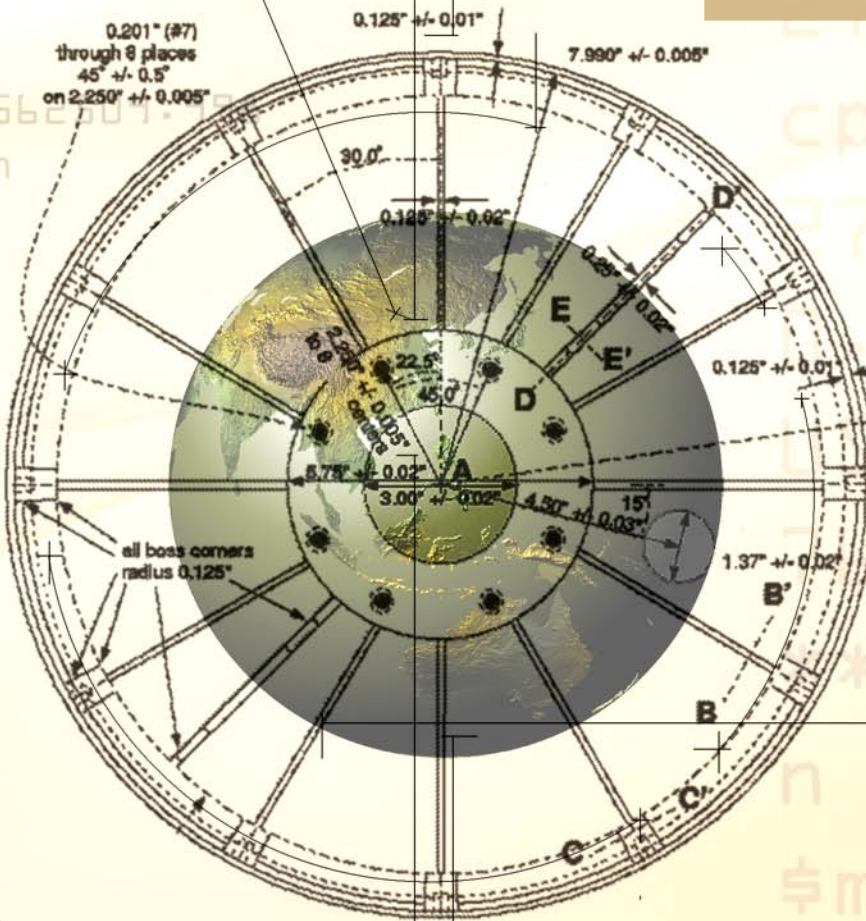
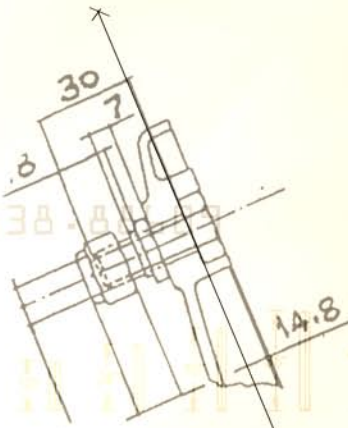


Redefining Intellectual Property Value*

The Case of China



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*connectedthinking

A Technology Center Publication

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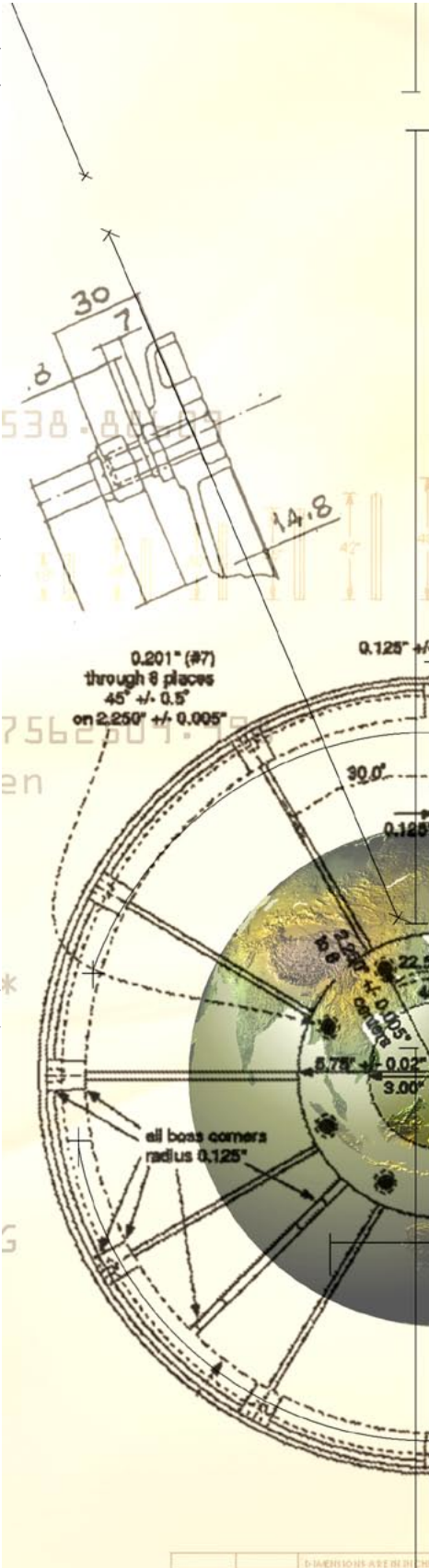
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Executive Summary



China's new prominence as a manufacturing power has been beneficial to multinational companies seeking to leverage its low-cost labor force and seemingly unlimited capacity. Outsourcing low-value manufacturing operations to China enables corporations to pursue value chain specialization, in which they focus strategically on high-value activities such as marketing and research and development. As a result of this trend, China has come to dominate outsourced manufacturing, supplying as much as 50 to 80 percent of global production in many product categories.

This circumstance has changed the way in which products are created. Even more importantly, it has transformed how they are valued. Certainly, low-cost manufacturing has accelerated the devaluation of many product categories, yet this impact is only the most obvious one.

China's unique relationship with countless multinational companies (MNCs)—as both a global manufacturing partner and an emerging competitor—is altering established conventions about the definition, role, and protection of intellectual property (IP). The rapidly growing capabilities of Chinese manufacturers, combined with their rapid appropriation of IP (through both legal and illegal means) are having an unprecedented impact. The effect is transforming the structure of supply chains, the segmentation of value chains, and the relative value of the hard and soft constituents of products and services.

Though the country's influence on IP protection practices is undeniable, other factors have also played a role, including the converging forces of the PC marketplace, distributed processing, new research and engineering technologies, and even the ability to raise vast amounts of capital on equity markets for relatively immature companies. Regulators, trade negotiators, and courts continue to struggle to define what can be protected and how protection is to be measured and enforced across a wide range of categories.

The result is a turbulent, high-risk IP environment that may persist for the foreseeable future. And it is not confined to only China; the country's own global expansion initiative has forced the issue to become one of global importance. Thus, regardless of whether a company is doing business in China, it must adapt to these significant changes.



IP value management is a holistic approach to intellectual property rights, which re-engineers core business strategies and operations to cultivate and preserve value in ways that are resistant to the global and market forces that have accelerated IP value erosion.



IP protection is the conventional approach to intellectual property rights, which is based upon the notion that IP value is embodied in the legal recognition of ownership of the product, processes, technologies, and know-how associated with an entity. This is separate from the resources and competency to manufacture that entity. IP protection centers on maintaining that separation and providing the party with cognized IP ownership a measure of economic value from the total value created in manufacturing the product.

■ IP Value Management

In order to successfully navigate this changing IP landscape, MNCs must rethink how they view, value, and protect their IP, the intangible assets that now represent as much as 85 percent of their corporate value.

At the heart of this new approach is a fundamental shift from merely protecting IP through legal means to holistically cultivating and retaining value through higher-level business strategies. This new approach, called IP value management, moves a company's IP activities from being primarily a legal function to becoming a strategic imperative that is the domain of corporate leaders. IP value management focuses on reorienting and redesigning core business strategies and operations to cultivate and preserve value in ways that are resistant to the global and market forces that have accelerated IP value erosion.

Central corporate functions such as product and service design, marketing strategy and delivery systems, mergers and acquisition (M&A) objectives, and strategic alliances all play a role in optimizing and sustaining IP value. In fact, many established strategies used in each of these corporate functions has the potential to be refined as a component of a comprehensive IP value management strategy.

For example, in the information technology industry, some software vendors have shifted to a product (and value management) strategy that defines attached services as the primary value component instead of core software products. Vendors of enterprise resource planning, accounting, and tax software have found that enhanced services coupled with standard product offerings will not only add revenue, but anchor key product values and features.

■ Scope of This Report

This report examines in depth how the growth of the economy in China and its recent opening to international trade and finance is challenging conventional approaches to IP protection. It also details how the circumstances in China necessitate that MNCs adopt a new IP value management approach to contend with these changes. Finally, it presents IP value management strategies for succeeding in this uncertain environment.

KEY FINDINGS AND RECOMMENDATIONS

The following is a summary of the primary findings. This report is based on third-party and original research, including PricewaterhouseCoopers' interviews with executives who have been involved in or have been affected by intellectual property (IP) protection activities in China, particularly in technology industries.

KEY FINDINGS

- **Chinese manufacturers are ultra lean and ultra agile.** They can move quickly to effectively become price and volume leaders in global manufacturing. The challenges China poses to the established IP rights paradigm in the developed world will mount as China's influence on global product markets grows. The issue is not only about outright IP infringement, which sometimes does occur, but more importantly is about the pace and scale at which derivative products—at significantly lower prices points—are brought to market by Chinese players, now on a global scale. This phenomenon is collapsing pricing structures and shortening the profit cycles of products, hence diminishing the return on investment from research and development (R&D), as well as from product development.
- **The preponderance of corporate value in mature markets is in intangibles, and a sizable percentage of that value is exposed in emerging economies involved in outsourced production.** In 1998, of the value of US corporations in the Standard and Poor's 500 (S&P 500) was 85 percent in intangibles, up from 38 percent in 1982. Most value continues to be in intangibles. By 2005, only a decade after China began to develop as a global manufacturing power, significant amounts of these intangibles had already been transferred—legally and illegally—from foreign companies to a number of Chinese corporations, as they expanded to generate massive revenues. With so much value in IP held by multinationals (MNCs), and Chinese manufacturers originally light in IP ownership, some movement toward equilibrium is unavoidable.
- **Tactical and legal, low-cost acquisitions of operations and facilities that include IP—from struggling foreign companies or vertically integrated MNCs who seek to shed their lower value manufacturing units entirely—are accelerating this movement.**
- **Technology transfer has set China up to become a global manufacturing and IP powerhouse.** Ever since China opened its doors to foreign investment, the Chinese government has consistently demanded technology transfer to its own manufacturing sector from foreign companies that have a presence in the country. The goals of the government are to continue the country's rapid economic growth and achieve independence from foreign investors by mastering or gaining access to key technologies. During the Mao era from the late 1940s to the mid-1970s, self-sufficiency was a tenet pushed down to the commune level, where the overall economic development model was aimed at creating economically self-sufficient communities for basic life needs. This legacy of self-reliance continues to have influence in contemporary China, where leaders frequently articulate a fear of being “contained” by hostile outside forces. In this view, China needs to appropriate not only commercially proven technology but the ability to create new technology on its own.
- **Much sponsored research in China is not dedicated to scientific discovery or true innovation.** Rather, the focus, in many cases, is on developing derivations of patented products to circumvent royalty fees. China spent less than six percent of its total research and development (R&D) budget on basic research in 2002 and 2003. In contrast, the US spent 19 percent of its R&D budget on basic research in 2003. The goals of the next 25 years of economic development notwithstanding, government-sponsored R&D in China is primarily dedicated to developed and applied—rather than basic—research according to statistics published officially in China. Truly innovative domestic companies that tend to be entrepreneurial and small are often under-funded and lack

KEY FINDINGS AND RECOMMENDATIONS (CONTINUED)

access to capital, while state-run or formerly state-run companies in China receive relatively strong support. In practice, investment is largely focused on commercially-proven end-product level innovations, cost reduction, and incremental improvements rather than more innovative and basic, higher risk IP. The choice is consistent with China's accelerated development needs, often referred to as leap-frogging.

■ **China continues to place the balance point more to the benefit of public good than to private owners, though some forces within the government are succeeding in shifting the balance somewhat.** The country's current position on public versus private needs is consistent with its ideological history and social and economic development philosophy. Recent publications by the National Standards Administration of China and draft language in the anti-monopoly laws confirm the emphasis on the public good, with the former requiring concessions from patent owners if their IP is to be included in an approved national standard. While Chinese policy at the national level is to maintain a reasonable balance, it is also realistic to expect at all levels some shift in the views of key policy makers and implementors when seeking the balance point between the Chinese public good and the private property rights of foreign IP owners.

■ **Commercial operations of state-funded companies are directly influenced by the requirements and directives of the State, confounding IP development decisions that would otherwise be driven by market opportunities.** China is well into the era of corporatization, which is committed to separating regulators from managers and rationalizing the operations of large corporations. Still, China's 200 largest enterprises are presently experiencing more intense and effective central government intervention than they have in many years through the recently established State Asset Supervisions and Administration Commission (SASAC). In November 2004, an administrative order of the State Council through SASAC rotated the chairmen, chief executive officers, and

other top executives of China's four major telecom operators from one of these companies to another, side-stepping their so-called independent boards of directors entirely. SASAC is influential in directing critical financial resources, appointing top managers, implementing major state directives such as the "going global" campaign, and in the restructuring of major players in the pillar sectors.

■ **Reverse engineering, counterfeiting, outright IP theft and other forms of IP misappropriation are widespread in China.** These practices are growing despite the pressure of foreign governments, China's government, and the private sector in China to fix the problem. Among other things, a deep-rooted ideological and social tenet is that shared property takes precedence over property that is owned by individual companies. Provincial and local governments have a great deal of economic autonomy and, in practice, legal autonomy to pursue the economic benefits of their citizens. Local economic development initiatives can be very aggressive and relatively unfettered by national law and policy. Many instances of reverse engineering, counterfeiting, and IP theft are widely documented and generally assumed. Despite the IP rights violations, global demand for products produced through these methods continues unabated because of their very low cost. Distribution globally has become highly efficient, and importing markets have not organized their defenses very successfully.

■ **The mixed motives of Chinese courts and law enforcement entities often result in outcomes unexpectedly adverse to the rights of IP owners.** In many emerging economies, governments have argued that protecting the public health of their citizens takes precedence over foreign-held IP rights. In China, across an even broader field of issues, individual property rights continue to receive less emphasis. Therefore, a desire to see China maintain stability and move from poverty to become a preeminent economic power, for some, benefits the nation as a whole and justifies some tolerance toward the

illicit use of IP. Current legal challenges brought by Chinese associations and companies against foreign and domestic IP owners, in court venues in China and the United States, are based on the argument that the enforcement of their technology royalty agreements unfairly restricts the growth and competitiveness of Chinese domestic manufacturers.

■ **High levels of IP transfer occur globally in many other ways that cannot be prevented by legal measures in any case.** IP beyond patents, copyrighted material, trademarks, and trade secrets are frequently transferred when skilled employees move from one company to another, for instance. In China, a large number of technical specialists who have retired after enjoying a full career in the United States or Europe discover a very supportive environment for a second career in China. Startups and established companies in China can both benefit substantially from this form of transfer. In China, funds are available for such start-ups from domestic and foreign sources, and venture capital money increasingly is attracted to ones with major potential and apparent political support. Additionally, when patents, trademarks and copyrights are infringed, enforcement is limited compared to countries with well-established and evenhanded legal systems. Thus, some companies are likely to mine IP—a term which, as employed in this report, means obtaining another company's IP illegally in one country and then using it without penalty in other countries where legal systems are poor and IP rights enforcement is non-existent.

■ **China's challenge to global IP practices began primarily in China's domestic market and has migrated to foreign emerging markets where IP protection is weak or non-existent.** Emerging markets are often of limited commercial interest to MNCs, which might not bother to register trademarks, copyrights, and patents in such markets. There may also be countries where commercial involvement is difficult or illegal. China's development strategy includes the idea of "eating global giants from the feet up," that is,

becoming engaged in and gaining significant shares in emerging markets where global corporations are not yet interested. For both resource acquisition and market development, Chinese enterprises actively are involved in many countries that the United States, for example, regards as trouble spots, including Angola, Iran, Sudan, and Venezuela. Chinese companies that may have IP liabilities, including primary commodity refiners, auto makers, IT equipment makers, as well as pharmaceutical counterfeiters and digital media pirates, are actively selling product and even building plants in such target geographies.

RECOMMENDATIONS for MNCS

The following is a summary of the key IP value management recommendations contained in this report. For a complete description of IP value management strategies, see "Value Management Strategies," on page 39.

■ **Assume that the IP challenges in China and other emerging low cost countries will not be significantly mitigated for many years.** More likely, this could permanently alter the global IP landscape. Many companies base their IP strategy on the assumption that China will be willing and able in relatively short order to defend IP rights in a comprehensive fashion. A more valid assumption, based on evidence contained in this report, is that low cost producing countries and the core dynamics of globalization may continue to pose a unique set of high risks to IP in the future.

■ **Reduce dependence on conventional IP protection mechanisms.** Although a number of conventional IP protection methods will still be warranted, a sounder and more scalable approach places IP strategy within the broader context of value management and overall business strategy. Forces contributing to accelerated and more pervasive value erosion include many that IP protection alone cannot address.

■ **Create and preserve IP using a value management approach that attunes core operations to the task.** When companies analyze exactly where value can be created and preserved, and seek to optimize their core processes for this purpose, they can take advantage of the creativity of multiple departments. They can also align their IP strategy with overall business objectives, including merger and acquisition activities. Recognize that IP value can be preserved not only in goods and manufacturing itself, but with related channel and distribution controls, service adjuncts, and other non-merchandise activities.

■ **Defend global markets by anticipating and responding to changes in emerging markets.** Companies can detect and respond early to the activities of potential infringers in developing countries that serve either as makers or consumers of violation-related goods and services. Infringers may choose to operate in these countries first as IP laws are not as well protected. Countering the activities of potential infringers with a market presence in these countries can prevent market share losses in developed countries later. Companies can potentially market commoditized products that pose lower risk of IP loss in these locations, and improve utilization of older capacity in the process.

■ **Maximize manufacturing flexibility to preserve the value of innovation.** Rapid versioning, agility in increasing or reducing capacity of product lines, and supply chain responsiveness can all enable companies to introduce products with new features more quickly than the competition and expand sales quickly to larger global markets to maximize the value of new features and functions.

■ **Tailor pricing and marketing to fit accelerated versioning capabilities.** Aggressive pricing can complement rapid versioning, making it difficult for less capable manufacturers to keep pace. Global product launches, similarly, can make it less possible for

competitors to answer effectively with their own new derivative offerings.

■ **Increase service capabilities to preserve product value.** Value-added services and brand attributes can turn a desirable product into an essential one, and make substitution of derivative or knock-off products unworkable. Many companies can serve as examples, with services that enable customers to use products much more effectively.

■ **Consider merger and acquisition (M&A) and partnering activities that can take IP infringing capability out of the market.** Whereas partial or contract-based outsourcing has led to undesirable IP transfer, deeper, more definitive and exclusive equity relationships along the supply chain can align the interests of participants around protecting core IP value.

■ **Encourage positive legal development in China by engaging at various levels with government, business and academic leaders.** Example actions include the following:

- Continue engagement with the related central government agencies to improve their knowledge and law enforcement capacity-building exercises.
- Align interests with local government parties, because much infringement is local in nature.
- Engage in local standards debates and elevating protection initiatives in international standards groups.
- Organize government education efforts that stress and quantify the benefits of IP protection for China's industrial development, and explaining the logic, utility, and appropriate adaptation of established protection mechanisms.
- Encourage local IP holders to support the cause of IP preservation.
- Nurture alliances with researchers, academics and policy advisors and helping them expand their knowledge and influence. ■

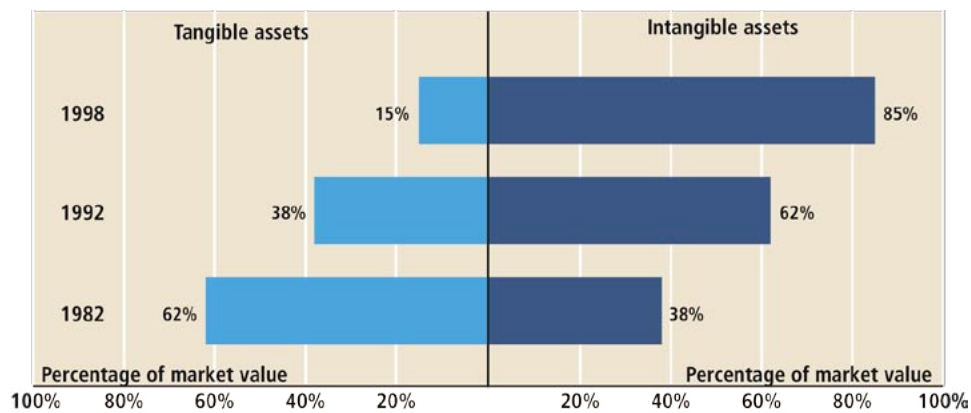
INTRODUCTION



Intellectual property (IP) protection in the commercial marketplace is a relatively new concept in many parts of the developing world. The idea of intangible assets is less than 300 years old. The ability to trade intangible assets or IP in the market is also an unfamiliar concept to many. In emerging markets such as China, where the existence of separate corporate legal identities have only been recognized for 20 years, companies face numerous difficulties in protecting or even defining their IP.

Multinational corporations (MNCs) must confront this issue during an era when intangible assets constitute a high percentage of total corporate value. In his analysis of intangibles, Baruch Lev noted that most of the value that companies in the Standard and Poor’s 500 (S&P 500) create moved from tangible to intangible assets during the 1980s and 1990s. (See Figure 1.)

FIGURE 1: PERCENT OF US CORPORATIONS’ TANGIBLE AND INTANGIBLE ASSET MARKET VALUE¹



The shift of asset values to intangibles and the erosion of these same assets implies that assets are less easily protected. A focus on value creation and preservation, rather than protection, is the best way to address the issue of intangible asset erosion.

Source: Baruch Lev (Brookings Institution and New York University) as cited by Jurgen Daum (SAP), 2001

Determining the value of IP is progressively more difficult as economic globalization expands and the influences of countries without a heritage of IP protection such as China grow. China’s dynamic impact on the global IP landscape is rooted in its own culture and new position in the world, as shown in Figure 2 on page 8. MNCs will need to create new strategies for their target markets, core operations, and innovation investments. Instead of emphasizing ways to protect IP, brand-owning companies will need to focus more on creating and implementing IP value management strategies.

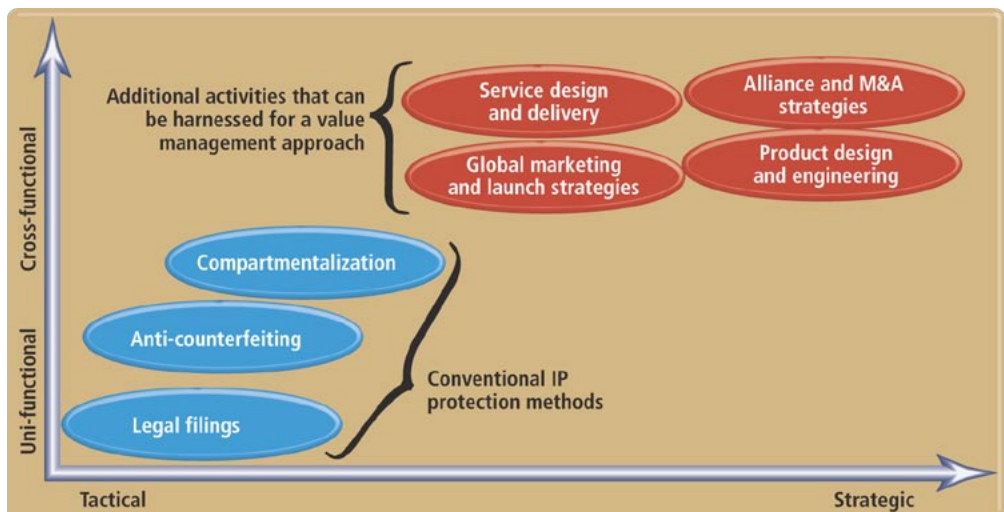
FIGURE 2: HOW CHINA AFFECTS THE GLOBAL IP LANDSCAPE



China's industrial growth has been a catalyst for IP transfer, as shown in the figure on the left, and many factors there have accelerated the rate of this transfer.

Value management's operational appeal lies in its strategic, cross-functional nature, as Figure 3 illustrates. It is predicated on the premise that the length of time for which premium value can be realized in the marketplace for distinguishing innovation continues to shorten, no matter what protective means are employed. Value management encourages companies to establish metrics to assess where and how the most value is created and how it can best be preserved. It encourages companies' operating units to achieve value management objectives that are by definition symbiotic with their commercial goals. In practice, this will net back to greater gains from research and development (R&D) investment and a more significant contribution by IP to overall enterprise value.

FIGURE 3: COMPARISON OF VALUE MANAGEMENT AND CONVENTIONAL IP PROTECTION METHODS



Activities such as product design and marketing can be reengineered by cross-functional teams to cultivate and preserve value that may otherwise be lost in an ultra low-cost manufacturing environment.

CHINA'S INFLUENCE ON THE IP ENVIRONMENT



Technological changes, such as digitization, have made IP more portable and are diminishing the effectiveness of current intellectual property enforcement mechanisms. As more countries are entering and profiting in international markets, the level of intellectual property infringement is rising and the distinction between innovation and copying is blurring. Emerging economies are unlikely to implement IP rights and protection practices as those established in North America and Western Europe.

Many of the litigation-oriented mechanisms now take more time to execute than the life cycles of the products they are hoping to protect. Hence, while they may yield some judicial redress post-mortem, these mechanisms essentially fail to protect the marketplace value of the product. China's growing influence on the intellectual property (IP) environment is emblematic of this trend. For this discussion, this section of the report will present case studies and explore nine different areas of change evident in the China example.

■ Proliferation of Technology and Diffusion of Intellectual Capital

In the 1990s, global dissemination of commercial design and manufacturing technology accelerated as general commercial trade in products and services became globalized. Offering the potential of 1.3 billion consumers, China imposed several conditions on foreign multinational corporations (MNCs) entering its market for the purposes of selling their products and services. The most significant of these was technology transfer.

In order to enter this market and perform successfully, MNCs engaged in equity joint ventures in many of its sectors with domestic Chinese companies. Often these Chinese counterparts were powerful domestic competitors, or aspiring competitors, of the MNCs. The nature of the ventures led to, in many cases, a substantial transfer of technology, processes, and expertise to the domestic companies. To surmount the challenge of meeting local market needs and requirements, MNCs encouraged the growth of domestic suppliers and invited their global suppliers to enter into the Chinese market.

By the mid-1990s, Chinese leaders recognized that this system of technology transfer trapped China in a dependency relationship with global MNCs and other IP owners. They then turned their attention to transferring in the capacity and ability to develop new technology as well as deploy existing technology. This led MNCs to create research and development (R&D) facilities in China to facilitate

Domestic companies that once were the manufacturing sites for the global brand-owning MNCs, have started to compete with the same MNCs that taught them their processes, shared their IP, and invested in R&D and other resources.

the application of foreign technology to locally made products, cultivate local engineering talent, and nurture the ability to create new technology on-shore. Labs covering everything from software to automotive engineering proliferated, while China's traditional R&D institutes watched attentively. The government established R&D funding mechanisms and launched an aggressive program of incentives for repatriating China-born technical experts trained abroad.

In addition to the MNC transfer of technology and expertise, other factors also propelled the dissemination of knowledge. Outsourcing strategies have accelerated the direct transfer of manufacturing know-how abroad, often without adequate safeguards. Since the early 1980s, large numbers of students from low-cost manufacturing countries have been trained in the United States. Those who return bring with them a wealth of knowledge rather easily transferred to new employers. A range of professionals who returned from working abroad, some after retirement from a lifetime career, brought with them experience and expertise that enhanced the developments that were occurring.

Although these developments yielded some short-term, successful outcomes, they also gave rise to many long-term IP challenges. In the short term, foreign investors and companies gained large market share in the domestic Chinese market as well as China's export market. But often within a three- to five-year time frame, they found domestic competitors rising quickly and creating a significantly low profit margin in the Chinese market.

In the long term, the issues of IP management and protection have proven to be difficult, problematic, and potentially costly. A key factor is that the margin squeeze has more recently been exported into global markets by increasingly wealthy and capable Chinese competitors. Domestic companies that once were the manufacturing sites for the global brand-owning MNCs, have started to compete with the same MNCs that taught them their processes, shared their IP, and invested in R&D and other resources.

Consequently, the value of originating as opposed to appropriating manufacturing IP is declining as manufacturing capabilities and expertise are now widely available, easily targeted, and inexpensively obtained. This is especially true in the pharmaceutical and consumer electronic sectors where the manufacturing capabilities of MNCs and Chinese manufacturers are comparable.

LEGAL, LOW-COST IP TRANSFER TO CHINA

In areas of high-value IP such as the semiconductor industry, the need for substantial investment in R&D sometimes creates a situation where failed companies end up selling their IP at a fraction of the cost required to develop it. The deverticalized manufacturing model, which makes it easier to launch a startup, creates the potential for many more companies to enter the market and makes failure a more likely outcome. These circumstances can allow Chinese companies a legal avenue

to obtain the technology to compete in more profitable sectors traditionally known for their high barriers to entry, as described in the following case.

Transmeta and Culturecom. In the mid-1990s, Transmeta, a fabless US-based microprocessor startup with high-profile backing, was considered by many to be a potential rival to the established industry giant Intel. The Crusoe chip, designed for use in personal computers, was developed with the goal of running x86 instructions faster with a fraction of the number of transistors and a simpler architecture than that required by an Intel Pentium processor chip. Patents issued to Transmeta while the company was in stealth mode noted the use of a very long instruction word (VLIW) architecture and an on-the-fly compiler that converted x86 instructions to Transmeta's own code designed to be processed with fewer transistors.¹

Unexpectedly, when Transmeta finally did launch its first products in January 2000, it did not claim a speed advantage for them. Rather, the value proposition announced for the new Crusoe chips was low power consumption, made possible by the on-the-fly code compilation and a power management technique that lowered both frequency and voltage to the minimum necessary during certain phases of operation.²

Despite its projected promise and evident appeal for the ultraportable PC category, the Crusoe did not meet market expectations. Sales were limited primarily to Japanese OEMs Fujitsu and Sony, and Transmeta encountered difficulties changing foundries while at the same time moving to smaller linewidths and copper interconnects. These problems resulted in a delay that allowed competitors AMD and Intel to develop their own mobile processors in time to retain their advantage in notebook PCs.

In the years following, Transmeta worked to improve on the Crusoe and then released its 130nm Efficeon processor, and later launched a 90nm version but was not able to capture large market share. The Efficeon processor also suffered from a delayed launch. Although Transmeta has received approximately \$650 million in funding during the last ten years, it has not been able to yield a profit. With only a short list of major clients, Transmeta has continued to incur losses.³

Unable to continue operations as before, Transmeta agreed to sell the rights of the Crusoe line and license production rights of the 130nm Efficeon to Hong Kong-based Culturecom Technology for \$15 million cash and small royalties. The sale is pending a technology export license from the US Department of Commerce and, with the time required for the technology transfer, is expected to close by the end of 2005.⁴

Culturecom previously acquired the Midori Linux platform from Transmeta and is responsible for bringing to market the V-Dragon chip, a Chinese-language processor. Once the transaction is approved, Culturecom will be able to market the Crusoe

The successful response of AMD and Intel in preventing the rise of Transmeta as a strong domestic competitor for the mobile computing marketplace resulted ultimately in creating a potentially more aggressive competitor in Culturecom, which will likely be able to bring product to market at a fraction of Transmeta's proposed pricing.

Chinese companies have advantages that are unavailable to foreign-owned companies operating facilities in China, such as lower-cost labor that is subject to fewer health and safety requirements than in developed countries, some government subsidies, and other forms of direct and indirect support.

and Efficeon chips at the low prices desirable for the Chinese market because of its substantial savings on R&D.⁵ The successful response of AMD and Intel in preventing the rise of Transmeta as a strong domestic competitor for the mobile computing marketplace resulted ultimately in creating a potentially more aggressive competitor in Culturecom, which will likely be able to bring product to market at a fraction of Transmeta's proposed pricing.

■ **Separation of Manufacturing from IP Ownership and Development**

Supply chain management today relies on outsourcing upstream manufacturing and assembly activities to lean manufacturers such as electronics manufacturing services (EMS) providers. Major EMS companies have made this practice cost effective by moving their operations to low-cost countries. As a result, an environment of extremely competitive local contract manufacturers has developed, and lean manufacturing techniques have become understood to other manufacturers in low cost countries such as China.

EMS providers can be globally owned, regionally owned (primarily by Taiwan and Hong Kong owners), or locally owned in China. Lean manufacturing profit margins have tended to decline, as some new entrants are able to operate with very little margin and extremely frugal costs bases. As a result, margin compression for contract manufacturers is a strong trend. As pure manufacturing and assembly capabilities lose their value through becoming commonplace, lean manufacturers are challenged with differentiating themselves to stay competitive. In their pursuit to survive, EMS companies have chosen one of two main solutions. The first is to not only provide a manufacturing service but to create value by developing their own IP, which would include developing their own designs, products, product features, and technology—a path the Chinese government has championed.

EMS companies migrating toward the creation of IP must confront the high cost of R&D. Thus, they often assume the role of original design manufacturers (ODMs) by also providing limited design and development services. This way, EMS companies add value to their manufacturing capacities by taking a transitional or intermediate position on the consumer electronics value chain instead of fully developed IP owners and brand marketers.

Because the R&D associated with true innovation is costly, ODMs have strong motivation to find ways to reduce the cost of IP they offer their customers. The second solution is to find ways to reduce costs associated with IP, such as royalties paid to IP owners. Powerful EMS companies have developed some leverage in negotiating better IP deals, in much the same way they can aggregate purchases of components for significant savings. But beyond that, reverse engineering has been a way to compete without incurring the high costs of basic R&D that innovation requires. Chinese companies also have advantages that are unavailable to

foreign-owned companies operating facilities in China, such as lower-cost labor that is subject to fewer health and safety requirements than in developed countries, some government subsidies, and other forms of direct and indirect support. These savings allow some Chinese companies to introduce products at prices well below their competitors' market rates.

This competitive advantage has enabled some Chinese companies to seek out new and innovative products throughout the world that do not have registered patents in China to produce reverse engineered products and enter the market very quickly. This path, having been opened, is providing significant cost advantage that is not limited to ODMs only, but is increasingly enabling other Chinese manufacturers to bring product to market at home and abroad under their own emerging brands.

THE EFFECTS OF RAPID IP TRANSFER TO CHINA ON END MARKETS

Chinese manufacturers across industries have been able to acquire IP and apply it quite quickly in export markets. With rapid capacity increases in the country and non-economic practices that are the legacy of state-owned enterprises, the resulting market volatility can undermine the ability of companies to seek redress when their IP rights are infringed. Even in places where administrative and legal procedures are well established, companies may not have the time to enlist government help quickly enough to stop unfair or illegal practices before their market position is permanently compromised.

Just as this problem in competition is an emerging one, the potential defenses against it are emerging as well. For some industries, anti-dumping petitions are one example of a means of recourse that had been more effective in the past. For instance, semiconductor memory companies have used these to good effect. More recently, however, consumer electronics manufacturers have not been successful with this approach. Several factors contribute to the current challenges. Among them, the concentration of buying power among a few large discount retailers in the United States has created a weighty counterbalance to those advocating tough controls over cheap, imported product. The following case of the US market for large-screen televisions is an example.

Five Rivers. From 1997 to 2001, Five Rivers, the most recent owner of a television manufacturing plant in Tennessee that had existed since 1963, managed to compete in a tough consumer electronics market as a contract manufacturer by assembling big-screen TVs for brands that included Akai, Diamond, Philips, and Samsung. Because of the high cost of cargo ship container space, assembling large-screen TVs for US consumers was still cost-effective for the most efficient US plants like this one. However, US TV assembly plants were unable to stay competitive after Chinese large-screen TV manufacturing reached critical mass. Tom Hopson, president and chief executive officer of Five Rivers, asserted in a statement during an October 2003 hearing of the US House Committee of Ways

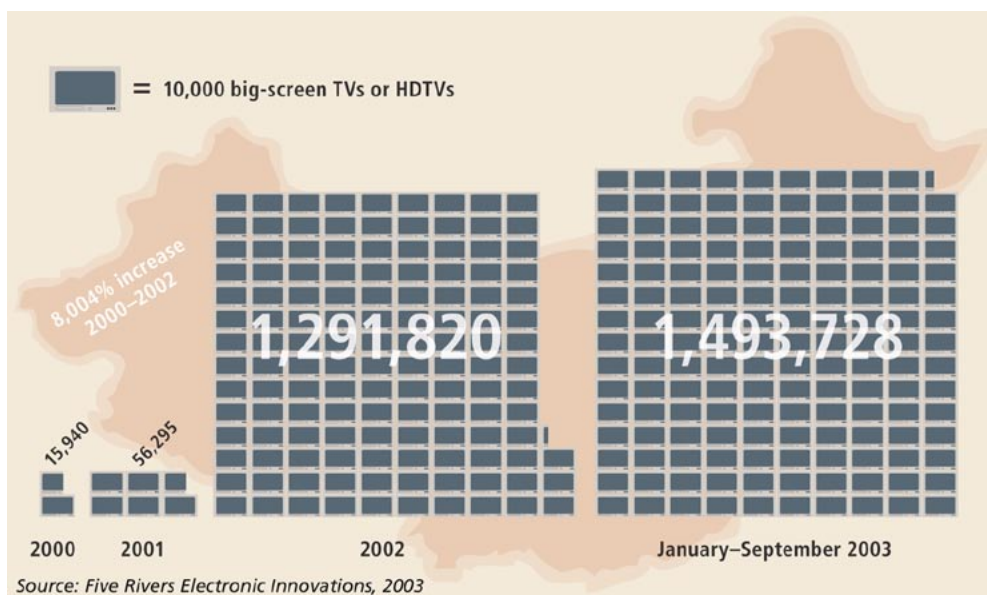
With rapid capacity increases and non-economic practices that are the legacy of state-owned enterprises, the resulting market volatility can undermine the ability of companies to seek redress when their IP rights are infringed.

and Means that the company faced an unprecedented level of price competition after Chinese manufacturers began what it characterized as the unfair trading of Chinese-made large screen TVs in the US in 2002.⁶

Hopson stated that the unfair trading was at such an extreme level that Five Rivers had no way to compete. He noted that many other manufacturers such as Sanyo with plants in the United States were suffering similarly. Between 2000 and 2002, importation of Chinese big-screen TVs increased 8,004 percent. (See Figure 4.)

FIGURE 4: IMPORTS OF BIG-SCREEN TVS AND HDTVS FROM CHINA JANUARY 2000–SEPTEMBER 2003

Big-screen TV imports to the US grew at an annual rate of over 4,000 percent, after a market glut in China caused more emphasis on exports. A number of factors associated with state-owned or influenced enterprises may have exacerbated this situation.



This big-screen statistic compares with 4.5 million TV sets overall shipped from China in 2002 to the United States, compared with 920,000 sets in 2001, a 45 percent increase, according to the Economist Intelligence Unit (EIU), which cited customs statistics. In June 2003, Five Rivers jointly filed an anti-dumping petition with two electronics industry labor unions.⁷

The company was eventually successful with its petition, and the US Department of Commerce imposed duties ranging between 28 and 46 percent on TVs shipped from China in December 2003, identifying four manufacturers: Shenzhen Konka, Sichuan Changhong Electronic, TCL International Holdings, and Xiamen Overseas. Five Rivers managed to stay afloat through October 2004, but sufficient damage had been done by that point that the loss of merely one product line—a cutting-edge, rear-projection, liquid crystal on silicon (LCoS) high-definition television for Philips that may have been very difficult to produce—caused the company to decide to seek bankruptcy protection later that month.⁸

The US Department of Commerce was not alone in taking action against Chinese TV manufacturers during the time. The European Union (EU), which had closely controlled TV imports from China since the mid-1990s through high tariffs and temporary bans, imposed its most recent outright ban on Chinese TVs in 2002—in addition to a ban issued in February 2002 on Chinese DVD players. After nine major Chinese manufacturers lodged a complaint in response to the TV ban, the EU agreed in September of that year to allow only 400,000 sets to be imported from each of seven Chinese manufacturers, including Hai'er Group, Hisense Group, Konka Group, Sichuan Changhong Electronic, TCL Holdings, Skyworth Group, and Xiamen Overseas.⁹

The situation in China for domestic TV manufacturers during this period is telling because it underscores why access to the US and European markets became even more essential to these companies.

Apex and Changhong. By the first half of 2001, so many makers of TVs had emerged that the industry had begun to suffer from overproduction and severe price erosion in the domestic market. As a result, Sichuan Changhong, the leading TV maker in the country, with reported TV production revenue of \$2.5 billion in 2000, experienced a decline in profits of 91 percent for the first half of 2001.¹⁰

This decrease in profit may have been a major motivating factor behind Changhong agreeing to an exclusive deal in November 2001 with Apex Digital. Apex, a Canadian-based company, sold low-priced but still technologically advanced consumer electronics products from China to US retail chains such as Wal-Mart and Best Buy under its own brand. Under the terms of the agreement, Apex gained exclusive rights to Changhong TV manufacturing and related technologies in the United States. At least some of these technologies were likely developed in the labs Changhong operated jointly with consumer electronics companies such as Philips, Sanyo, and Toshiba.¹¹

After the Changhong-Apex deal, Apex quickly sold a total of three million Changhong-made TV sets in the US in the first nine months of 2002 alone, according to the EIU. Changhong as a result returned to profitability in its TV unit in 2002, reporting profits of \$21.3 million for the year. Some of the Changhong sets clearly made up a substantial portion of the big-screen sets that Five Rivers objected to in its anti-dumping petition. Apex captured a 3.3 percent share of the US TV market in 2002, according to *Warren's Consumer Electronics Daily*, compared with 10 percent for the market leading RCA brand. For its part, Changhong claimed to be the world's second largest TV manufacturer at the time, behind only Samsung.¹²

After the Department of Commerce imposed duties on Chinese TVs in December 2003, Apex faced an untenable situation. It alone was responsible for 50 percent of Changhong's TV sales but through most of 2004 could not pay for the sets it had received. According to documents filed in the Los Angeles Superior Court and

Apex gained exclusive rights to Changhong TV manufacturing and related technologies in the United States. At least some of these technologies were likely developed in the labs Changhong operated jointly with consumer electronics companies such as Philips, Sanyo, and Toshiba.

To date, China's success in building the country's industrial base is undeniable. Over the long term, however, the cumulative effect of massive investment in areas where an adequate return on investment seems unlikely or impossible grows with each year.

reports in the Chinese media, Apex and Changhong had over \$1 billion in business agreements, covered completely in a one-page contract. However, the contract was lacking in stipulations covering IP royalty agreements and warranty and liability for product rejections. The Los Angeles-area press subsequently reported that rejection rates by US retailers reached double-digit numbers. Patent fees were another contentious issue. When both parties were sued by the US patent holder in April 2004 for infringements, Changhong agreed to pay the stipulated fees but failed to do so.

Changhong reported that it was owed \$467.5 million from Apex, and that it expected to recover no more than \$150 million, an announcement that drove down Changhong's share value by 10 percent. Changhong's apparent response to this crisis in October 2004 was to have the Apex President, David Ji, a US citizen, arrested. Apex Director of Purchasing Frank Ye asserted in an affidavit later submitted to a Los Angeles court that four men who claimed they were policemen took Ji from a hotel in Shenzhen to a building Changhong owned, where they forced him to sign documents handing over Apex to Changhong.¹³

Changhong then sued Apex in California for nearly \$500 million in December 2004. In response, Apex countered in a complaint that Changhong had failed to provide replacement parts, shipped defective, dated or substandard goods and shipped products to Apex whether or not Apex had actually ordered them. The Apex complaint also noted unpaid royalties, other intellectual property issues, and retailer penalties for late shipments. As of May 2005, Ji was still under arrest in China.¹⁴

The Five Rivers-Apex-Changhong case exemplifies the potential effects of legacy state-owned enterprises on established industries when these companies become competitive in export markets. These effects can be significant even in industries used to strong price competition such as consumer electronics. Overproduction will make prices artificially low to begin with. Through state-subsidized manufacturing technology and alliances with western and Japanese OEMs, products with attractive feature sets can be offered for export without the need to invest heavily in R&D.

Companies who do invest in R&D may find it necessary to face situations in which the combination of overproduction in China, hypercompetition in the domestic market, and the ability to export popular product varieties for extended periods without any apparent profit margin creates turbulent market conditions outside the country. When features are devalued quickly in this way, the cost of innovation can no longer be supported by a higher price, at least not to the same extent.

■ Mounting Pressures on the Economy

The Chinese government continues the balancing act it began in 1978 when it opened China's doors to foreign investment. To date, its success in building the country's industrial base is undeniable. Over the long term, however, the cumulative effect of massive investment in areas where an adequate return on

investment seems unlikely or impossible grows with each year. China, despite efforts of the Chinese government to improve its investment environment, still to a large extent lacks the moderating fluctuations of investment that allow market-based economies to adapt. This circumstance continues to threaten to destabilize the status quo.

Meanwhile, the various levels of government involved in implementing the Chinese People's Political Consultative Conference (CPPCC) five-year plans find themselves compelled to take actions that make this situation more, rather than less, precarious. For example, these governments find they must continue to invest at very high levels to avoid increases in unemployment and reduce underemployment. The three main areas the central planning authorities are most concerned with are employment, inflation and investment.

High savings rates in China, estimated to be 40 percent of earnings for the average Chinese, are an integral part of the fast development cycle, and an inescapable part of the economic puzzle. This massive and steady influx of retail deposits provides the capital that the State reinvests to maintain industrial and infrastructure growth. Investment in fixed assets showed a 22.9 percent year-over-year increase in the first quarter of 2005, despite the government's macro economic tightening. The downside is that domestic consumption is curtailed, and in many sectors manufacturing capacity significantly exceeds demand. Added to that is China's critical need for



For more information on R&D investment in China, see the sidebar below, "Research and Development in China."

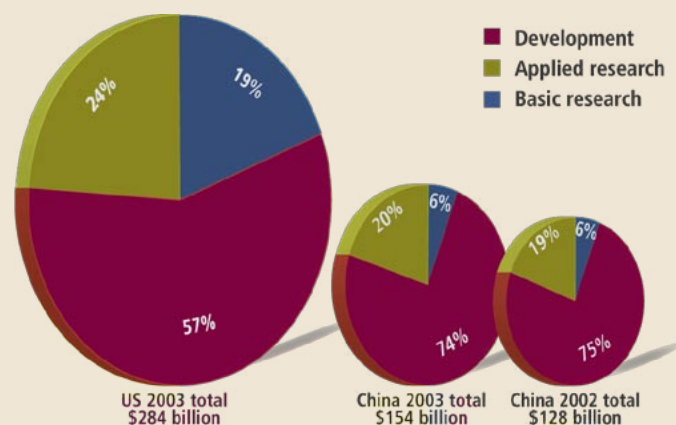
RESEARCH AND DEVELOPMENT IN CHINA

Research and development (R&D) expenditures in China reflect a strong emphasis on product development and only a small concern for basic research. Nineteen percent of R&D expenditures in the United States in 2003 were on basic research (see Figure A). By contrast, the Chinese government, in both 2002 and 2003 spent less than six percent of total R&D expenditures on basic research.

Rather than support scientific discovery, bureaucratic rewards for R&D expenditures are linked to replacing foreign technology (and reducing the associated royalties). To accomplish this goal, the government has sometimes mandated a highly orchestrated process requiring the lock-step involvement of whole domestic value chains. For example, the China Chip initiative of the Ministry of Information Industries included the development of processors like the Godson-1A and the eDSP21600 by the Chinese Academy of Sciences and Shanghai Jiaotong University that were then to be licensed by Chinese start-ups to develop commercial versions, fabbed by Chinese foundries and used by Chinese electronics and communications equipment manufacturers in over 100 different products.¹

Successful completion of these R&D initiatives is duly noted in articles in government-controlled media, but the obligation to actually sell the products developed then becomes the end manufacturer's job. In this part of the value chain, intense pressure to get to positive cash flow from R&D investments, and the environment regarding how IP is appropriated encourages infringement.

GOVERNMENT-SPONSORED RESEARCH AND DEVELOPMENT BY CATEGORY, CHINA AND THE UNITED STATES, 2002 AND 2003²



Source: US National Science Foundation, People's Republic of China State Statistics Bureau, Ministry of Science and Technology, 2004.

It is more difficult to quantify the contribution of innovative technology than something that displaces foreign technology and its visible IP costs. As a result, "real" R&D by Chinese firms is arguably more difficult to justify and support. ■

Sustaining more than seven percent GDP growth in an economy the size of China's requires exceptionally high levels of investment, especially when domestic consumption is low.

strong growth in employment. Rapid escalation of technology and other IP content is a required ingredient to make this work.

RELATIONSHIP BETWEEN CHINESE ECONOMIC POLICY AND GLOBAL IP TRENDS

An understanding of national economic and planning circumstances is important in an assessment of IP trends. Mandates to meet targets that maintain economic equilibrium in these areas have an increasingly distorting effect on development, placing mounting pressure on business concerns to engage in practices such as IP theft or reverse engineering. Officials who are responsible for business development projects place the focus of the organizations that are under them on attaining target numbers. This practice discourages more methodical, organic methods of industrial development that require large amounts of R&D investment.

LOW LEVELS OF UNEMPLOYMENT AND REDUCING UNDEREMPLOYMENT

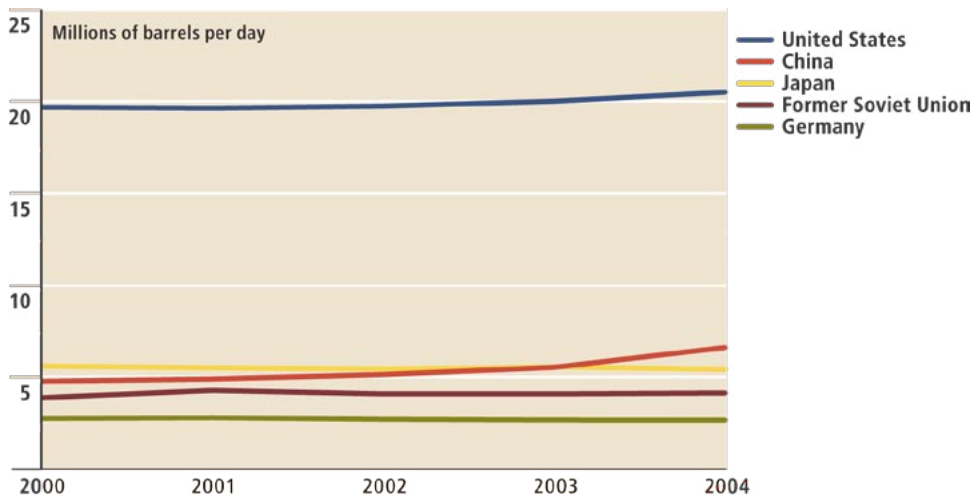
China faces a possibility of instability if it doesn't continue to create more and better jobs at a rapid clip. Unemployment and underemployment are the main threats to stability in the country over the next few years. Even if China's gross domestic product (GDP) grows at an average rate of 7 percent from 2004 through 2008 with employment elasticity of 0.5, the country would face an official unemployment rate of 10 percent, according to a 2003 analysis by the International Monetary Fund. This figure seriously underestimate the real levels of unemployment and under employment. For 2005, the central government has set a growth rate target of eight percent, and soon must confront its own earlier estimate that by 2007 sustainable growth in the country will not exceed seven percent annually.¹⁵

The pressure to maximize GDP growth has skewed China's investment toward production-oriented industries and away from agriculture. In addition to the wide-ranging effects this has had on global manufacturing, attendant changes in the employment base and a liberalization of restrictions on migration have both caused the influx of population from rural to urban areas to accelerate, especially over the past decade. In 1998 alone, 44 million people seeking better jobs moved from rural areas to cities and towns. If current rates of migration continue, China's population would be 50 percent urban by 2010, up from 40.5 percent urban in 2003.¹⁶ China overall is urbanizing at 2.5 percent per year, compared to India at 0.8 percent per year. In this rush to the manufacturing centers, China adds an urban population the size of Frankfurt or Philadelphia very four weeks. The central government grasps the necessity of continuing to transfer surplus labor (conservatively estimated at 150 million people) from the rural agricultural sector and state-owned enterprises to the private sector.

CURBING INFLATION

Political stability also depends on reliable consumer buying power. The 2005 government economic plan included a target of no more than four percent consumer price index (CPI) inflation, a difficult objective given the high level of investment in industrial production and very high GDP growth targets. Price volatility is high

FIGURE 5: AVERAGE DAILY OIL DEMAND, TOP FIVE COUNTRIES, 2000–2004



Source: CBC, April 2005

Daily demand for oil in China increased 19 percent from 2003 to 2004, yet while US demand grew only 2 percent during that same time period, its overall oil demand is three times higher than China's. Overall, world oil demand increased 3 percent from 2003 to 2004.

because demand for energy and other basic industrial inputs, still growing in places like the United States but at a faster pace in Asia's emerging economies, regularly outstrips supply. China now demands more of many commodities than any other country including the United States. China will produce and consume 2 billion metric tons of coal, and it is well on its way to an annual shortfall of 200 million tons. China's steel production continues to set records, up 25 percent year-over-year in April 2005 to an annualized rate of 337 metric tons. The United States consumed three times the oil in 2004 that China did, but China's consumption of oil has more than doubled since 1994. In 2004 alone, daily demand for oil in China increased 19 percent over 2003 levels, compared with a worldwide 3 percent increase.¹⁷ (See Figure 5 above.)

The basic commodity statistics underscore China's dilemma, shrinking margins for manufacturing and assembly between the twin pressures of non-renewable commodity price increases, on one hand, and increasing costs for R&D and new legal IP, channels to market, and global brands, on the other. While coal, oil, metal ores, and other non-renewable resources continue to climb in value, the products China produces—even basic commodity products—do not. Under pressure from China's surging supply, steel prices have collapsed around the world: down 27 percent in the month of May alone for benchmark hot rolled coil steel, down in six months from a brief peak near \$700 per metric ton at the end of 2004 to settle around \$450 per metric ton. In the meantime, manufacturing facilities all over China are facing rolling blackouts, with no immediate solution in sight, further aggravating a poor return on manufacturing investments brought on by the range of shrinking margin factors.

As a result of this preoccupation with GDP growth, employment, and investment, local governments welcome any low-cost means of acquiring IP so they can rush products to market and fill their newly constructed factories.

China is aggressively seeking solutions to its challenges with non-renewable inputs, especially energy. The emphasis should be on technologies for coal gasification, focusing on co-generation facilities that output some form of portable energy, like methane or methanol or hydrogen, with thermal and petrochemical products as well. But China is seeking to develop conventional nuclear fission plants, pebble bed nuclear reactors, wind farms, biodiesel conversion facilities, more hydroelectric power, and ethanol plants.

China's substantial influence on world commodity prices was proven in 2004. A rapid increase in demand for oil in China helped push world oil prices above \$50 per barrel by the end of 2004 and had a direct impact on transportation costs.

MAINTAINING HIGH LEVELS OF FOREIGN DIRECT INVESTMENT

Sustaining more than seven percent GDP growth in an economy the size of China's requires exceptionally high levels of investment, especially when domestic consumption is low. Through the 1990s to the present day, China's economic growth has enjoyed a steady increase in foreign investment, from \$40 billion to \$60 billion a year in 2004. Still, consistently over 90 percent of infrastructure and fixed asset investment has come from domestic sources, and as the level of investment grows, that percentage grows as well, recently hovering around 95 percent. Noting that investment in fixed assets and infrastructure now approaches 50 percent of GDP, economists express concern that China's growth rates may not be sustainable. But economists have done so since the early 1990s, when a drumbeat of predictions of slowing growth, bank failure, and massive state-owned enterprise failure was widely heard.

There is a consensus that the return on these high levels of necessary investment is weak. Whether one is addressing manufacturing, service, or R&D, foreign direct investment companies regularly outperform domestics on key measures. Cumulative foreign direct investment reached \$430 billion through the end of 2002, and as noted above account for about 2 percent of employment. Yet foreign-invested enterprises generate over 52 percent of China's \$325.6 billion in exports that year.

Much of this foreign investment was predicated on very low labor costs and generous government incentives, including subsidies and tax breaks, to locate plants in the country. The enthusiasm for China's advantages in these areas has subsided to some degree, although the desirability of integrating supply chains (for example, developing local sources of parts and materials supply for plants that produce finished goods) in the country continues. The status of China as a manufacturing power remains unchallenged, but labor costs in China's coastal cities are rising, particularly for skilled workers. Some developed countries have seen fit to offer sufficient incentives to maintain their manufacturing capacity, and many developing countries are competing directly with China for new investment.¹⁸ Within China, discussion of a labor shortage in historic manufacturing centers like Shenzhen remains both widespread and disputed. Beneath sustained substantial growth of Pearl River Delta

exports, generally, there is a movement domestically of manufacturing investment from the delta up the coasts of Fujian and Zhejiang provinces, and from Shanghai west to lesser developed areas of Zhejiang and Jiangsu provinces.

RESULTING IMPACT ON INDUSTRIAL DEVELOPMENT PROGRAMS

As a result of this preoccupation with GDP growth, employment, and investment, local governments welcome any low cost means of acquiring IP so they can rush products to market and fill their newly constructed factories. Many of China's industrial development programs are explicitly focused on decreasing IP costs and reducing the export of cash for IP-related expenses (see Table 1).

TABLE 1: OVERVIEW OF CHINA'S INDUSTRIAL DEVELOPMENT PROGRAMS

Guiding Principles	Manifestations and Mechanisms
Reduce amount of money sent abroad for technology acquisition and usage	Establish champion companies with initial capitalization and licensing space
For products and technologies with high foreign IP content, support the development of major domestic companies and alternative IP	Support IP developers with government procurement
For businesses of scale or potential scale, maintain significant State influence (if not direct control)	Support IP developers with policy driven credit lines
Develop every technology related to IT, logistics, tracking, etc., and preserve national security interests with appropriate safeguards	Support IP developers with sponsored research and product development mandates
Coordinate State policy and regulatory work to further the above interests	Recruit IP-bearing ethnic Chinese managers who have had significant careers with international technology firms

Many Westerners assume that respect for IP rights will develop in China as it did in Japan, Korea, and other parts of the now developed world.

OPPOSING THE PLANNED ECONOMY

Many Westerners assume that respect for IP rights will develop in China as it did in Japan, Korea, and other parts of the now developed world. According to the assumption, once China matures and becomes a true innovator itself, it will begin to protect the rights of intellectual property owners in earnest. This theory neither considers the weak status of private property in China, nor how state institutions in the country impose control on the business environment in ways that thwart not only foreign invested enterprises but private sector innovation as well. One example of interference in the private sector by state institutions can be found in the telecommunications sector.

Ningbo Aux Group. The Ministry of Information Industry (MII) struggled through February 2005 to maintain an inordinate amount of control over burgeoning domestic mobile phone production, expected to reach a capacity of 500 million units in 2005, compared with 300 million units in 2004. Using a newly established administrative permissions law designed to mitigate the effects of arbitrary government decisions on individual companies, Ningbo Aux Group sued the MII in October 2004. Aux claimed that the ministry had refused to approve the sale of

It is important to remember that China has taken many steps to improve its ability to protect IP rights for over two decades.

the company's own-branded mobile phones for the fifth time in two years. The MII stated in response that Aux did not have a production license.

Aux, frustrated by attempts to get a production license somehow so that it could produce phones under its own brand, withdrew the suit in February 2005 after the National Development and Reform Commission (NDRC) announced it would issue licenses to applying companies who met requirements, including having more than 200 million yuan (\$24 million) in registered assets. Other sizable companies such as Skyworth and Huawei seized the opportunity and also applied to the NDRC. The NDRC stated that from that point forward the MII would function in a merely advisory capacity on the licensing issue, but reiterated an MII concern that too many mobile phone manufacturers already exist in China.¹⁹

Many observers continue to object to the negative influence of the planned economy on private sector development generally. Economist Wu Jinglian of the China Europe International Business School, for instance, who criticized the behavior of the MII toward Aux, has noted discrimination on the part of state institutions against the private sector generally. He has also pointed out a relative lack of financing options for truly private companies by comparison with their state-sponsored or state-owned counterparts.²⁰

MANAGEMENT OF STATE-OWNED ASSETS

The State Asset Supervisory and Administration Commission (SASAC), established in 2003 to improve and rationalize the State's management of its owned assets, continue to assert control over vital commercial activity. Over the past decade, the foundational socialist market policy of *zhengqi fenkai*, separating regulation from business operation, is supposed to have been in force. However, SASAC has been very aggressive in guiding the strategies, executive management, and investment of the 190 massive state-owned enterprises it has under its control.

Much of the State's role is focused on access to resources for expansion and growth. The key mechanisms are the State's control of access to direct investments, government procurement opportunities, bank loans and lines of credit, and domestic and foreign equity markets. It is in this role that the State influences high levels of non-market, and "misallocated" capital into low return investments, and that inadvertently increases pressure on innovative privately run companies and large state-owned enterprises as well. The politicization of capital allocation has the additional unfortunate effect of protecting many manufacturing enterprises from bankruptcy, even if they have sustained periods of losses.

Overcapacity in China has a more pronounced and sustained negative impact on pricing and value, because many manufacturers do not disappear under market pressures, as they do in more marketized economies. So whether the manufacturing involves mobile phones, durable appliances, automobiles, or televisions, overproduction will often continue unabated long after demand has

waned. China's long-awaited bankruptcy law is still not finalized, but it has been made clear that more than 2,500 enterprises will be exempt from the normal application of the law when it is. There are too many urgent social and political demands that conflict with an expedient rationalization of the marketizing and bankruptcy process.

Yet, in the current climate, companies struggling for profitability in grossly over-supplied sectors are under intense pressure to stem losses. They are constantly seeking to develop new streams of revenue, enhance output value, open overseas markets, and improve overall manufacturing processes and the technology levels of products being made.

■ The Balance of IP Pricing Power and the Changing Direction of IP Law

It is important to remember that China has taken many steps to improve its ability to protect IP rights for over two decades. Beginning in the early 1980s, the Chinese government passed laws covering various aspects of patent, trademark, and copyright protection. In 2001, the year of its World Trade Organization (WTO) accession, China further refined its laws in these areas to comply with the WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

In order to provide a means for enforcing these new laws, the country assigned a wide range of different state organs new responsibilities for IP protection, in addition to enlarging the State Intellectual Property Office (SIPO), the State Copyright Bureau and other entities for which IP rights protection is a primary focus. This is not to mention other measures the Chinese state government took through 2004 to raise public awareness and participate in international IP protection initiatives.²¹

In 2004 and 2005, state law enforcement agencies in the government intensified their efforts, actively collaborating with their US counterparts to uncover counterfeit DVD and Viagra drug rings. For their part, US officials in September 2005 confirmed improvements at the national level in the level of serious IP law enforcement activity, but assert that local governments have yet to demonstrate their resolve in this area.²²

Even when long-term commitment to solving the problem is evident, counterfeiting has proven to be a problem that is difficult to combat. Many fakes are produced in Guangdong province, which has been the focus of a Chinese customs bureau crackdown that intensified in 2005. After durable goods parts counterfeiters felt the pressure of the crackdown, they shifted their production to finished goods. Luxury purse counterfeiters, for their part, have found it easy to produce fakes in this area that look like they are authentic because legitimate leather goods are produced nearby.²³

China is an environment where everything is negotiated, and as Chinese manufacturers have achieved huge global market share, they have successfully broken down long established pricing barriers for things like mobile telephony, audio and video codecs, and software.

In many other instances the courts have voided what were widely perceived outside China as solid patent, copyright, and trademark claims. Even when they found for foreign plaintiffs asserting their IP rights, awarded damages were trivial.

China is an environment where everything is negotiated, and as Chinese manufacturers have achieved huge global market share, they have successfully broken down long established pricing barriers for things like mobile telephony, audio and video codecs, and software. This is achieved through a number of mechanisms. Where competing technologies exist in the global marketplace, marketed potentially by competing patent pool groups, prices have been pushed down through straightforward procurement pressure from the world's largest potential users of the technologies.

High piracy rates in China and years of ineffectual actions on the part of the Chinese government to discourage pirates caused the Office of the US Trade Representative (USTR) to conduct an out-of-cycle review in early 2005 "to evaluate China's implementation of its commitments to significantly reduce IP rights infringement levels." After completing the review, the USTR office in April 2005 placed China on its Priority Watch List and asserted its intent to use WTO procedures to press China to comply with its TRIPs obligations.²⁴

PROTECTING CHINESE COMPANIES IN CHINESE COURTS

While enforcement of the IP rights of foreign companies has been weak in China, there are some indications that the country's own companies are quickly learning how to use the legal system there in ways common to those of a transitional economy. A number of cases indicate that, rather than being ineffectual, the Chinese courts can be a reliable means to protect Chinese companies. Novel, even unprecedented legal initiatives are important starting points in understanding the direction of China's IP strategy, law, and practice. Consider the following examples:

- Chinese drug makers took the step of asking the SIPO to invalidate Pfizer's method-of-use patent for Viagra, and SIPO responded by invalidating the patent in July 2004. The companies challenging the patent actually took their cue from a UK court's previous invalidation of a Viagra method-of-use patent, according to the *National Law Journal*, which also pointed out that these pharmaceutical manufacturers could have chosen to illegally make and distribute copies of the drug as many had in the past, rather than go through the legal process.²⁵
- In April 2005, a trial began between Eli Lilly and pharmaceutical firm Puyang Hengfeng, which similarly argued that Lilly's Gemzar cancer treatment drug had no novelty and asked that SIPO overturn Lilly's patent for it.²⁶
- After Intel filed its first ever copyright infringement lawsuit in China, asserting its software was being used illegally, Shenzhen Donjin Communication Technology, the defendant, filed a countersuit in April 2005. Donjin accused Intel of monopolistic activities and sought a judgment to invalidate Intel's "monopolistic protocol." Beijing's No. 1 Intermediary People's Court accepted the countersuit.²⁷

- Toyota lost its trademark lawsuit against Geely Group in November 2003, after it had claimed the logo on Geely's cars closely resembled its own. Although infringement may have seemed clear to some, the Beijing No. 2 Intermediate People's Court did not find there was any resemblance.²⁸
- Even though only 326 out of the approximately 25,000 trademark registrations filed in China in 2004 were for Chinese trademarks, the trademark holders who do exist in China are exploring the extent of their claims. Shanghai Shenji Computer, for instance, sued IBM in September for trademark infringement after IBM ran ads using the terms "Shen Ji" and "Shen Ji Miao Suan" ("wonderful foresight"), which Shenji asserts are trademarked. Shenji requested an apology and RMB500,000 in compensation. Beijing's Chaoyang People's Court reviewed the matter in January 2005 but hasn't yet made a determination.²⁹

The results of recent decisions issued by Chinese courts, similarly, are mixed. In some instances, the courts have demonstrated they can be effective in the arena of IP. The copyright infringement case of Graduate Management Admission Council (GMAC) and the Educational Testing Service (ETS) versus Beijing New Oriental School (BNOS) in which the defendant was accused of violating copyright of GMAT, TOEFL, and GRE course materials is an example. In this case, the Beijing High Court in December 2004 affirmed the ruling of a lower court and awarded \$774,000 in damages to the plaintiff, as well as requiring the destruction of the infringing materials and a published apology.³⁰

In many other instances, however, the courts have voided what were widely perceived outside China as solid patent, copyright, and trademark claims. Even when they found for foreign plaintiffs asserting their IP rights, awarded damages were trivial. Three counterfeiters of brake pads, for example, were each fined in March 2003 only \$121 for selling pads with the trademarks of 10 different brand owners that had a total market value of \$142,000. The lack of punitive measures for counterfeiting and IP theft in China almost certainly causes losses in the billions for various industries. Pfizer, for its part, asserts that it loses as much business to counterfeiters as it does to its legitimate competitors, and notes that China is the primary source of the counterfeits.³¹ China has recently strengthened the criminal sanctions in its IP protection laws, but so far there is little that has been done to apply these as broadly as needed to provide a meaningful deterrent.

USE OF THE US LEGAL SYSTEM

China is anxious to continue its high GDP, increase export growth rates, and increase its companies global competitive advantage. If it continues to set the bar low for IP rights in a manner developing countries will emulate, this factor needs to be considered. The case filed on behalf of Wuxi Multimedia Power (Wuxi) Digital Technology, a trading and manufacturing concern headquartered in Hong Kong with manufacturing facilities in China, against the 3C DVD patent pool in

If China continues to set the bar low for IP rights in a manner developing countries will emulate, this factor needs to be considered.

a US court, for example, could have a generally detrimental effect on how patent pools are perceived inside the United States, as well as outside it.

3C DVD patent pool. Philips and Sony have pooled their patents and collected royalties jointly on compact disc equipment and media since CDs were introduced in the early 1980s. By 1995, the royalty stream on CD media alone amounted to a minimum of \$30 million annually, or three cents per CD of the billion discs pressed annually. Philips and Sony were also founding members of the MPEG LA and contributed to that organization's success with the expertise they had developed in CD technology patents.

When DVDs were being developed in the mid-1990s, Philips and Sony again sided together and planned a licensing strategy similar to what they followed with CDs.³² In February 1999, the two along with Pioneer announced a joint licensing program that was dubbed the 3C DVD licensing group. Rather than join the 3C, Hitachi, Matsushita, Mitsubishi, Time Warner, Toshiba, and Victor Company of Japan (JVC) formed their own DVD 6C Licensing Agency, which they announced in June 1999.³³

In 2002, the 3C added a fourth member when LG added its patents to the pool's portfolio. The growing amount of pooling in DVD technology increased the influence of the pool on consumer electronics manufacturers in China—in 2004, Chinese licensees cited in the press reported paying between \$12 and \$27 in royalties per DVD player to various patent pools.³⁴

Law firm Handal & Associates filed a class-action lawsuit in June 2004 against the 3C that named Wuxi Multimedia as plaintiff. The firm amended the complaint in December to add Orient Power (Wuxi) Digital Technology, described as a limited

PUBLIC GOOD VERSUS PRIVATE INTEREST IN CHINESE ANTITRUST LAW

Any national IP regimen must establish a balance point between public good and the private property rights of asset owners, including IP owners. This balance point is obvious in hard asset areas like telecom facility ownership, power generation, and all highly regulated utility industries that tend toward monopoly. In the case of IP assets, it is most evident in areas like standards and antitrust, where severe choke points could be created by owners of key IP seeking what may be seen as unreasonable returns.

In China, the emphasis continues to be more on the public good than would be the case in the United States, for example. This is not surprising, considering the ideological and socioeconomic history of China. The draft anti-monopoly law of the State Council notes, for example, allows public interest exceptions to anti-competitive practices, opening up the possibility that some domestic companies could receive protected status not available to their foreign competitors.

The proposed law, a draft of which appeared in March 2005, is based in large part on EU and other Western European anti-monopoly law,

and like many such laws, includes some broadly defined concepts that can be subject to differing interpretations. For instance, the law bans "abusive" behavior by "dominant" companies.

However, unlike similar laws in the United States and Europe, the draft Chinese law also bans both "monopolistically" high prices and predatory pricing, and does not impose requirements on plaintiffs to prove that a competitor is selling products below cost in order to judge that the competitor's prices are unfairly low. One attorney noted that the law's lack of specificity leaves much up to interpretation, making erratic enforcement more likely and providing more latitude for those who seek to take action against foreign company IP rights "abusers."³

Until the law is actually in place and plaintiffs begin to try to avail themselves of the remedies it could potentially provide, however, no one knows how it will be used or what its implications will be for MNC IP owners. The possibility exists that antitrust actions against a number of foreign companies with a dominant presence in China would be launched soon after the enactment of such a law. ■

liability company in Wuxi, China, as plaintiff. In the amended complaint, the plaintiffs accused the 3C of violating four provisions of the Sherman Act and two provisions of the California Unfair Competition Law in actions amounting to an attempt to monopolize the market for DVD players. The complaint demanded that the patent licensing agreement of the 3C be voided, the royalties to date be refunded and treble the amount of royalties as damages be awarded.³⁵

Cited in the complaint was a letter from the Department of Justice to the 3C in response to a request for guidance that recommended a number of patent pool practices to avoid the risk of antitrust violations. According to the complaint, in the letter the Department of Justice recommended the following:

- allowing only patents in the pool that are essential to meet the DVD standard from a manufacturing perspective
- establishing a low royalty rate relative to manufacturing cost to eliminate the threat of price fixing
- licensing on a non-discriminatory basis
- allowing patent holders to license patents elsewhere besides through the patent pool
- avoiding disclosure of sensitive, proprietary information
- avoiding provisions that grant back improvements in the licensed technology to the licensor

The complaint alleged that the 3C disregarded each one of these recommendations except the one concerning sensitive information.

When Handal originally filed this complaint, DVD player production by Chinese OEMs was in a state of turmoil. Price competition for domestic-based manufacturers was excessive, with some Chinese companies claiming a profit margin of only \$1 per player and complaining of royalty fees that they said amounted to 20 to 30 percent of production costs. During the first five months of 2004, 30 DVD player manufacturers went bankrupt in Shehzhzen's Baoan District. Despite this, through August 2004, there still remained 200 Chinese DVD player manufacturers, according to the Development Research Center of the State Council of PRC (DRC). These remaining 200 had a capacity of 70 million players annually and faced a domestic market that consumes less than 5 million DVD players a year.³⁶

Most, if not all members of DVD patent pools were able to maintain market share during this chaotic situation. Worldwide, consumers were demanding 100 million units annually—apparently almost entirely supplied by the 3C, 6C, and 1C member companies who had outsourced manufacturing to China. Total DVD player shipments from China in that five-month period amounted to 41 million units (seemingly almost all the DVD players produced worldwide), but the number of Chinese-branded units appeared to be less than 10 percent of the total. For exam-

It seems clear that the Chinese government will continue to take actions that are designed to reduce royalty payments, particularly when its perception is that royalty rates are far too high.

ple, only 193,000 Chinese-branded DVD players shipped from Shanghai, of 2 million total shipped from that port in the first five months of 2004.³⁷

It is questionable whether or not these pools will be able to retain the same power they held in 2004. The Wuxi Multimedia suit follows a Philips loss of a lawsuit filed in July 2002 against Taiwanese blank CD makers for non-payment of royalties. In a US International Trade Commission decision on this case that was finalized in December 2003, an administrative law judge declared Philips misused patents by tying essential and non-essential patents together. With the exposure of this practice and vulnerability, it is not surprising to see follow-on lawsuits being filed against the Philips-administered 3C patent pool.³⁸

Besides supporting general lower royalty arrangements, the Chinese and Taiwanese governments responded to the 2004 DVD player manufacturing crisis by stepping up their standards efforts. The MII pondered a next-generation, integrated standard in September 2004 and declared enhanced versatile disc (EVD) as the current national versatile disk standard in China in February 2005. Taiwan is developing its own forward versatile disk (FVD) standard. For its part, the 6C Licensing Group in March 2005 lowered its royalty fees on DVD players by 25 percent and on discs by 10 percent.³⁹

It seems clear that the Chinese government will continue to take actions that are designed to reduce royalty payments, particularly when its perception is that royalty rates are far too high. The case of DVD technology illustrates the multi-pronged approach the Chinese government and domestic entities have favored to date to effect change in this area:

- devising new standards for established technology that avoid the patents held by the dominant pools
- pricing media and equipment based on the new standard at a fraction of the price offered by makers of DVD-standard media and equipment, to encourage adoption of the new standard
- attacking the validity of patents held by foreign companies, particularly those fundamental to an established pool
- citing anti-trust law when making the charge that patent pools and their member companies are monopolistic



IP mining, as employed in this report, means obtaining another company's IP illegally in one country and then using it without penalty in other countries where legal systems are poor and IP rights enforcement is non-existent.

■ Underserved Market Vulnerabilities and IP Mining

As emerging economies continue to develop, they will seek out untapped markets and develop new strategies for growth. Emerging economies are likely to target undeveloped markets, which have largely been ignored by Western technology companies that look to develop and market technologically advanced products developed with substantial R&D that are sold at premium prices. Countries like China have the opportunity to gain significant shares of undeveloped markets, where basic, commoditized technologies often suffice. As China and others enter

these markets, the practice of IP mining is growing. Sometimes this practice takes advantage of markets where trademarks, copyrights, or patents have not even been filed for potentially marketable IP. Other times, the practice takes advantage of politically or economically motivated lack of interest in enforcing the IP rights of North American and European companies.

Manufacturers in the emerging economies that have limited marketing resources, product-quality challenges, low-cost bases and margin requirements, weak brands, and limited customer service capabilities will be attracted to undeveloped markets. These markets may be easier to penetrate than mature markets where IP rights are strongly enforced. Emerging-economy governments have lacked enthusiasm for IP rights because of the enforcement costs they would ultimately bear and can scarcely afford. Many manufacturers can enter undeveloped markets with products that would otherwise be infringing on global brand-owners' patents, and copyrights. For consumers in undeveloped markets, low prices for acceptable-quality products take precedence over IP enforcement.

Many IP-owning MNCs leave their IP unprotected in various countries for financial reasons, lack of interest in undeveloped and unpredictable markets, or negligence. Consequently, emerging-market manufacturers have gained in unprotected markets by finding products with trademarks and patents—of older technologies that are now common commodities and less-used in mature markets, for example—that are not registered. These manufacturers are not usually the owners of the IP but capitalize in the unprotected by producing and supplying the same or similar products as the trademarked or patented ones at lower prices.

IP MINING AS A STRATEGY

As the quality of low-cost countries manufacturers' products improves, along with their ability to launch these products successfully in the undeveloped markets, brand-owning MNCs are realizing the threat posed to their IP. These MNCs may need to reconsider their strategy in such regions to guard against IP loss. Measures could include developing products with a minimum of features or extending the life spans of older products to meet the needs of these undeveloped markets.

Huawei. Founded by a former People's Liberation Army officer in 1988, Huawei Technologies is a maker of networking and telecommunications equipment. Since 1996, the company has aggressively pursued emerging markets, competing head-to-head with major equipment vendors like Cisco, Ericsson, and Fujitsu in countries like Bangladesh, Iraq, and Nigeria where lowest cost is essential. After successfully pursuing this strategy, the company also began to compete in developed

Cisco asserted that Huawei's copying included technologies that were patented, sections of the company's user manuals, and whole passages of source code that Huawei appropriated as "the basis of the operating system for their knock-off routers."

markets, and now claims to have 22 of the world's leading 50 telecommunications operators as customers, including British Telecom.⁴⁰

Shortly after Huawei's products appeared in the United States, in January 2003, Cisco filed an IP infringement lawsuit in a US district court in Texas against Huawei and its subsidiaries FutureWei and Huawei America, both of which had offices located in Plano, Texas. Cisco alleged in its complaint that Huawei sold networking products, through these subsidiaries, in the United States, infringing Cisco's IP rights in numerous ways.

Cisco characterized the amount of outright copying and misappropriation of its IP as staggering. It asserted that Huawei's copying included Cisco technologies that were patented, sections of the company's user manuals, whole passages of source code including strings of text, file names, and bugs that Huawei appropriated as "the basis for the operating system for their knock-off routers," and Cisco's user interface, including verbatim portions of its Command Line Interface help screens. Exhibit H of the complaint consisted of a side-by-side comparison of the user interface section of a Huawei user manual posted on the Huawei Web site with the identical section of a copyrighted Cisco manual posted on its Web site.

The press release announcing the initiation of the lawsuit quoted Cisco Vice President and General Counsel Mark Chandler, who stated that Huawei had "refused Cisco's numerous attempts to resolve these issues."⁴¹

In response to the complaint, the Texas court in June 2003 issued a preliminary injunction against Huawei to halt the sale or distribution of products containing the disputed source code and to prevent the company from using employees or consultants who previously had access to the source code. The injunction formed the basis of later agreements to stay the lawsuit in October 2003 and then settle it in July 2004.⁴²

Earlier that same month, a Huawei employee attending Supercomm was accused of espionage by Fujitsu Network Communications (FNC). FNC general counsel alleged in a letter to Huawei cited by *Business Week* that the employee came by the Fujitsu booth after exhibit hours were over, opened the case of a piece of optical networking gear there and began to take photos of circuit boards inside. A security

OUTSIDER PERCEPTIONS OF IP RIGHTS PROTECTION IN CHINA

The seriousness of China's current IP rights issues as perceived by outsiders is not easily overstated. In the recently published American Chamber survey results, respondents uniformly report an improving investment environment in China, year on year, from the standpoint of processes, profits, and opportunities. The one notable exception is the IP rights climate, said to be improving, though very slowly.

A full 80 percent of respondents rated China's IP rights enforcement as totally or largely ineffective, and 67 percent believe that recent

changes in law will not significantly improve the situation. Half of foreign companies that have experienced infringement believe it is hurting their global operations, beyond what is happening in the China market, yet only 16 percent of all companies suffering infringement choose to pursue the problems in court. About one third of all respondents report that China's IP rights problems are slowing their investment plans, and 44 percent blame China's IP rights environment for decisions not to invest in R&D facilities in China.⁴³

guard alerted to the situation apprehended the employee and confiscated the flash memory card in the man's camera. Fujitsu did not press charges, but did send copies of the letter to AT&T, Cisco, Lucent, Nortel, and Tellabs; considering this, *Business Week* speculated that Fujitsu may have come across evidence that the employee may have gathered proprietary information on their products as well.⁴³

These altercations with competitors have not seemed to have a detrimental impact on Huawei's business. The company doubled its export sales to \$2.28 billion in 2004 from \$1.05 billion in 2003 and reached \$5.58 billion in overall 2004 sales. Some observers, while acknowledging the Huawei's poor reputation, have also praised the company's software development and operational expertise, noting that the company often builds on and sometimes improves what it copies.⁴⁴

Huawei seems to be succeeding with a business model that has at its base an overt strategy, in which gaps in IP protection coverage can be exploited, particularly in developing countries. Warren Heit, a partner at White & Case observed:

"You walk into their offices and it might as well be a Silicon Valley company, and they have a beautiful display case after display case after display case after display case of all the unbelievable equipment they have, each a perfect copy of current equipment that is being offered in the United States. In addition to the Cisco telecom equipment, Polycom, on each row of display, there is a beautiful piece of Polycom equipment. It just so happens that it's not made by Polycom. It's made by Huawei and it's clear what Huawei has done is saying to itself, well okay these are great products. I'm going to knock them off and to the extent the IP law allows me to practice in these areas, I'm going to go there. I mean the reason Cisco is such an expensive model is they put in all the IP protection to adopt for itself the United States market, but they haven't gone to Mongolia, they haven't gone to all these other countries to obtain the necessary patent protection. Huawei is saying to itself, well okay, Cisco, okay maybe you can have the US, but I'll take everywhere you haven't gone."⁴⁵

■ The Underground Network and Counterfeit Goods Distribution

IP infringements extend beyond manufacturing and design to include other forms of violations, such as distribution of counterfeit, unlicensed, or unauthorized products. This category of goods can be intended to mislead the purchaser into believing they are buying from the company who actually owns the brand. Growth in counterfeit goods has coincided with China's rise as a commercial and manufacturing power. The US Department of Commerce estimates the incidence of counterfeiting in China now to be as much as 20 times as great as in any other country; the impact of Chinese counterfeiting on the US economy was \$20 to 24 billion in 2004, compared with counterfeiting in Russia, the number two country with an impact of \$1 billion. Seen from the perspective of China's development pattern, recent studies have concluded that as much as 8 percent of China's GDP is in counterfeit goods trade.⁴⁶

Control and enforcement at the factory level have not had much effect as the interests of counterfeit distribution leaders in many cases prevail over those of the IP owners.

Working against prolific counterfeiting of auto parts is a priority for global suppliers and OEMs operating in China, not only for commercial reasons but for reputational and liability reasons as well.

A distributor of specific counterfeit products, such as fake designer watches, is also likely to be involved in IP infringement, such as distributing pirated DVDs and counterfeit popular prescription medication like Viagra. This method of diversifying the product lines is probably used by most underground organizations around the world. Counterfeit goods may be sold by myriad street vendors, retail stores, or Internet Web sites. A few, highly sophisticated, powerful groups that have the technological, financial, and other required resources to enable successful counterfeit activities are likely to be at the top of these operations. These networks are all the more interesting because global trading capability is not normally identified as an emerging competence of Chinese firms. That is to say, powerful Chinese trading houses have not emerged as part of China's export growth. As contract manufacturers, Chinese enterprises typically leave the trading activity to their brand-owning buyers. Yet, the evidence is increasingly clear that large, albeit non-transparent, trading networks are efficient, profitable, and expanding very quickly.

For this reason, more sophisticated counterfeit products—made not just for the domestic Chinese market, but for international export—are on the rise in a number of industries. Examples are prevalent in many mature manufacturing industries. In the automotive industry, for example, rampant counterfeit parts proliferation has been followed by Chinese-branded cars that have design elements that are identical to those of certain Mercedes and Nissan models, or even copies of entire GM Daewoo and Honda vehicles. Rather than helping to discourage the copycats, some American importers are making arrangements to sell Chinese-branded cars in the United States, where they will try to undercut the prices of major brands by 30 percent.⁴⁷ Chinese-manufactured prescription drugs have found their way into global black market channels and in some reported cases into regular, prescription-secured distribution channels. Rebranded semiconductors, counterfeit leather goods, designer accessories, digital cameras, batteries, and even aircraft maintenance parts appear in markets around the world, in emerging economies and developed economies.

Those involved in anti-counterfeiting activities agree that matters will worsen before they improve, but argue that persistent, coordinated effort over years will result in halting the growth of counterfeiting and eventually in an overall reduction in counterfeit crime. According to Tim Trainer, president of the Global Intellectual Property Strategy Center, "It's a matter of getting to a point where it's not so out of control, and then to reducing it one tenth of a percent at a time." Trainer acknowledges that counterfeiting cannot be eliminated entirely. "I can't think of any crime out there that we have gotten rid of completely," he says.

STRUGGLES AGAINST COUNTERFEITING

Anti-counterfeit measures and activities are met with many obstacles. First, in an era of globalized economies, identical goods can be manufactured in dozens of locations around the world, legitimately, and be moved by proper owners from market to market, to take advantage of shifting labor advantages, resource availability,

and currency realignments. A second challenge is that the range of products is so diverse and the quantity so vast. Once products leave the factories they become difficult to track and manage, even in proper logistics systems. A third obstacle is that packaging, quality, and the product itself can be virtually identical to the authentic product, deceiving not only consumers but authorities as well. Fourth, control and enforcement at the factory level have not had much effect as the interests of counterfeit distribution leaders in many cases prevail over those of the IP owners.

Finally, there are competing interests in target markets that may benefit from but not share the liabilities of product manufactured without proper acknowledgement of IP rights and ownership. Systems integrators, large consumer electronics chains, adventurous automobile dealerships and distributors, margin-hungry repair shops, drug and electronic component distributors, sidewalk vendors, eBay entrepreneurs, and others are potential beneficiaries of moving inexpensive, inauthentic goods. Customs and trade authorities are often not fully or efficiently mobilized in target markets to block incoming goods, even when they are readily identifiable. In the United States, for example, the current focus on fighting terrorism occupies the attention of all border protection systems and institutions, and they readily admit they cannot realistically refocus their resources elsewhere.

The Auto Parts Industry

Phillip Rotman, assistant patent and trademark counsel of Dana Corporation, a US auto parts maker, stated during a 2004 Senate hearing that Dana has averaged 10 actions against counterfeiters per year since 2000. The \$7.9 billion company asserts that the criminal laws against trademark counterfeiting are not being enforced, so it is investing its own money to encourage enforcement.⁴⁸

The automotive parts industry loses billions of dollars in sales to counterfeiters annually, and China is a leading auto parts counterfeiting country, according to Stephen Pinkos, deputy undersecretary of commerce for intellectual property and deputy director of the US Patent and Trademark Office, testifying in May 2005 before the US Senate Judiciary Committee. Pinkos noted that though a windshield factory in Guangdong Province had been raided multiple times to seize counterfeits, the factory was allowed to continue to operate and produce windshields for export bearing the brands of Western and Japanese trademark owners on them.⁴⁹

“More sophisticated infringement schemes, combined with an increasing number of exporters, mean more counterfeits are showing up in foreign markets,” noted James Zimmerman, vice chairman of the board of governors of the American Chamber of Commerce in China, in his May 2005 remarks to the Congressional-Executive Commission on China. Zimmerman listed auto parts among the many product categories suffering high levels of Chinese counterfeits. General Motors estimates that 30 to 70 percent of auto parts for the Chinese market are counterfeited.⁵⁰

There is a mutuality of interests binding the funders, local regulators, and other parties that offers a shield against adverse IP actions, legal or illegal.

Working against prolific counterfeiting of auto parts is a priority for global suppliers and OEMs operating in China, not only for commercial reasons but for reputational and liability reasons as well. Fake brake pads and shoes, with linings of indeterminate quality, circulating under a fake brand name, are a hazard to users and the reputation of the brand owners. Reporting IP violations to the local authorities where the infringement is occurring is never sufficient. In some cases, IP owners have taken their own measures to counter IP theft and other infringements. For example, one battery maker regularly employs outside, private investigating agents to work with, and motivate, local authorities to take action against factories branding look-alike batteries with its logo. Major pharmaceutical companies fund what they have described as private armies working to pressure counterfeiters to keep goods out of global channels.

■ Piracy and Reverse Engineering

Small entrepreneurial enterprises are the primary engine of China's genuine innovation. Still, piracy and reverse engineering, in various forms, are found throughout genuine private sector companies; apparent private sector businesses, such as those funded by large research universities; the Chinese Academy of Sciences; and the national-level science and technology organs.

In China, research universities who have funding at their disposal to identify and target niche technologies of proven commercial value, will also take major equity and effective ownership of start-ups established to commercialize that technology. For example, a research project design to domesticate the technology and process to manufacture fatty acid food supplements might be funded by a regional research university of science and technology but headed by a former bureaucrat who is referred to as the private owner. The fermentation technologies might have been developed or uncovered by the university, and the university will seek revenue by direct ownership and control of the manufacturer.

In such cases, the actual source of capital and locus of governance authority might be unclear. In others it is explicit. Recently, a company in the portfolio of Tsinghua University, Tsinghua Tongfang, which is China's third largest PC maker, announced it had received a loan of \$460 million from the China Development Bank to support commercialization of new technologies. Among these are technologies that extract aluminum and silica from burnt coal ash.⁵¹ There is a mutuality of interests binding the funders, local regulators, and other parties that offers a shield against adverse IP actions, legal or illegal. At the same time, there is risk in these investments, because unlike the process of commercializing university-based discoveries in many other countries, there is no real market test of the technologies involved, unless they already exist in the market and have been proven viable.

At the level of nationally administered state-owned enterprises, there is a constellation of companies that are regarded as national champions. These are enterprises that have massive capital resources, and are well-connected to regulators and standards makers. Some companies are formally acknowledged as state-owned. Others

are considered private but strongly supported by the government, like telecom equipment makers Huawei and ZTE, PC maker Lenovo, appliance maker Hai'er, or technology champion Tsinghua Tongfang. The system of R&D institutes is chartered to identify the best technology and spread it as quickly as possible through the entire relevant sector.

China's focus on reverse engineering today is not an entirely unprecedented practice. The former Soviet Union demonstrated its ability to reverse engineer products for national defense purposes. Sixty years ago, Stalin was unwilling to devote the time or the resources to develop a Soviet long-range bomber. Instead, he ordered the Tupolev aircraft enterprise and a selected group of engineers and pilots to copy exactly all 105,000 parts of the US B-29 in order to build the TU-4. By 1947, TU-4s were already in service. Through reverse engineering, Stalin was thus able to obtain leading edge technology and shorten Tupolev's aircraft development cycle by years. When this kind of reverse engineering was coupled with the theft of US secrets behind the atomic bomb and the successful testing of a Soviet A-bomb soon thereafter, the Soviet Union had the ability to drop nuclear bombs anywhere on the United States by 1949, a mere four years after the end of World War II.⁵²

While piracy and outright counterfeiting are clearly uncontroversial IP rights violations, the relationship between larger engineering/R&D initiatives and existing technology and expertise is always unclear. As such, determining what constitutes an IP violation can be challenging. Especially in the space between product and process, in everything from CPU design to graphical user interface (GUI) design to patented pharmaceuticals, these boundaries are dynamic and continuously being redrawn. Defenders of China's IP rights practices are quick to note these points. In addition to pointing to the growing pains experienced throughout the industrialized world as IP rights and associated laws were developed and refined, they are quick to note that in all industries one innovator stands on the shoulders of another. From such an argument, they focus on incremental improvements made by Chinese enterprises to technologies widely dispersed in the world. Whereas Chinese mobile phone makers clearly derived a lot from the presence of the major foreign manufacturers, the major foreign manufacturers clearly derive a lot from each other.

In conjunction with this point of emphasis, officials and researchers of core bodies like the SIPO are increasingly taking the position that the multitude of lawyers, detectives, and other agents unleashed on China by foreign IP owners and their governments is an abuse of the global IP rights system. They charge this is a form of unfair tax that developed nations try to impose on China with the goal of suppressing the intensely competitive Chinese manufacturing sectors. They argue further that such intense enforcement action actually impedes China's progress toward the rule of law, with respect to IP rights protection.⁵³



For more information on SIPO's views on global IP rights protection measures imposed on China, see the sidebar "A Differing View on Intangible Assests," on page 36.

REVERSE ENGINEERING AND INNOVATION

Some state-sponsored Chinese companies efficiently reverse engineer technology, even those products that have thousands of individual design elements, to bring high-demand products to market quickly and seize market share. The fact that many of these companies are undercapitalized encourages a higher level of derivation and a lower level of real innovation than standard industry practice. The case of GS Magicstor may be one example.

GS Magicstor. A Guiyang-based company that had its origins as a state-run freight car manufacturer, GS Magicstor later became a supplier of miniature hard drives to Apple for the iPod. In December 2004, Hitachi Global Storage Technologies (GST) accused a joint venture group that included Magicstor of infringing on its patented disk drive technology. Hitachi requested damages and an injunction against manufacture, importation, or sale of the drives in the United States.⁵⁴

Hitachi, itself a long-time innovator in the highly competitive disk drive market, had bought IBM's storage unit for \$2.05 billion (IBM retained ownership of 30 percent of the resulting combination) just two years before filing this suit against Magicstor. IBM's own heritage as a leader in computer storage R&D went back to its invention of core memory for the IBM 405 Alphabetical Accounting Machine, first developed in 1952. By pairing its own R&D with IBM's, Hitachi could legitimately claim to have the world's largest R&D capability in computer storage technology by the end of 2002.⁵⁵

A DIFFERING VIEW OF INTANGIBLE ASSETS

Conflicts of interest are arising in the global economy as China and other emerging markets grow. For hundreds of years, the global trading system has favored and has been guided by the developed world. Although countries like China have a significant role in the supply chain, their share of profits has been negligible and returns have been redirected to the mature economies of the West. As their positions strengthen, China and the other developing economies are raising their own definitions and value of intangible assets and IP to better serve their interests, as opposed to global brand-owning multinational corporations MNCs.

Holding positions in many economic organizations, including the World Trade Organization (WTO), China is considered to be the leader among the emerging economies in representing the emerging markets' views of IP and IP ownership. China's views on IP matters are likely to influence the other emergent markets. As the discussion globally of China's role in IP issues heat up, spokespeople for key agencies in China, such as the State Intellectual Property Office (SIPO), are speaking out themselves, frankly, on their views. The SIPO, charged with overseeing IP protection in China, is regarded as a crucial entity in shaping the country's attitudes toward IP protection. The SIPO's past claims and remarks have thought to have been adversarial toward IP owners.

A recent article published in the Chinese language journal *Business Weekly*, written by a manager in the research office of the SIPO, was

entitled "Saying 'No' to Intellectual Property Rights Abuses," echoing the title of the defiant and wildly popular nationalistic book of some years ago, *China Can Say "No."*⁵

Author Wei Yanliang identifies three types of abuses, all abuses perpetrated by intellectual property owners on others. First is the abuse by individual companies, which can cause loss of profits to leading enterprises in a sector, can endanger the survival and development of entire industries, and cause considerable harm to an entire value chain through enforcement of their IP rights. Second is the abuse by foreign consortia, which can cause serious harm to China's low cost manufacturers, forced to pay high technology costs no matter what their physical manufacturing costs are or how large their unit outputs become. Third are the abuses perpetrated by the United States government, causing harm to Chinese exporters through the use of 337 actions.

In addition to reviewing the robust law-making and enforcement efforts made by the Chinese government since reforms began, the author emphasizes the special Chinese characteristics of IP protection, which is neither designed to benefit China over other countries nor overly emphasize the benefits of an individual property owner over the welfare of others.⁶ The international community, especially global brand-owning companies, cannot disregard China's position on IP enforcement as these themes resonate in every sector of the Chinese market. ■

After the acquisition, Hitachi had trouble finding a profitable path for GST. By 2004, the outlook for this unit began to improve when Apple iPod, which contained Hitachi one-inch disk drives, became widely popular. Hitachi's miniature disk drive was clearly a primary enabler of the iPod's success. It was not long after the iPod phenomenon began, however, that Magicstor began also to supply miniature hard drives to Apple, drives that apparently shared technical characteristics with Hitachi's. By December 2004, Hitachi had filed its detailed complaint in a US Federal District Court in California that GS Magicstor infringed multiple patents. Magicstor, for its part, denied the charge and asserted in response that Hitachi simply could not compete with them.⁵⁶

Before it filed this lawsuit, Hitachi GST had established extensive operations in China. In order to cut costs, it had invested a reported several hundred million dollars in 2003 to relocate its hard disk component manufacturing to Shenzhen. By that time, the company already had two hard-disk drive production plants in Shenzhen, and had also licensed Great Wall Technology of China to manufacture 3.5-inch disk drives for it. By July 2004, the company was shipping a million units each quarter from China, including the recently developed one-inch drives.⁵⁷

Questions arose about how Magicstor, a company in rural China formed in June 2002—as part of a joint venture called South Huiton Micro Hard Disc Technology, with a total of \$20 million in registered capital—could have independently developed its own IP to be able to compete effectively as a manufacturer of advanced miniature hard disk drives. Guiyang is the capital of Guizhou, one of China's poorest provinces, generally not noted for any achievements in technology industries nor any human capital in the technology sectors.

If Magicstor or one of its joint venture partners did transfer patented IP from Hitachi and/or IBM, at least some of the IP may have been transferred in the United States rather than China. RioSpring, a Milpitas, California startup that was one of the South Huiton joint venture partners also named in Hitachi's lawsuit, has been dedicated to Magicstor's R&D since 2002. Like Cornice, RioSpring claims a staff with long experience in the industry. Although Magicstor had mentioned plans for its hard disk drive R&D center in Guiyang to conduct research rather than production, the company said that center's focus was entirely on production.

The company was the beneficiary of a generous state-sponsored plan that included the establishment of six different high-tech industries in Guizhou province. It is apparent that the company not only obtained land from Guizhou province at no cost, but also state funding for a large class-10 cleanroom, as well as automated manufacturing and advanced test capability. David Chu, chief executive officer of parent company GS Magic's was quoted in Business Daily Update in September 2003 as saying "I am really amazed by the provincial government's commitment to and support for high-tech industry growth." But even though funding for plant and equipment was apparently extensive, it appears the company was undercapitalized for other purposes. By March 2005, the company's reported capital was still

Questions arose about how Magicstor, a company in rural China formed in June 2002 could have independently developed its own IP to be able to compete effectively as a manufacturer of advanced miniature hard disk drives.

\$20 million, and Magicstor was seeking help from the provincial government to obtain \$80 million in loans from several banks, saying its trading company partner, South Huiton, owed it \$50 million that it couldn't pay.⁵⁸

In the last few years, the hard disk drive business has seen consolidation. One reason is that the capital investment required to increase disk storage density is substantial. However, this fact has not prevented startups outside China from forming to pursue the miniature disk drive market. Cornice of Longmont, Colorado, is an example. In contrast with Magicstor, Cornice, founded in 2000, amassed \$81 million in invested capital after two rounds of venture funding. But similar to Magicstor, Cornice was also sued in 2004 (by Western Digital and Seagate) for patent infringement in the area of miniature disk drive technology. Cornice countersued in both instances.⁵⁹

■ Key Points of the Case Studies

The Magicstor case, the Changhong case, and other industry examples illustrate some additional important points about technology manufacturers in China. First, IP rights issues are global in nature, not only in their adverse market facing outcomes, like market share dilution, reputational risk, and value depression. Technology acquisition, either legitimately or illegitimately, occurs globally, in Boston, California, Detroit, Frankfurt, London, Seoul, and Tokyo, and many other cities through many different channels.

Secondly, even if the Chinese companies discussed in the preceding cases are guilty of illegal use of IP, as alleged in pending lawsuits, they would not necessarily be sustainable competitors anyway. The same legal environment that facilitates IP rights violations influences all manner of commitment, reliability, and recourse. Through fraud, embezzlement, and simple defaults, they are vulnerable to bankrupting losses in their dealings with other links in the value chain, either their IP suppliers or distributors. And their actual underlying manufacturing costs may not be that competitive. In industries like mobile telephone manufacturing and DVD player manufacturing, as Chinese makers fall into line with appropriate technology payments, they often lose market share to global brand owners.

Also, the processes of such companies are often immature, with no discernible R&D capability that can keep them competitive as products advance. If their sole means of technology acquisition is a one-time process, their capabilities will not enable them to compete with those who excel at rapid versioning and new features. This weakness often coincides with defects in quality, and it is aggravated by growing sophistication of domestic and global buyers. These buyers will buy for price only until they understand the importance of service life, aftermarket service, feature and accessory compatibility, and the other value offerings of companies in control of their overall value chain and able to sustain both development costs and market development costs. In complex supply chain product businesses, it is extremely difficult for companies that do not invest sufficiently in technology acquisition or do not take any other step in their development to sustain their growth.

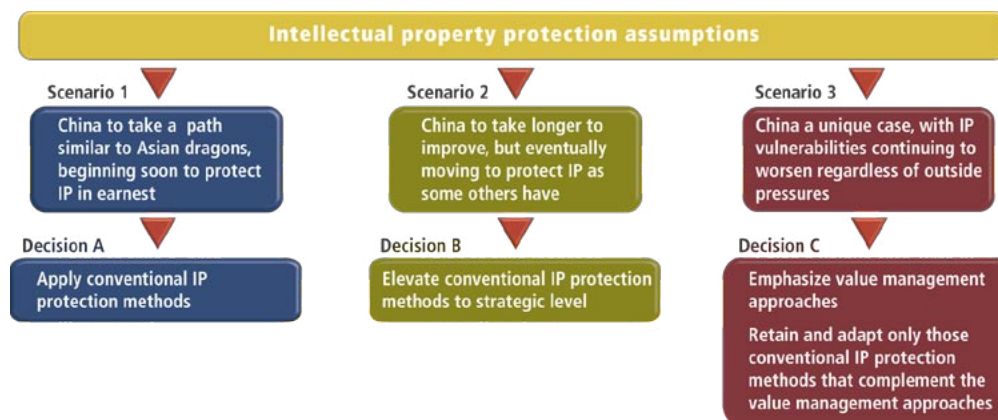
VALUE MANAGEMENT STRATEGIES



As with any strategy, a company will base its intellectual property strategy on a set of assumptions about the future. If its assumptions are incorrect, the strategy will be flawed, and the company’s performance will suffer as a result. China’s current influence on global business is undeniable, and few doubt this influence will grow. For these reasons, enterprises in general, particularly multinational corporations, will find it essential to base their strategies on sound assumptions about China.

Figure 6 identifies the most fundamental intellectual property (IP) protection assumptions concerning China, along with the fundamental decisions that would flow from each assumption.

FIGURE 6: INTANGIBLE ASSET MANAGEMENT SCENARIOS IN CHINA



A flawed assumption regarding future IP vulnerabilities in China will result in management decisions that are equally flawed. The evidence gathered for this report does not support the widely held assumption that IP vulnerabilities in China will be reduced once the legal system and law enforcement improve sufficiently.

Many companies assume China will take the path, more or less, of Japan, Singapore, South Korea, and Taiwan and begin to protect intellectual property once it engages in research and development that will truly innovate and develop its own IP. This assumption reflects the underlying belief that China is similar to Asia’s “dragons” of the previous 40 years in its orientation toward IP, and in fact not all that different from the United States during the nineteenth and early twentieth centuries. Accordingly, companies making this assumption will base their strategies on existing models of IP protection developed to fit the needs of the dominant markets of the twentieth century.

To get major IP risks under control, companies should seriously consider that China may differ from Asia’s other “dragons.” There are indications documented previously in this report that China will not have adequate IP protection in place



For detailed information and case studies on the current IP protection trends in China, see the chapter “China’s Influence on the IP Environment,” on page 9.

10 or even 15 years from now, and that the challenges that lie ahead may permanently alter the IP paradigm. As current issues on the agenda in setting up the next World Trade Organization (WTO) round make clear, there is better communication and coordination among the emerging economies in the world that may share China’s negative view of overly intensive IP enforcement by mature economies. If China and the future of IP rights are indeed different in these respects, many conventional methods of IP protection will require reevaluation, alteration, or may not be relevant in the near term at all.

■ Outlook for IP Protection in China

This report supports the contention that China is a different case than most other global trading powers with respect to IP. At the root of this difference are varying aspects of the same situation illustrated in the case studies in the preceding chapter. China is still a poor country attempting to bootstrap its economy with a hybrid approach—one that is partly market-based, but in many respects still occupied with public interest objectives. The following elements of state-influenced commerce may actually provide incentives to misappropriate IP.

PUBLIC INTEREST FOCUS

The state’s emphasis on public needs conflicts with the rights of individual property owners in China more often than in other internationally trading countries. For instance, the need in China to employ hundreds of millions of people at income levels that maintain political stability takes precedence over the needs of individual factory owners to match supply to demand.

When classic economic drivers of supply and demand equilibrium in a manufacturing environment become a secondary concern and additional capacity is created for reasons other than projected profit, overcapacity occurs and prices suffer as a result. The state ends up devaluing the output of factories, both in China and in places that import Chinese goods. Manufacturing devaluation in China clearly undercuts prices globally and has the effect of strengthening the state’s resolve to seek out other sources of value that can be quickly exploited to then fill the void, such as IP from MNCs. This in turn is also devalued when it is misappropriated.

DISTORTING EFFECTS OF GOVERNMENT GROWTH PLANS

China’s annual nationwide 8 percent GDP and 20 percent export growth targets place an emphasis on only those activities associated with tangible, measurable, and immediate results. Similarly, other aspects of Chinese five-year plans are only satisfiable by results that are rapid and measurable.

R&D programs, which can require decades of methodical experimentation to achieve substantive progress, are not attractive funding priorities in such an environment. China’s plan to set its own standards for electronics equipment, for example, could easily misdirect the efforts of research toward the goal of lowering royalty payments to MNCs and waste scarce resources on already-developed technologies.

FAVORITISM TOWARD STATE-OWNED ENTERPRISES

Most government funding in China goes to state-owned companies led by executives with extensive political connections, political roots, and career aspirations with the government. Localities are the main source of subsidies, land, and even a channel for direct financial support in many cases. For this reason, local officials hold substantial power, which is generally unchecked by an independent judiciary or other source. Truly innovative startups may lack connections with these local officials. IP rights violators may be well-connected to them.

The local officials are also those who must oversee the fulfillment of the five-year plan, and rely on the largest enterprises in the area—which they have supported financially—to help them execute the plan. The locus of the distortions of plan fulfillment thus resides within the state-owned enterprises receiving much of the support. IP, however obtained, can be seen as the means for the company's executives to help the local official meet the plan's objectives.

Foreign direct investment often goes to foreign-owned or joint venture facilities, although this is changing with some overseas venture capital, from both strategic investors and financial investors, coming now into Chinese startup ventures. With no onshore or state funding sources, the startups have few places to turn for funding, and these tend to offer capital on poor terms at usurious interest rates.

■ Conflicting Global Forces at Work

Developed countries have enjoyed the benefits of ultra-low-cost manufacturing since China became a major manufacturing country in the mid 1990s. This circumstance poses a dilemma for developed countries when it becomes clear that counterfeiting and other forms of IP misappropriation are rampant. MNCs have been able to reduce costs and maintain margins by leveraging China's ultra low cost manufacturing environment. And consumer prices in developed countries have arguably been kept in check. This has been the case even as the economy and employment levels have risen as purchases of Chinese-manufactured goods attract shoppers and pressure US manufacturers to hold down prices.

At the same time, many US-based large enterprises that heretofore have been the sources of many American jobs are downsizing, off-shoring employment, selling off assets, and even failing completely because of Chinese imports. When these imports contain misappropriated IP, the basis of competition shifts from China's ultra low-cost labor to a new form of societal competition.

Yet, by not respecting the business model that rewards the inventions and IP of individual companies with rights and financial premiums that fund future R&D, China is also exporting its "IP free" business environment to any country that accepts imports containing stolen IP from China. If the developed world's IP-oriented business model is destroyed it will devalue entire industries and cause significant economic disruption in developed countries.

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GLOBALIZATION AND THE MIXED MOTIVATIONS OF WESTERN ENTERPRISE

By positioning themselves over the last decade to benefit directly from the growth of lowest-cost Chinese manufacturing, Western companies have become dependent on Chinese suppliers to remain competitive. Consequently, they have often unwittingly participated in misappropriating IP. This situation implies a double standard. With their own customers, Western companies may generally adhere to IP laws, but they may not assume responsibility for or pay due attention to the infringements of their Chinese partners or suppliers from which they benefit. The world’s largest companies may, even with the best of intentions, not be able to enforce the same IP standards with their suppliers that they set for themselves, given their extensive supply networks.

China’s growing influence on IP is necessitating new approaches to IP rights and IP value management. A successful approach complements best practices that will continue to be viable and that can be selected to round out a complete strategy.

■ **Value Management versus Conventional IP Protection**

Companies adopting a value management approach pursue a fundamentally different objective than those who continue to focus purely on a strategy of IP protection. Value has become so fleeting, particularly for manufacturers in industries where barriers to entry are low, that many companies have been compelled to manage value more carefully. As noted above, various forces—not only those in China, but worldwide—will tend to erode the value of products and services at a faster pace than in previous decades. Commoditization is already an established fact for several product categories, regardless of where the products are manufactured.

CHARACTERISTICS OF VALUE MANAGEMENT AND IP PROTECTION

IP protection alone, by contrast, is an isolated technical support function, giving no real consideration to how threats to value are changing and how the core operations of enterprises can be engaged to identify, preserve and maximize value. See Table 2 for a comparison of the basic value management and IP

TABLE 2: VALUE MANAGEMENT VERSUS IP PROTECTION-CENTERED APPROACHES

Intellectual Asset	Value Management Approach	IP Protection-Centered Approach
Organizational	A strategic approach, requiring the establishment of processes across multiple operational departments to assess, maximize and preserve value given a new set of assumptions. Requires a global view of potential emerging competitor capacity and coordination of all potential corporate responses, from HR through M&A.	A tactical approach involving a few support departments and relying heavily on legal filings and remedies
Brand	Specific components of brand value—including product performance and consistency, service delivery, and customer perception—are identified and evaluated so the value of these intangibles can be better managed. Timely and comprehensive asset valuation allows efficient resource allocation across the enterprise.	Brand equity is an issue not directly addressed by the IP protection process. Some intangibles are comprehensively protected, but resources are allocated evenly without regard to where the preponderance of value created by the companies’ products and services lies.
Relational	A service orientation—emphasis on supply and demand chain efficiencies, as well as extensive service offerings that complement each product line. Increased focus on service as a locus of consumer value over product itself.	Emphasis on who owns what and what the related rights are, with the threat of legal action against non-owners potentially splitting the marketplace into two camps.

protection approaches. The R&D, design, product development, marketing and finance functions of companies should all be kept apprised of the emerging vulnerabilities of products and IP to accelerated value loss and how it can happen. Once multiple departments are aware of these issues, the path for innovation is clear, and the creativity of many different people can be harnessed to develop alternative approaches.

A contemporary value management approach anticipates accelerated commoditization, particularly where IP is the sole guarantor of differentiation and pricing power, and seeks to identify and devise ways to preserve or extend the life of product and IP value. Additionally, it considers how to augment product offerings with related services, an important means to achieving and maintaining competitive advantage regardless of product category and in some cases a significant barrier to IP theft.

Shortfalls of an IP Protection-only Strategy

Companies can be systematic in their conventional IP protection strategy and thoroughgoing in their execution, yet still experience substantial losses of their intangible assets. Figure 7 on page 44 notes some specific weaknesses of a paradigm that incorrectly assumes continuous improvement in legal systems and a manageable level of infringement.

■ Anticipating Changes in the Competitive Landscape

MNCs must plan their value management strategy by first considering likely scenarios for the markets and the competitive landscape in their industries. In the worst case scenario, potential infringers may be well-funded, able to build a brand with fewer resources than their competitors, do product development that adds to the IP they have possibly misappropriated from others, and win business in emerging markets first. Success in emerging markets would then enable infringers to enter larger, more developed markets with a competitive advantage. All of this can happen within a very short timeframe of two to three years. Potential customers in developed markets have shown little hesitancy about buying goods from known infringers. First targeted markets are often unsupportive of IP rights.

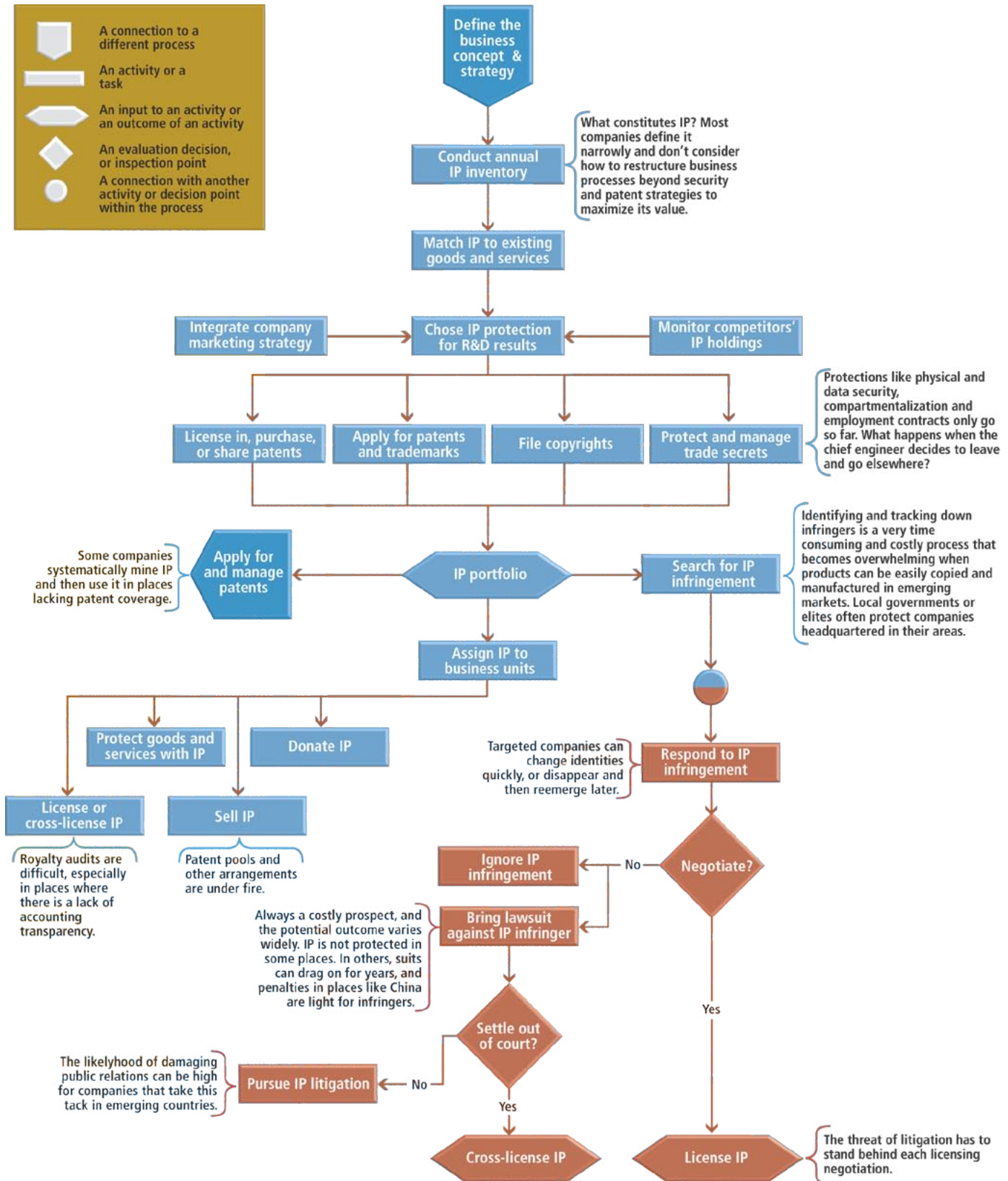
This kind of scenario planning should begin with assessments of potential IP vulnerabilities and how those vulnerabilities may change, given new information about the dynamics of the current IP environment. The plan should then address means for countering or responding to the exploitation of these vulnerabilities, as discussed in the following sections.

ASSESSING AND ADJUSTING TO IP TRANSFER

Companies need to evaluate how IP transfer will affect their overall business. Answers to each of the following and other similar questions will allow companies to shift resources to product categories and regions where they will be most effective. Where are product sales truly affected, and by how much? How will it change over time? What will the long-term impact be when theft occurs in developing markets? Where is protection unquestionably important? Would competitors from China or

Multinational corporations must plan their value management strategy by first considering likely scenarios for the markets and the competitive landscape in their industries.

FIGURE 7: EVALUATION OF A STRATEGY THAT FOCUSES ONLY ON IP PROTECTION



other countries attempt to mine IP in this location? If not, is there a long-term strategy to compete with IP miners there?

IDENTIFYING AND CONTROLLING CHANNELS OF IP LEAKAGE

MNCs must examine the potential risks of IP loss and must develop a strategy to minimize the leakage that occurs through various channels. What are the risks involved in various forms of contract manufacturing relationships and joint ventures? What are the pros and cons of various legal filings for protection, tax advantage, or licensing requirements? What are the risks and security measures in place for employees with access to valuable IP in any location in the world? What are the risks and strategies for controlling the knowledge and subsequent activities of retiring or transferring employees?

DECIDING WHEN TO FOREGO PATENTS

Manufacturers such as pharmaceutical companies that depend on closely held proprietary formulas may find that the negative effects of disclosure when filing for patents can outweigh the positive benefits of filings in some cases. Proprietary information is not only at risk of being transferred in China, but even in the United States—when information regarding patent filings is available on the Patent and Trademark Office Web site. Companies must also consider the defensibility of patents in countries with underdeveloped legal systems.

In some cases, if the only buyer of medications is the state health sector, it may be simpler to negotiate sales directly at whatever price that can be settled, rather than filing patents. However, not filing for patents will most likely result in no IP protection in the country and may set the stage for a local manufacturer to undercut negotiated pricing.

ENTERING EMERGING MARKETS TO FORESTALL INFRINGING COMPETITORS

Consider countering these companies with an aging portion of a vertically deep product line that can address the needs of emerging markets and forestall the competition early on. Underutilized manufacturing capacity can be dedicated to this purpose, and the result may be that participation in these markets slows the devaluation of the associated IP. Potentially infringing companies may seek to gain a foothold first in emerging markets and then build their capabilities by selling low-margin goods first.

PRESERVING VALUE WITH ALLIANCES AND ACQUISITIONS

Partnering and acquisition strategies can be used to neutralize the effects of forces that destroy value. Brand owners who can ally themselves with efficient Chinese manufacturers, for example, may be able to foster a mutually beneficial arrangement and demonstrate the long-term commercial viability of a value-preserving approach to product development during collaborative efforts. Capacity that produces or is at risk of producing infringing goods can be absorbed into an aligned entity. Such a technique will require extensive due diligence before selecting partner or acquisition targets.

Proprietary information is not only at risk of being transferred in China, but even in the United States when information regarding patent filings is available on the Patent and Trademark Office Web site.

Companies should invest in a variety of techniques to accelerate time to market, and then rethink how products should be launched once they are developed.

■ Product Development and Manufacturing Strategies

In a rapidly changing global market, the locus of true value creation within large, vertically integrated enterprises is not obvious. Overlay an uncertain future environment for IP protection and the question of how an enterprise creates value for its customers becomes paramount. For example, a manufacturer of network storage devices may today design and, through an EMS company, manufacture all aspects of its products. The manufacturer must distinguish the trade secrets and innovations that its products contain from the design aspects that are commodities. The manufacturer can then develop an IP value management strategy based on those true differentiators. Such a strategy may require the company to divide the manufacturing process into two steps: a commodity-oriented assembly in a China-based EMS company and the addition of their value added in a country with strong IP protection in place.

Once companies assess where the value in the business process lies and discover ways to expand and preserve it, the rest of the value management solution is indistinguishable from the familiar task of building a better brand than those of competitors, but at an accelerated pace and with an understanding of how the competitive landscape is changing. These product development and manufacturing approaches have to do with product, marketing, and delivery improvement—in ways that have not really been widely adopted before—as well as a wider variety of value-added services that are tailored to the needs of customers.

ACCELERATING PRODUCT LIFE CYCLES

Companies should invest in a variety of techniques to accelerate time to market, and then rethink how products should be launched once they are developed. Companies used to launching products first in one country and then region-by-region make themselves less able to capture value early in the life cycle, and more apt to lose value later once their products are reverse engineered. Marketing messages should be refocused on sustainable advantages of product and service features beyond the reach of infringers.

OEMs should leverage the ability of contract manufacturers to ramp up quickly and supply a rapid surge in demand that could result from the global launch. Similarly, OEMs can work with their suppliers to introduce and market new versions of products faster than knockoffs can be introduced. This strategy will require more flexible manufacturing, so that changes in production can be accomplished quickly enough.

LIFE CYCLE PRICE MANAGEMENT

Flexible manufacturing, rapid versioning, learning curve advantages, and economies of scale will enable experienced manufacturers to introduce new versions of their products in that market more quickly. As a result, they can shift the prices of their products downward rapidly during short product life cycles to make it more difficult for competitors to follow. Again, the fundamental strategy should

be to accelerate versioning and align production and marketing techniques with the short life cycles of each version. Companies that attempt to sustain higher margins for tier-1 (T-1) and tier-2 (T-2) products might leave headroom for infringing competitors, ultimately resulting in more value loss than smaller margins in the first place.

REINVENTING THE COMMODITY

One response to the rapid commoditization of a product line is to add value to that product line in other ways and create ancillary offerings that are difficult to imitate.⁶⁰ Apple's iPod is a prime example. MP3 players are commodities, but the iPod has additional cachet, a group of intangible qualities that are associated with it that work together to constitute a powerful brand. The characteristics that make the iPod appealing at a premium price include its polished look and feel, smooth user interface, rapid versioning, expansion of video and audio capacity and features, and the simplicity of the iTunes service.

Durable goods manufacturers such as automakers and equipment providers, for example, can compete effectively by focusing on elements of value that prevail in the long run. Reliability, performance, and perceived quality, three of the most central elements in this regard, are all difficult for competitors to replicate. Design aesthetics and ergonomics can also be important because of the high prices, status associations, and long lifetimes of automobiles or motorcycles, for example. Unlike luxury accessories, which are pirated in volume, durables are primarily confronted with look-alike products, creating a foundation for a marketing message that promotes the value of long histories and authenticity.

COUPLING PRODUCTS WITH VALUE-ADDED SERVICES

Value-added services can be basic or quite extensive in their scope. In either case, service quality and delivery differentiates one company substantially from another, regardless of industry. Software companies like Cadence and Red Hat understand that the services they provide generate more value for their customers than the software would on its own. Enterprises are well aware that the purchase price of software is less than 30 percent of the total cost. The value of the overall combination of software and services exceeds the real purchase price by orders of magnitude.

Even if the software is pirated, buyers of the pirated software cannot gain access to services necessary to make the software useful. "You can find copies of our software on the Internet," says Ray Bingham, executive chairman, retired, of Cadence Design Systems. "The barrier for them is that when you're doing simple devices, that's probably enough and you can get by without buying. For old generation technology, you can get by without paying the few thousand dollars it would cost you to buy the software. As you move up the curve where the financial incentive to not pay the license fee is higher, the need for support as you develop your design is acute. And so in a perverse way that's actually pretty good protection."

One response to the rapid commoditization of a product line is to add value to that product line in other ways and create ancillary offerings that are difficult to imitate.

COMPLEMENTARY CONVENTIONAL APPROACHES



Some conventional approaches to intellectual property protection can be complementary to a holistic value management strategy. Whichever strategies particular companies adopt, they should be aware of the potential effects of their allocation of resources on overall value. Some of the strategies outlined in the following section can be desirable but not essential in some circumstances, while absolutely essential in others.

■ Mitigating the Effects of State-Run Commercial Enterprise on IP

Makers of consumer electronics, other manufacturers, and retailers should anticipate the behavior of Chinese manufacturing concerns in international markets and plan ways to respond to unfair practices that have been facilitated by the rapid transfer of intellectual property (IP). Chinese domestic companies are still mostly inexperienced in international markets, but are under pressure to use their new capacity, much of which has been heavily subsidized by the government.

At the same time, saturated domestic markets are forcing these companies to turn aggressively to export opportunities. Domestic Chinese companies have benefited from transfers from joint venture arrangements, the return of expatriate engineers to China, and the placement of wholly foreign-owned research and development (R&D) centers or plants in the country. If they partner with well-connected distributors in target markets, these companies may have all the means necessary to compete head-to-head with established brand owners outside China, especially at the low end of the product spectrum.

RAISING AWARENESS OF THE EXTENT OF THE PROBLEM

Companies who are not knowledgeable about the peculiarities of China's hybrid state-run/commercial business culture will not be prepared for its effects as China expands internationally. The Chinese government has been overt in its intentions to gather IP in order to enable its companies to compete on an international scale. It has also provided substantial credits, through entities such as the China Development Bank, to further the expansion of larger companies whose IP practices have been questioned into foreign markets.

ANTICIPATING OWN-BRAND MANUFACTURING IN CHINA

By 2008, many industries will see Chinese-branded goods exported internationally. Some sectors of the electronics business already have prominent Chinese brands: Huawei in networking equipment and Lenovo in personal computers, for example. Companies from other countries should not underestimate the ability of Chinese



For more information on these techniques, see “Product Development and Manufacturing Strategies,” on page 46.

brand owners to gain market share very quickly with the help of considerable financing that is not available to other players.

Companies outside China should anticipate that own-brand manufacturing (OBM) from China will be a form of original equipment manufacturing, but often without the extensive R&D investment and cost historically associated with OEM services provided for MNCs. The entrance of Chinese OBMs will further accelerate and intensify global competition, making it necessary to identify, nurture and preserve value added using the techniques described in the preceding chapter.

PLANNING FOR EXCESS CAPACITY AND INCREASED MARKET VOLATILITY

As pointed out in the Changhong case on page 15, Chinese suppliers tend to proliferate and then flood the domestic market with products, creating an impossible situation with little or no profit potential for anyone. Once these suppliers decide to export, these same problems are spread to global target markets. Production levels are subject to a number of non-economic forces that are the legacy of government growth plans and sustained by the state’s ongoing role in resource allocation.

Many makers of commoditized products can learn from the experiences of manufacturers in other industries. Examples of how to respond to situations of overcapacity and market volatility can be found in the more typically volatile parts of many different supply chains. For example, equipment and manufacturing automation providers are more used to predicting and moderating the “bullwhip effect” than their end product manufacturing customers are. This is because the bullwhip effect is more sharply felt by suppliers at the front end of the supply chain, with equipment sales much less frequent than end product sales.

Suppliers in various parts of the chain would benefit by working together generally to develop improved, integrated supply chain management techniques to confront the growing problems of a hypercompetitive manufacturing environment. The distribution of real-time information on unplanned events to all parts of the chain, for instance, will improve the ability of suppliers to respond quickly, reducing overall volatility. Supply chain event management (SCEM) systems can enable this type of real-time information sharing. Integrated, highly responsive supply chains have the added benefit of exclusivity; suppliers must meet stricter qualifications and invest in the proper real-time inventory reporting capabilities to be able to participate.

SUPPLIER BACKGROUND CHECKING

The cases discussed previously in this report underscore the need for manufacturers, distributors, and retailers to ensure they have a detailed knowledge of their Chinese suppliers, particularly state-owned companies. Supplier qualification processes should reflect an awareness of the kinds of illegal or unethical practices these companies might engage in. All companies, but particularly MNCs with high name recognition, risk the loss of reputation if they buy from suppliers who violate laws or reasonable standards of behavior. European, Japanese, and US governments are particularly sensitive to these issues because of the public outcry against outsourcing.

■ Legal Filings and Enforcement

Resource allocation questions abound when it comes to the issues of where to file and which rights to assert, but companies must expect that markets will change in unanticipated ways and plan accordingly. MNCs companies should become knowledgeable about the unique characteristics of the legal systems in leading developing countries such as China. Many companies make the mistake of overly relying on legal methods and remedies, while others overlook standard procedures that provide even a minimum amount of recourse.

REGISTERING LEGAL RIGHTS

A company's IP rights are not enforceable in China unless they are registered there. The US Department of Commerce recommends that IP owners file patent and trademark rights in the country through government-authorized Chinese agents. When copyright enforcement is needed, the copyright owners can register through the National Copyright Administration (NCA) to facilitate enforcement.⁶¹

Whether or not an IP owner anticipates initiating legal action in China or plans to export products there in the near term, protecting trademarks and product designs in this country is essential to preserve future market entry rights, as Lucy Nichols of Nokia points out. Unlike countries such as the United States where "first-use" for trademarks and "first-to-invent" for patent designs are the rule, China is a "first-to-file" country.

"When companies have not registered their rights in China, it is legal for a counterfeiter to recognize that omission and seize the opportunity by filing for protection themselves, which could keep the legitimate brand owner out of China," she notes. "If the brand owner later decides to enter the China market, then the counterfeiter could conceivably sue the brand owner for infringement based upon its earlier registered rights."⁶²

OBTAINING SUPPORT OF OTHER GOVERNMENTS FOR LEGAL ACTIONS IN CHINA

"If you file all the right papers in China flawlessly, register your mark, register your design, et cetera, you still will get no meaningful enforcement unless the US government comes in and stands behind you very forcefully—and I do mean forcefully," says William Lash, former assistant secretary for market access and compliance of the US Department of Commerce. The resources of any government to dedicate to legal actions in other countries are necessarily limited. Companies and their respective governments must work together to encourage consistent and strong enforcement of existing laws in developing countries. The World Trade Organization (WTO) accession process, the prominence of manufacturing in China, and rampant counterfeiting in that country have all combined to raise the level of visibility of IP issues in China. Consequently, it is more likely that governments will be willing to support companies who must take legal action there.⁶³

UNDERSTANDING THE CAUSES OF LEGAL OUTCOMES IN CHINA

Recent cases have underscored that many factors and influences can bear on the legal outcomes of cases in China. Chinese IP lawyers will note that court outcomes often reflect the influence of many factors, including the potential effects on local

"When companies have not registered their rights in China, it is legal for a counterfeiter to recognize that omission and seize the opportunity by filing for protection themselves, which could keep the legitimate brand owner out of China."

*Lucy Nichols,
Nokia*

“You should acquire patents in China with the hope that you’ve got a strategic Chinese partner who is going to help your chances of successfully enforcing that patent against somebody who is trying to knock it off.”

*Bradley Botsch,
ON Semiconductor*

industries, the impact on China’s reputation as an investment environment, and the general need to create examples of allowable and unallowable commercial behavior. Behind high profile cases, such as those in the pharmaceutical, semi-conductors, software, and automotive industries, the appropriate ministry will typically study these issues, well beyond the narrow legal issues of the complaint, and advise the courts.

ADJUSTING TO THE ABSENCE OF TRADE SECRET ENFORCEMENT

China does not yet have laws that direct attention to issues of imitation, laws that might constrain the production of directly imitative products, trademarks, and packaging schemes. Bradley Botsch, chief patent counsel of ON Semiconductor, notes “With respect to product designs, it’s going to be near impossible to protect anything that’s not patentable because anybody in China can reverse engineer your product and ascertain your circuit. You can’t prevent them from doing that because that’s permitted by the laws. What’s not permitted, though, is patents which cover certain circuits or structures in that circuit that are reverse engineered. So the trade secret misappropriation all comes back down to a patent enforcement matter.”⁶⁴

For this reason, adequate patent coverage and enforcement leverage become essential. Botsch sees the value in this context of a partner with enough influence locally to encourage enforcement. “You should acquire patents in China with the hope that you’ve got a strategic Chinese partner who is going to help your chances of successfully enforcing that patent against somebody who is trying to knock it off,” he says.⁶⁵

ANTICIPATING LOOPHOLES IN PATENT LAWS

The Information Office of the State Council (IOSC) in China issued a white paper in April 2005 summarizing the country’s actions that support IP rights protection. In the area of patents, the IOSC noted that patent filings doubled between 2000 and 2004. By the end of 2004, nearly 2.3 million patents had been processed since April 1985. In 2004 alone, the SIPO processed 353,807 patent applications. Patent agencies in the country now employ over 5,000 people.⁶⁶

Of the patent applications processed in 2004, the IOSC noted that 51 percent were for utility model patents. According to Xiaogang Wang, associate of White and Case, 99 percent of these applications are filed by Chinese companies. The patent agency in question does not examine utility and design patent applications but simply processes the paperwork and grants the patents.

The lack of initial examination and requirement for novelty in patent applications creates a situation that invites abuse, according to Xiaogang. Consider a hypothetical case in which a group of employees leaves a US company to start their own Chinese company. The new company files fraudulent utility patents that duplicate the patents filed by its former company. It then begins copying the products of the former company—a legal activity as long as the fraudulent patents are considered to be valid—and can request a customs injunction to block the importation of the former company’s products.

The new company's ability to operate like this would continue until the US company persuades, if possible, a court to invalidate the false patents. Even then, there is no penalty for the false filings. "This loophole of the patent system is designed to give local industry a leg up. This has created a lot of trouble, because local counsel often invites them to file patents that can be used as a very sharp weapon," says Xiaogang.⁶⁷

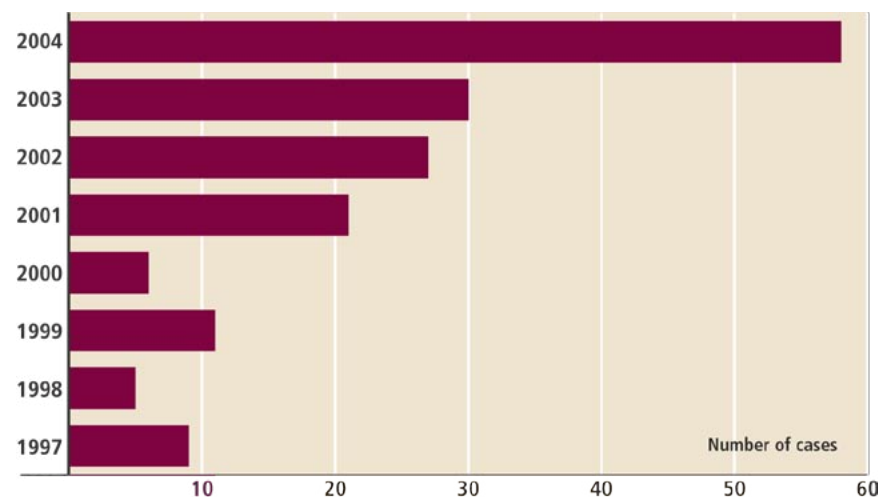
Even if the laws governing patents are changed, companies will still find it necessary to monitor patents issued in China closely for evidence of fraudulent applications. Intra-industry collaboration on this work, through an existing trade group, for example, could ensure a more efficient and comprehensive patent monitoring process by sharing information on questionable patents.

Information sharing between patent offices in various countries already benefits the examination process in developing countries such as China, and more collaboration in this area could make it more feasible to detect and deter false patent filings.⁶⁸

■ Anti-Counterfeiting

Companies should view their case-by-case efforts to thwart counterfeiting in China as much a strategy to encourage law enforcement and promote product safety as it is a tactic to achieve an acceptable result for the issue at hand. Government officials and industry associations from the developed world are actively engaged in what is currently a losing battle against counterfeiting and need substantial, consistent support from the private sector to be able to effect positive change. Often pressure is focused entirely on producing countries, when the borders of target markets are not doing all they could to deflect counterfeit goods. An economic rationale must justify the effort in a particular country, but in a country like China, the rise of counterfeit drugs, for example, is particularly worrisome because of the widespread nature

FIGURE 8: COUNTERFEIT DRUG CASES OPENED ANNUALLY BY THE US FDA, 1997–2004²



Source: US Food and Drug Administration, 2005

The problem of counterfeit drugs has worsened considerably with the growth of manufacturing capabilities and Internet commerce. In 2004, the number of counterfeit drug cases opened by the US Food and Drug Administration increased 93 percent from the previous year.

Multinational corporations experienced in dealing with counterfeits of their own products generally combat counterfeiting on multiple levels, particularly if the counterfeits are unsafe.

of the activity and public health concerns. The US Food and Drug Administration (FDA) reported a 93 percent increase between 2003 and 2004 in the number of counterfeit drug cases it opened, as shown in Figure 8 on page 53. And, according to Pfizer, China is the world's largest source of counterfeit drugs.⁶⁹

ESTABLISHED ANTI-COUNTERFEITING METHODS

MNCs experienced in dealing with counterfeits of their own products generally combat counterfeiting on multiple levels, particularly if the counterfeits are unsafe. Nokia, for example, found it essential to confront counterfeits of its mobile phone batteries with an extensive campaign. In some reported cases, the counterfeit batteries exploded because of a faulty circuit design, causing injury to users or, at a minimum, damage to the phone. Nokia's specific actions to discourage these counterfeits from October 2003 to April 2005 included:⁷⁰

- Notifying the public and providing an efficient means of reporting the suspected counterfeits
- Notifying distribution channels, others in the industry (including direct competitors) and requesting their cooperation in tracking down and prosecuting counterfeiters
- Focusing on countries where the counterfeiting is occurring and hiring good investigators and outside counsel there
- Training local customs and law enforcement agencies to detect counterfeits
- Issuing follow-on notifications and providing detailed information about counterfeits through Web print and audio media
- Publicly reporting the details of the progress in efforts to collect and destroy counterfeits

The following sections present other techniques manufacturing companies can use to discourage and respond to incidents of counterfeiting.

Holograms

In December 2004, Nokia began to label each of its batteries with holograms to help users, merchants, distributors, law enforcement agencies, and others verify their authenticity. Each hologram consists of four layers of visual identifiers: a symbol, a logo, dot markings that appear differently when viewed at different angles, and a unique 20-digit code that can be authenticated through the company Web site. Lucy Nichols, Nokia's global director of IP rights brand protection, underscored the care the company took to develop this hologram. "So many companies have implemented holograms, only to find out they've been copied within six months to a year. In developing our hologram, we wanted to make sure that there were different levels and the degree of difficulty in replicating that increased with every level."⁷¹

Radio Frequency Identification

Radio frequency identification (RFID) tags on products could allow easier authentication of those products, as well as the ability to track transported, warehoused, and retail stocked items in real time. Anti-counterfeiting efforts could clearly benefit from a more automated authentication and tracking technology of this sort.

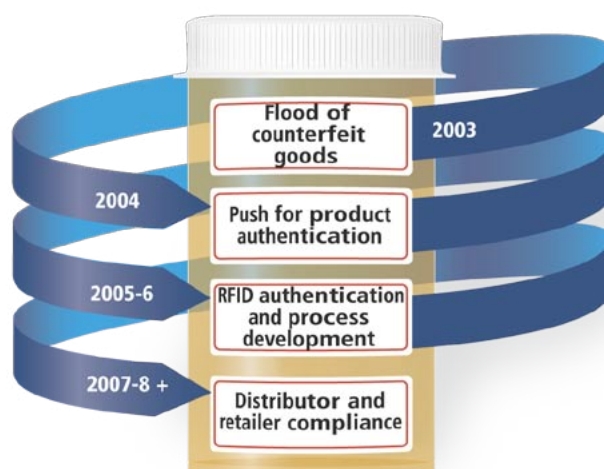
RFID tags are in this sense the more capable successors to bar codes, enabling hundreds or even thousands of items to be scanned simultaneously. They do not need to be visible, and they can be individually serialized, and refer to data held remotely on central servers. Even if perfectly duplicated, they would alert supervising software to the duplication. Concealable tags are quite small and thus difficult to replicate. Larger active read, write, and process tags can even be used with sensors to detect and log environmental changes or tampering a shipping container has been exposed to.

Encouraged by the US FDA, pharmaceutical companies are moving forward aggressively with RFID. Their initial focus is on package authentication to make it easier to spot counterfeit drugs, although the technology can also help improve inventory management. GlaxoSmithKline, Pfizer, and Purdue Pharma have all announced plans for item-level RFID implementations. Purdue Pharma donated 100 RFID readers to law enforcement and investigative agencies to support their anti-counterfeiting efforts. In June 2005, Texas Instruments and VeriSign announced an authentication model that would allow an end-to-end certification process for the pharmaceutical supply chain.⁷²

These are promising first steps in what will likely be a long process to develop RFID as an effective anti-counterfeiting tool with global reach. In the most optimistic scenario, process development steps required for the pharmaceutical supply chain are shown in Figure 9 with a timeline enabling implementation for early adopters in 2007 and 2008. When the technology becomes pervasive, it could allow customs officials the ability to pass RFID-authenticated shipments through quickly and then focus their resources on checking the remainder.

Despite its attractiveness in an anti-counterfeiting and product safety context, the primary impetus behind RFID has been inventory management. Regardless of the application, the desired result is that high volume production will drive tag prices

FIGURE 9: ADOPTION OF ANTI-COUNTERFEITING RFID SYSTEMS IN THE PHARMACEUTICAL INDUSTRY



Complicated technologies with major impacts on business processes such as RFID are rarely adopted quickly. In the most aggressive scenario, one that considers the active encouragement of the US Food and Drug Administration, pharmaceutical distributors and retailers who are early adopters could use RFID for drug package authentication beginning in 2007 and 2008.

down to an affordable level, but this goal has been elusive. For many other reasons besides tag prices, however, RFID will require years to gain a critical mass of adoption, particularly considering the existing large installed base of and investment in bar code systems that many consider sufficiently useful for inventory management. For each vertical to realize the technology's true potential will require comprehensive item-level tagging, the participation of thousands of suppliers worldwide, the resolution of numerous issues related to software, data handling, and standards development, and years of implementation and business process reengineering work. Many of these same developments will be necessary for effective RFID-enabled product security as well. And as with any value chain security measure, weak links in the chain, for example with compromised distributors or retailers, can render the entire system ineffective.

Some verticals will adopt RFID more rapidly than others. The history of bar codes may provide a guide in this respect. Hospitals standardized bar codes only recently, for example. But even for consumer products, packaged goods companies in the United States were conducting bar code pilots as early as 1974, a decade before 33 percent of consumer product packages were bar coded. Even after bar codes were pervasive, it took years for many retailers to install scanners at the point of sale.⁷³

Early adopters who grasp the wide-ranging productivity and security benefits of RFID are trying to push development and adoption along. Retailers like Marks & Spencer, Metro AG, and Wal-Mart and their suppliers have already done extensive RFID pilots and have begun to use tags regularly in limited ways at the pallet or case level, but not at the item level. Some item-level tagging for these retailers could begin by 2007 or 2008, but even Metro AG asserts that the use of RFID at the item level will not be common for another 10 to 15 years.⁷⁴

Improved Information Sharing and Product Testing

As counterfeiting grows, distributors and buyers are finding it necessary to dedicate more resources to formalized information sharing on counterfeit parts and conduct extensive, methodical parts inspection and testing. Counterfeiters are able to obtain substandard parts, build fakes, or reverse engineer copies of even sophisticated components. "The biggest mistake you could make is to underestimate the ability of the counterfeiters," says Dan DiMase, president of semiconductor distributor SemiXchange and member of the board of directors of the Independent Distributors Electronics Association (IDEA).⁷⁵

SemiXchange developed a 94-point inspection list for components, along with a three-tier approved vendor list; parts from vendors at the lowest tier of approval get the most scrutiny. As a service to its members, IDEA established a non-conforming parts database in September 2004. With the database, members can find out from each other about parts that do not meet specifications.

DiMase emphasizes the necessity for brand owners to support these efforts, as well as seek out and take action to close down sources of counterfeit parts. "If you don't review the problems as they occur, you're not going to close the loop," he notes. "If you do close the loop, people will have more faith in your brand."

"The biggest mistake you could make is to underestimate the ability of the counterfeiters."

*Dan DiMase,
SemiXchange*

■ Patent Pooling

Patent pools can provide to patent holders substantial benefits, such as lower costs of licenses, reduced costs of manufacturing, and higher profit retention. Pools have been most effective in industries with a large number of patent holders for an innovative, standards-based technology with sizable market potential. The 3C and 6C pools formed by DVD equipment manufacturers, are examples of such a pool. The holders pool complementary patents and establish a joint licensing program, sharing the royalties earned by the program. An independent expert employed by the program ensures the patents addressed in the licensing program are essential and complementary.

Though most of the largest and most profitable patent pools originated in the West, Chinese and other Asian IP pools are proliferating. China is currently using the bargaining chip of access to its market, and the size of the market itself, to create competing standards and IP pools with far lower royalty rates, with the hope of eventually exporting products to third-party countries. Its standard setting efforts have not yet been successful in establishing global standards, but it may have a discernible impact on the pricing of technology based on existing standards. In any case, the persistence and determination of Chinese standards authorities are clear, and they have begun to articulate claims that standards practices themselves are excessively dominated by traditional players and are part of the IP abuse practiced by mature economies.

COST ADVANTAGES OF POOLS

Ideally, the formation of such a pool will simplify and reduce the cost of the task of obtaining licenses necessary to sell media or equipment that must use the technology. In cases where cross-licensing may be too cumbersome, a patent pool may be a more economical mechanism for the orderly negotiation of royalty rates that the product can support and an appropriate allocation of that royalty stream among the IP owners whose IP is required for a successful product launch. In addition, by using an IP pool, industry participants may be able to avoid having one IP owner delay the launch of new products by being a holdout, or unexpectedly driving up costs by auctioning the last valuable pieces.

As products progress through their life cycle, from higher price points at initial launch of new technology to lower prices and larger volumes, IP owners may wish to shift manufacturing to third parties to help reduce a product's manufacturing cost and to free up capital for other uses. In such circumstances, a patent pool may be an efficient means to retain a portion of the profits from such products sales and foster competition among product manufacturers. This pattern is evident in consumer electronics.

One result evident from the 3C and 6C examples has been the cost benefit of DVD equipment and media manufacturers that are pool members. Through cross licensing, the pool members have been able to lower the cost floor for themselves to be more competitive with the cost floor for non-member licensees. In response to this situation, more than 100 Chinese manufacturers have joined the China Audio

Patent pools can provide to patent holders substantial benefits, such as lower costs of licenses, reduced costs of manufacturing, and higher profit retention.

“You’ve got to find a sweet spot for this license that is something everybody can afford to pay, to find that tension between what patent holders are willing to offer the license for and what licensees are willing to pay.”

*Larry Horn,
MPEG LA*

Industries Association to negotiate on their behalf and protect their cost advantage. However, without a license from the pool, or a license from each patent holder that contributed to the pool, the Chinese manufacturers would not have been able to sell DVD equipment in the markets covered by the licensed patents.⁷⁶

OTHER BENEFITS

Pools provide benefits to patent holders generally by helping to foster a culture of respect for IP within industries. Experienced pool license administrators can serve to educate and encourage companies in developing countries to operate under license and to develop their own licensable IP. Particularly if the companies export to countries with established IP rights protection, administrators can be successful in signing up licensees. “For the products made in China but exported elsewhere, we have been as successful and tremendously solid as any company, as any licensing program in the world in getting these products under license,” says Larry Horn, vice president of licensing and business development for MPEG LA.⁷⁷

Horn attributes MPEG LA’s success to the general reliability of a number of legal systems in countries where the exports end up and MPEG LA’s ability to price licenses and sell them. “You’ve got to find a sweet spot for this license that is something everybody can afford to pay, to find that tension between what patent holders are willing to offer the license for and what licensees are willing to pay.” Horn acknowledged that signing up companies who do not export is a more difficult task. For those companies, he says, “Collection is an issue which relies upon a rational legal system.”⁷⁸ He believes the Chinese legal system will improve as China begins to own more IP.

Another important advantage of pooling is that it opens a legitimate entry path for new enterprises, including Chinese enterprises with commercially valuable IP, to get additional value from it. By joining a pool, a new entrant can benefit from the marketing, pricing, collection, and enforcement system already in place. It can reduce its own royalty spend as a member of the pool. All in all, the pool raises to a high level of visibility the benefits of legitimate IP investment and playing by widely-accepted rules.

■ Control of Proprietary Information

Controlling proprietary information is important not only for companies located in China but in any country. Some companies have learned that value management includes protecting IP in the country they are headquartered. For example, electronic design automation vendor Cadence Design Systems established a number of information control best practices after it suffered a substantial loss of IP to US competitor Avant.

Cadence brought its first lawsuit against Avant in 1995, accusing the startup of misappropriating “trade secrets, copyright infringement, conspiracy, and other illegalities.” At the core of this allegation was the theft of 4,000 strings of source code by former Cadence employees. In May 2001, Avant pleaded no contest to conspiracy, securities fraud, and trade secret theft. Six of the accused went to prison, and seven

paid a total of \$8 million in fines. Avant itself paid \$27 million in fines, the maximum allowed, and was ordered to pay \$182 million plus interest in restitution. Cadence's legal action against Avant continued through November 2002, when parties finally settled and Synopsys, which had acquired Avant in June 2002, agreed to pay Cadence a total of \$265 million in restitution.⁷⁹

INFORMATION TECHNOLOGY USE RESTRICTIONS

As a result of this drawn-out process, Cadence developed a reputation for persistent and forceful legal action that continues as a component of its IP protection strategy. This strategy also features extensive information control. "On a global basis, we do all of the things that everybody should do, the best practices," says Ray Bingham, retired executive chairman. "From lots of education, lots of training on the front end to very aggressive litigation and remedial actions on the back end....We don't allow remote access except in a highly secure situation. We don't allow personal IT stuff. We are in the middle of rooting out things like the ability to stick your little device in the USB port....We're doing all of those kinds of things."⁸⁰

COMPARTMENTALIZATION

To address the additional risk of operating in developing countries, Cadence compartmentalizes information using a modular development process. "You just don't give the developers access to the code tree the way we would in an equivalent position here," states Bingham. "We're just opening up Russia as an example. We have 100 people there; we'll have 200 people there a year from now. They're superb engineers. They are the best of the best out of the Russian Academy of Sciences and their engineering schools, and they're astonishing mathematicians. So we're giving them big math problems, big algorithm problems to help drive the heart of these software packages that we produce. It doesn't connect to anything for them—it's just a big matrix to solve, and they're doing a marvelous job of it." This is the heart of a strategy widely deployed in manufacturing as well as R&D. Everything from "flavor keys" for beverages to critical path components for consumer electronics can be kept locked away from value chain players where risk is heightened.

DOCUMENT CONTROL AND ENTERPRISE RIGHTS MANAGEMENT

Until recently, the risk of loss of sensitive information through e-mail or document file sharing has seemed unavoidable. Secure e-mail and encrypted files for most companies in the private sector were proving too much of a complication. Employees, the main source of the risk, often have to have access to corporate networks and the Internet, and have to be able to attach documents and send e-mail beyond the firewall to be able to get their work done. Once outside, that material, often unencrypted and with no retransmission restrictions, can be forwarded to and read by anyone, creating substantial potential for unauthorized disclosure. In many cases, employees have inadvertently disclosed sensitive information, when pressing the "Send" button without realizing they were sending to the wrong person, or sending to an entire discussion group, for instance, or by attaching and sending the wrong file.

"On a global basis, we do all of the things that everybody should do, the best practices, from lots of education, lots of training on the front end to very aggressive litigation and remedial actions on the back end."

*Ray Bingham,
Cadence*

Inadvertent disclosure of information by employees is a larger problem than many assume: 80 to 90 percent of confidential information loss is due to inadvertent disclosure, according to Pro-Tec Data.⁸¹(See Table 3.)

TABLE 3: INFORMATION LOSS RISKS RELATED TO DIGITAL BUSINESS FILES AND E-MAIL¹

Risk	Loss or Risk Level Estimate	Attributed Source
Percentage of confidential information loss from inadvertent disclosures	80 to 90 percent of total losses	Pro-Tec Data, 2005
Percentage of intellectual capital available in digital format	90 percent	Secure Computing, 2001
Percentage of intellectual capital available in digital format that is contained in an organization's e-mail system	45 percent	Secure Computing, 2001
Amount of business information loss via e-mail	\$24 billion per year for all industries	Gartner, 2005

Source: *Liquid Machines and Pro-Tec Data, 2005*

Inadvertent disclosure of information by employees is a larger problem than many assume: 80 to 90 percent of confidential information loss is due to inadvertent disclosure.

Enterprises may be coming to a phase in IT development where they can begin to reduce unauthorized file and e-mail message disclosures without overly burdening the information sharing process. After a number of false starts and design iterations over the past decade, secure e-mail and document control has become easier to use, more capable, and more broadly supportive of commonly used file formats. Even simple document distribution formats, like Adobe Acrobat PDF, are increasingly enabling producers to control what gets copied, edited, printed, and redistributed. As a result, rights management software in general is gaining adoption and could prove useful in addressing the risks noted in Table 3.

One important product feature that has been refined in the current generation of rights management software is persistence, the ability to encrypt and protect files and messages—or file extracts—wherever they end up. For example, Liquid Machines' Document Control allows administrators to track who is using which documents outside the enterprise, and also to set permissions for redistributing documents. To facilitate this activity, Document Control logs document activity with the help of an internetworked server.

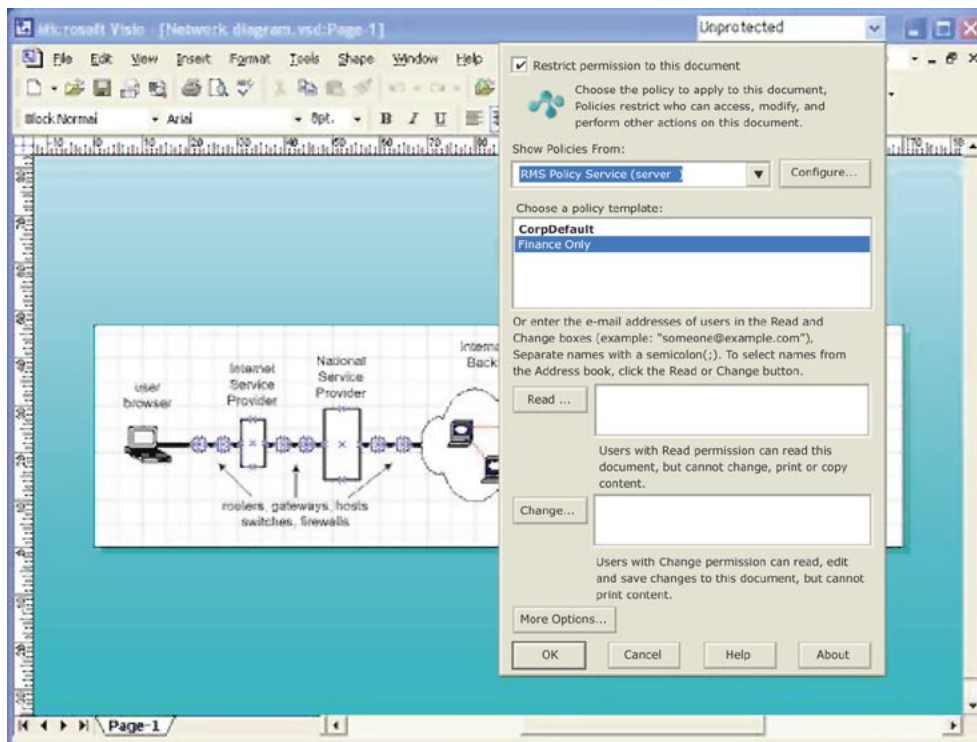
Similarly, Liquid Machines Email Control product encapsulates e-mail messages in a secure wrapper that adheres to corporate-defined, automatically enforced access and use policies regardless of the location of the e-mail. Only individuals who are granted the rights to read, edit, or print an e-mail message can do so. Even excerpts of messages carry these secure wrappers and use restrictions.

An equally important benefit of products like Liquid Machines is that access and use control is automatic, pervasive and uncomplicated. Users do not invoke a separate application or ask the e-mail system to encrypt or set use restrictions for each document or e-mail; rather, this process is a basic element of the task of creating new content or sending any message. Users choose from a list of policy options and rights to assign to documents. (See Figure 10.)

Within the enterprise, adoption of rights management software outside the media industry has been limited to regulated industries such as financial services, healthcare, and biotechnology companies. However these technologies can be applied elsewhere.

Software companies like Adobe, Authentica, and Microsoft have developed platforms that enable enterprise rights management (ERM). However, at this point, the limited support for many digital formats continues to be a limitation of ERM.

FIGURE 10: OVERVIEW OF HOW DOCUMENT CONTROL SYSTEMS WORK



Source: Liquid Machines, 2005

Enterprises are exploring better information control primarily to comply with HIPAA and other privacy law requirements. These same rights management tools such as the Liquid Machines Document Control, shown here, can be used for better control of intellectual property as well. In this example, a user is selecting a control policy for a specific Microsoft Visio file. This document control helps protect inadvertent disclosure and insider theft of the file wherever it is copied or transmitted.

CONCLUSION

Whether or not they conduct business in China, multinational corporations must address the global issues that threaten intellectual property value. Erosion of intangible asset value is due to many factors, some of which include piracy; the unsanctioned, rapid proliferation of process technology and expertise; pervasiveness and misuse of electronic communications; and the illegal appropriation of intangible technology assets, including the design, features, and functionality of electronics, pharmaceuticals, automobiles, and many other products and services.

Corporate intellectual property (IP) or information technology functions, which have typically been charged with IP protection, are unable to adequately address the unauthorized transfer of intangibles in this global environment. Consequently, companies must develop more fundamental strategies that enable them to effectively deal with the root problems causing IP value erosion. Product and service development, design, engineering, manufacturing, marketing, and partnering strategies are each important elements of this approach. This cross-functional strategy is one of IP value management. It enables companies to create a more resilient business approach to maximizing the long-term value of intangibles such as intellectual property.

To adapt to today's dynamic business environment—and to prosper during the next decade—today's multinational corporation (MNC) must implement an IP value management strategy within the context of its business model, supply chain, sales channel, and other enterprise-wide initiatives. The emerging global business environment offers an unprecedented combination of both sizable opportunity and substantial risk.

Companies pondering what the future holds might first look back 15 years and think about how circumstances have changed considerably. China's share of world trade in 1990, for instance, was less than a third of its current share. Today, China's sixth largest export market is not a country but big-box retailer Wal-Mart. At the same time, consumer electronics product categories, the majority of which are manufactured in China, such as DVD recorders, for example, are experiencing rates of price declines that are unprecedented.

Would the major consumer electronics vendors that existed 15 years ago have predicted these outcomes when they embarked on their strategic planning? If they had known what the future would bring, would they not have tried to best position

themselves to succeed in this radically altered market? The truth then, as now, is that companies must be prepared to reposition themselves when major industry and market shifts arise. They must assume at least the minimum risk that accompanies a successful repositioning strategy to survive. Today, a growing amount of this risk is IP-related.

To be successful in an environment of rapid change and high uncertainty, MNCs must become expert at assessing complicated combinations of opportunity and risk, combinations that are also subject to rapid change. To respond effectively, companies need to consider the catalyst of IP transfer and assess its effect on how they design, develop, manufacture, and market their products and services for the future customers they intend to serve. By approaching future risks and rewards through the lens of IP value management, enterprises can define a business strategy based on a realistic assessment of sustainable competitive advantage.

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