

Welcoming ‘the innovator’s dilemma’ to patent committees

Many organisations struggle to make the most of disruptive innovation emerging from their R&D functions. Patent committees can ensure that potentially game-changing inventions do not slip through the net

By **Peter Kim** and **Anthony Trippe**

Clayton Christensen is a man who “wears many different hats” (according to his website). The Harvard Business School professor is the best-selling author of a 1997 book, *The Innovator’s Dilemma*, about why leading companies fail (and become obsolete) when confronted with disruptive technologies. His ideas have spread to nearly every corner of influence in the Fortune 500, with the exception of one key area of innovation strategy: patent committees. Disruptive technologies do not fare well at patent committees for the same reasons as the innovator’s dilemma – patent committees are set up to support sustaining technologies. But reorganising the patent committee is very straightforward once we understand the nature of the problem.

Although *The Innovator’s Dilemma* was not specifically written to cover patents, this article draws the most important lessons from disruptive technologies to teach us how to better manage corporate patent committees. Patent committees play a critical (and under-appreciated) resource allocation role that can have a significant impact on a company’s innovation strategy; yet they risk ignoring disruptive technologies at their own peril. The profound implications of *The Innovator’s Dilemma*, which clearly affect the CEO’s agenda, also affect the agenda of the

general counsel, chief IP officer and chief technology officer. All of these activities aim to avoid pitfalls in managing corporate-wide innovation.

Christiansen’s book deeply influenced Steve Jobs, a business visionary who himself revolutionised seven different industries. So we expect a major benefit from injecting these same important lessons into a sophisticated discussion of IP strategy. This article invites *The Innovator’s Dilemma* into the inner workings of the patent committee.

As a roadmap of our article, first we review the definition of ‘disruptive technologies’ and the innovator’s dilemma. Second, we provide background on patent committees and the benefits that they bring. Third, to prevent the pitfalls of the innovator’s dilemma at the patent committee, we propose a new solution framework called ‘The Three Ps’ (focusing on purpose, pitch and participants). Finally, we translate top-down innovation strategy to the investment concepts of portfolio risk and diversification.

Disruptive technologies and the innovator’s dilemma

Let us first review the definition of ‘disruptive technologies’ and the innovator’s dilemma (Figure 1). ‘Disruptive technologies’ are new technologies that redefine product performance for customers, (ie, represent a paradigm shift). In Figure 2, we provide examples of disruptive technologies: electronic book readers (including tablets), hydraulic fracturing of oil and gas, semiconductor system-on-chips (SoCs), input/output memory, hybrid cars and social media networking. In each of these examples, the technology redefines product performance in a dramatically different way. Often a

disruptive technology is first adopted for new applications in a small emerging industry, until the technology improves enough to displace legacy technologies used by customers in large established industries. By contrast, ‘sustaining technologies’ are new technologies that sustain the industry’s historical rate of improvement along traditional measures of product performance.

The innovator’s dilemma is that leading companies tend to fail when confronted with the arrival of disruptive technologies. The failures are often due to surprising reasons – not because the leading companies are mismanaged or because a technology is advancing too quickly for a company to keep up (the ‘technology mudslide’ hypothesis). Leading companies fail because they excel at managing sustaining technologies (in fact, this is the historical contributor to success), which turns out to be exactly the wrong approach for managing disruptive technologies.

SoC technology is a poignant case study from the semiconductor industry (see Figure 3). Since the 1960s, the growth driver in semiconductors was attributed to Moore’s Law, an observation by Gordon Moore (co-founder of Intel) about the trend of increasing transistor density. However, in today’s era of mobile computing and smartphones, Moore’s Law has become almost irrelevant. Instead, SoC technology has been the new growth driver for emerging leaders such as ARM Holdings, Imagination Technologies and Qualcomm – at the expense of the industry giant Intel. These SoCs, which are the computing brains inside Apple iPhones and Android smartphones, have already started to challenge industry leader Intel in other core markets, such as server chips. While Intel is currently working to catch up in SoC technology, the prognosis from *The Innovator’s Dilemma* looks grim. The book includes many examples of former industry leaders becoming obsolete by mismanaging the arrival of disruptive technology.

So what does any of this have to do with patent committees? The greatest risk of a patent committee is falling prey to the innovator’s dilemma. In our next section, we provide background on patent committees, the benefits that they offer corporations and an illustration of how they work. We also address some common traps in patent committees that lower their effectiveness. And later in the article, we introduce the ‘Three Ps’ solution framework,

Figure 1. Definitions from *The Innovator’s Dilemma*

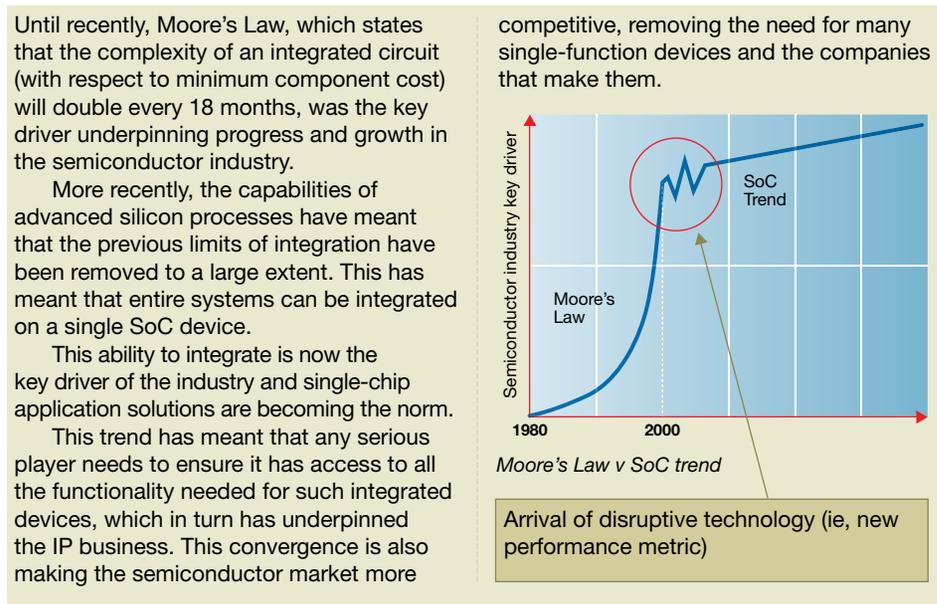
Sustaining technology	Disruptive technology
New technologies that sustain the industry’s historical rate of improvement along traditional measures of product performance.	New technologies that redefine product performance in a dramatically different way.

Note: for sustaining technology, we include new technology applied to new markets (with improvements along traditional product performance measures).

Figure 2. Examples of the innovator’s dilemma by industry

Industry	Sustaining technology	Disruptive technology
Energy exploration	Vertical drilling	Horizontal drilling
Semiconductors	Moore’s Law (add transistors)	System-on-chip (add IP cores)
Computer memory	Cheaper capacity	Faster server access
Internet	Faster webpage access	Bigger social network

Figure 3. System-on-chip (SoC) case study: disruptive technology in semiconductors



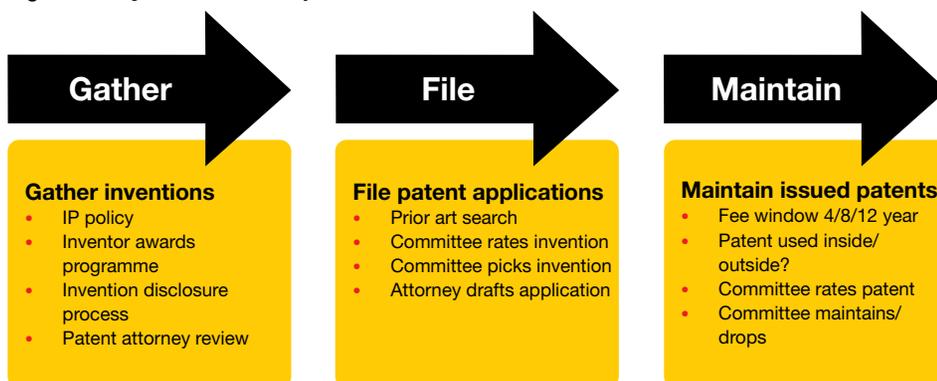
Source: *Imagination Technologies (2005 Annual Report)*

which grafts the most important lessons of *The Innovator’s Dilemma* into the management of patent committees.

Calling a committee

The patent committee is not well understood by top management, but it is an important resource allocation function that wields an outsized influence on innovation strategy. Secondly, patenting decisions

Figure 4. Key functions of a patent committee



also provide organisational feedback to employee-inventors.

Patent committees have three major innovation functions (see Figure 4): gathering, filing and maintaining. Specifically, these functions involve:

- Gathering invention ideas from employees.
- Filing applications for new patents on the most promising ideas.
- Maintaining active patents by paying the regular fees (or inactivating the patents by not paying fees).

Filing a patent application is very expensive, so to stay within budget, the patent committee decides which ideas are worth pursuing. The committee typically includes patent attorneys, scientists, engineers, business managers and product managers.

As an illustration, an employee at a company comes up with an idea and submits his invention to the patent department (in an invention disclosure). First, a patent attorney reviews the invention disclosure. In some cases the patent attorney commissions a prior art search to find out what other similar ideas have been widely published by others beforehand, and compares them to the original idea. At some companies, the inventor has the opportunity to pitch his idea directly to the committee. Finally, the committee decides whether to file a patent application.

Many committees use an invention scoring tool (see Figure 5) based on criteria such as technology value, idea uniqueness, infringement visibility, potential legal breadth, target market size, market growth, projected return on investment and relevance to current customers/revenues. These variables can be weighted based on importance, and the composite score might be required to meet a minimum threshold or ranked against other inventions submitted at the same time. Depending on the outcome of the scoring and voting, the patent committee decides whether to file a new patent application or to reject the invention. Many organisations also have a budget for rewarding monetary bonuses to inventors for submitting ideas and being granted patents.

This process of scoring an idea can have important benefits for large organisations. Patent committees create a rational framework for managing large portfolios of ideas. Small organisations often use a casual or subjective process – in a start-up, patenting decisions might be handled part time by one employee or outside counsel. But for large organisations, it is critical to manage innovation using a scalable process that enables the committee to prioritise thousands of invention disclosures per year. For example, based on a study from the Intellectual Property Owners Association, the top 30 organisations each received over 1,000 US patents in 2012. IBM, as the top holder, received 6,457 patents last year. Prioritising this enormous volume of invention disclosures require a systematic approach.

For example, some critical questions need to be asked. What exactly is the idea? How valuable is the idea? How effective is the idea at solving a problem? Has anyone tried a similar approach before? How different is the idea from earlier similar ideas? Can the idea be implemented using current technology, or does it require significant breakthroughs to implement? Could a patent protect the bigger

Figure 5. Sample invention scorecard at patent committee

Factors	Invention criteria	Score (1-5, low-high)	Weighting	Weighted score
Technical	Technology value	4	0.5	2.0
	Idea uniqueness	5	0.5	2.5
Legal	Infringement visibility	5	0.9	4.5
	Legal breadth	5	0.8	4.0
Business	Market size	2	0.9	1.8
	Return on investment	1	1.0	1.0
	For key customers	3	1.0	3.0
			Total score:	18.8

This is a sample of an invention scorecard used at a patent committee (status quo). Although this approach is very methodical and thoughtful, the drawback is that it emphasises sustaining technology inventions over disruptive technology inventions. The business factors are over-weighted and the technical/legal factors

are under-weighted. Moreover, the criteria for a disruptive technology invention are not addressed at all. We propose that in order to foster disruptive technology, the patent committee should create a new invention scorecard, which could approve patent filings under a separate strategic budget allocated by senior management.

overarching idea or would the patent only protect a small incremental improvement? If someone were to copy this idea, how easily could the copying be detected? Which customers would want to use the idea? How big is the target market? Answering these questions creates a 'triage' framework.

Alan Sorgi, president of Blue Sands Intellectual Property, has created and led patent committees, and believes that picking the 'best' ideas to patent does not only mean picking the best technology solution. In Sorgi's view, it is critical to predict what the competition will do to solve this same problem. Will the competition prefer a solution that is cheaper to manufacture, a solution that is technically less complex? "It is more important to patent the idea mostly likely to become the *de facto* standard, rather than picking the best technology," he notes.

Despite the numerous benefits of formalising the patent committee function, an organisation should watch out for the common traps that lower overall efficiency. As examples of common traps, the patent committee might:

- Have a risk aversion bias.
- Have a preference for simple (and easily communicated) ideas.
- Avoid complicated and misunderstood concepts.
- Be swayed by the strong endorsement value of an influential member.
- Have a forceful personality who dominates decision making.
- Focus on tactical inventions (instead of strategic technologies).
- Make decisions based on a political agenda (instead of a corporate agenda).

Later in the article, we provide a portfolio risk and diversification framework for categorising different types of technology investment and prudently allocating risk based on company size and stage.

However, the greatest risk of a patent committee is falling prey to the innovator's dilemma. Patent committees tend to greenlight sustaining technology inventions to the exclusion of disruptive technology inventions. In our next section, we discuss three powerful ideas on how to manage disruptive technology inventions. And finally we provide a higher-level perspective for CEOs and boards of directors to align technology investments based on portfolio risk and diversification.

New framework: the Three Ps

We recommend rethinking about patent committees using a framework that we

refer to as the 'Three Ps' – purpose, pitch and participants:

- The purpose of patent committees should be broadened to explicitly seek disruptive technology inventions and increase patent budgets for this purpose.
- The pitch to patent a disruptive technology invention should be based on a new set of criteria adapted to disruptive technologies rather than using those for a sustaining technology invention.
- The participants of a patent committee should include advocates of disruptive technologies.

Purpose

We recommend broadening the purpose of a patent committee to think of patents as an insurance policy covering a disruptive technology. Our observation is that leading companies allocate very little of the overall patent budget for disruptive technology inventions, typically less than 5%. (By contrast, small start-up companies allocate nearly their entire patent/R&D budgets to disruptive technologies. And patent decisions are made by individuals instead of a large patent committee.) Large companies prefer to allocate most of their patent budgets to sustaining technologies.

Our opinion is that the traditional purpose of patent committees in large companies is too narrow; protecting against only existing competitors blinds a company to the greater threat of new entrants. However, patents on sustaining technologies are practically useless against a new entrant/competitor using a disruptive technology. As such, the patent budget for disruptive technologies should increase to at least 10% to 20%.

Why 10% to 20%? Selecting a precise patent allocation percentage for disruptive technologies is difficult, but as proxy guidance, three well-known examples

Figure 6. Industry perspective on patent committees

“It's more important to patent the idea mostly likely to become the *de facto* standard, rather than picking the best technology”

Alan Sorgi, president, Blue Sands IP

exist for employee time allocations to side projects and unorthodox innovations. Hewlett-Packard allowed employees to spend 10% of their time on wild ideas (leading to the invention of HP printers). The famously innovative company 3M allows employees to spend 15% of their time to pursue other innovations (leading to the accidental invention of Post-It Notes). Google allows employees to spend 20% of their time on projects that interest them (leading to 50% of the new products launched in the second half of 2005). An alternate suggestion for determining the proper allocation of resources for disruptive technology patenting is provided later in this article.

Pitch

The inventor's pitch to apply for a patent on disruptive technology needs to emphasise very different characteristics from those traditionally used by patent committees. The inventor's pitch or proposal is typically presented directly in person to the patent committee or submitted in writing as a document called an invention disclosure. We recommend using two separate checklists for evaluating disruptive versus sustaining technology inventions. According to Christensen, a disruptive technology exhibits the following characteristics:

- It underperforms in the mainstream market, although other features are valued by new customers.
- It targets a small or undefined market.
- The company's most profitable customers do not want or cannot use it.
- The initial customer is the least profitable customer in the market.
- It has a low projected profit margin and financial return.
- Development costs are low, using off-the-shelf materials/components.
- There is internal fear of cannibalising existing products.
- It is championed by the engineering department, or by staff from a small acquisition.
- The technology is moving faster than market needs (ie, closing the performance gap).

The distinct nature of disruptive technology is sometimes misunderstood because it is evaluated using a checklist for a sustaining technology. However, understanding the differences is crucial to developing effective IP strategies. For instance, a sustaining technology can be managed using financial metrics based on

reasonable forecasts. On the other hand, a disruptive technology defies financial forecasting, because if it eventually replaces legacy technology in a large existing market, the investment will yield a lottery-style pay-off. Or, put another way, a low initial profit margin from a disruptive technology can make sense (from a return on investment comparison) if the disruptive technology becomes the *de facto* standard in the future. The financial uncertainty of disruptive technology can be an acceptable risk if the invention pitch describes the same characteristics as Christiansen's book.

Participants

The participants of a patent committee should be expanded to include advocates of disruptive technology. The three most common advocates of disruptive technology are:

- R&D technologists.
- Engineers dealing with new markets/customers.
- Staff from small acquisitions (fluent in needs of new markets/customers).

These advocates should be empowered to vote on disruptive technology inventions or file the patents through a separate patent budget allocation dedicated to disruptive technology inventions.

In addition, it is important to retain strategic buy-in from two additional corporate departments, by including participants who can advocate disruptive technologies to implement portfolio risk and diversification:

- The executive function (eg, the CEO or board of directors).
- The marketing team

The four biggest objections to disruptive technology inventions at a traditional patent committee are as follows:

- Small/undefined markets cannot address the company's near-term financial goals.
- The patent budget should be used for technology requested by core customers.
- The financial return projections are lower than those for other inventions.
- The new technology might cannibalise existing revenue.

However, the core insight is that a new technology established in emerging markets will someday invade large established markets. Waiting to allow a new entrant to reach that point will give the new entrant insurmountable advantages (lower manufacturing costs, greater design experience, the ability to wage price war).

Advocates of disruptive technology are ideally suited to understand these future threats, to lobby for filing disruptive technology patents, and to prepare for future marketplace shifts.

Some market leaders celebrate the foresight of addressing unknowable future threats. Apple CEO Tim Cook famously stated: “I see cannibalisation as a huge opportunity for us. Our core philosophy is to never fear cannibalisation. If we don’t do it, someone else will.” Apple is a market leader that actively manages the arrival of new disruptive technologies.

Portfolio risk and diversification

We have presented the Three Ps as a solution framework to be implemented at the patent committee. But the top-down perspective of the CEO and board of directors also requires rethinking the role of patent committees more broadly. One way of viewing innovation strategy at a corporate level is by framing the discussion in terms of portfolio risk and diversification.

A key attribute to identifying corporate goals and defining a strategy for leveraging intellectual property within a company is deciding on the performance expectations associated with those assets. Traditionally, in order to increase the amount of return or profit from an investment, a higher level of risk must be assumed by the organisation. The decision on how much risk is acceptable, weighed against the potential for gain from IP assets, should be made at the highest levels of a company, with understanding and approval from the executive staff and the board. In this fashion, a discussion of patent assets and strategy can be moved from the general counsel’s office into the CEO’s. When patents and other forms of intellectual property are treated as investment vehicles, they can be managed using techniques that boards and executives are familiar with and can relate to, and play a meaningful role in their development.

Once a corporate-wide decision is made on the expected returns associated with investments in technology, a strategy can be formulated for accomplishing these goals. Higher returns from technology can be accomplished by developing new approaches to answering existing issues in a market, or by reapplying existing technologies to new markets. High-risk technology investments, with the opportunity either to dramatically increase efficiencies associated with delivering a consumer benefit or to change the way that business is fundamentally conducted, are by their nature game changers, and are

Figure 7. Technology investments: portfolio risk and diversification

Technology categorisation	Financial investment similarities
Sustaining technology (improvement to existing market)	Bond: low risk/return
Sustaining technology (applied to new market)	Stock: moderate risk/return (diversifying industries can lower correlation)
Disruptive technology	Early-stage venture investment: high risk/return

Figure 8. Sample patent budget allocations for portfolio risk and diversification

Technology categorisation	Start-up	New entrant (moderate size)	Leading company (high mkt share)
Sustaining technology (improvement to existing market)	10%	20%	50%
Sustaining technology (applied to new market)	20%	50%	35%
Disruptive technology	70%	30%	15%
Total budget	100%	100%	100%

the basis of Christiansen’s definition of a ‘disruptive technology’. Unfortunately, a high degree of risk is associated with them, since they rarely work out as anticipated. A way to mitigate this risk, to maximise the likelihood of an organisation accomplishing its goals for returns on technology investment, can be accomplished by applying the same principles of diversification that managers use when developing a financial portfolio.

In the financial world, investors seeking steady, long-term growth use diversification strategies to buffer themselves from momentary turbulence that can take place in individual investment vehicles. They will select diversified asset classes, such as stocks versus bonds. For example, traditionally, when one of these begins to decline, the portfolio is compensated for with an increase in the other. Diversified financial portfolios also contain a mixture of investments where there is no correlation between the businesses associated with each. Depending on how risk averse an organisation may be, it will choose its financial portfolio to deliver an expected return with the least amount of risk.

Investments in technology (and their subsequent protection with patents and other forms of intellectual property) can be managed using similar principles. In this case, though, technology investments can be categorised based on their inherent risk and unfamiliarity to the organisation. For example (see Figure 7):

Summary of key points

CEOs (and boards) pay attention to *The Innovator's Dilemma*, and the most important lessons also apply to patent committees:

- The innovator's dilemma is that leading companies fail with the arrival of disruptive technologies.
- There are many fundamental differences between sustaining and disruptive technologies.
- Patent committees have a resource allocation function with an influence on

innovation strategy.

- Patent committees are also susceptible to the innovator's dilemma.
- A solution framework for patent committees is the Three Ps: purpose, pitch and participants.
- Top-down innovation strategy view: portfolio risk and diversification.
- Goal: capture valuable disruptive technology inventions that would otherwise be ignored.

- Making incremental improvements to existing technologies, referred to earlier as sustaining technologies – this can be thought of like a bond, low risk and familiar, but not providing large returns.
- Applying sustaining technologies to new markets – this is similar to a stock investment in a correlated industry where changes in traditional markets can be balanced by making investments in alternative industries that offers low correlations.
- Developing disruptive technologies, either in existing industries or for likely high-value markets for the future – this is similar to a venture fund or angel investment where the earlier the investment is made, the larger the opportunity for explosive growth, but with the inherent risks associated with early-stage investments

Companies can meet corporate expectations for returns on intellectual property and determine the right mixture of technology investments if they consider which combination of these categories they will try to achieve with their research initiatives. Once this strategy is developed, it can be employed by both research managers and participants within the organisation's patent committee to ensure that the resulting patent portfolios are maximised to achieve their stated objectives.

Looking at some examples, we can imagine that organisations at various stages in their corporate lifetimes might want to create custom portfolios to match their desire for growth versus their interest in assuming risk. Companies that are just getting started, for instance, are looking for rapid, explosive growth and thus will be interested in devoting the majority of their resources to developing disruptive technologies. At the same time, they would be well served by also

acquiring or creating technology that can be applied to existing markets, so that they can begin to generate a revenue stream while they are waiting for their longer-term investments to pay off. For a start-up company, a mixture of patents where the basis of the start-up (or a large part of its business plan) is predicated on disruptive technologies, with the remainder devoted to incremental improvements or reapplication of existing technologies to new verticals, will provide for the opportunity to generate explosive growth while keeping the bills paid with some steady revenues.

Bigger companies that are still relatively young might consider a different mix of patents in order to stabilise their risk profile while still providing continued growth. In these circumstances a nice mix of investments might include only a 30% stake in disruptive technologies, with 50% invested in applying existing inventions to new markets and the final 20% devoted to incremental improvements. For companies at this stage, their strategy will still rely on high-risk disruptive technologies, but more resources should be devoted to growing the business beyond the initial market (see Figure 8).

A final example could centre on an established market leader with a large, established customer base and shareholders that are expecting steady growth with low risk. In this case, a 10% to 15% investment in disruptive technologies might suffice in order to ensure that the company is investigating new items that could potentially impact its business, but the majority of the effort can be applied to expanding its markets and ensuring that existing markets continue to be well served by the latest improvements.

In each of these instances, the decision on how much risk can be assumed should be influenced by the competitive environment in which the company finds itself and how other market leaders in the industry make similar investment decisions. One way to evaluate a competitor's portfolio diversification is to engage in a patent landscaping or analysis study, looking specifically at how much investment a competitor makes in disruptive technologies. Studying the mix of technologies pursued by a competitor can provide key insight into the level of risk they are willing to maintain while still concentrating on their core businesses. Companies that have employed a long-term growth strategy with their patent portfolios can be identified by the level of

Action plan



In order for the patent committee to survive (and thrive) amid disruptive technology, a company must:

- Apply the innovator's dilemma to its own industry to identify historical performance measures.
- Identify past disruptive technologies and potential future disruptive technologies.
- Restructure the patent committee using the Three Ps solution framework.
- Drive patent and IP strategy as top management agenda for resource allocation.
- Employ risk and diversification strategy to determine mixture of technologies in the portfolio.

diversification they pursue. While further discussion is beyond the scope of this article, it is also important to keep in mind that building diversified, custom patent portfolios can be something of an art form. Suggestions for means either to acquire or organically develop a patent portfolio that fits a particular risk and growth profile may be addressed in future articles.

First responders

Many areas of IP strategy contain insights that impact on broader corporate strategy. CEOs can use patent landscaping techniques to forecast R&D trends and provide competitive intelligence. Boards of directors can borrow patent litigation maths tools (also used by the infamous MIT Blackjack teams) to inform M&A budget allocations. Corporate strategists can imitate IP licensing ecosystems in order to drive adoption of new product lines. Understanding inventor incentive programmes can enhance organisational restructuring efforts. IP strategy remains an untapped resource for inspiring corporate-level strategy.

The Innovator's Dilemma is a revolutionary strategy that shows leading companies how to respond to the arrival of disruptive technologies. This article shows patent committees how to proactively manage disruptive technology inventions, both by using the 'Three Ps' solution framework and by viewing innovation strategy in terms of portfolio risk and diversification. The desired outcome of this article is for companies to better capture inventions of disruptive technologies that would otherwise be ignored. The resulting intellectual property will be the foundation of new value creation and revenue growth, thereby avoiding the perils of the innovator's dilemma. **iam**

Peter Kim is principal at Irvine Pointe Advisory, LLC

Anthony Trippe is the managing director of Patinformatics, LLC

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