

The contribution of patents to enterprise value

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“*In situ* valuation focuses on the impact on cash flow of owning a patent portfolio.”

It is easy to assert that patents are valuable and much harder to quantify that value. This has typically been explained by reference to the unique and unusual characteristics of patents. To deal with this reality, many valuation methodologies have been developed. Among the most common are the cost, income and market approaches.

None of the existing approaches to patent valuation are well suited for valuing an entire portfolio owned by a company where there is no patent specific transaction or event on the horizon. Intangible assets account for the vast majority of the value of most companies, but there is no satisfactory approach to attributing this value to specific intellectual property rights, and as an important subset of that value, patents.

This article describes a valuation methodology for calculating the contribution that an entire portfolio makes to the overall value of the company. We have coined the description *in situ* valuation for this approach to emphasise that the valuation is only relevant to the current owner and that it is not dependent on a specific licensing, litigation or other corporate event.

In situ valuation focuses on the impact on cash flow of owning a patent portfolio. This impact can be both positive, such as royalty payments, and negative such as the maintenance costs. For many companies the value of their portfolio stems from its defensive value: namely, the avoidance of royalty payments to third parties. Advances in strategic patent intelligence and its use in areas

such as patent risk management, provide the confidence that this impact can be modelled with the necessary levels of robustness. Once the impact on cash flow is established, there are conventional approaches that enable the proportion of enterprise value attributable to patents to be calculated.

This article begins by explaining the importance of patents in an era dominated by advances in technology. It then describes existing approaches to patent valuation highlighting the fact that they are designed for specific events or transactions. The main section of the article describes how the *in situ* valuation of patents can be calculated.

Widespread adoption of this approach to valuation would have a positive and significant impact on the broader topic of transparency around intangible assets. At a time when investment in innovation and technology are significant determinants of which companies and sectors succeed or fail, quantification of patent portfolio value will help fill the void in current accounting standards and practices.

This will be beneficial for both the C-suite and the board to improve understanding of why patents are important and how they deliver value to the organisation. Once the company is armed with this understanding, this will also become highly relevant and significant to key financial counterparties including investors, lenders, insurers and accountants. We are now at a point in time where greater transparency around the value of patents would be beneficial to all.

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The importance of patents

The Fourth Industrial revolution describes the current period of rapid technological change largely attributable to the exponential proliferation of interconnectivity and automation. This reliance on technology sits at the heart of the economic transformation of what companies own and value.

Patents protect inventions that are created as a result of substantial expenditure on R&D. In order to get a sense of scale, there are over 45m active patents and applications owned by over 500,000 organisations. The rate of new patents being granted has been growing at a CAGR of 14.6% over the last ten years, a trend which is largely unaffected by pandemics or recessions. Fig 1 represents the growth in the number of new patents over time.

Patents are relevant to all technologies and sectors. Fig 2 is an analysis of active patents using CIPHER’s Universal Technology Taxonomy.

When considering the value of patents, it is necessary to start with an understanding of how patents deliver value to an organisation. This includes:

Licensing: a situation where a patent owner licences its patents to a third party for consideration in the form of royalty or other payments.

Litigation: patent litigation makes the news, but is in fact relatively rare. This can be illustrated using US litigation data, historically a popular jurisdiction for patent disputes. Fig 3 charts the proportion of US patents that were used in litigation over a 10 year period. So in 2020 there were 5,619 US patents used in litigations, out of a population of 3.35m active granted US patents.

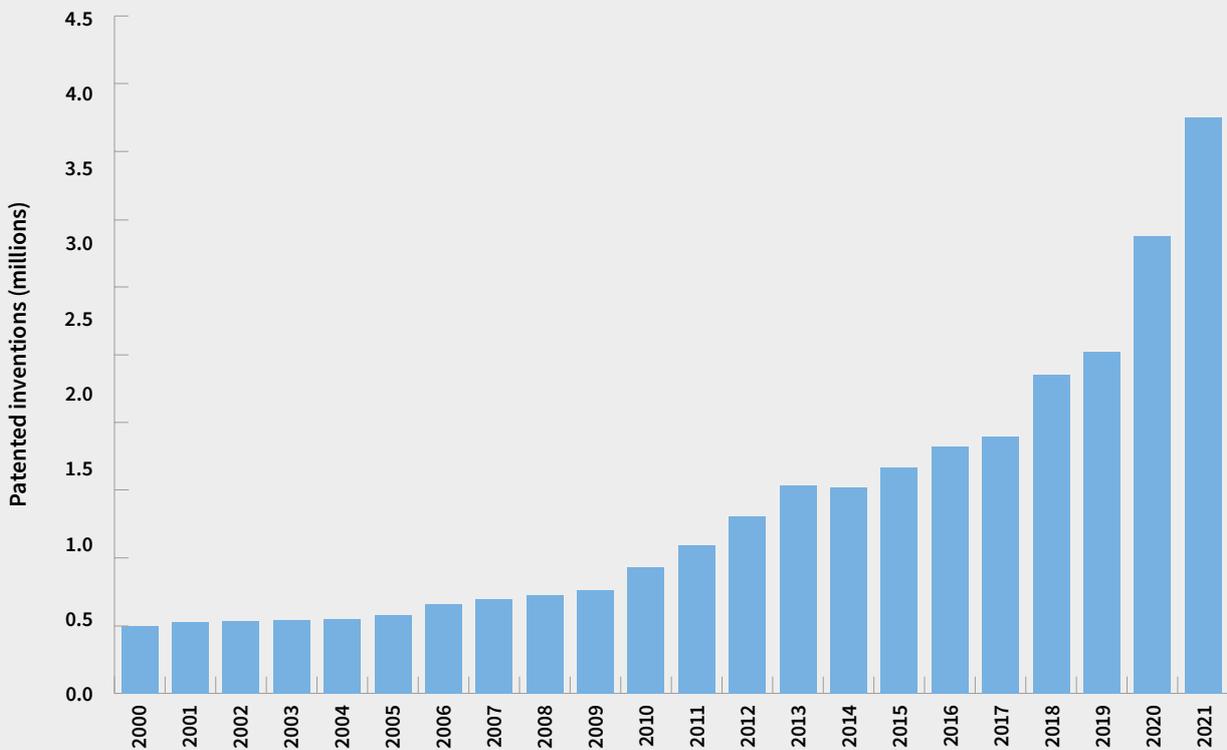
14.6%

CAGR growth in granted patents over the last 10 years

45m+

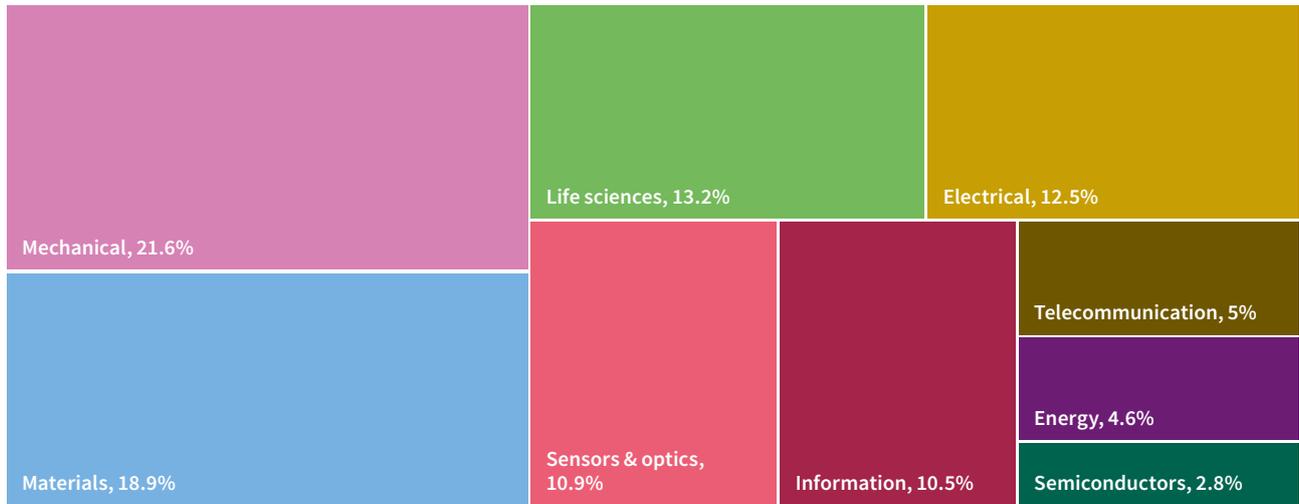
active patents and applications owned by 500,000 organisations

Figure 1 | Growth of patents over time



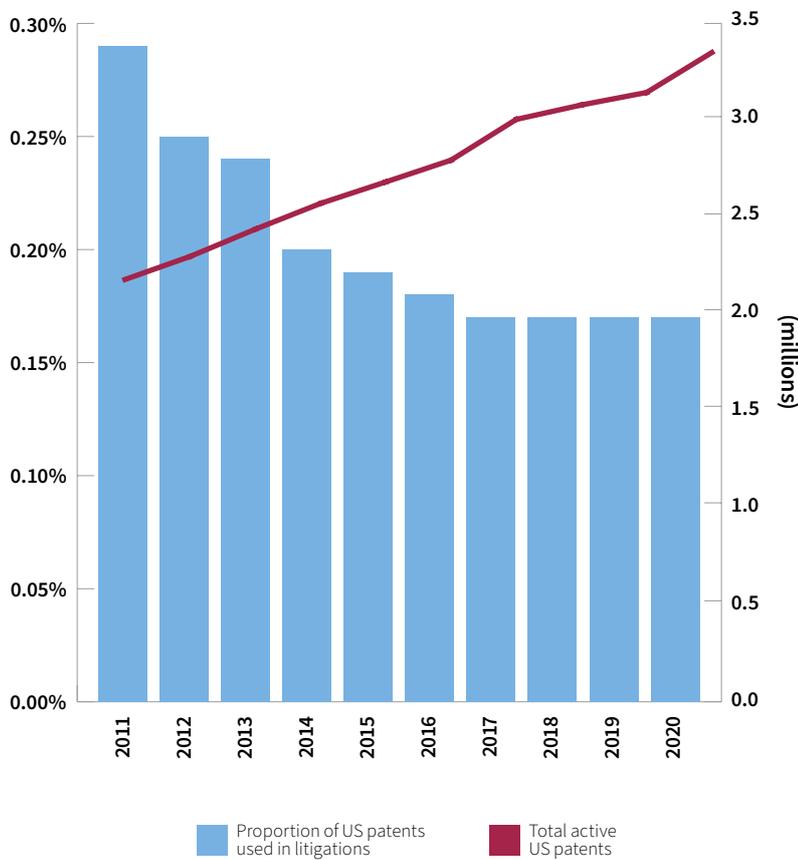
Source: CIPHER

Figure 2 | Active patents by Universal Technology Taxonomy Superclass



Source: CIPHER

Figure 3 | Litigated US patents as a proportion of all US grants



Source: CIPHER

Patent licensing and litigation are textbook examples of patents being used by the owner. Similarly there are also situations where patents have no use to the business. Here the owner can elect between lapsing the patents (effectively making the invention free for all) or offering the patents for sale.

What is often ignored is the significant value delivered by patents in situations not evidenced by a licence, litigation or sale. This category can be defined as use by the patent owner in the ordinary course of business. In this article we refer to this as *in situ* use. Two of the ways in which *in situ* use delivers value to an organisation are:

Defensive: 62% of organisations say that risk mitigation and deterrent are the primary strategic objectives served by their patent portfolio (see *Beyond Portfolio Optimisation: understanding the connection between patent cost and value* (IAM, 2020, Swycher, Harris and McMahon)). The survey on which these findings are based also highlights the fact that patent strategies differ across sectors, but for sectors including technology, semiconductors, software, automotive, aerospace & defence, these are the primary patent strategies.

For companies with this strategy, patent portfolios are used to defend the company from claims by third parties that their products (or services) infringe the patents of others. This works on the basis of deterrent effect: that is to say, third parties are discouraged from asserting their patents because of the belief that the counter-claim would balance out the benefit of any claim in the other direction. This is often referred to as detente by virtue of the threat of mutually assured destruction.

Barriers to entry: patents can be used to exclude competitors from developing a specific product or feature, or can create a barrier to entry for new participants. While it is rare for a single patent to prevent competitors bringing to market a whole product class, it does happen, specifically in pharmaceuticals, chemicals and some fields of engineering.

More frequently, however, in complex devices such as smartphones, products are covered by hundreds or thousands of patents. Here patent owners must develop patent strategies (commonly cross-licensing) in order to avoid costly litigation. Those without significant portfolios are effectively excluded from the market as the royalties that would be payable to third parties make market entry economically unviable.

Existing approaches to patent valuation

Current approaches to patent valuation have been adapted to situations where there is a specific transaction or event relating to a patent (or set of related patents). The most common approaches to patent valuation are referred to as income, market and cost:

Income: the income approach requires measurement of the future revenue stream (or cost savings) from the patent, adjusted to present day value. This approach works well where the patent is

currently licensed and there are readily identifiable cash flows. It is not useful for valuation where the majority of the portfolio is not subject to a royalty bearing licence.

Market: as the name suggests, this involves the identification of comparable transactions of similar assets. There are many reasons why it is difficult to use this approach. First, organisations are incredibly secretive about their patent transactions. Secondly, it is really hard to compare transactions. An agreement between two competitors reached after extensive litigation may be no help at all 5 years later when looking to put in place an intra-group license for the purpose of transfer pricing.

This approach is used when establishing royalty rates for transfer pricing, where the tax authorities are able to bolster the publicly available data with precedents from other similar transactions that have been submitted to them for assessment. This approach cannot assist with *in situ* valuations, for two reasons. First, there are very few instances of companies selling all or a substantial part of their patent portfolio. Secondly, the market approach helps to determine the price that another party is willing to pay. This is very different to *in situ* valuation, which calculates the value of the patents to the current owner.

Cost: this approach is based on the economic concept of substitution. There are two variants of this method, which involve calculating the cost of reproduction or the cost of replacement. It would be impractical to apply the cost approach to an entire patent portfolio. Furthermore, *in situ* valuation is not focussed on the cost of developing the patent portfolio, and only interested on the value it delivers to its owner.

More recently patents have been analysed as real options. This adopts methodologies widely used in the financial options markets (many built on the Black Scholes model published in 1973). While it is early days for such complex methodologies, the extensive economics literature on the

62%

of organisations say that risk mitigation and deterrent are the primary strategic objectives served by their patent portfolio

topic connects the exclusivity granted by a patent with the freedom for the patent owner to exploit that invention at a given point in time, later or never. This methodology offers fresh insight in situations where a specific patented invention may enjoy different levels of success depending on when its owner chooses to exploit. The real options approach cannot be applied to a whole portfolio, and not in the common situation where there are no plans to generate revenue from the majority of the patent portfolio.

There is an increasing demand for a methodology that enables a patent owner to calculate and communicate the value delivered by patent portfolios. This would make a meaningful contribution to the gap created by the total absence of financial information in corporate accounts on intangibles. For a broader discussion about the impact of intangibles on corporate reporting, refer to the seminal work *The End of Accounting* by Baruch Lev and Feng Gu (2016).

In situ valuation of patents

Corporate Finance theory states that most assets – companies, bonds, property, and so on are best valued as the total impact on net future cash flows discounted back to today. Patents should be no different.

There are four main ways that patents can impact the cash flow of a business. We will look at each of these in turn and propose methods of quantifying the impact on cash flow.

Defensive value

As described in the *Importance of Patents* section above, for the majority of owners the primary function of the patent portfolio is to mitigate risk from third party litigation and aggressive licensing approaches. This is referred to as a defensive patent strategy. Economic models describing this are covered in *Beyond Portfolio Optimisation*

(referred to earlier). However the case here is simpler as we are only concerned with the difference between the current situation, and the situation where the company had no patents. For this case we consider the difference between the cost of the licences the company has entered into despite the presence of a patent portfolio, and the impact of royalties that would need to be paid in the case where the company held no patents.

For a single product, p the hypothetical worst case licensing royalty is the revenue from that product (r_p), multiplied by the royalty rate that would typically be paid (s_p). A reasonable estimate for s_p would typically be known by the patent team, or could be calculated from past licences.

So, for an entire portfolio, covering a set of products, P the worst case cash flow impact is:

$$\sum_{p \in P} r_p s_p$$

So, if for example some technology is on average licensed at 5% of revenues, then the worst case, assuming all relevant patent owners achieved an equitable licence, would be 5% of revenues attributable to that product.

In reality this could never happen – it is likely that only holders of large portfolios would be motivated or equipped to negotiate a licence, so this number should be scaled back to some extent to reflect that. There are various techniques for estimating this, including one published by the authors in *IAM*.

Barriers to Entry

Patent portfolios can prevent competitors from entering the market, or at the very least increase the cost of doing so. The extreme example of this is pharmaceuticals, where patented drugs confer exclusivity that enables the patent owner to charge monopoly pricing.

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This is the most difficult aspect of the value of a patent portfolio to quantify, as it requires an understanding of what the market for some products would look like, without the deterrent effect of patents. In many industries the effect of this factor is negligible, but there are cases where a single patent (or a small set of patents) does prevent new players from entering the market.

In the most extreme case, we have a product protected by a small number of patents, which are not licensed to any competitor. When those patents expire we can see the impact of the loss of patent protection. The company still has some brand recognition, and first mover advantage (often bolstered by early patent protection), but we can imagine the impact of increased competition due to one barrier to entry being removed.

We will look at a well-known example from the pharmaceutical industry to illustrate this. Pfizer's Viagra mean worldwide revenue from **2003-2019**, was US\$1.62B compared to approximately US\$412M in **2020**, after the patent had expired. This represents a 75% drop in revenue, though there are multiple factors at work, and the change is not due to patent expiration in isolation.

The cash flow is simply the revenue multiplied by the expected reduction in revenue due to increased competition.

We will use b_p to represent the cash flow due to barriers to entry for a single product, p .

With this defined, we can write the contribution to cash flow (earnings), for a specific products as:

$$e_p = r_p s_p h_p + b_p$$

Or, the revenue, multiplied by the typical royalty rate, multiplied by the proportion of likely licensors, plus the barrier to entry.

Existing licences

We must also consider the cost or income from existing third party operating company patent licences, a . This will be negative for licences where the company pays away, and positive when there are payments from third parties. Note that a should not include any licences or damages paid to Non Practising Entities (NPEs), as the company's patent portfolio delivers no benefit in this situation.

NPEs are organisations that own and licence patents, but do not make products, and hence have no revenue associated with the use of patents. Because of this licences tend to be one-sided, and the company's own patent portfolio does not offer a defence against them. Types of NPE include research labs, universities, and patent trolls.

Monetisation

Some companies adopt a monetisation strategy of licensing their patents to third parties as a specific revenue stream. For these companies, it is more straightforward to identify the revenue streams associated with this activity. Examples of this include the owners of large portfolios of standard essential patents, which are widely licensed to other industry participants for substantial royalties across a number of years.

This is the simplest impact to calculate, as it is just the actual or expected licensing revenue over the time period in question. We will use the symbol m to represent this.

Taxation

Patents are often the focal point for structures designed to reduce the corporate tax burden. Whether this is transfer pricing or specific patent box regimes, the tax saving delivered directly reduces the tax (a cost) that would otherwise have been paid. The cash flow impact of transfer pricing is simply the reduction in tax paid from the value of the licence used to transfer profits from one tax jurisdiction to the other.

For example, if \$10M of revenue is moved from a 19% corporate tax jurisdiction to a 12% tax jurisdiction then the cash flow increase is:

$$(19 - 12)\% \times \$10M = 7\% \times \$10M = \$0.7M$$

We will use the symbol t to represent the cash flow attributable to transfer pricing.

Cost of portfolio

In order to calculate the cash flow we also need to consider the cost of building and maintaining the portfolio. Several costs have to be taken into account, including the preparation and prosecution costs for the patents, staff salaries, outside attorney fees, patent office fees, and annuities.

Several budget items will need to be brought together to capture the entire cost, and it must be projected into the future, but these figures are generally readily available.

We will represent the cost of building and maintaining the portfolio for one year as c . Note that this quantity will be negative.

Total impact on cash flow

Bringing all the above factors together, an expression describing the total portfolio cash flow, for a single year is:

$$e = \sum_{p \in P} e_p + m + t + a + c$$

$$\text{Where } e_p = r_p s_p h_p + b_p$$

This impact is not the same for all years. If, for example, some of the revenue attributable to m comes from a licence with 5 years left to run, then the contribution should be stopped after year 5.

Discounted Cash Flow

A common way to calculate value based on cash flow is DCF. Given a discount rate, r ,

and a cash flow (earnings) from year n of e_n , then the DCF is given by:

$$\frac{e_1}{(1+r)^1} + \frac{e_2}{(1+r)^2} + \dots + \frac{e_n}{(1+r)^n}$$

The discount rate used is typically the cost of capital (such as the Weighted Average Cost of Capital, WACC) for the company.

Worked example

Our example company has three product lines, with the following characteristics in the current year:

Product (p)	Revenue (r)	Royalty rate (s)	Asserter proportion (h)	Barrier to entry (b)	Contribution ($e_p = rsh + b$)
x	\$450M	5%	42%	\$0M	\$9.45M
y	\$770M	7%	51%	\$0M	\$27.49M
z	\$1100M	6%	65%	\$0M	\$42.90M

This company has an effective patent portfolio, so the royalties paid are relatively low, but they exist in a technology space where this company's patents do not offer a material barrier to entry to new entrants (so $b_p = 0$).

There is \$10M per year of monetisation revenue (m), which is due to run for another 5 years, the amount paid away in 3rd party licences (a) is -\$10M, the annual cost of the portfolio (c) is -\$23M, and there is no cash flow contribution from taxation.

The means that the total cash flow attributable to the portfolio in year 1 is:

$$\begin{aligned} e_1 &= e_x + e_y + e_z + m + t + a + c \\ &= 9.45 + 27.49 + 42.90 + 10 - 10 - 23 \\ &= 56.84 \text{ (\$56.84M)} \end{aligned}$$

If we use $r=0.08$, and our expectation of growth of the defensive cash flow and cost is 3% per year for the first 20 years, then flat thereafter, we have:

If our company has a total value of \$5,220M¹, then the patent portfolio makes up 16% of that, at \$834M.

“In situ valuation offers the opportunity for the board of directors to quantify the value of patents and encourages an organisation to articulate and quantify why they are investing in patents and how patent ownership impacts cash flow.”

Year	Defensive	Monetisation	Existing licences	Cost	Cash flow	Discounted CF
1	\$79.8	\$10.0	-\$10.0	-\$23.0	\$56.8	\$52.6
2	\$82.2	\$10.0	-\$10.3	-\$23.7	\$58.2	\$49.9
3	\$84.7	\$10.0	-\$10.6	-\$24.4	\$59.7	\$47.4
...
19	\$135.9	\$0.0	-\$17.0	-\$39.2	\$79.7	\$18.5
20	\$140.0	\$0.0	-\$17.5	-\$40.3	\$82.1	\$17.6
...
Total						\$833.9

An opportunity to communicate patent value

Many organisations regard patents as a cost. The current accounting standards have reinforced this approach for over 40 years. Yet over the same period intangibles have become a significant driver of corporate value and patents are a large part of that value. A straightforward approach to valuing entire patent portfolios, without the need for an extraneous event such as licensing or litigation, would therefore make an important contribution to existing patent valuation methodologies.

In situ valuation offers the opportunity for the board of directors to quantify the value of patents and encourages an organisation to articulate and quantify why they are investing in patents and how patent ownership impacts cash flow. This can be either as a positive contribution to revenue, or removal of cost (such as payment of third party royalties). Both are valid as both have a direct impact on cash flow.

There are significant benefits flowing from *in situ* valuation. First, it is a methodology that can be applied to all patent owning companies, whether publicly or privately owned. The calculations required rely solely on revenue, royalty and cost data which is either readily available or which can be generated from commercially available strategic patent intelligence platforms.

Secondly, this methodology feeds directly into the primary business metric used by those responsible for corporate strategy. *In situ* valuation does not compel business teams to engage with the nuances of patent law and practice – a reason often given by finance and strategy teams for not engaging with the subject of patents. Thirdly, it creates a common language for communication both inside the business and for the purpose of external communication with shareholders and other stakeholders.

The systematic adoption of *in situ* valuation as a regular and consistent reporting framework will help deliver the evidence required to understand patent strategies and will also support the need for investment in technology areas that directly create shareholder value. Patents can then be seen as what they are – a key strategic source of long-term competitive and economic value.

Nigel Swycher is CEO and Steve Harris is CTO at Cipher, London. With thanks to the contributions from Steve Halliday, Chairman and Scott Bell who serve on the Cipher board as Chairman and non-executive director respectively.

¹ For example an EBIT margin of 15% on the total revenue of 450 + 770 + 1100 = \$2,320M, and an EBIT multiple of 15, 2320 * 0.15 * 15 = \$5,220M



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Investing in the future of technology

Episode 10



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About Cipher

Cipher is the first company to develop machine learning algorithms to automate the mapping of patents to technologies.

This capability has enabled the development of the Universal Technology Taxonomy that maps global patent data to 9 Superclasses and 114 Subclasses. This fresh source of strategic patent intelligence has unleashed the ability to objectively and consistently assess and compare the portfolios of all patent owning companies. Cipher is committed to patent transparency and helping investors, lenders and the financial services community understand intangible assets owned by companies.

For more information, go to cipher.ai/patentvalue or email enquiry@cipher.ai