Taking advantage of change

If an IP owner is to extract maximum value from its patent portfolio, it is vital to ensure that the portfolio is properly organised and analysed. This is the only way to be confident of identifying all potential revenue-generating opportunities

By **Stuart Kamin** and **Sam Khoury**

Effective patent portfolio management is critical to a company's strategic operations in so many ways. But one of the most important is that change is constant in technology-driven industries: consumer demand for products waxes and wanes according to the effectiveness of comparable technology, the overall strength of the economy and a multitude of other factors. R&D considerations fluctuate as a result of limitations of scientific knowledge, and from advances or setbacks in product development. The explicit knowledge of a company, its intangible assets and intellectual property, may change and grow as the tacit knowledge capital of its employee constituency is documented and incorporated into core operations. A company's patenting policy may change to reflect budgetary concerns, tactical market positioning, or even the strategic refocusing of company-goals.

As a result, the degree to which a particular technology portfolio can fulfil current market needs changes constantly. Vigilant management of a patent portfolio can improve the overall profitability of a business by ensuring that the proprietary technology of a company, to whatever stage it is developed, can better exploit sometimes-fickle market demands. Indeed, such constant re-evaluation is important not just to large, established enterprises, but also to any moderate or smaller-sized companies that wish to remain an innovative vanguard in their industries.

The primary goal of any IP portfolio management is the maximisation of value extracted from the IP portfolio, and a combination of techniques is often necessary to capture the business potential of technological innovations. In order for an IP portfolio management process to be effective, core technologies must be identified and the relative market significance of these technologies must be ascertained. Various organisational, analytical and financial tools have been developed to accomplish these ends, and industry professionals continue to explore the potential for a number of different managerial techniques. One frequently used approach maps out the technologies of an IP portfolio in terms of their product or market application potential, then uses a series of consistent qualitative analyses to suggest a combination of leveraging tactics. The strategic positioning of IP suggested by this process capitalises on a portfolio's strengths while mitigating its weaknesses, and the company's operational efficiency improves by creating or enhancing IP-based streams of revenue.

Developing a matrix

Any portfolio management exercise must begin with some sort of organisational or cataloguing phase in order to create a platform from which to apply analytical tools. Although topographical or relationship mapping techniques are often used for the effective management of intellectual property, these maps often appear chaotic in nature (regardless of their analytical organisation), and are therefore most effective when preceded by the construction of a gridded matrix, purely for the purposes of facilitating organisation.

The matrix is a profoundly informative map that matches technological attributes described in patent claims with the markets to which those technologies can add value. After reviewing the portfolio, a list of enabled

products can be created along a vertical axis, and a list of the technological attributes of these same patents created along a horizontal axis. The product categories created on the vertical axis are often called projects because they each indicate an independent business opportunity for the company.

Patent numbers can be placed into the nodes where the patents' product relevance and technology attributes intersect. Each node indicates which patents protect certain technologies that are crucial for the design and support of specific projects. Some projects may incorporate several distinct technologies and, conversely, a technology may enable the production or support of several different projects, sometimes in completely separate markets. Patents that contain such broad scope should be placed in every node that is appropriate.

Such a platform facilitates both corporate development and licensing objectives by providing the manager with a means to determine the representative strength of various technologies, and their contribution to saleable products within a given patent estate. Furthermore, the matrix adds value when negotiating licences because when interest is expressed in one group of patents, the licensing executive can quickly scan the document for other related art, and explore whether there may be interest in this additional art as well, thus bolstering the licensing package and increasing royalty revenue. Once the matrix scaffold is in place, subsequent relational mapping, such as that offered by the Delphion or MicroPatent services, can encourage the observation of technology-market relationships without sacrificing psychological advantages of organising data into a matrix.

Versatile tool

The matrix is a versatile tool that can manifest in a number of ways to suit particular ends. Patents can be thought of as having broad, general technological attributes as well as more specific attributes. Often, it is just as important to know what combination of technologies is necessary to create a particular project it as is to know where individual technologies apply over a range of projects. Expanding the matrix platform into two or more documents can facilitate a better understanding of these combinations. A main, condensed document can serve to point out how general, homogeneous technology groups apply to which projects, thus suggesting general packages for value extraction strategies such as proactive out-licensing. Secondary, expanded documents can then delineate more specifically defined technological attributes. Certain patents will often possess one or two general technological attributes in a given condensed matrix but many specific attributes of expanded matrices. As such, elegant combinations of patent synergies will convene in the nodes of these secondary matrices that can communicate the relative importance of complex technology relationships for individual projects (see figure 1). Simple techniques such as colour-coding the general attributes can further elucidate the nature of these patent synergies.

Another modified embodiment of this patent-project matrix can serve R&D and legal efforts when drafting patents. The practice of conducting extensive competitive intelligence regarding similar patented technologies is well known to industry legal departments. A claims analysis of these patents can be incorporated into a matrix that can identify which technologies apply to competitive patents. Here, the matrix identifies what everyone else has, and the goal is not so much to communicate where technology strengths lie as to deduce where weaknesses lie. That is, by exposing holes in legal protection inherent throughout industry patents, an IP management team can work with R&D and legal teams to draft patents that effectively block the rest of the industry from patenting further in a given area.

Flexibility of design is one of the matrix platform's primary advantages. Just as technology attributes can be defined either generally or specifically, so too can the markets that those technologies feed into. The degree to which patents in a given portfolio will apply to individual products varies with the nature of the technology itself. In order for a given matrix to be appropriately constructed for a given portfolio and yield analytical usefulness, the listed market applications should mirror the degree of product specificity described in the patents themselves.

This is because the subsequent qualitative assessment used to direct the tactical value extraction of different technologies is more effective when projects convey a product perspective than when they convey the perspective from an overall market. Consider that it is sometimes difficult to determine the relative business strength of an individual patent, because that patent may or may not be sufficient to create a product that can directly translate into product-derived revenue. It is sometimes equally difficult to determine how the application of technology to a broader field can translate into revenue derived directly from individual products from one company.

Project specificity

The power of project specificity can be best illustrated with an example. In a given biotechnology patent portfolio there may be IP regarding a number of different aspects of gene therapy. There may be patents describing gene sequencing and hybridisation techniques alongside patents describing antibody construction and vector engineering. All of these techniques may be integral to a successful gene therapy effort, but the individual products that are created by each specific technology may have different market potentials. In addition, the different technologies may have been taken to different stages of internal development, and they may be differentially unique with respect to other technologies in the industry. Determining the market potential, economic viability and extent of legal protection for the individual technologies that fit into the enormous bucket of gene therapy is difficult if one observes data relating to gene therapy as a whole. Creating throughput screening processes or sequencing software or vector engineering projects instead of one gene therapy project enables portfolio management analytics to capture better the differential economic, legal and technological qualities of distinct technologies.

Once projects are created, analytical tools can be applied to suggest tactics that optimally leverage these technologies in the marketplace. Because the introduction of technologies into the marketplace is a complex process, versatile analytical tools are helpful when maintaining accuracy in any tactical assessment. Here also, automated IP management tools such as citation tree examination, technology cycle-time analysis and patent growth indexing are growing in popularity as expedient means to contrast IP portfolios among industry players and to forecast their capacity for future technology creation. Although these tools can provide significant quantitative insight into the general industry trends, effective portfolio management also includes a more case-specific, qualitative evaluation of a portfolio's constituent technologies. Just because a patent has been cited extensively does not mean that the economies of producing a derivative product are competitively viable.

Analytical tools

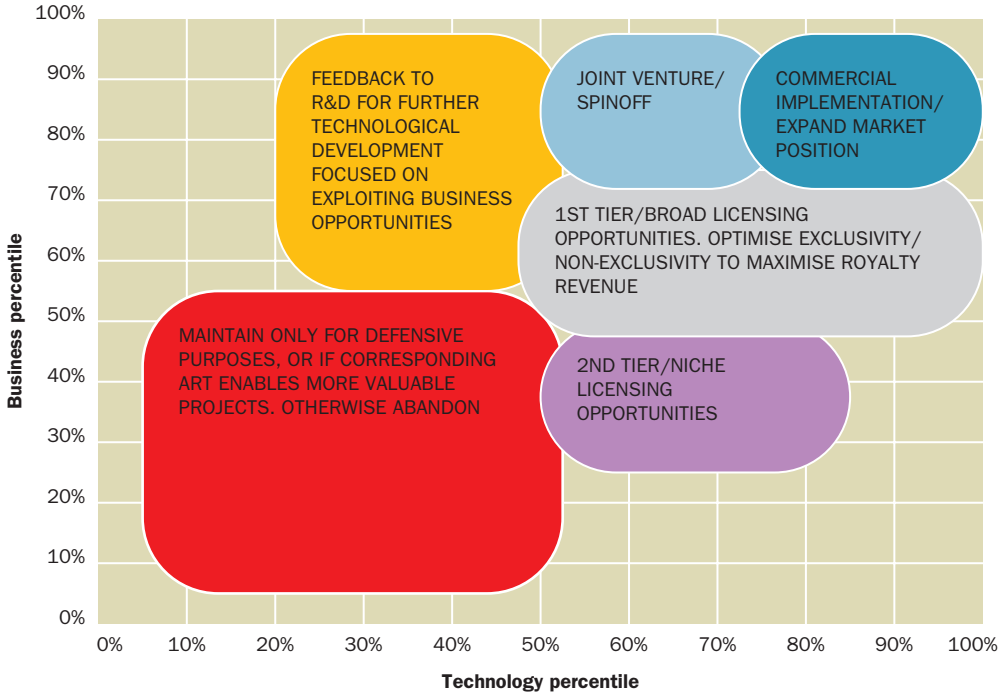
Different methods for analytical, case-specific project scoring have been created across various industries, as IP management has become an increasingly important corporate priority. Like the construction of the patent-project matrix, analytical tools are generally customised to the needs of the IP manager. Essentially, however, all analytical processes have two goals: the identification and quantification of project value. As such, a particularly effective analytical process utilises a two-phase methodology to distil these two goals. A first phase employs a screening tool to recognise the mere existence of value, or lack thereof, in a particular project. If no value is apparent, or if the weaknesses of such a project appear at a high level to outweigh the benefits, then the abandonment or tactical redirection of IP contributing to that project should be considered. If, on the other hand, the screening tool indicates a base level of value, then a more detailed analysis of the project's strengths and weaknesses may be warranted. The subsequent, more detailed assessment can determine which leveraging tactics may be most appropriate to yield the maximum revenue from the project's associated IP.

Screening tools of this nature are straightforward, consisting of only a few statements qualifying pivotal considerations for technology implementation. Common criteria for value indication include the stage of technology

Figure 1: **The expanded matrix**

	Attribute (Specific)			
	Cytokine	**Interferon**	**Recombinant**	**Transcription Regulatory Sequence**
Project **Gene Sequencing/ Hybridization**	535X3XX 54X97XX	63X07XX 606X6XX 51X27XX 511X7XX 50X73XX 5X958XX 604X1XX 5683XXX 52X82XX 5200130	554X9XX 6X598XX 594X9XX 5X824XX 5858XXX 5427XXX 541X0XX	61X11XX, 558X9XX, 5X522XX, 60X20XX, 5X927XX, 549X4XX, 6461XXX, 63X97XX, 6245XXX, 6X751XX, 60X20XX, 601X7XX, 5X979XX, 5X958XX, 59X41XX, 5932XXX, 585X9XX
Throughput Screening	5X097XX	599X0XX 52X82XX 6350XXX	542X8XX 538X4XX 5X180XX 6X549XX 599X7XX 5X110XX	647X1XX, 61X11XX, 595X2XX, 60X20XX, 549X7XX, 52X38XX, 52X18XX, 5X208XX, 6X157XX, 60X59XX, 607X1XX, 5X984XX, 5X958XX, 5X55XX, 5932XXX, 5914XXX, 5X979XX
Vector Engineering	48X42XX	6X431XX 647X1XX	554X9XX 615X8XX 5X109XX 5X479XX 58X85XX 567X4XX 538X4XX 5X180XX	647X1XX, 61X11XX, 595X2XX, 60X20XX, 549X7XX, 52X38XX, 52X18XX, 5X208XX, 6X157XX, 60X59XX, 607X1XX, 5X984XX, 5X958XX, 5X55XX, 5932XXX, 5914XXX, 5X979XX, 61X36XX, 545X1XX, 5188XXX, 4818XXX, 617X9XX

Figure 2: **Portfolio management value extraction strategy**



development, the time and capital required for commercialisation, the degree of legal protection, the environmental impact of the technology and the presence of competing or substitutable technologies. Often, these criteria are presented in software formats as multiple-choice questions, with the answer options corresponding to scores. This consistent measuring stick mitigates bias and creates a level playing field from which to compare different projects that may incorporate diverse technologies. The tallied sum of a project's scores can be compared to a minimum required threshold score to determine whether that project does indeed seem initially valuable.

The ratio of this threshold score to a maximum score for a given screening tool is dependent on several variables, most notably the overall goals of the portfolio management. If a company wants to identify only the most valuable project in order to focus resources on the technologies with the highest potential for value, then only a few projects will exceed a threshold of 80% to 90% of the total possible score. When maximising value extraction from IP portfolios of resource-limited companies, it is generally advisable to analyse further all projects scoring at least 50% to 60% of the total possible score. In this way, even projects with marginal value can contribute to overall value extraction and contribute to a return on investment. Those projects not able to exceed even this liberal benchmark, though technologically innovative, clearly have little marketplace value and may not contribute significantly enough to overall value extraction to merit the company's time and consideration.

Further assessment

A screening phase, however, is only the first step towards qualitatively establishing the leverage potential of IP bundles. Once this screening phase has been conducted, those projects that do exceed this threshold should be assessed further in order to determine the nature of their strengths and weaknesses. In order to examine the capacity for various IP to be leveraged in the marketplace, any such assessment should account for the multifaceted nature of IP-derived goods. There are generally three major perspectives from which strengths and weaknesses of IP can be viewed as influencing the strength or weakness of their associated revenue-driving projects: business, legal and stage of technological development. Analysing projects from these three dimensions will paint a complete picture of the feasibility of building a profit centre around a technology.

From a business perspective, the first question that must be answered when assessing technology is the degree to which the production and marketing of individual products resonates with the overall strategic vision of the company. If certain technology, however innovative, does not harmonise with this mission, then that company should not commercialise it in the marketplace. If valuable enough, these technologies can generate large amounts of revenue in joint venture or licence opportunities. Assessing non-core technologies in this way enables a significant extraction of value from the IP, while at the same time freeing the parent company to produce and market those products that better manifest the company's vision. Other important areas of business assessment include the economies of producing associated products and the demand for them in a global marketplace, as well as the degree of differentiation and novelty a particular technology-based product could embody.

From a legal perspective, the degree to which a project is protected by IP is a crucial detail that heavily influences the value extraction potential of that technology. As companies continue to exert their legal rights to protect novel technology in the marketplace, patent drafting and R&D efforts have become increasingly creative and strategic. Patent drafting aims at protecting new goods and services, as well as at blocking competitors from introducing

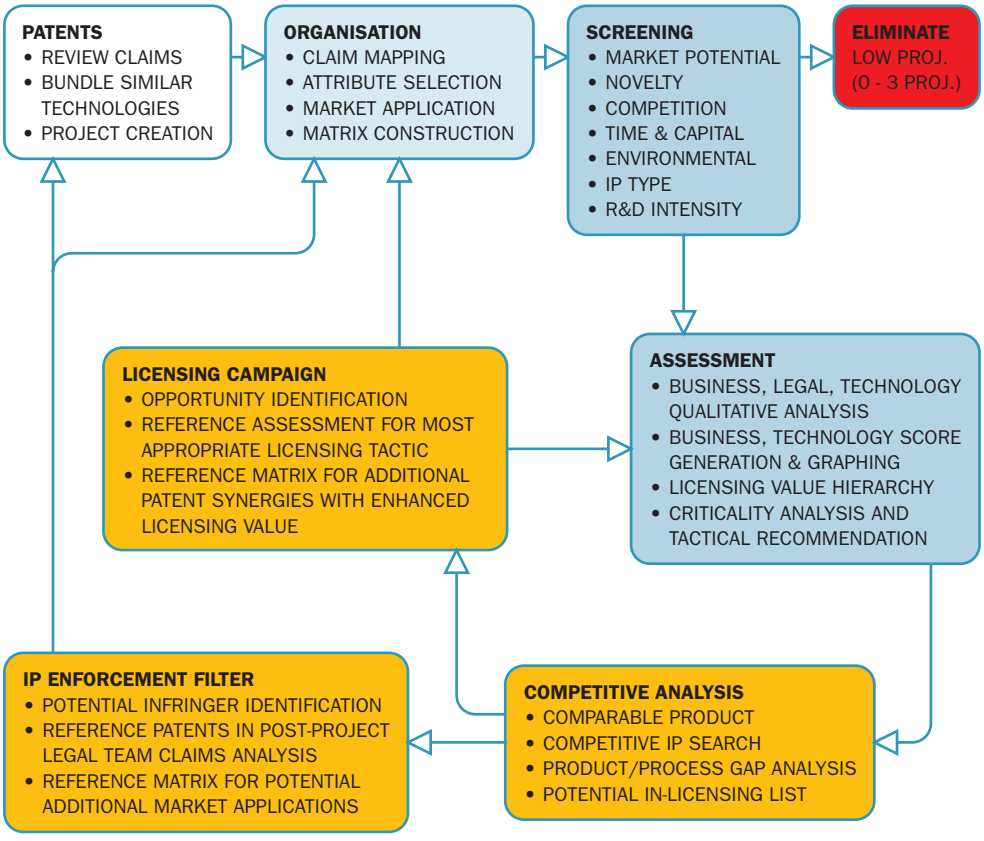
comparable products and processes. It is therefore critical to include in this legal assessment measures of the commitment to continuing expanded protection of IP in the project areas, the breadth and depth of existing claims, and an analysis of the competitive commitment in these respects as well. Quantitative data can facilitate this assessment, and citation tree analysis and patent growth indexing can convey a more concrete portrait of IP protection trends across various industries and individual technologies. Upon completion of this legal examination the nature of legal protection in the overall industry is better understood, and management can tailor patent drafting strategies to maintain competitiveness and increase market penetration.

A third perspective for project assessment is the stage of development of the technology. IP can protect know-how manifested as nothing more than an idea on a sheet of paper as well as a fully commercialised, market-penetrating consumer product. The additional investment required to extract value from the latter is quite small compared to the former, and will influence the ability for such products to be leveraged in the marketplace. Other important considerations to be analysed when assessing the technological aspect of IP are the degree to which a particular product or service could be commercially implemented in international markets, and the extent of competitive research in comparable areas.

The cosmetics of such an analysis are less important than its ability to reliably capture the true nature of a technology-derived product in a valid and robust manner. One example of a platform that incorporates all these analyses in a direct, user-friendly manner provides qualitative multiple-choice statements along a continuum. If a project indicates innovative, value-added products that can be strategically implemented by a company on a global scale and are covered by continuously expanding legal protection, then this project will resonate with the stronger statements of such a continuum. If the opposite is true, and a project generally indicates product substitutes that incorporate public domain know-how, then the nature of this project will resonate with weaker statements. Most projects fall somewhere in the middle, however, and it is important, regardless of the system used, to be honest when scoring this assessment in order to clarify the true tactical value of a project.

By using this type of multiple-choice framework, bias is mitigated because of feedback between business, legal and technical teams. All team members are aware of the rationale behind all possible scoring options and can discuss scoring accuracy. This collaboration of business, legal and technical teams is a core benefit of intellectual asset management and enables the integration of all relevant information in order to identify and quantify the market viability of technology.

Figure 3: **IP portfolio management process**



Hierarchies of strength

Once this in-depth analysis is complete, the scoring of projects suggests a hierarchy of product strength. These scores can then be graphed to convey a linear relationship among the differentially valuable projects. This relationship highlights project comparisons along two axes. One, a business axis, represents the capacity for a business unit centred on a technology-derived product to generate revenue in the marketplace. Information that yields data plotted on this axis should include the qualitative assessments of the degree of strategic business harmony, product differentiation, economic viability, competitive edge and comparable financial successes.

The other axis represents technological strength, ie, the capacity for the technology

itself to add innovative value to the world marketplace. The ability for companies to leverage technologies in competitive industries is dependent not only on the innovativeness of the technology, but also the extent of legal protection. As a result, the legal and technological assessments can be combined to yield one technology score representative of the true capacity for a given technology to be leveraged. Information that yields data plotted on this second axis should include the qualitative assessments of the degree of legal protection and technology viability, as well as the extent of the financial advantage to claims expansion and continued R&D. In addition, the effect of legal protection and technology commercialisation on competing technologies could be incorporated into this score.

Each project score translates into a data point when graphed on the plane formed by the business and technology axes. These points portray a project's overall strength relative to other projects. Projects with similar combinations of business and technological strength will naturally appear near each other on this graph, facilitating the grouping and tactical direction of these projects (see Figure 2). Generally, if a project rates above the 75th percentile of both business and technology scores, it should be considered for commercial implementation. If it is already implemented, expansion of the associated IP and increased marketing can help exploit a clear market advantage. If not, it is generally the case that technologies similar to those supporting the project in question will already be commercialised. It should be relatively simple for the company to determine the feasibility of commercially implementing the project to meet consumer needs and strengthen the market position of the company as a whole.

Projects that score between the 75th-50th percentiles for business but anywhere above the 50th percentile for technology should be candidates for cooperative opportunities such as out-licensing. Tactics of this nature capitalise on the strengths of the company's IP and strengthen the business case for the project by leveraging the tangible assets of other industry players to create truly value-added products and services. Although technology-based companies sometimes pursue out-licensing rather than joint venture as a means for value extraction because of its relatively passive nature, licensing is not always the optimal tactic.

Sometimes, the market potential for a particular project is substantial but the creation or application of the necessary complementary business assets for implementation is best handled by another company. Particularly where a project's business score is above the 75th percentile but its technology score is between the 75th and 50th percentiles, a joint venture or other strategic alliance may be able to more maximise exploitation of market demand. Other times, however, specific assets cannot easily be created or are not required to actualise the project of interest. In these cases, out-licensing often realises more value, especially if the technology is not sufficient to create a product itself, but can add value to a larger system.

If a project scores below the 50th percentile on its technology score but above the 50th percentile on its business score, it suggests that the technology is so early stage that significant development is required before it can be implemented in the marketplace. In this case, detailed feedback can be delivered to R&D teams to facilitate research efforts focused on commercialisable technology. Early -stage technologies of this nature, however, often fall by the corporate wayside because their potential for revenue generation is 10 or 15 years down the road. In cases like this, particularly where the technology constitutes a significant breakthrough or has the potential for industry transformation, a technology manager may consider extracting value through strategic partnerships with the academic community. A university or other non-profit setting with the freedom to pursue early-stage technology could be highly conducive to the development of this technology and the benefit of its future consumers. Utilisation of such methods ensures that no valuable technology is left inactive or undeveloped, and can help managers under increasing financial pressures to achieve important ROI benchmarks.

If a project scores below the 50th percentile on its business score but above the 50th percentile on its technology score, it suggests that the market is especially limited, usually for a variety of reasons, or that the economies of technology development and production are not profitable. Sometimes it is the case that a project's business viability can be improved through new business development efforts, such as enhanced marketing campaigns and revised pricing strategies.

When both scores fall below the 50th percentile, the project represents technology that is simply old and displaced by newer, more innovative products on the market. Intellectual property supporting obsolescence should be maintained only if either the proprietary know-how contains elements of knowledge that can be strategically utilised

towards the production of new technology, or the patent protection effectively blocks competitors from venturing into that field. If the IP contains no such productive or defensive benefit, then it should be abandoned. Divesting valueless patents from an IP portfolio is an important aspect of IP management, alleviating unnecessary budgetary encumbrances and streamlining the portfolio into a more effective and manageable corporate tool.

This assessment tool is useful when examining a portfolio of licensing packages as well. When the target is to license-out all projects, project grouping can be interpreted in the following way. Those projects falling above the 75th percentile for both scores should be licensed on a more limited geographic or application-related scope, so as to not impinge upon the core, product-related revenue of the company. Projects falling between the 75th and 50th percentiles for the business score, and above the 50th percentile for the technology score, should be licensed as broadly as possible, or in the optimal combination of exclusivity and non-exclusivity to achieve the maximum royalty return. Any project falling below the 50th percentile in terms of its business score may represent niche, second-tier opportunities or candidates for abandonment.

Organising the portfolio

Upon the completion of these analyses, the patent portfolio is organised in terms of its business potential and strategic leveraging tactics are suggested for the optimal exploitation of that potential. In order to facilitate successful value extraction efforts further, it can be useful to perform a detailed competitive analysis of the patent portfolios and product lines for comparable companies. Identifying products similar to those suggested by the intellectual asset management projects enables the competition to be recognised. Once the patent portfolios of these competitors are searched and comparable patents denoted, it should be determined which products produced by these competing companies are not supported by corresponding art in their IP portfolios.

Distinguishing product patents from process patents can segment this analysis further by determining how these two types of patents support marketed products. It may be the case that a competitor maintains patents describing the product itself without the process to produce it, or vice versa. If it is the case that vacuums of this nature are present in the operations of competing companies, it is possible that they are in fact infringing upon the art of the company performing intellectual asset management. While not rendering a legal opinion, the portfolio management process can highlight to licensing or legal teams this opportunity to increase licensing revenue, or, less preferably, to engage in litigation to protect the ownership of proprietary technology. Technology valuations can then be fed into linear optimisation programmes to determine, for different combinations of opportunities, the permutation that has the optimal cost-benefit ratio and should be immediately pursued. ■

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