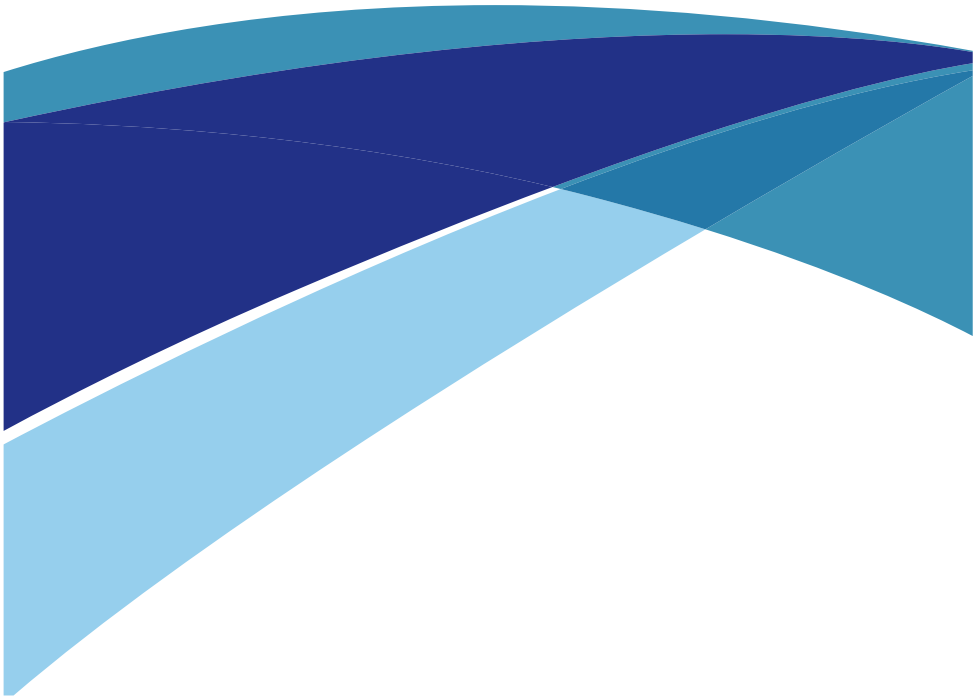
Intellectual Property Office

The Patent Guide

A handbook for analysing and interpreting patent data

Second Edition



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2nd edition – September 2015

This handbook has been created using the expertise of UK patent examiners. For this reason, while attempts have been made to correctly report the practice of other Intellectual Property (IP) offices, this may not always be possible.

It is intended that this handbook will grow organically. New topics of relevance will be added (consideration of patent families and patent classification has been added in this edition) and updates based upon international practice will be made as such information becomes available. Future editions will consider the analysis and interpretation of statistics on other Intellectual Property Rights (IPRs).

To discuss the content of this handbook or suggest future content, please contact the Informatics team at informatics@ipo.gov.uk

The Patent Guide

A handbook for analysing and interpreting patent data

The study of patents has been approached with increased enthusiasm in recent times. At present there are clear differences in perspective between professional patent experts, researchers undertaking patent analysis and the audience for this research, which includes governments, the press, businesses and individuals.

Such differences increase the possibility for incorrect analysis or inappropriate interpretation of analysis. Decisions based upon this could be incorrect and potentially harmful.

This handbook has been created to improve shared understanding between patent experts and those undertaking or using patent research.

Informatics team,
Intellectual Property Office, United Kingdom

What is a patent?

A patent is granted in the UK for inventions that are[1]:

- **New**
- **Inventive** - not just an obvious modification to something that already exists
- Something that can be **made** or **used**

You cannot patent:

- A discovery, scientific theory or mathematical method;
- A literary, dramatic, musical or artistic work or any other aesthetic creation;
- A scheme, rule or method for performing a mental act, playing a game or doing business
- The way information is presented;
- Some computer programs.

The criteria in other countries may differ, particularly with regards to what can and cannot be patented.

1 See https://www.gov.uk/patent-your-invention/what-you-can-patent

Data capture

Patent data is captured and reported to reflect different stages in their lifecycle:

Application – when a patent application is filed

Publication – publication normally happens 18 months after application. This stage is referred to as 'A' publication

Grant – those that pass the criteria for grant stated above. This stage is referred to as 'B' publication

In force – patents that have been granted and remain protected through the payment of annual renewal fees

The data required depends on the type of analysis. Data from one stage may suffice but a combination of stages may be necessary.

Reporting of this information differs between countries. In the UK a limited amount of information is reported at application stage in the patent journal[2]. At 'A' publication more information is made available and this is then updated to reflect grant and renewal (in force)[3].

2 See http://www.ipo.gov.uk/p-pj

3 See http://www.ipo.gov.uk/p-ipsum.htm - IPSUM is the IPO's online patent search tool
Analysable data - https://www.gov.uk/government/publications/ipo-patent-data is an analysable dataset, a subset of the information available on IPSUM

Are all patents equal?

Some patents protect inventions that are completely unique; however most cover incremental changes to inventions that already exist.

Patents are usually sought to establish a commercially useful monopoly that is related to one or more products or processes. Depending on the applicants filing strategy a single patent could suffice but it may be necessary to use multiple patents.

For example multiple patents can give multiple monopolies covering all possible variations of a product or process maximising a patent portfolio. Alternatively, the same coverage could be achieved using a single patent[4].

There are also patent filing strategies where the main purpose is not to establish a commercially useful monopoly. Patent applications have been used to meet government targets[5], qualify for tax breaks[6], as a measure of academic/professional credibility or rank, or for a method of disclosure (defensive publication).

This demonstrates that it is important to understand what a patent represents and the extent to which patents are directly comparable.

4 See "Claims" section, page 14

5 See http://www.oecd.org/site/stipatents/4-3-Lei-Sun-Wright.pdf

6 See https://www.gov.uk/corporation-tax-the-patent-box

Patents as a proxy for innovation

Innovation is considered a driver for economic growth. Throughout history society has developed on the back of key innovations such as the spinning jenny, mass production, the home computer or the World Wide Web.

Innovation occurs in businesses and households all over the globe. While it can be obvious that innovation is occurring, often through investigating success stories, there is no agreed definition or measure of it.

Measuring innovation is of particular interest to governments to determine:

- How innovative a country is?
- Where innovation is taking place?
- How can innovation be fostered and cultivated?

There is no direct measure for innovation so researchers use other measures as a proxy. Patents, or perhaps more appropriately patent counts, are one such proxy that has been used.

Innovation versus invention

Invention is the creation of something new. Inventions can be protected by a patent, so all patents are inventions, but not all inventions have a patent. There are many definitions of innovation. For example, the UK Government consider innovation to be the "successful exploitation of new ideas"[7]. A broader definition is doing something new with an existing idea, method or product.

7 See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/238751/7345.pdf page 15

Given either definition of innovation, it is possible to be inventive but not innovative and innovative but not inventive. Both invention and innovation could, but do not necessarily, lead to financial or social benefits.

Can patents be used as a proxy for innovation?

Individually patents cannot be correlated with a "level" of innovation. For example, consider patents which grant the following monopolies:

- The use of a mechanically automated windscreen wiper for a vehicle (i.e. the first ever car windscreen wiper).
- A vehicle windscreen wiper blade shape (i.e. an improvement to car windscreen wipers).
- A vehicle windscreen wiper blade assembly, which when combined with 10 other related monopolies (patents), protects a new wiper blade, arm and motor assembly (i.e. a single patent from a group of patents which protect an entire windscreen wiper product).
- A vehicle seatbelt which has 3 anchor points (i.e. the standard modern vehicle seatbelt arrangement).
- Paracetamol (i.e. the well known painkilling medication).

These hypothetical patents might be perceived as relating to different "levels" of innovation. It would be very difficult, or perhaps impossible, to qualify or quantify such differences without a microscopic analysis of the claims of each of the patents alongside a myriad of other factors such as the dates of grant, the state of the art in the field of technology, as well as the economic success in the market place, which may depend on non-economic factors.

Furthermore, a patent is not the only way to protect innovation. Patents provide formal protection but do not account for unregistered inventions (e.g. trade secrets) nor do they consider non invention-based innovation.

For these reasons it is fair to question how appropriate patents are as a proxy for innovation. Patent counts indicate that an applicant has invented something and would like to formally protect it, but it is difficult to see what further inferences can be made.

Nationality

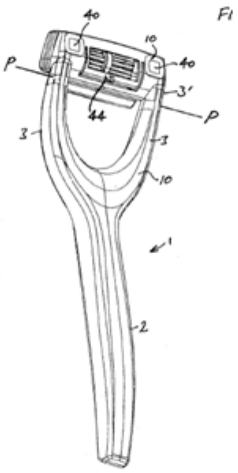
Geographical representations are common in patent analyses. They allow comparisons between patent systems or the filing habits of applicants in different countries.

Patents do not have a nationality. A patent is granted by a national or regional IP office for a jurisdiction and records the countries of residence/reported place of business for the applicants and inventors.

Jurisdiction

Jurisdiction represents the geographical area in which patent protection is required. For example, a US patent is one granted by the USPTO and only provides protection within the USA. A patent can be applied for in multiple jurisdictions.

The diagram below shows a King of Shaves razor and the granted patents that protect it. The first two letters indicate the jurisdiction of protection, so this invention is covered by granted patents in the UK, Europe, China and the USA.



GB2452411B
GB2452412B
EP2195145B1
EP2195146B1
GB2466139B
US8166661B2
GB2467480B
CN101848794B
US8484852B2
CN101842199B

Residency

Residency is the country the applicant(s)[8], inventor(s)[9] and assignee(s)[10] have stated as part of their address on the application. For analysis this has often been used as a proxy of ownership or where innovation[11] has taken place. Residency is self-reported and for this reason may not be an accurate measure.

The applicant/inventor address may be that of the head office of a company rather than the actual location from which the application was made. This implies that applicant/inventor residency could be determined by corporate decision, for example, if there are employee security concerns.

In other instances, the inventor's personal address may be used rather than the actual location of where the invention took place, which suggests that inventor information may not take into account a mobile workforce.

The graphic on the following page is a good example of the issues discussed above. GB2511502A is a UK patent in the name of General Motors[12]. This patent application is for the UK and, if granted in the future, will confer protection in the UK. The named applicant is based in the USA and two named inventors are based in Germany and Italy respectively. Since one of the two inventors is based in Germany and the attorney (Address for Service) is based in Rüsselsheim, Germany, where General Motors have a large Opel factory and research facility, it is highly likely that the patent has originated from work that has actually taken place in Germany even though the named

8 The applicant is the person or entity listed as original owner of the patent

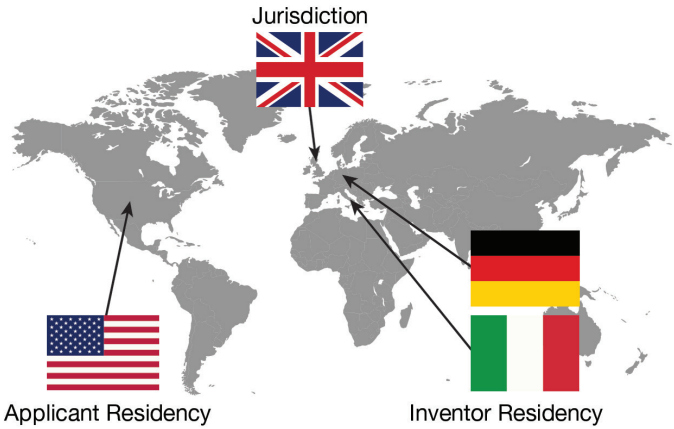
9 The inventor is the person listed as having invented the patent; this could be the same person as the owner

10 The assignee is the person or entity that has the monopoly right to the granted patent; for example, if the applicant sells their patent, it is assigned to the new owner

11 See "Patents as a proxy for innovation" section, page 5

12 See http://www.ipo.gov.uk/p-ipsum/Case/PublicationNumber/GB2511502

applicant has given a US address (General Motors' headquarters are in Detroit, USA). In this instance, it may be wrong to infer that any innovative activity has taken place in the USA.



For analytical purposes multiple residencies require further consideration. In the example above the two inventors are based in Germany and Italy respectively. Simply counting one patent for the German inventor and another for the Italian inventor would double count the number of patents. Some analyses have used fractional counts suggesting, for the given example, that 0.5 inventors are German and 0.5 inventors are Italian. Both approaches are valid but have different uses: one counts the number of patents, the other the number of applicants/inventors.

It is clear that geographical representation of patents requires appropriate caveats before use. Data coverage may also differ depending on the data source used.

Citations

A citation is prior art relevant to the patent being applied for. Using citations in patent analyses could be popular due to a perceived similarity with academic references. Citations have been used as a symbol for value, worth or innovativeness.

Are citations an appropriate basis of analysis?

To answer this question another should be posed, namely why are there citations.

Patents can be cited by the applicant and the examiner, but IP offices have different rules for how citations are determined and reported.

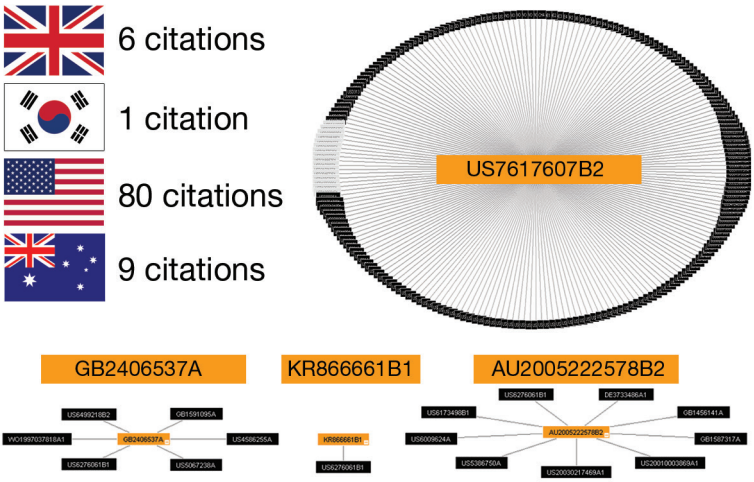
Perhaps the best starting place is the USA. US statute encourages applicants to disclose all relevant prior art and failure to disclose may harm the applicant should the patent be questioned in court[13]. This detail could be considered to come closest to that of academic references, although may omit key information such as the relevance of applicant citations.

For other countries the citations recorded on the published patent are solely determined by the examiner based on their own search and any relevant prior art supplied by the applicant. Citations are used by the examiner to demonstrate whether an application meets the requirements of patentability[14]. There is no incentive for the examiner to list all relevant citations, just the most relevant to determine whether an application meets these requirements. While possible,

13 See http://www.whda.com/whda/assets/File/Duty_of_Disclosure_ENG.pdf

14 In the UK, under section 1 of the Patents Act 1977, a patent must be new, have an inventive step, be made or used in some kind of industry and must not fall within one of the excluded categories

searching for less relevant patents is not required to judge whether an application is patentable.



This diagram illustrates patent applications for the same invention (a Gillette razor) in four different jurisdictions and the patent citations recorded on each application.

The orange rectangles reflect the patent applications in each jurisdiction with the black rectangles representing each patent cited on that application by the respective patent examiners.

Citation types have given rise to enhanced measures to indicate the relevance of a specific document. The citation types most commonly used for this are:

X - document indicating lack of novelty or inventive step

Y - document indicating lack of inventive step if combined with one or more other documents

A - document indicating technological background and/or state of the art

Can citations be analysed?

Using US citations can provide insight into, for example, knowledge flows[15]. However, in other jurisdictions their use is questionable. The citations reported can provide some insight but it is difficult to imagine how the conclusions could be considered robust while reporting is so incomplete, due to the difference in provision and capture between IP offices and examiners.

It could be argued that patent applications with only A citations provide an indicator of a unique invention to the extent that the search is complete. However X and Y citations should not be used as a measure of relevance or importance because of the incomplete nature of data capture and reporting worldwide.

15 Jaffe, A.B and Trajtenberg, M. "Patents, Citations & Innovations" 2002. Chapter 7 (this particular analysis only includes examiner citations and does not include self-citation)

Claims

The claims of a patent application provide statements defining the scope of protection sought. On a granted patent the claims define the exact scope of the protected monopoly.

There are two types of claim:

- **Independent claims** define the essential features of the invention.
- **Additional (dependent) claims** specify optional embodiments of the main invention defined in the independent claims.

Claims have been used in research as a proxy for quality, complexity or value. Specifically, the number of claims or the content of the claim (for example claim length) has been used on the basis that more claims or content equates to greater quality, a more complex technology or a more valuable patent.

How should claims be analysed?

The example below shows the number of claims on four patents in the same patent family. There is no correlation between the number of claims on each patent, either as filed or when granted, highlighting that claim-counting should not be used for analysis.

Patent as filed		Granted patent
EP2278401A 48 claims		EP2278401B 133 claims
US2006/0114445A1 34 claims		US7321419B2 7 claims
CN1802726A 26 claims		CN100459036C 26 claims
JP2012138618A 33 claims		JP5488635B2 114 claims

The independent claims are important as they define the core invention but the quantification of independent (and dependent) claims has no meaning. Therefore, it is not appropriate to use claims to infer quality, complexity or value of a patent.

It is also inappropriate to use claim length for analysis as this is dependent on how the claim is drafted by the applicant or their representative. Were two people to write the same claim it is likely the result would be different especially where translation is required for foreign filings. This is highlighted in the example below.

This example shows the difference in the length of the main claim for the same invention filed in two jurisdictions where the same invention has been drafted by different patent attorneys. There will also be a difference in claim length and complexity between and within IP offices, depending on what examiners accept/reject in order to meet the legal requirements for grant.

The content of the claim can provide some insight into whether an invention may be of value, but only through the eyes of an expert in the field and they are unlikely to be able to forecast the extent or manifestation of this value.

Patent families

A patent family is a group of patents related through earlier priority applications.

Priority applications

Priority applications disclose the same or related inventions by the same applicant as a new patent application. Patent applications have to be filed within a year of the priority application (the priority year) to be entitled to the date of the earlier application.

Priority applications can be used for example when:

a. an applicant seeks protection for the same invention filed in multiple jurisdictions[16]

b. an applicant seeks protection for a different invention that builds upon their previous invention(s)

c. the combination of a and b.

In such circumstances the subsequent applications will refer to the priority application.

Patents can have multiple priority applications. Multiple priority applications may occur when an applicant builds on the subject matter of several applications they have already filed. This typically results in later application(s) containing several sets of features, each set claiming priority from a different priority application, and so each set of features has a different priority date.

16 An applicant may file the same application in different jurisdictions on the same date. Should this occur these patents will not report a priority date and would not be recognised as a family

Family definitions

Families are used in patent analysis to identify single inventions or to group closely related inventions together to avoid double counting of patent publications. However, there are multiple definitions of a patent family.

To demonstrate the family definitions consider the following scenario:

- There are three patent applications X, Y and Z
- Patents X and Y share the priority application A
- Patents Y and Z share the priority application B

The **Simple family** considers a group of patent applications for the same invention[17,18].

Using the Simple approach there are three families in this example:

1. Patent X and priority application A
2. Patent Y and priority applications A and B
3. Patent Z and priority application B

17 The Derwent World Patent Index (DWPI) family uses the Simple family but creates further family associations

18 Some research uses the triadic patents grouping. Triadic patents are those applied for within the European Patent Office (EPO), the Japan Patent Office (JPO) and the United States Patent and Trademark Office (USPTO). The triadic patent could be a Simple patent family, but the measure itself is not a proxy for a patent family

The **Single Priority family** considers a group of patent applications with the same priority application.

Using the Single Priority approach there are two families for the given example:

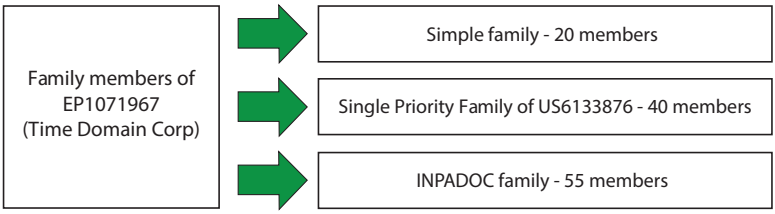
1. Patents X and Y and priority application A
2. Patents Y and Z and priority application B

The **INPADOC**[19] **(extended) family** considers all related priority and non-priority applications. Drawing comparisons with a human family tree, the previous family types focus upon certain elements of that tree, whereas this approach considers the whole tree.

Using the INPADOC approach there is a single family for the given example:

1. Patents X, Y and Z and priority applications A and B

The example below shows how the number of family members varies depending on the definition of a family used.



19 International Patent Documentation

Use of family definitions

When undertaking patent analysis it is important to define which definition of a patent family is being used. The family definition used should be determined by the desired analysis.

Simple families report a single invention and for this reason are the most commonly used.

Single Priority families report a single priority but result in inventions being present in multiple families.

INPADOC families can provide an insight into an applicant's development in a particular field. However, it can result in large family sizes as unrelated inventions may be grouped together[20].

20 In the example, Patents X and Z are for unrelated inventions

Patent classification

Classifications are groupings based upon the technical features of the invention seeking patent protection. They are applied by the examiner during patent prosecution and are subsequently used by examiners as a point of reference to find similar inventions that are relevant for novelty and inventive step considerations during search and examination.

Classifications are used for analysis as they provide an insight into the area of technology for which protection is sought. However, there are a number of considerations to be aware of when using patent classification data for analysis.

Classification schemes

The World Intellectual Property Organisation (WIPO) maintains the International Patent Classification (IPC), which is the internationally agreed classification scheme. The IPC is the only universally applied classification scheme and therefore the most commonly used for analysis. Other classification schemes exist but are not universally applied[21]; for example, the Cooperative Patent Classification (CPC), created by the European Patent Office (EPO) and United States Patent and Trademark Office (USPTO), is an extension of the IPC offering increased classification resolution. When undertaking patent analysis it is important to define which scheme is being used.

21 https://www.gov.uk/government/publications/patent-classification/patent-classification

Classification structure

Classifications are presented in a hierarchical system with levels of increasing resolution. To demonstrate, the IPC code A01B1/04 can be broken down as follows[22]:

A	Section	Human Necessities
A01	Class	Agriculture; Forestry; Animal Husbandry; Hunting; Trapping; Fishing
A01B	Subclass	Soil working in agriculture or forestry; parts, details, or accessories of agricultural machines or implements, in general
A01B1/00	Group	Hand tools
A01B1/04	Subgroup	• Spades; Shovels •• With teeth[23]

Classifications develop over time to better reflect new technologies being invented. This can cause inconsistencies since later patent applications could be classified under a new group not available in earlier years. Some patents are back classified as new areas develop. However, this process can lead to erroneous entries through automated reclassification of an entire area rather than considering the actual content of individual patent applications.

22 IPC official publication http://web2.wipo.int/ipcpub/#refresh=page
IPC guide http://www.wipo.int/export/sites/www/classifications/ipc/en/guide/guide_ipc.pdf

23 Note the subgroup does not add additional digits to define the next level of resolution. The subgroup A01B1/04 description is •• with teeth. The text is preceded by two dots, which signify that this subgroup is two levels below the group. Therefore this subgroup should be read - the first subgroup (A01B1/02 • Spades; shovels) followed by the text for this, the second, subgroup; as demonstrated in the example

As with citations[24], classifications are determined by the patent examiner and are therefore subjective. The examiner aims to report the relevant, or most relevant, classifications for a given invention. This can create disparities in the allocation of patent classifications between and within patent offices.

Primary and secondary classifications

Some patent offices report primary and secondary classifications to identify the main and supporting technologies within a patent application. The examiner will record a single primary classification and any relevant secondary classifications[25].

As technologies become more complex, and the combination of technologies more common, it is difficult to ascertain which subclass should be assigned as the primary classification. In some instances a single primary classification would be inaccurate.

Not all offices use the concept of primary and secondary classifications, even if they appear to be recorded as such. This may mean that the primary classification recorded is not actually an area that would be considered the main technology. This would lead to an incorrect analysis.

Given these considerations it is questionable how useful such information is for analytical purposes.

24 See “Citations” section, page 11

25 Please note that the term primary and secondary may not be that used by a given office or classification code. For example, IPC8 uses Invention (F) and Invention

Comparisons to technology and industry

Classifications have been used in analysis to identify specific[26] or map all[27] technology areas. Further uses and inferences are often sought. Perhaps the most common is identifying the link between patents, technologies and industries[28].

Such links have been made through matching datasets. Matched datasets have been interpreted to provide additional insight; for example, the number of patents as a proxy of industrial or technological innovativeness. While such a proxy requires due caution[29], the ability to consider the formal protection of inventions by industry or technology area has merit.

The difficulty in matching classifications to industries and technologies is that inventions can be allocated a number of classifications and applicants seek to protect inventions in areas other than that of their core business. For this reason an IPC-to-industry/technology mapping should be considered a crude proxy at best.

26 For example; IPO https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360986/Eight_Great_Technologies.pdf

27 For example; Kay, L. Newman, Nils. Youtie, J. Porter, Alan and Rafols, I. 2013. http://arxiv.org/ftp/arxiv/papers/1208/1208.4380.pdf

28 For example; Standard Industrial Classification, http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html

29 See “What is a patent” section, page 2

The example below illustrates the classifications (IPC), at class level, of a granted patent for a layered structural material[30,31].

Class	Description
A41	Wearing apparel
A47	Furniture
B32	Layered products
B42	Bookbinding; Album; Files; Special printed matter
B44	Writing or drawing implements; Bureau Accessories
C14	Skins; Hides; Pelts; Leathers
D03	Weaving
D05	Sewing; Embroidering; Tufting
D06	Treatment of textiles or the like; Laundering; Flexible materials not otherwise provided for

The primary IPC for this patent is B32 – layered products. This IPC could be linked to an industry or technology area. However, this appears to be inappropriate as, while the process does relate to a layered product, the use of this process could result in products related to other IPCs such as clothing or furniture.

This illustrates the difficulties of using a wholesale approach when matching IPCs to industries or technologies. Furthermore, it demonstrates that without considerable background research it is difficult, or not possible, to associate a patent to a single industry or technology area.

30 Application number GB0711547.0 https://www.ipo.gov.uk/p-ipsum/Case/PublicationNumber/GB2450071

31 Please note that the title is for "Recycled material", however the patent protects a layered structured material as described in claim 1. This highlights the difficulty of using patent titles for analysis

The most appropriate method of analysing patent classification and industry data is by matching the applicant with a company. Such matching can be resource intensive but has been undertaken by patent offices and organisations around the world. Such matching has its own caveats and considerations.

Analysing patent classifications and technology areas could be considered straight forward as patent classifications already proxy the technical features of an invention. The difficulty is appropriately representing a patent with multiple patent classifications in different technology areas.

Concordance to other classifications

To remove the necessity of matching data some organisations have created concordance tables matching patent classifications to technologies[32] and industries[33].

Concordance tables can provide an insight but it is important to consider how such concordances are constructed in light of the issues of making such comparisons above. If used for analysis it is important to understand and detail how the method of concordance could impact results.

32 For example; WIPO – technology concordance table http://www.wipo.int/ipstats/en/statistics/technology_concordance.html

33 For example; WIPO Economics & Statistics Series, 2012, http://www.wipo.int/export/sites/www/econ_stat/en/economics/pdf/wp5.pdf

Patent quality

One of the aims of research has been to determine the quality of a patent. This handbook does not provide guidance on how to measure patent quality because to do so would be to suggest that there is an accepted measure, which there is not. Researchers have used various proxies to create such a measure; however, the definition of patent quality can vary.

Why does the definition of patent quality vary?

Patent quality depends upon the perspective from which the patent is considered. There are many perspectives of patent quality:

- Patent examiners
- The legal system
- Patent applicants
- Legal representatives
- Third parties
- Consumers
- Researchers

Patent examiners want a patent to be well-drafted and to meet legal requirements with the claimed monopoly being commensurate with the invention. The legal system has a similar opinion of quality, but from the perspective of providing clarity for legal proceedings.

An applicant wants a patent that provides the protection they require. This is potentially the biggest difference in terms of perspective on quality, for the protection required by the applicant may differ considerably from the opinion of the patent examiner.

Legal representatives have a similar view to applicants, their clients, and aim to fulfil the requested requirements whilst getting a granted patent with as broad a scope as possible.

The view of third parties should also be considered. For them a patent should clearly set out where the boundaries of patent protection are. For example, a competitor will require this knowledge to ensure that they do not inadvertently infringe a patent through their operations.

Consumers may have a view about patent quality. Their views may be more closely aligned with satisfaction for an end-product, which could contain any number of patented inventions, other intellectual property rights (trade marks and designs) and may also be influenced by non-product features such as advertising and brand strength.

What to consider when analysing patent quality in research?

It is clear that there are many differing potentially competing views of what patent quality is. It is important that researchers acknowledge these perspectives to clarify the view of patent quality that is being considered.

The value of patents

It is often not clear what is meant by "patent value". Some consider the terms value and quality interchangeable, which is incorrect[34]. Researchers most commonly consider "patent value" to be that of the invention and the patent that protects it. It does not seem possible to disaggregate this to "patent value" and "invention value" given the data currently available.

What are the difficulties of determining patent value?

Lipitor®, a cholesterol lowering drug that helps reduce the risk of heart attacks and strokes invented by Pfizer, is considered to be the most valuable patent in history, with total revenue of greater than $125 billion[35].

Pfizer was able to determine the value of their Lipitor® patent because:

- There was a single patent
- The patent was for the key part of the product
- They could identify the turnover associated with the product

For pharmaceutical products there is often a one-to-one relationship between the patent and the product and so it is more straightforward to assign a financial value to the patent.

However consider a smartphone. A smartphone may have a significant number of patents protecting it. It may also have other types of IP, registered or otherwise, such as copyright, trade marks, design rights and trade secrets. Therefore even if the revenue of a particular smartphone can be determined, it is

34 See "Patent quality" section, page 27

35 Associated Press, 2011 http://www.crainsnewyork.com/article/20111228/HEALTH_CARE/111229902

difficult to isolate the value provided by each type of protection.

This demonstrates three difficulties:

- Associating a patent with a product
- The availability of product revenue data36
- Distributing the appropriate proportion of product revenue to a given patent.

How can value be better estimated?

Researchers continually seek more information to establish better links between patents and the revenue they generate. For example there is a lot of activity at present in developing ways to reliably link patents and other IP data to firm level data. Steps are also underway to source unstructured data from the internet to link with IP data.

Ascertaining the value of patents, and thus patenting as a whole, could be considered the golden chalice of patent research. Over the last few years there have been notable inroads and improvements on this, both for individual products and for patents as a whole, though it is clear that there is still some ground to cover for a robust estimation.

36 Financial data is available but is not necessarily complete for example subsidiary companies whose accounts are consolidated with their owners. This makes association with products virtually impossible

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