aware of case law in which a patent holder has received damages for moral prejudice. But it does not seem completely implausible. In the pharmaceutical sector several pharmaceutical companies have barred their producers from selling certain drugs to be used in lethal injections in capital punishment. If an infringing product reached the market, and was used in lethal injections, the rightholders could arguably demand damages for moral prejudice [26].

Calculating the moral prejudice, however, seems to be – at best – difficult. Of course, it should be possible to identify a loss of goodwill, although this loss would also be covered as a direct economic loss to the rightholder. Therefore, damages for moral prejudice will likely be “calculated” as a lump sum.

3.3. The Infringer's economic gains

Shifting focus to the infringer's economic gains from the infringement, the UPCA also asks the Court to take into account the Infringer's unfair profits. The general principle applied to this measure is that of deterrence, and as stated in article 68(2) of the UPCA, the infringer “*shall not benefit*”. Another advantage of looking at the infringer's profits is that it can be an aid in a damages calculation, where the negative economic consequences of the infringement are difficult to determine; for instance if the infringer operates in a different market than the rightholder. Furthermore, it would seem that not only the direct gains, made by the infringer, should be taken into account, but other, more indirect benefits, can affect the damages calculation, cf. article 68(2) of the UPCA, mentioned above.

3.4. Lump sum damages at least equivalent to a ‘hypothetical license’

Whereas the above approaches have been focused on a counterfactual scenario in which the infringement did not happen, lump sum damages are based on a hypothetical license are based on a counterfactual scenario, in which the parties agreed to the use ex ante.

Lump sum damages are an important part of determining damages for patent infringement, as they allow the rightholder to attain damages even in scenarios where it is difficult to meet the burden of proof for the more conventional methods of calculating damages, mentioned above.

Under the UPCA, the hypothetical license is defined as the royalties or fees which would have been due if the Infringer had requested authorization to use the patent in question. This definition brings to mind a contract fiction, in which it is assumed that the parties have agreed on a price for the usage. Thereby, the court has to find a price in between what the rightholder ex ante would demand and what the infringer ex ante would be willing to pay [27]. In other words the hypothetical license tries to find the value in between the rightholder's expected loss of the infringement and the infringer's expected gains.

This is often easier said than done, especially in situations, where the value to the infringer is lower than to the rightholder. In those circumstances, an agreement would never have been reached.

It is maybe because of these problems that European courts have a tendency to apply market oriented approaches, where it is not asked what the rightholder would demand, and what the infringer would pay, but rather what the rightholder could reasonably demand on the market [28].

Although the market approach does clear up some uncertainties, some are still left behind. For instance what is the relevant market to price on, if infringement happens on another market than the one the rightholder licenses on, and how is the counterfactual scenario played out? Can the rightholder for instance argue, that the infringer would have acted differently, if they had asked for permission prior to the infringement? Also, to what extent are previous licensing transactions of the rightholder adequate to determine the market value? What if the rightholder was able to obtain licensing fees from previous licensors simply because he had leverage over them? Are these then adequate comparable licensing rates?

Finally, the hypothetical license is only a part of lump sum damages, although it is not clear how the lump sum is connected to the hypothetical license. Some European jurisdiction have been known to multiply the hypothetical license with a factor X, either to add a punitive element, or simply to compensate for the chance that the infringer would not have been caught [29]. However, in the Communication from the European Commission on the IPR Enforcement Directive published on the 29th of November 2017, it was once more emphasized that ‘the aim of this provision is not to introduce an obligation to provide for punitive damages.’ (p.3) Equally, the Communication emphasized that ‘Member States are to ensure that both methods as set out under Article 13(1) are reflected in national legislation.’ (p.4) Hence there needs to be scope to assess damages on the basis of all of the principles discussed above [29].

3.5. The legal approach – what is the status now?

Damages under the UPCA are dictated by the general principles of compensation and deterrence. This gives the Court a broad scope for calculating damages, only limited by the fact that they cannot be punitive.

At least four approaches for calculating damages are found. These are: The rightholder’ s economic loss from infringement, the rightholder's moral loss from the infringement, the infringer's unfair profits, and a lump sum based on at least the hypothetical license. These four approaches try to estimate damages from

different perspectives: The loss of value to the rightholder, and the gain of value to the infringer, both from the ex post and ex ante view. Further, article 68 of the UPCA gives concrete guidance as to the core of each approach. For instance, the rightholder's lost profits are at the core of her actual loss, but this does not bar the Court from using the multitude of factors that can affect the economic consequences of infringement.

Thereby, the four approaches in principle allow for a comprehensive analysis of economic consequences of an infringement, and should make it possible to calculate damages in most circumstances. However, we have also shown that the four approaches contain fundamental questions, which need to be answered for a proper understanding of how to calculate damages. Further, even though the UPCA does indicate the different applicable approaches and focal points at the core of these approaches, it does not state any concrete methods for calculating the economic consequences, e.g. the rightholder's lost profits. Such a method for calculating the economic consequences could be the use of publicly sanctioned IP valuation methods.

This article systematically links patent valuation to the calculation of damages for patent infringement and its major contribution to the academic literature is to show how this can be done. In doing so, it reflects an increasing practice in Europe to take advantage of IP valuation methods in a host of use cases, including the determination of damage awards. It also is reflective of the autumn 2017 communication on the IPR Enforcement Directive of the European Commission, as well as its Communication on Standard Essential Patents. The already mentioned E.U.'s expert committee on IP valuation comprised key figures in the European IP valuation landscape and in the group there was a clear consensus that the cost, market and income method are the key methods to value IP [30]. Equally, the UK Intellectual Property Office has published an overview of the UK IP valuation market, assessing in great detail the rationale for valuing the market, the key players in the market. Also this study illustrates that the cost market and income approach are the most widely used methods among the UK IP valuation community [31]. In a recorded talk given during the course of autumn 2017, a senior counsellor in the IP Department of Siemens confirmed that the market, cost and income approach are the key methods used by Siemens in a variety of use cases [32]. Equally, in a recorded talk given by Senior Legal Advisor in the Federal Trade Commission of the United States of America confirmed the key relevance of the cost market and income approach in the valuation of intellectual property [33].

Interestingly, the rationale of the income method was also reflected in the guidelines issued by the European Commission on Standard Essential Patents on the 29th of November 2017: 'Determining the FRAND (fair, reasonable and non-discriminatory) value should require taking into account the present value added of the patented technology … the present value is the value discounted to the time of the conclusion of the license agreement. Allowing for the discounting over time is important against the backdrop of license agreement running over several years in sometimes technologically fast moving environments '[34]. These guidelines will likely become soft law across the E.U. and it is important to note that they rely strongly on the reasoning underlying the discounted cash flow method. In light of this key recommendation given by the European Commission, it remains to be seen if decisions issued in previous European standard essential patent cases, such as the Dutch decision in Philips vs. Archos, will need to be revised as it appears not to be commensurate with the FRAND Guidelines of the European Commission, which indicate preference for the income method as a means to assess the FRAND royalty rate. Even more so, as in the same dispute a German Court refused to issue an injunction against the defendant on procedural grounds associated with the IP valuation received [35].

The valuation methods generally fit with the legal approach described, as they either seek to identify the value lost by the rightholder, or the value gained by the infringer, ex post. In particular, the income approach seems appropriate as it allows for a counterfactual analysis when determining damages, and can both identify the rightholder's and infringer's direct economic loss/gain from the infringement.

One area that is however not covered by the valuation methods is damages for moral prejudice. For instance, it is assumed that the rightholder can only claim damages for the part of her lost profit that follow from the patent. Whether this is however the correct legal interpretation is unclear. But the income and market approach can account for these differences. An interesting approach that has not been developed further was the use of the cost method in situations with little information regarding the patent's value in the market or income approach. In those situations, the cost method is the only method available to the courts. However, the weakness of the cost method is that it is not affected by the extent of the infringement, and it is not entirely clear how the cost method can be translated into the rightholder's damages. But other than that, the valuation methods seem to cover most areas that are relevant for the calculation of damages, including the determination of a hypothetical licensing rate.

An interesting approach that has not been developed further was the use of the cost method in situations with little information regarding the patent's value in the market or income approach. In those situations, the cost method is the only method available to the courts. However, the weakness of the cost method is that it is not affected by the extent of the infringement, and it is not entirely clear how the cost method can be translated into the rightholder's damages.

3.6. Practical challenges with applying the valuation methods

The different valuation methods lead to different valuations of the patent. It is therefore very important to find an adequate weighing of the different methods, and a method to translate these values into damages.

There is clearly consensus among publicly sanctioned IP valuation methods in Europe that the income approach is the most reliable IP valuation method. That is however not to say that the cost and the market method should be neglected. Rather, it is the mix of different methods that provides the necessary insights on how to value IP. In doing so, the income method needs to be recognized the most. The statutory provisions set out under the UPCA give sufficient scope to select the respective valuation approach that fits best the peculiar aspects of each case. In particular it is important to determine which of the various conditions discussed above have the biggest or smallest influence on the value of the IP. Hence, it is of paramount importance to apply qualitative judgment when applying the various valuation methods available. This is why a hybrid 'qualitative-quantitative' approach could arguably be a good way to assess damages.

3.7. Moving forward

Valuation methods can be a very useful tool for calculating damages, but there are practical difficulties in applying them. In particular, identifying the necessary information to undertake an IP valuation translates into substantial costs associated with the assessment of damages. Since these costs will need to be carried by the parties to the case, this can make it difficult for Small and Medium Sized Enterprises (SMEs) to adequately assess damages. Furthermore, it would be important to increase the level of

transparency in markets for IP, which would allow to gain deeper insights in a faster and less costly manner. Therefore, it would be beneficial if further clarification were provided at the European level and that such guidelines would address the need for further transparency. Likely this could be achieved through further guidelines or a practical handbook on how to apply the various economic and legal principles in each single case brought forward under the UPC. This can then lead to the establishing of binding guidelines on IP valuation at the pan European level. The various recommendations on IP valuation already offered by a host of different public institutions offers a solid baseline to do so.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.wpi.2017.12.003.

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