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The Impact of Stronger IP on the Business Model

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How to Thrive in the New Innovation Landscape

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The Impact of Stronger IP on the Business Model

In the last chapter, we saw how patent protection had strengthened considerably in the past twenty-five years. This creates a new environment for business models and suggests that every company needs to pay closer attention to its IP than it used to. Protecting ideas is costly and time consuming, but it has become too important to innovation to neglect. To complicate matters further, there are new players emerging whose business models are focused on extracting value for any of their IP that may be involved in your innovations. And there may be instances where your business model may dictate that you *not* protect all of your ideas, in order to create value for your customers and collaborators.

In this chapter, we will explore how to link your IP protection to your business model. We will also explore how you can leverage underutilized IP coverage that you have to either enter into new markets or obtain revenues from others in those new markets. And we will consider how an Open Innovation approach to IP might preempt some of the threats from firms specializing in IP licensing.

We will begin by looking at individual patents and technologies. Then we will examine value chains and patent mapping, which connect a number of patents and a number of technologies. Then we

will consider the role of the technology life cycle in how to manage patents and IP. While many companies have grappled with these concerns, two things are missing from the ways that most companies manage IP. First, companies must connect the management of their IP to the underlying technology life cycle of that IP. Second, companies must change the management of intellectual property surrounding the technology in different stages of the technology life cycle. Those two often-overlooked aspects are explored here.

PROTECTING INDIVIDUAL PATENTS AND TECHNOLOGIES

Choosing how to protect one's technology and ideas is a challenging and complex activity. There are many legal and economic considerations that must be taken into account.[1] Before developing the connection between technology, the business model, and IP management, it is good to develop some foundational concepts. I will begin with what patents do and do not protect.

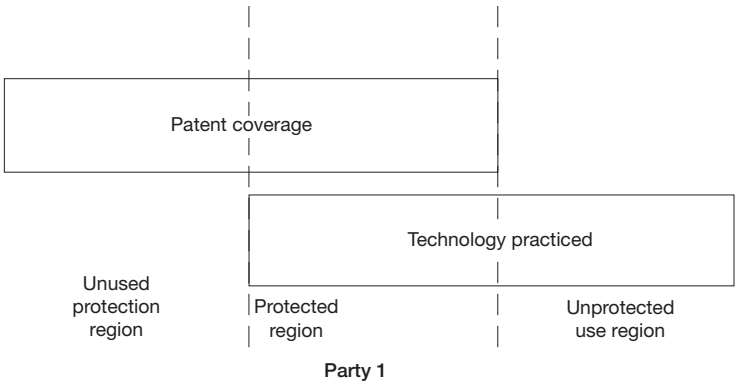
While it is well known to legal experts, most managers do not realize that patents do not directly protect technologies. Patents may cover aspects of a technology that are embodied in a product. But the technologies in the product, and those used to make the product, may not align entirely with a company's patents. For the sake of what follows, I am assuming that the patents in the analysis are valid. (In many patent infringement cases, however, the defense usually claims that the patents in question were wrongly granted and therefore not valid.)

To illustrate what protection patents provide, consider the series of figures, figures 4-1 through 4-3.[2] In figure 4-1, I have created a schematic representation of a technology and its associated patent protection. The two are drawn deliberately such that the practice of the technology, and the protection for that technology, are not entirely aligned.

There are three regions of interest in the figure. The middle region is the region where the patent coverage and technology coverage overlap. Uses of the technology in this area are protected by the patents held by the firm. This is the conventional assumption made

FIGURE 4-1

Evaluating technology alignment with patent coverage



by most managers—that they can practice their technology safely, due to their patent protection. (In practice, the protection may be provided by many patents, rather than just one. I suppress this to simplify the presentation of the argument.)

The region on the right, though, is a region where the technology is practiced (i.e., it is being applied to solve a real problem) without any protection from patents held by the firm. This is an unprotected region. Companies deploying a technology in this space are running a risk that someone somewhere else might have a patent that covers (or "reads on," in industry parlance) that usage. The left-most region is also typically neglected by most managers. This is an area where the patent provides coverage, but where the technology is not currently practiced. This can be thought of as "unused protection" because the scope of the patent coverage extends beyond what the company is currently using. In contrast to the unprotected region, this is a region of latent potential value, because that coverage could support extensions of the technology in that area or might provide licensing opportunities to other firms that might be operating in that space.

Figure 4-2 introduces a second party into the analysis. That second party also has some patent coverage and a region where its technology is useful. Like the first party, the alignment between the patent

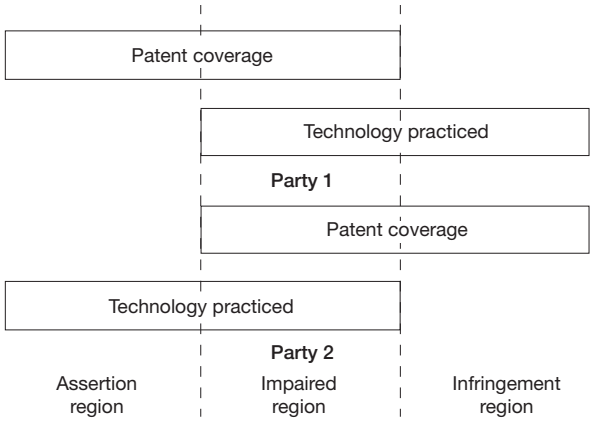
coverage and the usefulness of the technology is not complete. For ease of exposition, I have drawn the second party's position to be symmetrically opposite that of the first party. This makes the analysis much easier to explain, but each party's position is unlikely to be so symmetrical in reality.

The presence of the second party forces us to be clearer about what protection patents actually provide. A patent is a legal right to exclude others from practicing a technology when you own a patent that covers that technology. It does not actually grant you permission to practice the technology yourself. In order to have what industry calls "freedom of action," you must be sure that no other companies' patents cover your technology.[3]

Figure 4-2 illustrates this situation. The middle region that formerly was protected for party 1 is now transformed. The presence of party 2's patents now makes this region impaired for party 1. That is, party 1 cannot simply practice its technology as before in this region because party 2 also holds valid patents that read on this area. Party 2 may have the ability to block party 1 from using its own technology here or may choose instead to charge a fee for allowing party 1 to use its own technology.

FIGURE 4-2

Complex technology alignment when two parties have conflicting patent claims



The right-hand region that formerly was unprotected has now changed to an infringing region for party 1. Party 1's practice in this region directly infringes on party 2's patent rights. Party 1 is vulnerable to party 2's enforcement of those rights.

The left-hand region that formerly was unused protection has now evolved into an assertion region for party 1. That is, party 1 has valid patent claims here that cover party 2's practice of party 2's technology. Here, party 1 has the choice of how it wishes to assert its rights and can charge a wide range of monetary amounts to enforce those rights (recall how TI much profited from its patents in chapter 3 by licensing them to other firms). However, the firm does not have to license. If it prefers, party 1 can simply deny party 2 the right to use party 2's technology in this area (as we saw in Polaroid's victory over Kodak, in which Polaroid forced Kodak to exit the instant photography market).

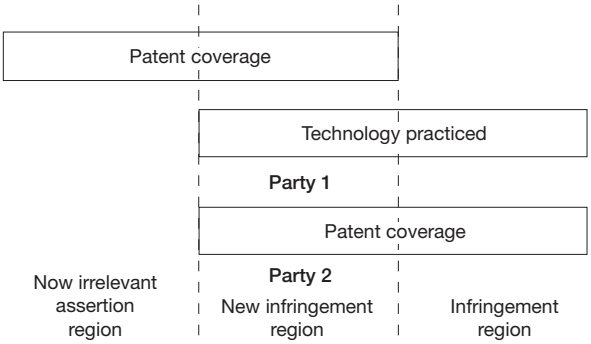
The stage is set in figure 4-2 for a grand bargain: party 1 and party 2 agree to cross-license each other so that both can practice their respective technologies without having to fight patent infringement litigation with each other. This cross-licensing is a common practice in complex industries like semiconductors, where every company must use the technologies of many other companies to make products.[4]

Now consider a slight modification to figure 4-2, shown in figure 4-3. Here, party 2 has the same patent claims as in figure 4-2, but in this case, party 2 is not making any products and is not practicing any technology. This subtle change dramatically alters the circumstances of figure 4-2. There can be no grand bargain here in figure 4-3 because party 2 is not at risk for losing the ability to practice its technology. Party 2 is a pure-play IP company whose business model focuses exclusively on IP and nothing else. Examples of such pure-play IP firms include ARM or Rambus in the semiconductor industry, NTP in litigation over Research In Motion's BlackBerry, or Dolby in the consumer electronics and entertainment industry. Other examples also include the so-called patent trolls that we discussed in the previous chapter.[5]

The pure-play IP business model does not value a cross-license; it wants cash compensation instead. In figure 4-3, this is shown in two ways. First, the infringement region for party 1 expands to include the

FIGURE 4-3

Complex technology alignment when second party holds IP, but does not practice technology



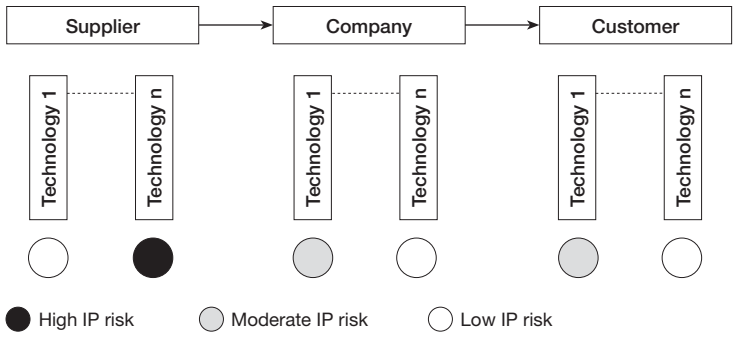
middle region. And second, the previous assertion region for party 1 is now irrelevant because party 2 is not practicing any technology covered by party 1's IP. This is a far more dangerous business model to confront for party 1 because its earlier ability to barter access to others' IP with its own IP is no longer effective. Correspondingly, this business model potentially increases the economic value of party 2's IP by removing any commercial activities that could be held hostage (assuming that there was some risk of infringement from those activities) in a negotiation with party 1.

MAPPING YOUR SITUATION

How does a manager know what his or her situation is, with regard to these different regions? The basic tool used to assess these questions is called "patent mapping." This mapping examines all of the granted claims of an issued patent and considers where they might apply. It then examines other patents from other patent holders to see where their claims might apply. This is an expensive exercise, and the resulting analysis is not nearly as neat and precise as figures 4-4 and 4-5. It has become increasingly essential, though, in creating and managing business models in many different industries.

FIGURE 4-4

A patent map of the value chain

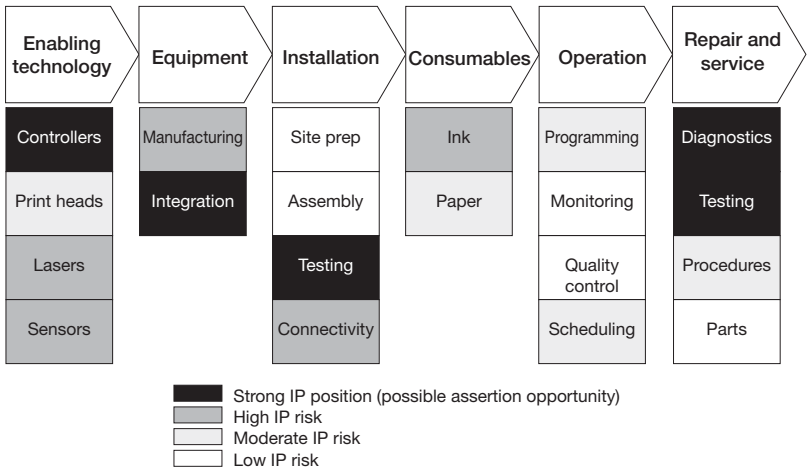


The earlier analysis looked at one technology in isolation. A more realistic analysis, and one that is increasingly common in many companies, is to map the entire value chain for a company.[6] At a minimum, such maps examine the company and its direct competitors, and then include the company's suppliers and customers (and often those customers' respective direct competitors as well). Figure 4-4 provides a simplified illustration of such a patent map.

In essence, figure 4-4 shows where companies are protected or exposed in different parts of the value chain. The earlier analysis of potential patent infringement of a technology being practiced in figures 4-1, 4-2, and 4-3 would be performed at each node of the value chain in figure 4-4. For simplicity and ease of communication, companies will often use black, gray, and white (or, equivalently, red, yellow, and green) to indicate the level of exposure that they face at each stage of the value chain. Black areas in the value chain indicate areas where the continued practice of the technology is at risk of infringing one or more patent claims of another company. Gray areas indicate areas of caution, where there may be some risks or challenges. White areas indicate areas of freedom, where the company can continue to operate with little or no risk to its business. In figure 4-4, the company itself faces a moderate risk on one technology (technology 1) and a low risk on another technology (technology *n*). And its customers

FIGURE 4-5

IP mapping value chain analysis: printers



and distribution channels face a similar level of risk. However, there is a serious IP risk in the company's supply chain, as shown by the black circle for technology *n*. If the supplier is challenged on this technology, the supplier may not be able to continue its supply of that item.

Figure 4-5 shows an actual patent map of a value chain of printers, done for a company that makes specialty materials that are used in the printing market. It shows that this organization faces a number of areas where it is potentially exposed in different parts of its value chain. Some of the risk lies within its own business. But other risks lie within its supplier base (such as sensors and lasers, where those suppliers could be held up or even shut down for alleged infringement) or within the firm's customers (especially in the consumables area) and distribution channels.

These maps can reveal opportunities, as well as risks. There are areas in figure 4-5 where the company enjoys a strong position, primarily in integration and testing, which might be opportunities for product line extensions or external technology licensing. These could be leveraged to enter into adjacent markets, to generate revenue from licensing, or to neutralize some of the risk areas elsewhere in the

value chain. And these are not mutually exclusive possibilities; the company could also combine two or more of them. The firm could also secure better terms from suppliers if it could provide some IP coverage to those suppliers in areas where the suppliers are exposed. Similarly, IP rights could become additional items in negotiations with customers and distribution partners to achieve better terms.

The clear message of figure 4-5 is that firms should not only think about their IP situation in their own business but also consider IP risks in other portions of the value chain.

Patent maps are snapshots of a company's situation at a single point in time. These proactive approaches become even more interesting in a dynamic context, which will be explored further in the next section. The question of whether to protect ideas, and how much to protect them, will be shown to vary over the technology life cycle.

THE DYNAMICS OF IP MANAGEMENT: LINKING IP TO THE TECHNOLOGY LIFE CYCLE

One thing that is well known and well accepted among those who study or work in technology is that technology changes rapidly. Some have defined a technology life cycle (TLC) to help describe the underlying patterns in the constantly changing world of technology. What has not been done to date is to link the management of IP and the business model to the TLC.

The proper management of IP should vary with the stage of the relevant technology in the TLC underlying that IP. Currently, most companies use a one-size-fits-all approach to managing IP, effectively ignoring the underlying technology life cycles. This is a mistake. IP management should align with the stage of the technology in question and help shape the subsequent stages of that technology's development. First, we will examine the life cycle concept in some detail and introduce the IP life cycle model. Then we will explore the implications of this model for the differing ways to develop business models and manage the intellectual property associated with the technology.

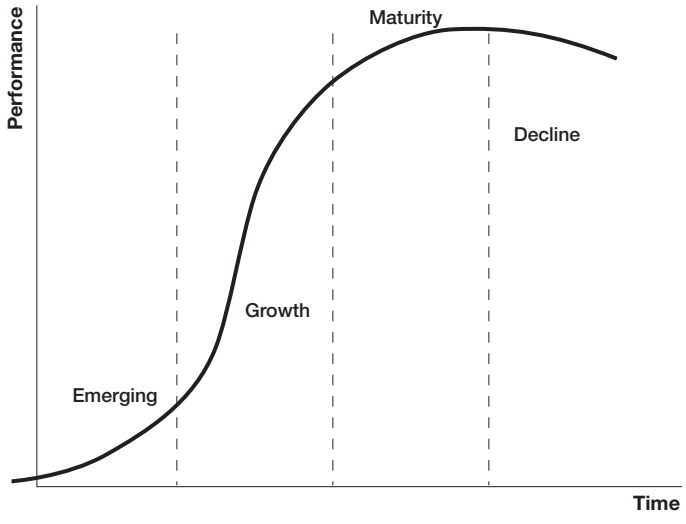
The technology life cycle is one of the most fundamental aspects of managing technology. The idea goes back to the seminal research of William Abernathy of Harvard Business School and James Utterback of MIT, and has been widely embraced by other scholars since.[7] This line of research has shown that technology does not simply develop at a single, straightforward pace. Instead, there is an initial period where a wide variety of technologies vie for acceptance in the market, a later period where the winning or "dominant design" technology establishes itself in the market, a third period where the technology matures, and a final period in which it becomes obsolete.

The notion of technology life cycles can be well explained with a simple *S* curve (or "logistic curve," as it is sometimes called). In figure 4-6, the performance of a technology is graphed on the *y*-axis, while the *x*-axis shows the time since the technology first appeared. Four distinct stages in the technology's evolution may be observed.

In the first stage, the technology is just beginning to emerge. Its rate of improvement is modest at best, and it takes some amount of time to eke out even this modest performance advance. This stage comes be-

FIGURE 4-6

Stages in the technology life cycle



fore the emergence of a dominant design, so there are a wide variety of potential technologies. In automobiles, for example, there was a time in the very early 1900s when gasoline engines vied with steam and electrical engines to be the dominant power plant for motor vehicles.

The second phase is the growth phase; this is where technologies catch fire and grow explosively in performance. In the terms of academic scholars, the "dominant design" of the technology has taken root, causing the industry to focus its innovative efforts on how to advance the technology within the dominant design. Customers now find the technology to be a powerful solution for at least one pressing problem they face, and companies begin to incorporate the technology into portions of their business. The market then takes off, generating very rapid growth in units and in revenues. To stick with the automotive example, the gasoline engine became the dominant design for the power plant of the car, so innovations began to focus on how to increase the horsepower of the engine. Henry Ford's Model T, and the later Model A, are examples of products in this phase.

The third phase of the curve is the mature phase, where the market growth slows down and the industry reaches its maximum levels of revenue for the technology. At this stage, the technology is well understood, the leading players are well established, and there is little or no entry by new firms into the industry. The technology itself begins to subdivide, creating new niches of opportunity for novel applications of the technology, and penetration is now widespread around the globe. Within the auto industry, this might correspond to Alfred Sloan's segmentation of the auto market into different categories of vehicles and price points. More recently, the rise of sport-utility vehicle and minivan categories could be seen as outcomes of a mature phase of the industry. Customers now show real interest, as the technologies are proven and reliable. Customers themselves are able to innovate by creating new ways of applying the technology to their business problems.

The fourth phase is the declining phase of the technology. In this phase, the technology's rate of performance improvement reaches a plateau. Often, a newer technology has arisen to take the place of the earlier technology, substituting for the functions performed by the earlier technology. While cars continue to grow and advance, albeit

slowly, there are examples of declining technologies within the industry. One such decline was clearly seen in the response of U.S. tire manufacturers to the advent of radial tires coming into the industry from Europe. Relative to the performance offered by radials, bias-ply tires simply couldn't advance much further and eventually conceded the entire market to the newer belt technology.[8]

This view of a technology life cycle is necessarily a simplification of the complexities of technological evolution. But the model shows some important features that will be important for the analysis of crafting business models and managing IP. One important feature is the necessary emergence of a dominant design to spur the growth of the technology in the market. Another important feature is that technological performance is of critical importance early on, while quality, volume, and cost become more critical to success later on. A third important feature is the high number of newly entering firms in the first two stages and the lack of such entries in the final phases.

Perhaps the overarching implication, though, is that companies cannot manage technology in the same way throughout each of the phases of the cycle. The key success factors for the technology in one phase are *not* the key factors in a different phase. Instead of using a one-size-fits-all model of technology management, a company instead must adapt its management of technology to the phase of the cycle in which it competes.

THE IP LIFE CYCLE MODEL

The very same logic of avoiding one-size-fits-all needs to be applied to business models and the management of intellectual property as well. Just as one should not manage technology in the same way in each phase of the technology life cycle, so too one should not manage IP covering that technology the same way throughout its legal life. As with the management of technology, the management of IP should be tailored to the phase of the technology life cycle that the IP covers. I call this tailored approach the "IP life cycle model." Here is how the model works:

- In the initial stages of a new technology, companies must invest in creating IP and choose the best method to protect

that IP. That choice will depend on the role that the new technology might play in the company's business model.

- In the next phase, the company will deploy the technology and go to market. Options to take the technology to market include partnering to obtain distinctive capabilities required to complete the offering and accessing necessary complementary assets to support the offering.
- In the third phase, the company will consider how to harvest the fruits of the technology. While this certainly includes using the technology within the company's own business, the possibilities extend well beyond, to include competitors, customers, suppliers, and third parties in other markets. There are both revenue and profit opportunities that promote external licensing or spin-offs in many cases, as well as strategic considerations that might limit the outside licensing of the technology in other cases.
- In the final phase, the company will manage its exit from the technology. This might be forced by the expiration of legal protection for the IP (note that while patents and copyrights expire, trade secrets do not). Or the exit might also be motivated by the introduction of a new, improved technology that replaces the earlier technology. In these cases, the legal protection for the IP may extend well beyond its value in a use within the original business model. However, the IP may remain quite valuable to another company's business model in a different use.

Let's explore this process in more depth and see how IP might be managed uniquely within each stage.

Emerging Phase

In the initial stages of a new technology, the management of IP will depend greatly on whether the technology fits well with an existing business model. If it doesn't, the business model that makes the best use of the technology may not be apparent and will have to be discovered.

In the former instance, the management of IP is straightforward. The company should seek as much IP protection as it can afford, and it should aggressively develop the technology. When Texas Instruments developed its microprocessor patents, which we saw in the previous chapter, it already had a strong original-equipment-manufacturer (OEM) business model to sell chips to the consumer electronics and computer industries. TI could make these investments with the knowledge that the other elements of its business model already fit well with the technology. Important aspects of the business model—such as the distribution system, the manufacturing and operational processes, and the service and support elements—act as complementary assets in this phase. The brands and trademarks already owned by the firm may extend to cover the new technology. The fit with such complementary assets provides additional assurance that the company will be able to profit from the investment in the technology.[9]

When Apple began the development of its iPod player, it faced many risks. Could its player compete with the other MP3 format players that were already out there? Could its iTunes store, which used a proprietary format to download music, become the preferred place for content owners to list their titles? If Apple could engineer a better user experience, would its more proprietary business model (when compared to MP3 players using free music services that downloaded music illegally) fit with downloadable music?

Apple essentially bet that the answer to these challenges was yes. The company's business model is centered around offering a superior user experience as a value proposition. Apple knew from its many years in the PC business that its Macintosh technology was easier to use and easier to learn, and that Mac users believed they were receiving a superior experience. Apple could bring a similarly superior user experience to downloaded music, played on a handheld device. Moreover, its iPod used many other elements of its business model in operations, distribution, marketing, and sales.[10] Its IP is strongly protected, since Apple can keep the internal elements of its solution proprietary, enabling it to operate with trade secrets, patents, copyrights, and trademark protections. Apple's surrounding complementary assets in its business model provided further protection,

which was one reassuring aspect of its business model to the music companies that would provide the content.[11]

But there will be other times when a technology does not fit with any established business model and a new business model must be created to commercialize the technology effectively. When Kodak first started working on digital photography, it quickly mastered the technology but struggled to figure out where it could make money. There was no equivalent to the film that Kodak used as its primary source of profits from chemically based photography.

Closer to the iPod space, RealNetworks developed some excellent technology to act as a streaming media player, able to play both MP3-formatted music and digital video content. Its RealAudio and RealPlayer, respectively, enable users to play music and video in a variety of formats. RealNetworks was a start-up and had to figure out a business model that would best allow it to compete with its technologies. The company experimented with a variety of approaches, from selling the standalone player, to bundling it in with subscriptions, to providing specific audio and video content, to creating radio over the Internet, and, later, to enabling computer gaming over the Internet.

In the beginning, Real needed to establish itself as the first and biggest streaming media technology and to try to become the industry standard. Its IP strategy was to brand its player and open up its interfaces while retaining proprietary control over the internal code. But the key strategic goal was to get its RealAudio software established as the de facto standard (i.e., the dominant design) for streaming audio content, and later, to get the RealPlayer software similarly ensconced as the de facto standard for streaming video content.

In this emerging phase, when a company lacks an appropriate business model at the outset, and there is no dominant design that determines how the technology will unfold, IP protection is secondary to the strategic mission of finding the business model that can best commercialize the technology. Indeed, a company often does not know the best use of a technology at the outset, and so it may be unclear how best to protect that technology for that use. There is little value in very strong protection of a technology that has lost the race to be the dominant design.

Growth Phase

In the next phase, the company will deploy the technology and go to market through a business model. If the company's technology wins the competition to be the dominant design, its technology and business model will likely be widely copied throughout the industry. Winning this competition requires successfully practicing the technology and developing the considerable know-how required to incorporate the technology into the customers' own business, often fitting the technology into a larger system. Significant tacit knowledge is built in doing this.

If the company's technology has not won, there is strong research that shows that it usually is futile to hang on to the approach that lost the race to be the dominant design.[12] Instead, it is best to either withdraw from the industry altogether or shift over to the winning design. In the latter case, the company needs to access the IP of the dominant design, as well as the associated know-how needed to practice the technology effectively. While reverse engineering and hiring away employees from the winning rival firm may help, the losing firm's IP may also be enlisted here. That IP may provide a bargaining chip to gain a license on attractive terms to the winning technology. Alternatively, the losing firm may prefer to exit the industry and receive some licensing revenues for its IP, a sort of consolation prize for losing the race to be the dominant design.

For the winning technology, intellectual property management in this phase takes on a dual character. The first portion of IP management was to support the company in its ability to make its technology become the dominant design. This may have caused the firm to consciously share much of the technology with other firms, in hopes of recruiting more firms to rally around its technology. In this second phase of the IP life cycle, the second portion of IP protection comes into play. Here, the firm seeks to capture a portion of the value created by the now dominant design.

There is a natural tension between these two elements of IP management in this phase.[13] As has been observed in many technology competitions, one can win the battle of becoming the dominant design and still lose the war to capture the value from this victory.

Rambus, the pure-play DRAM IP company we saw in the last chapter, started out by trying to set a standard with its technology. Only after that effort did not succeed did it shift to an aggressive licensing model to generate its profits.

The IBM personal computer is another example of this tension. The PC triumphed as the architecture that defined the evolution of personal computing since its introduction into the market in 1981. And for the next few years, IBM watched its architecture move its market share past Tandy, past Commodore, and even past Apple to become the dominant share supplier of PCs by 1985.

IBM also had crafted significant protection of key portions of its intellectual property for its PC. It had a strong brand, both for its corporate identity and for its PC product (those readers past a certain age may recall the Charlie Chaplin–esque, "little tramp" advertising theme). It also had patents on many elements of its computer design and carefully fenced off its ROM BIOS code that connected the DOS operating system with the PC hardware. As it happened, companies such as Compaq and Phoenix Software realized that they could legally reverse-engineer this code without violating IBM's intellectual property. While this was expensive and time consuming, once they succeeded in this effort, dozens of companies (which bought ROM BIOS chips from Compaq and Phoenix Software) could now offer truly compatible computers to IBM.

Thus IBM won the battle of becoming the dominant design. In 2004, however, the company threw in the towel and sold its PC business to Linova, a PC manufacturer based in China. The war *within* the IBM PC industry architecture over the long run had been won by others, such as Dell and HP (which bought Compaq). IBM's efforts to manage its IP succeeded in establishing the dominant design. Those efforts failed to enable IBM to protect enough of its technology to retain industry leadership two decades later.[14]

The iPod must also strike the right balance, now that the device is strongly in its growth phase. If it loses control of its architecture entirely, it could face the fate of the IBM PC. If it keeps too tight a grip on its proprietary approach, other, more open approaches will eventually overtake it in the market (as happened back in the 1980s with the Macintosh versus the PC).

Mature Phase

In the mature phase, the bulk of the market growth has already occurred. Instead of positioning itself for the future, the company must now focus on how to harvest the fruits of the technology today. As product lives shorten in specific markets, maturation encourages companies to begin to entertain other uses of the technology in newly emerging segments within the industry, and even in wholly different uses in other industries.

In the technology life cycle literature, this is the juncture where the basis of technical competition shifts from superior product technology to superior process technology. In part, this is due to the increasing difficulty in differentiating one's products from those of rivals. In part, however, there is now enough widely shared information throughout the industry that vertically integrated organizational structures confer fewer benefits, while more specialized and focused parties within the value chain (with highly optimized processes for those elements of the value chain) become increasingly competitive.

This phase ushers in a variety of innovations in business models, even as the technological differences diminish. Companies now craft many alternative business models, often involving new arrangements with competitors, customers, suppliers, and third parties in other markets. In the PC market, for example, the Dell Direct model emerged to become a dominant force as the industry matured. Taiwanese companies began to manufacture PCs and laptops to the specifications of the big-name computer manufacturers. Other companies started to reverse-engineer the printer cartridges of successful companies like HP.

This phase also ushers in a different objective for managing intellectual property. It is no longer enough for IP management to establish and defend the company's business model within the industry. IP management must now support the application of IP to new segments within the current industry and seek out new applications of the IP in other industries. Polaroid, for example, pushed its instant photography into many commercial applications, such as identity badges and security documents. Kodak for its part pushed its film technology into many parts of medicine, to provide high-quality images for patient diagnosis.

In many cases, those applications will not be pursued by the company owning the IP but instead will be realized by other companies. Overly restrictive IP management strategies will impair the search for these new uses of the company's technology. Proactive and appropriate strategies, however, can help the company identify and exploit these new opportunities. Business models for these new areas of application must take account of the value provided by the new application partner, as well as that of the technology provider.

In later stages of its evolution, RealNetworks has moved increasingly into content and services, now relying on exclusivity in access to content for particular display media (such as PCs and wireless devices such as cell phones). As streaming media has matured, Real has moved its player software (as opposed to its content) toward an open source approach. This increases the number of developers building on Real's technology, even as it loosens Real's ability to control the direction of the RealPlayer software technology.

It is likely that Apple's iPod will have the opportunity to be useful in a variety of applications well beyond the playback of music and video. But Apple will have to be quite agile and adaptable to find the right mix of protection and openness to penetrate these newer application opportunities in a profitable way.

Decline Phase

In the final phase of the technology life cycle, the technology no longer has much, if any, value in the original market. This might be forced by the expiration of legal protection for the IP. More commonly, though, in rapidly advancing industries, the market value of a technology expires long before its legal protection lapses. This typically occurs when there is the introduction of a new, improved technology that replaces the earlier technology. As product lives shorten in many industries, this latter force increasingly comes to the fore.

At first blush, the decline phase might seem like the least interesting phase of the cycle. The key battles have been fought, the winners have emerged, and there is little or no prospect of additional market growth. Meanwhile, newer technologies are entering into the market and obsoleting much, or all, of the value of the current technologies.

In fact, though, alert managers are crafting business models that employ many profitable ways to extract value from IP that might seem to be of little value. GE exited most of its electronics businesses (televisions, radios, stereos, etc.) a long time ago. Yet one can still readily purchase GE brand products of many kinds, thanks to a clever deal GE did with some Asian manufacturers to supply these goods under the GE nameplate. The manufacturers do all the R&D, manufacturing, marketing, sales, and distribution, and pay GE a royalty for the use of its IP (here, the GE trademark). GE takes no business risk, requires no assets to support this use of its IP, and receives a nice royalty for its name. This is a very profitable business model indeed! And it came from GE's choosing to exit a declining set of businesses that it felt were no longer strategically attractive for the company.

IBM is another company that has made some very profitable lemonade by getting out of businesses it felt had become lemons. When IBM exited the PC business, it found that it had some tremendous IP assets that it could leverage against the leaders in the PC business, such as Dell and Linova. In the case of Dell, IBM packaged its IP assets together with a long-term deal to supply various IT services to Dell and announced a relationship that will result in many tens of millions of dollars being paid to IBM. In the case of Linova, IBM also receives more than $1.7 billion in payment, plus expanded access in China for IBM's IT services businesses. By closing one door (its PC business), IBM has opened another door (its IT services offerings in China). A third exit came in the switches and router business, where IBM was competing against Cisco Systems without much success. When IBM closed its business, it licensed some of its IP to Cisco (again bundled into an announced agreement to sell IT services to Cisco) and received many tens of millions of dollars.

These examples illustrate the value of alert IP management in the declining phase of the IP life cycle model. One factor that adds to the opportunity for value realization in this stage is the fact that the firm is no longer going to be operating in that business. While the firm was in that business, its own assets and operations were at risk of violating another company's IP rights. If the firm elected to assert its IP claims over another firm, that other firm often chose to file a counterclaim against the first firm. That counterclaim alleged that

the first firm was infringing on the second firm's IP. The usual course for such issues is a good deal of posturing by both sides, followed by a settlement whereby each side cross-licenses its IP to the other, perhaps with a payment to make up any perceived difference. This was the situation in figure 4-2.

Once the first firm chooses to leave the business, the situation changes. Now the firm no longer has its own assets exposed to the potential counterclaims of the other party. The apparent weakness (namely, the decision to leave the business) creates a stronger position from which to negotiate with others that might infringe on the firm's IP (which, after all, remains in force even after the firm leaves the business). This is the situation in figure 4-3.[15]

Another example of finding IP value in the declining phase of the TLC comes from failed start-up ventures. From 1998 to early 2001, the business world witnessed a boom in start-ups (during the so-called bubble years) that was followed by a corresponding bust. Ventures that had achieved pre-money valuations of $100 million or more had to sell off all of their assets at auction to recover a few pennies on the dollar for their investors. These assets included the IP held by the venture. While many of these ventures had no assets of any real value, some of them may have had patents on good technologies and ideas that failed due to other reasons. These IP assets are typically auctioned off with the furniture by the auctioneer, such that alert buyers can obtain legally valid patents for as little as a few thousand dollars each. By comparison, the process of developing and filing for a new patent that eventually issues is somewhere between $15,000 and $50,000. It is often more expensive to analyze the patents carefully than it is to simply purchase them. Established companies are now rounding out their IP portfolios by shopping at these auctions to acquire additional patents.

Managing Across Phases of the Technology Life Cycle: Windows in China

With the IP life cycle model, the prevailing conception of managing intellectual property with a one-size-fits-all mentality is swept aside. In its place, a more nuanced, dynamic, and strategically focused

approach will arise, causing firms to search actively for unrealized business opportunities latent within their knowledge base, even as they manage risks that emerge in their current businesses. While I have already illustrated examples of differing IP management strategies within each phase of the TLC, much of the power of this approach comes from looking across phases of the cycle.

In the earliest phase of the technology, it pays to be very open. Neither you nor others know yet the best use of a particular technology, and no one has an appropriate business model to commercialize any applications either. As the dominant design emerges, tightening the protection for one's ideas becomes very important. In the mature phase, IP management must become more differentiated and segmented, to support different applications of the technology in different uses. In the decline phase, firms can aggressively harvest the fruits of their earlier investments in IP protection.

To see the benefit of this approach across phases of the TLC, consider the problem Microsoft is facing with pirated copies of Windows in China. In the United States and Europe, Windows has become the dominant PC operating system, and growth in those regions now is quite flat—placing it squarely in the mature phase of the technology life cycle. In China, however, matters are quite different. The rising economic prosperity of the country has created a recent boom in the number of PCs selling in the country such that, in this region, the technology life cycle is transitioning from emerging to growth.

One-size-fits-all thinking would suggest that Microsoft should seek to employ the same protections against software piracy in China that it uses in the United States. This would mean that the company (perhaps in concert with other prominent software companies) should vigorously police the use of its software and undertake prompt legal action against any and all illegal use, wherever in the world such illegal activities are found.

A more nuanced view of where Windows falls in the TLC suggests a dramatically different approach. In the United States, Microsoft has won the battle for the desktop. Its Windows operating system enjoys a market share in excess of 90 percent.[16] Even the rival operating system of Linux, from the open source community, poses little real threat to Microsoft's position on the desktop. In China, however,

the battle for the desktop is still very much in progress. While Microsoft is in the lead, Linux is making a strong challenge. In fact, the Linux community has signed a deal with the Chinese government to make Linux the default operating system for computers in the Chinese government and many parts of the Chinese educational system.

In this context, applying western IP enforcement policies to stem the flood of illegal copies of Windows in China risks winning the battle (to deter and punish IP infringement) while losing the war (to become the dominant standard on the desktop). So long as Linux remains a serious rival for the desktop operating system of choice in China, Microsoft should actually *welcome* pirated copies of its software. Illegal copies of Windows are free, which helps Microsoft offset the initial cost advantage of "free" open source software. Every pirated copy installed on a Chinese computer that is used by one or more Chinese citizens brings one more person into the Microsoft ecosystem. This strengthens Microsoft's market for third-party developers of applications, tools, and other complementary products (some of which are made by Microsoft itself, so Microsoft can make money on pirated versions of Windows through these other products). More importantly, this approach denies Linux that next new customer that would similarly strengthen *its* ecosystem against Windows.

If Microsoft succeeds in discouraging piracy of Windows in China during this current stage, it is far more likely to drive the user of the pirated software into the Linux camp than it is to drive that person into the ranks of paid-up users of Windows in China. So long as Linux remains a strategic threat to Windows, this is the exact opposite of what Microsoft's IP management should be trying to accomplish. Microsoft's IP management strategy in China should be focused on securing the victory of Windows on the desktops of all PCs in China. That may require deliberately lax enforcement efforts against pirated copies of Windows for the short and medium term. And there are hints that Microsoft may be doing just that.[17] Only after the Linux threat has been eliminated does Microsoft have the luxury of then tightening up the protection of Windows against piracy, as it is now doing in the West.

So Microsoft would be well advised to take a very different approach to managing its IP around Windows in the earlier phase of

the TLC in China, when compared to its approach to protecting its IP around Windows in the United States. This suggests that IP management must be driven first and foremost by the business objectives of the company, and not by a legal perspective.

A legal perspective might well be, for example, that lax enforcement of IP in one region sets a bad precedent for IP enforcement in other regions. Another legal view might be to pick an especially egregious case of piracy of Windows in China to set an example for others who might seek to copy Windows illegally themselves. These are worthy points to consider but are subordinate to the strategic objective of establishing the market position of the default standard operating system in China. Unless the legal team is included in all of the key business and strategic decision making for Windows in China, the legal specialists, doing their job as best as they know how, might inadvertently sabotage the overall strategy.

AN OPEN APPROACH TO MANAGING IP

Patents allow you to exclude others from practicing a technology that is covered by your patent. It may not, however, allow you to practice your own technology, if someone else holds patents that read on your approach. This subtle distinction gives rise to a variety of circumstances that the firm must manage as it creates and manages a business model to profit from a technology. In some cases, the firm may achieve freedom of action by cross-licensing. In other cases, though, the owners of other patents may employ business models that make cross-licensing unattractive to them. In this latter instance, cross-licensing will not provide any protection to the business model.

Patent mapping can help identify the risks, and the opportunities, that exist in the value chains in which your business model operates. Hazardous areas can be proactively flagged for specific attention. Here is where you can take steps to protect yourself against the trolls. Areas of opportunity may help direct the entry into related products and services that benefit from the IP portfolio of the firm, enhance relationships with suppliers and customers, or generate new revenue streams.

In the previous chapter, we discussed the emergence of secondary markets for innovations and their associated IP. These secondary markets become a shopping center for IP to help provide protection when entering into new markets. As we saw in this chapter, they can also help create monetary value from IP associated with businesses in which you are no longer operating.

Overall, on both the buy side and the sell side, managing IP requires a phased approach that corresponds to the technology life cycle of the industry. Effective management will vary by the phase in this cycle, instead of using a one-size-fits-all approach. And a truly dynamic approach will harness the management of IP to the larger business strategy objectives, whether those objectives are operating in the United States or around the globe.

Notes

Chapter 4

1. Carl Shapiro and Hal Varian's book, *Information Rules* (Boston: Harvard Business School Press, 1999), and the references in that book, are good places to start for the economic and legal aspects of protecting one's IP. Kevin Rivette and David Klein's book, *Rembrandts in the Attic* (Boston: Harvard Business

School Press, 2000), provides an exuberant account of some of the management opportunities in underutilized IP. Another, more balanced account of the management of IP can be found in Julie Davis and Suzanne Harrison's book, *Edison in the Boardroom* (New York: John Wiley, 2001).

2. This analysis is offered to expose managers who ordinarily do not deal with IP to the issues and opportunities that IP offers. Readers should be aware, however, that this analysis is a simplification of reality. For example, the following analysis does not consider the complications created by the fact that most U.S. patents have multiple claims, not just one. Infringing on a single claim of a valid patent is sufficient to be legal infringement. In all of this, any important decisions should be taken only after consulting with legal counsel because the many such details that I am glossing over here may prove critical in a litigation action.

3. Economists distinguish between "simple" and "complex" technologies in terms of whether owning a patent gives you effective protection of your technology. *Simple technologies* are ones like those in biotechnology, where your patent on a particular compound not only excludes anyone else from using that compound but also effectively lets you be the only one to develop it. *Complex technologies* like semiconductors, by contrast, involve hundreds or even thousands of patents held by dozens of companies. No one patent in this sector enables a company to practice the technology, unless that company embarks on extensive cross-licensing activities. See B. Douthwaite, D. H. Keatinge, and R. Park, "Why Promising Technologies Fail: The Neglected Role of User Innovation During Adoption," *Research Policy* 30, no. 5 (2001): 819–836.

4. See Bronwyn Hall and Rosemarie Ham Ziedonis, "The Patent Paradox Revisited," *RAND Journal of Economics* 32, no. 1 (2001): 101–128. In that paper, the authors discuss their explanation for the rise in semiconductor patenting as a result of the strengthened patent courts, which in turn strengthened the need for more patents for defensive purposes.

5. Michael Kayat and Tova Greenberg credit Peter Detkin, formerly of Intel and now at Intellectual Ventures, for coining the term *troll*. See their article, "IP-Based Open Innovation Pre-empts Trolls," *Intellectual Asset Management*, February/March 2006, 43.

6. As an anonymous reviewer pointed out, patent maps can be misleading because the software that generates them usually does not take the many individual claims within each patent into account. Mapping all of the claims is a daunting task and so is typically not done. In a legal action, however, it is the individual claims that will control a dispute, so the mapping may gloss over liabilities that could surface later on in court. Still, mapping patents is surely better than doing nothing, even if important risks are left out of the analysis.

7. See William Abernathy and James Utterback, "Patterns of Industrial Innovation," *Technology Review*, June/July 1978, for the pioneering work in this

area. These authors show that technological competition goes through a predictable cycle. First, very different technologies compete in the market until a dominant design emerges within the market. Then there is a marked phase shift, and competition moves within the dominant design, as those designs that did not win fade from the market. At that point, the basic parameters of the technology have been established and companies must compete on process technologies to achieve success. A later book by Utterback, *Mastering the Dynamics of Innovation* (Boston: Harvard Business School Press, 1994), documented this cyclical pattern in a wide range of industries, from sailing ships to ice and refrigeration. While the losing technologies often demonstrated a "last gasp" of improvement, established players that failed to support the newly dominant design went out of business.

Important contributions subsequently have been made by Philip Anderson and Michael Tushman, in "Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change," *Administrative Science Quarterly* 35, no. 3 (1990), who showed that some dominant designs were "competency enhancing" and caused incumbent firms to become further entrenched in their industry. Other designs were "competency destroying," which caused incumbent firms to be dislodged in the market. Steven Klepper, in "Entry, Exit, Growth and Innovation over the Product Life Cycle," *American Economic Review*, 87 no. 7 (1996): 562–583, documented how firm size was initially disadvantageous in early stages of the life cycle, but strongly advantageous in later stages. In these later stages, the ability of large firms to spread costs over more volume was a powerful advantage in the market.

These are largely supply-side views. A demand-side view of the technology cycle comes from patterns of technology diffusion (Everett Rogers, *Diffusion of Innovations* [New York: Simon and Schuster, 1995]), where early adopters are followed by an early majority, then a late majority, and finally the laggards. Ron Adner and Daniel Levinthal, in "Demand Heterogeneity and Technology Evolution," *Management Science*, 47 no. 9 (2001): 611–628, propose a demand-side model that explains pre- and postdominant design cycles from the consumer's perspective. In their model, consumers are unsatisfied with the performance of the technology in the early stage of the cycle. Gradually, as suppliers advance the technology, consumers become more satisfied, until a threshold of sufficiency is reached. Past that point (which shifts the cycle), further performance improvement is valued little, if at all, by consumers.

Whatever the sources of the technology cycles, their presence is well accepted in academic and business circles. What has not been developed until now is the implications for this cycle on the management of intellectual property.

8. See Donald Sull's fascinating research, "The Dynamics of Standing Still: Firestone Tire & Rubber and the Radial Revolution," *Business History Review*

73, no. 4 (1999): 430–464, for an engaging yet scholarly account of how U.S. tire manufacturers responded to the threat posed by the new and superior radial tire technology offered by Michelin and others. Sull's research finds that while the U.S. manufacturers tried many maneuvers to fend off the threat, they failed to make the critical and necessary investments to adopt the technology until very, very late in the game.

9. See David Teece, "Profiting from Innovation," *Research Policy* 15, no. 6 (1986), for a seminal treatment of how first movers do or do not profit from their innovations. In Teece's analysis, it is not whether the firm is the first to offer the technology that matters. Instead, he shows the importance of complementary assets (such as manufacturing, marketing, or distribution assets) in whether first movers in a new technology succeed in capturing value from their innovations, or whether "fast followers" overtake them and capture the lion's share of the profits instead.

10. Apple's success with its iPod has allowed it to create more complementary assets, in the form of Apple retail storefronts that sell the iPod, along with other Apple products. This growing retail presence will become a stronger complementary asset for Apple in future technologies it may choose to offer.

11. As David Teece noted in "Profiting from Innovation," IP protection can come from business assets and business models, as well as the courts. In this case, Apple's strong brand, marketing, distribution, and operations assets all help capture value from the iPod and to date have withstood efforts by competitors to imitate it. Interestingly, though, Microsoft actually filed a patent on an iPod-type device before Apple did. How that potential patent infringement situation will be resolved remains to be seen as of this writing.

12. James Utterback's work, particularly his book, *Mastering the Dynamics of Innovation*, contains many examples of the futility of trying to hang on to the losing technology.

13. If the firm has other value capture points in its business model (such as a strong brand, world-class manufacturing, or an excellent sales force), then it may not need its IP managed so as to capture value.

14. The rise and fall of IBM in the PC business is well told in Charles Ferguson and Charles Morris's book *Computer Wars* (New York: Times Books, 1993). As the authors point out, IBM never even owned the source code for the DOS operating system that it purchased from Microsoft. In "When Is Virtual Virtuous?" *Harvard Business Review*, January–February 1996, David Teece and I analyzed the benefits and risks of IBM's outsourcing a systemic, interdependent technology like the operating system. Robert Purvy, a former Xerox employee who now works as a patent attorney, offered this assessment of IBM's situation in the PC market: "IBM had the misfortunate to develop their stuff *barely* be-

fore software patents became acceptable (1982 or so). Nowadays, they'd patent the very *idea* of a ROM BIOS and all its functions!" (author's phone interview with Robert Purvy, January 21, 2005). His point is that the development of the PC market might have proceeded differently in such a world.

15. This ability to extract some value from exiting a business also suggests that companies should be careful how strongly they criticize the "trolls" who profit from owning patents without practicing them. In the cases noted earlier in this chapter, GE and IBM acted like these trolls when they exited their businesses. Presumably, they would like to retain the ability to receive compensation from other IP if and when they choose to exit future businesses.

16. See en.wikipedia.org/wiki/Microsoft.

17. Microsoft cofounder and chairman Bill Gates made the following observation in an unguarded moment in 1998 to an audience at the University of Washington: "Although about 3 million computers get sold every year in China, people don't pay for the software. Someday they will, though. And as long as they're going to steal it, we want them to steal ours. They'll get sort of addicted, and then we'll somehow figure out how to collect sometime in the next decade." (Charles Pillar, "How Piracy Opens Doors for Windows," *Los Angeles Times*, April 9, 2006, C1.) The account I have provided in this chapter adds the importance of network effects to become the desktop standard and the need to win the battle against Linux on the desktop first, though these factors are certainly more important now than in 1998.