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Strategies for Surviving in China's Intellectual Property Minefield

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Despite a slowdown in China's GDP growth from the double-digit heights of the last decade, it is still expanding at over 7% per annum – a growth rate that looks more sustainable. Growth in the other major emerging economies including India, Brazil and Russia, by contrast, has all but collapsed, at least for the present. Growth in the developed economies, meanwhile, remains fragile in the wake of their post-2008 financial crisis recessions. It is not surprising, therefore, that the Boards of many foreign companies are counting on winning share in the China market to support their top-line growth in coming years. They should be in no doubt, however, that to do so will necessitate more and more of their high-value technologies, trade secrets and know-how being exposed to the risks and vagaries of the Chinese intellectual property (IP) environment.

The reasons are several. First, Chinese companies have begun to establish R&D centres overseas and acquire high-tech companies that give them access both to existing technology and on-going R&D and design capabilities. Chinese acquisitions abroad exceeded $105 billion in 2013 – a nine-fold increase since 2006. Last year, "industrial acquisitions" – mainly focused on acquiring technology and R&D capacity – accounted for 20% of the total number of deals completed by Chinese companies. And nearly two-thirds of these were mid-sized industrial companies in Europe, half of these in Germany alone. Many of the rest were smaller US companies with strong technology or design skills. This is helping Chinese companies close the technology gap with multinationals. So, to compete for market share with local companies in China, foreign companies will increasingly need to deploy state-of-the art IP; it is no longer adequate to offer only yesterday's technology to Chinese consumers.

Secondly, the Chinese Government has embarked on a clear policy of strengthening innovation in China. As far back as 2006, then President Hu Jintao outlined plans for building China into innovation-oriented country. Part of this policy was focused on ramping up so-called "indigenous innovation". Despite this new emphasis China will also continue to encourage foreign investors to bring new technology to China. From 2002 to 2010, the share of China's high tech exports by Foreign Invested Enterprises (FIEs) rose from 79% to 82%. During the same period, the share of China's high tech exports that was made by wholly owned foreign firms (which excludes foreign joint ventures with Chinese firms) rose from 55% to 67%.[1] But in its drive to become an innovation economy the Chinese government is loathe to approve foreign direct investment (FDI) that embodies technology and IP that is anything but leading edge. Even existing joint ventures in the automobile field are coming under pressure to develop their indigenous R&D facilities so as to reduce the levels of royalties paid for the foreign party's proprietary technology.[2] Moreover, given its huge foreign exchange reserves and lack of need for foreign capital, proposals for FDI are increasingly being judged on the quality of technology they embody and whether they involve investment in R&D and design activities as well as manufacturing.

Thirdly, a growing number of foreign companies are expanding their R&D, innovation and design activities in China to take advantage of lower costs, the local availability of engineers and scientists, and distinctive local knowhow – especially in the creation of products and services suitable for China and other emerging markets. Recent statistics have identified at least 1,200 foreign R&D centres located in China with investment in these facilities totalling US$12.8 billion.[3]

Taken together, these developments mean that foreign companies need to find ways to effectively manage an ever-greater quantity of higher-value IP in China. At the same time as IP policy and enforcement mechanisms have been developing rapidly in China, foreign companies have been gaining experience in the efficacy of different approaches to managing their IP. It is therefore opportune to reassess the risks of IP loss and leakage in the Chinese

environment and the various strategies that foreign companies might adopt to successfully navigate the Chinese IP minefield.

IP Risks in China

California-headquartered E.F. Kluft & Co, a maker of luxury mattresses that sell for between US$3,500 and US$70,000, was approached by a large Chinese manufacturer of recliners and standard mattresses with a proposal to cooperate in launching top-of-the-line products in China. Kluft entered into an arrangement where the Chinese company would purchase a line of six mattresses, each named after an American city, designed and manufactured by Kluft and market them under their own Chinese brand. Initial sales were strong, but quickly went into decline. On successive trips to China, Earl Kluft, CEO of the family-owned corporation, noticed that retailers were displaying fewer and fewer of his products and more of those sourced from other manufacturers with suspiciously similar designs but bearing a brand other than Kluft. Lacking any design protection in China, Kluft's only viable option was to terminate the agreement. Even so, pictures of Kluft's designs remained on display in China. The Californian corporation subsequently re-entered the market using its own Kluft brand through the Chinese subsidiary of an Indonesian company which paid a royalty on each product sold.[4]

The Kluft example is a clear case of a "partner" company copying unprotected designs in China. Some have argued that the prevalence of this risk reflects deep-seated Chinese attitudes to copying where, rather than purely valuing originality, the Chinese art of reproduction is viewed as equally demanding and, when done exquisitely, perhaps even superior.[5] Intriguingly, Qin Shihuangdi, the first ruler to unify the core kingdoms of China, was known to build a replica of the former ruler's palace outside his own capital of Xianyang after each conquest.[6]

Other cases of IP leakage in China are more complex and nuanced. In 2004 the Chinese Ministry of Railways embarked on long-term railway development plan to invest US$293 billion to build 18,000km of dedicated high-speed rail lines connecting all of China's major cities by 2015. By the end of 2013

some 10,500km of high-speed rail was already operating. But the source of the technology to run that network remains a matter of controversy. The German news magazine Der Spiegel, for example, argued that: "using both the political bait of forming joint ventures and deft negotiating tactics, China attracted leading Western engineering companies to China -- such as Siemens from Germany, Alstom from France, Bombardier from Canada and Kawasaki from Japan. Once it had these foreign companies where it wanted them, it played them off against each other so that they would relinquish key pieces of technological know-how at a low price." [7]

In the case of Kawasaki Heavy Industries (KHI), within two years of starting cooperation to produce high-speed trains, the Chinese partner, China South Car (CSR), began producing similar models independently without any assistance from KHI.[8] According to CSR president Zhang Chenghong, CSR "made the bold move of forming a systemic development platform for high-speed locomotives and further upgrading its design and manufacturing technology. Later, we began to independently develop high-speed trains with a maximum velocity of 300–350 kms per hour, which eventually rolled off the production line in December 2007."[9]

Since then, CSR has ended its Chinese cooperation with KHI, who then threatened to challenge China's high-speed rail project for patent infringement.[10] As so often happens, the threats were withdrawn in 2013. (It is interesting to note, however, that while all this was going on in China, Singapore's Land Transport Authority announced in May 2009 that KHI and CSR Sifang had won the bid to supply new rolling stock for the country's Mass Rapid Transit system. CSR Sifang handled the manufacturing and testing of the rolling stock, while Kawasaki oversaw the project and design. The contract was the first successful joint venture between these two companies in the international market and by 2013 156 cars were already in service, with the latest contract to supply more awarded to CSR Sifang/KHI in 2012.)

The Chinese, on the other hand, point out that they have adapted and developed the transferred technology, and filed more than 940 applications for

patents of their own. They also argue that foreign train-makers are fully aware that technology transfer is an important part of gaining access to the China market and that the Ministry of Railways has ordered over 400 new generation trains from joint ventures involving Siemens and Bombardier.[11]

It is not only patented technology and design blueprints that are at risk, however. Equally important are so-called "trade secrets" or confidential information – such as how to make a product -- that would be valuable to a competitor. Most jurisdictions restrict protection of this kind of valuable information to that which can be clearly described and shown to not be generally known.[12] Trade secrets are especially exposed because many can literally walk out the door in the heads of employees, no matter what an employment contract may say.

This is a particular problem in China where employee turnover at all levels of organisations tends to be high. In June 2013, for example, China's largest wind turbine producer Sinovel and two of its executives were charged in a US federal court with stealing trade secrets from its former software supplier Massachusetts-based American Superconductor (AMSC). The suit was initiated after a former employee of AMSC pleaded guilty, in Austria, to stealing a source code for turbine controllers. Sinovel's deputy director of research and development department Su Liying, the firm's technology manager Zhao Haichun and former AMSC employee Dejan Karabasevic have each been charged with conspiracy to commit trade secret theft, theft of trade secrets and wire fraud. AMSC claims that Sinovel used the allegedly stolen software in four Sinovel turbines installed in the USA less than 40 miles from AMSC's global headquarters, which its president described as showing: "not only a blatant disrespect for intellectual property but a disregard for international trade law."[13]

After the July 2011 train crash in Wenzhou, it was revealed that key signaling systems used on China's high-speed network were assembled by Beijing-based Hollysys Automation Technologies Ltd., one of the few companies China's Ministry of Railways contracted to handle such work. In some signal systems it supplied, technology described as proprietary to Hollysys contained

circuitry that had been tailor-made for it by Hitachi Ltd of Japan, albeit to Hollysys specifications.

The problem, according to an article in the *Wall Street Journal* (October 3, 2011), was that Hitachi—concerned that Chinese technicians might 'steal' its technology—supplied components whose inner workings were concealed from Hollysys (in a so-called "black box"), so that they could not be reverse-engineered. "It's still generally a mystery how a company like Hollysys could integrate our equipment into a broader safety-signaling system without intimate knowledge of our know-how," a senior Hitachi executive told the *Wall Street Journal*.

As these examples demonstrate, the IP exposures associated with operating in, or even supplying to, the China market are significant. They vary from outright copying of existing designs, through leakage of IP to partners who then incorporate it unattributed into their own generations of product, to the loss of trade secrets when employees move to competitors or even try to start up their own firms as rivals. Two questions then arise. First, what legal protection is available from the Chinese IP regime in practice? Secondly, to the extent that reliance on China's IP protection system is at best a partial solution (as indeed it is in many other parts of the world), what other pragmatic strategies might companies adopt to reduce either the likelihood or the negative impacts of IP leakage associated with operating in China?

Strengths and Weaknesses of China's IP Protection Regime

Although China became a member of the World Intellectual Property Organization (WIPO) in 1980, it was not until 1992 that a comprehensive set of IP laws, regulations and administrative procedures was established. This was subsequently refined throughout the 1990s and other provisions were added, such as the Law Against Unfair Competition (1993) and Regulations on Customs Protection of Intellectual Property Rights (1995) which strengthened border control to stop counterfeited goods from coming into, or leaving, the country. Today China has in place a quite comprehensive system of intellectual property rights (IPRs) including trademarks, patents and copyright. IP can also be

protected by recourse to China's laws and regulations prohibiting unfair competition and for the protection of trade secrets.

However, the institutional framework does not make it easy, with different bodies responsible for different IPRs. Patents and petty patents (a form of legal protection for minor inventions based on German law but unknown in the USA) are issued by the State Intellectual Property Office (SIPO), while trademarks are under the authority of the State Administration for Industry and Commerce and copyrights fall within the remit of the State Administration for Press and Publication. According to the latest published statistics, SIPO received 526,000 invention patent applications in 2011, a 34.5% growth year on year. Some 79% of these were from domestic applicants (which includes applicants from Taiwan, Hong Kong and Macao) and 21% from applicants based overseas. At the end of 2011, all departments of SIPO had a total of 2,954 patent examiners (compared with 6,200 at the US Patent & Trademark Office in 2009). SIPO granted 172,000 invention patents in 2011, up by 27.4% year on year, split 65% granted to domestic applicants and 35% granted to foreign applicants.[14]

It is clear, therefore, that an active system for granting IPRs is up and running in China. At the same time, the system provides far from a perfect solution to the issue of protecting IP in China (and some would argue this is a classic example of British understatement). The reason why relying solely on legal protection is not viable for most companies in China is, however, not usually because of deficiencies in the legislative framework. There are some peculiarities with Chinese IP laws compared with international practice. For example, China's Trademark Law follows the "first-to-file" rule which stipulates that a trademark is granted to the party that files first, rather than the party that first uses the trademark. This disparity can result in "trademark squatting," whereby local Chinese businesses and individuals are granted trademarks of foreign products. This problem is complicated by the likelihood of numerous alternative Chinese translations of foreign trade names. Facebook, for example, discovered that many iterations of the website's name and its Chinese translations have already been registered in China and has itself decided to apply for as many as 60 trademarks (some of which have already been registered),

including the English and simplified character iterations of “Facebook,” “Fei-si-bu,” “Fei-shu-bo,” “Fei-si-bo-ke,” and “Mianshu.”[15]

In general, however, Chinese IP legislation is quite closely aligned with international standards – in part because the three major revisions to Chinese IP law which have been adopted since 1992 (in 1995, 2001, and 2004) have been shaped by the conclusion of international treaties, especially bilateral treaties with the USA. Sometimes China has even been ahead in legislative terms: for example, it adopted the first-to-file rule for patents (as used in Europe) in its original legislation – an innovation that was not incorporated into US law until passage of the Leahy–Smith America Invents Act in 2011.

Instead, the two main factors limiting reliance on the legal and regulatory regime for IP protection in China are the practicalities of enforcement in many parts of a huge country and the fact that, as already noted, the most critical IP for most foreign companies is often embodied in their trade secrets rather than patents, trademarks or copyrights.

Enforcement in China’s IP Protection Regime

To handle cases of infringement of the IPRs special intellectual property courts have been established in major cities and provinces. In 1992, the Supreme People's Court established an intellectual property division. At the level of the Higher People's Court in Beijing, Shanghai, Guangdong, Fujian and Hainan, intellectual property courts have been separated from the more general economic division dealing with other commercial matters. Beijing, Shanghai and Tianjin have also established intellectual property courts within their Intermediate People's Courts. In 2011, local courts at all levels across the country received 59,612 new IPR-related civil cases and concluded the trials of 58,201 cases, up by 39%.

There has been much criticism of the reliability of the processes and judgments of these IP courts.[16] China’s uses a civil (not common) law system, where little to no deference is given to prior decisions by judges facing the same issues. In theory, each judge reading the same statute is expected to arrive at the same interpretation. Of course, as in any legal system, this is often not the case in

practice. Instead the lack of precedent results in divergent interpretations by different courts. Certainly in the 1980s and 1990s this was exacerbated by a shortage of qualified, specialist judges, and experienced intellectual property lawyers and advocates in China, particularly in less developed Chinese provinces – who have also been accused of local protectionism.

A good example of the limitations of the Chinese system is the experience if the French manufacturer of electrical equipment, Schneider Electric. Schneider was involved in IP cases starting in 2006 against Chint, a large Chinese competitor. Schneider filed several patent lawsuits against Chint in Europe and Chint counter-sued in Wenzhou, seeking statutory damages amounting to less than US$75,000. Schneider requested the Chinese SIPO to invalidate Chint's patent, but the request was denied and upheld on appeal. Chint then increased its request to damages of US$48.5 million, based on new evidence of Schneider's sales revenue for the products utilising the patent. The Wenzhou court found in Chint's favour and awarded it the full US$48.5 million. Finally, after two years of appeals, the parties entered a global settlement in 2009 for US$23 million.

Despite this cautionary example, the aggregate data suggest foreign litigants in fact have a good record of success in IP litigation in China, winning between 90-95 per cent of reported cases on average across all Chinese courts.[17] Another recent study of a sample of patent cases in 2010 found that the probability of a foreign litigant winning was 60% when the opposing party was a Chinese entity.[18] Chinese IP trials also tend to be quicker and cheaper, certainly than in the USA, and often the UK and some other jurisdictions. Chinese patent cases, for example, often taking just six months from filing of the complaint to trial and another three months for appeal, compared to a norm of several years in the USA.[19] One reason is that there are no juries (as indeed there are not anywhere else except in the USA). Nor is there what is termed a "discovery" procedure in the USA (and "disclosure" in the UK) – a potentially lengthy pre-trial process where evidence can be obtained from the other party through a series of demands and questions – before the trial even begins. In this respect Chinese trials are much closer to the majority of continental European countries

with roots in Roman law where cases are tightly run by a presiding judge and there is no discovery or disclosure.

Many IP cases in China, however, do not end up in the courts. Instead, they are handled by administrative processes. When an owner of an IPR deemed it to have been infringed it can request local authorities in charge of IP for redress. In general the administrative route of patent enforcement is cheap, quick, and simple (a maximum time for submissions and action is set a four months). The local authorities can impose an injunction and mediate (but not compel) damages. If the mediation fails, the patentee can then sue the infringer in the court. Initially many companies found that local authorities were reluctant to pursue enforcement. But in the last few years the enforcement capacity of local IP offices has increased significantly. In 2012, local IP authorities in China have handled a total of 9,022 IP cases through administrative enforcement, close to double the number in 2011.

Of course administrative enforcement authorities tend to focus their inevitably limited resources on areas they perceive as higher priority. Just as one might expect British trading standards officers to pay more attention to counterfeit pharmaceuticals than to fake handbags, we might assume that stretched Chinese local IP authorities to be more willing to investigate and pursue some claims than others. In China this probably means those that are seen to contribute most to local economy and align with government policy priorities will be favoured, as well as those who a long-term commitment to the development of the Chinese economy and society. Pure traders and short-term investors are unlikely to be a priority.

In sum, China's IP protection regime and associated enforcement capabilities have been improving rapidly. Foreign companies should not assume that IPRs are unobtainable unenforceable or that Chinese courts are always act in favour of Chinese over foreign parties. However the system, in common with much of the rest of the world, is imperfect and sometimes unpredictable. Foreign companies should take the initiatives and build the capabilities to use it fully and effectively where possible. But it is not, and probably never will be, a silver bullet

solution to the problems of protecting IP in China – not only as a result of its inevitable limitations but also because much of a company's valuable IP takes the form of trade secrets.

Protection of Trade Secrets in China

As we have already noted, with relatively high employee turnover in many industries in China job-hopping leading to a breach of trade secrets is a common problem. China instituted a legal framework for the protection of trade secrets under the Anti-Unfair Competition Law in 1993, which was further clarified in January 2007. In China the definition of a trade secret is "any non-public information with actual or potential commercial value and that is guarded by confidentiality measures". In other words, a trade secret cannot be something known by the general public or by your competitors; it must give you a competitive advantage or be capable of generating economic benefit; and you must have taken reasonable measures to protect the confidentiality of the information.

One of the first actions successfully concluded by a foreign firm under this clarified legislation was brought by General Electric (GE) in respect of its medical systems business in 2007. GE had discovered that an ex-employee was offering training courses using GE's trade secrets. It filed a complaint with the Hangzhou Administration for Industry and Commerce whose inspection of the training company's premises resulted in the seizure of a large quantity of materials that included GE's internal logo and copyright. GE subsequently brought a case against the ex-employee using this evidence in the People's Court of Xi'an for misappropriating trade secrets and copyright infringement. The court ruled in favour of GE and ordered an injunction and compensatory damages of RMB 900,000 (£90,000).

In order to open the option of invoking Chinese trade protection laws if necessary the starting point, of course, is to identify information that can justifiably be regarded as a trade secret. Documents or electronic formats containing this information need to be labelled or encrypted and where possible securely stored and their transfer and sharing logged. Employee manuals and

employment contracts need to be drafted so as to be consistent with the burden of proof required by Chinese trade secrets laws (making it clear, for example, how confidential information should be handled and emphasising to employees that they have a duty of confidentiality).

It is also necessary to continually scan the market and visit suppliers to identify fake or copied products as soon as possible after they appear in the market. This includes attending trade shows, monitoring e-commerce sites such as Alibaba, and undertaking “undercover” mock purchase calls.

Even if steps have been taken that make it possible to invoke Chinese legislative protection, however, trade secret enforcement in China can still be tricky and the damages awarded can be inadequate. A case recently written up by the United Kingdom Intellectual Property Office (UKIPO) concerning integrated circuit cards ("IC cards") demonstrates the issues. An employee of a company making IC cards (Company A), contacted a rival IC card manufacturer ("Company B") and helped it to establish a competing IC card manufacturing operation. Several months later, the employee quit. Almost immediately after the employee's departure, Company A discovered that Company B was selling an identical IC card system using nearly identical technology. Company A requested the People's court in China to preserve evidence obtained from two computers found in Company B’s premises containing Company A’s software, Company A’s design diagrams, customer lists, marketing materials, technical documents, and note from the employee containing technical specifications for modifying Company B’s IC card software.

In its judgement concerning the subsequent suit, the People's Court agreed that the Company A's IC card technology was a trade secret because the technical information disclosed had commercial value, the employee’s contract containing confidentiality provisions demonstrated Company A's efforts to keep the information a secret, and the he employee had disclosed the information without permission because the employee was simultaneously employed by both companies for a period of time. But the court awarded damages of only RMB 136,450 (approximately £14,000) to Company A[20].

Given the limitations of bringing action inside China, therefore, it is also advisable for foreign companies to look for opportunities that might open up to enforce protection of the IP outside China. Ford Motor Company, for example, became aware that Xiang Dong Yu, a former product engineer with Ford from 1997 to 2007, intended to return to the U.S. in 2011, having ceased his subsequent jobs in China with Ford's American and Chinese competitors. Ford had evidence that on the eve of his departure from Ford back in 2006 and before he told Ford of his new job in early 2007, Yu had copied some 4,000 Ford documents onto an external hard drive, including sensitive designs that the company had spent millions of dollars and decades on research, development, and testing to develop. On entering the U.S. he was arrested based on information provided by Ford. At the conclusion of the trial the court in east Michigan sentenced Yu to 70 months imprisonment and fined $12,500 for stealing trade secrets[21].

Even with a comprehensive set of procedures in place to make use of the Chinese legislative framework and a resolve to pursue any violations as soon as the perpetrators try to enter countries with proven enforcement regimes, however, trade secrets along with IP will remain difficult to protect. Such initiatives are "necessary but not sufficient". Legal initiatives, therefore, will need to be complemented with other pragmatic strategies outlined below.

Pragmatically Navigating the Minefield

A pragmatic approach to navigating IP minefield in China must start with a recognition that technological upgrading is a key pillar of China's development policy. Mechanisms to promote technological spillovers from foreign companies operating in China are central to the implementation of this policy. In some cases these mechanisms have been formally embedded in the foreign investment regulations such as the requirement for foreign carmakers to form joint ventures with at least 50% Chinese shareholding or making technology transfer agreements an eligibility condition for foreign participation in major infrastructure projects (such as the supply electricity generation turbines for the Three Gorges Dam or the supply of rolling stock for the expansion of China's high-speed rail network). In other cases the spillovers have happened through

local staff trained by foreign investors moving to local competitors or starting up their own businesses where they inevitably use at least the non-proprietary knowledge they have gained. In addition, some degree of "informal" leakage of IP is inevitable. This is true everywhere in the world. But leakage will almost certainly more significant in China given a strong national focus on technological upgrading and the incomplete enforcement environment outlined above.

Some companies believe the solution is simply to avoid taking their IP, trade secrets and broader knowledge to China even is this means foregoing the opportunities for revenue and profits in the local market entirely or limiting their involvement purely to the export of final products to China. As we have already noted, however, the increasing need for local adaptation, opportunities to access R&D resources and knowledge in China itself (especially in the rapid scale-up of new technologies, complementary process technology, and efficiency improvement), and intense competition from both Chinese and foreign rivals who can access other local advantages, means a pure export strategy is less and less viable. Moreover, even attempts to protect IP by keeping it walled off back at home base does not the resulting product advantages cannot be matched in China. Modern information and communication systems enable companies in China to easily view IP registered overseas. Many Chinese companies have large numbers of staff devoted to tracking new developments in relevant scientific and technological fields everywhere in the world. There is also a large pool of scientists and engineers exceptionally skilled and experienced in developing parallel products that match the performance of foreign designs without necessarily violating IP rights. Chinese companies have also become adept at taking a product or service concept and developing parallel innovations of their own that can deliver the benefits using different technologies and approaches. Examples abound in Internet and e-commerce businesses where companies such as Alibaba have developed their own infrastructure and technologies to deliver ideas behind PayPal or eBay or Tencent with its QQ instant messaging and social media products – often taking the functionality of these well beyond the original foreign idea. Likewise, China launched the world's fastest supercomputer in June

2013, the Tianhe-2, using its own unique architecture to create superior performance by innovatively linking together industry standard Intel Xeon chips.

The message is clear: simply trying to lock up IP, technology and know-how at home provides no guarantee that the customer benefits will not be replicated in China by other means. We believe that a more effective approach that also opens the way to grasping opportunities in the Chinese market is to adopt a strategy of on-going engagement using a mix of approaches both to exploiting and protecting IP in China. The right mix will vary between individual companies, but can include: compartmentalising IP and R&D knowledge, only some of which are transferred to China; up-front agreements to share markets internationally with a Chinese partner; staged timetables for technology transfer; reciprocal obligations for Chinese partners to share complementary innovations or incremental improvements; implementing human resource management (HRM) policies that complement IP strategies; and initiatives to align IP protection strategy with Chinese government policy.

Compartmentalising IP and R&D Knowledge

The starting point of this strategy is identify what aspects of IP and associated knowledge needs to be shared with Chinese distributors, suppliers or partners in order for them to support, and maybe also adapt and improve, your product or service effectively. Once IP and knowledge are categorised on the "need to know" basis then decisions can be taken about what needs to shared and what can remain in a "black box". The old adage "share the interfaces but not the core" can be a helpful rule of thumb here. Moreover, as one IP lawyer experienced in China recommends: "You transfer that part [of the IP] that is most easily reverse engineered or easily dissected"[22].

Another useful compartmentalisation is to divide hardware from the software. An increasing number of products, including industrial machinery, cannot function effectively unless hardware and software are working together in concert. Some companies, therefore, retain elements of the software on secure servers overseas to reduce the risk that imitators can achieve the same performance even if they copy the hardware. Continually updating this remotely

hosted software can further reduce the probability of successful imitation. AMSC took this approach in respect of its business making equipment for wind turbines. When it opened a factory in China to assemble power convertors for these turbines, AMSC decided that the most technology-rich components continued to be built in its U.S. plants and shipped in as sub-modules. It took the further precaution of separating out software and keeping the source code for its control system software on a secure server at its R&D centre in Klagenfurt, Austria[23]. It is perhaps testament to the effectiveness of this strategy that one of AMSC's former Chinese customers, Sinovel, is alleged to have contracted to pay US$1.7 million in 2011 for access to the software to a rogue AMSC engineer working at the Klagenfurt centre who, as we have already mentioned, stole it.[24]

In the semiconductor sector the maker of electronic design automation (EDA) tools, Cadence Design Systems Inc., compartmentalises its knowledge by using a modular design process. It then provides developers in locations where the risks of leakage are considered high only some of these modules to work with, rather than its entire code tree.

Even where it is necessary to share a large proportion of the products details (or where these can be understood by deconstructing the final product), it may be unnecessary to share knowledge concerning R&D and innovation processes by which products are designed and developed. By keeping as secret the knowledge required for product development, IP owners will position themselves to stay ahead of their imitators as new generations are evolved.

Up-Front Agreements To Share Markets Internationally

A concern shared by many foreign companies evaluating partnerships in China, especially those involving co-development of new products and services is the risk that the Chinese partner will eventually become a new competitor in the global market using the joint IP resulting from the initial cooperation. One strategy to mitigate this risk is to agree up-front an arrangement to divide up the international markets for the products of co-development between the partners. Typically the Chinese partner will be awarded the rights to sell the products in China and potentially other emerging markets where its capabilities and

experience in marketing and distribution are most relevant. The foreign partner, meanwhile, might retain the rights to sell the products in its own home market and other developed markets where it has established distribution or relatively more transferable skills and experience. For the foreign partner such agreements have the advantage, subject to anti-trust considerations, that any violations can be pursued through courts outside China. This arrangement was adopted, for example, by HUYA Bioscience International (San Diego) when it entered into a co-development agreement with Shenzhen Chipscreen Biosciences for a prospective cancer treatment, Chidamide. Both companies agreed to register and conduct parallel clinical trials in their home countries. If the product is eventually approved for use, Chipscreen Biosciences will retain the marketing rights in China, with HUYA retaining the remaining global marketing rights.

In other cases the partners agree that sales into the global market will be made by their joint venture rather than the independently. In October 2013 for example Chicago-based Velsicol Chemical LLC, a leading specialty chemical producer and marketer, announced a joint venture with ECOD Specialties Co., Ltd of Wuhan, China. The joint venture located in Wuhan will not only manufacture, but also sell, its environmentally friendly plasticizers globally with Velsicol acting as its sole agent marketing agent worldwide[25].

Staged Timetables For Technology Transfer

Another strategy for managing the IP risks is to agree a staged timetable to manage the speed of technology transfer to a Chinese partner. In 1999, for example, Airbus signed an agreement with China Aviation Industry Corporation (AVIC), under which Airbus would transfer manufacturing technologies and production lines used in the making of A320 wings components, with the objective of enabling China to manufacture whole wings. This agreement specified a stage transfer of technology over seven years. The first two phases included technology for the manufacture of the fixed leading and trailing edges of the wing respectively. In the third phase, Airbus placed more engineers into its Chinese partner's factories to enable local manufacture of the wing box. By July 2007 the first China-made A319 wing box was delivered to Airbus[26].

This approach was replicated when Airbus began manufacturing its A320 family of aircraft in China in a joint venture with China Aviation Industry Corporation (AVIC) in 2008 as part of its drive for sales in the world's fastest growing civil aviation market. Initially the aircraft was assembled in China from kits with 95% of the parts imported as sub-modules, painted and the seats installed. From that starting point, "one by one we start to transfer parts, but each is a subassembly is a complex project – its takes five years" the general manager of Airbus's assembly operation in Tianjin was quoted as saying in 2013[27].

Reciprocal Obligations For Chinese Partners To Share Complementary Innovations

In seeking to mitigate the downside risks of IP leakage in China it also important to keep in mind that working with Chinese partners can result in the base technology being improved locally. Chinese partners often bring complementary skills and a deep understanding of local customer needs that can stimulate derivative innovations. Sophisticated strategies for IP management in China, therefore, should also be designed to make sure your company is able to capture a share of the rights to these improvements.

A good example of capturing this potential is the experience of Areva, the French nuclear and renewables giant. Its long-term partner, The China General Nuclear Power Company enhanced the French 900 megawatt electrical (MWe) three-cooling-loop reactor design transferred to China by Areva in the 1990s into a more powerful and more cost efficient 1,000 MWe CPR-1000 design. The new design was quickly deployed with fifteen units under construction by June 2010[28]. Areva's partnership agreement enabled it to share the intellectual property rights for the new design that it is reported to be considering marketing outside China as a way of unlocking other emerging markets[29].

Implementing Complementary HRM Policies

We have already drawn attention to the importance of trade secrets that employees may carry around in their heads. Given the significance of these and their inextricable links with the motivations and actions of your staff, human resource management (HRM) policies must also be part of the overall strategy to

protect IP. Considering the impact of HRM policies on IP risks that starts with the recognition that high growth in China means that many employees have the ambition for rapid career advancement and keep a close eye on the progression of their social status relative to their peers. In this environment unless your policies provide opportunities for continuous learning and a clear career ladder, retention will be impaired and trade secrets will quite literally keep flowing out the door. Both your programme for on-going training and your policies for comparing internal and external candidates for vacancies when they occur, therefore, need to be designed taking the likely impact on IP risks into account. Likewise, investment in developing a deep understanding of the expectations and cultural norms that determine whether employees feel appreciated and "well cared for" and adapting foreign HRM practices accordingly, will pay dividends in helping to secure valuable knowledge and IP.

It is also likely to be useful to address the risk of trade secret leakage from the other direction as well: trying to convince employees that proprietary knowledge likely to be of little value if taken out of the context of the company, its products and brand equity. This means emphasising in both internal and external communications that your company's value proposition is underpinned by the total package customers receive, rather than a specific technology or a particular product alone.

Aligning IP Protection Strategy With Government Policy

Aligning your IP protection strategy with Chinese government policy will almost inevitably involvement adjustments and compromises. But a strategy that is in tune with the flow of the river is much more likely to deliver long-term success that one that is continually fighting against it. This is well demonstrated by the experience of Microsoft in China.

In 1992 Microsoft formally began offering its software in China. Its strategy was to sell its products at prices similar to what it charged elsewhere in the world. Its offerings, including Windows and Office, were enthusiastically adopted by users; the problem was that very few of them were paying – almost all of the installations were pirated. Microsoft's immediate response was to

attack the counterfeiters in the law courts. By the late 1990s it had attracted unwelcome publicity as a bully to the point were its former country manager described it as “arrogant and selfish” and “an enemy of Chinese consumers”[30]. As a result the Chinese government began actively promoting a Chinese version of Linux with the Beijing municipal government, China Post, and the National Statistic Bureau, among others, installing Linux on the personal computers of their hundreds of thousands of staff.

By 2001, Microsoft had reached the conclusion that its usual pricing and IP protection strategies were doomed to failure in China. So they began to change tack. Microsoft started by upgrading the R&D centre it had first established in China back in 1998. They then set about repairing relations with the Chinese government. In February 2002 in an attempt to assuage Chinese concerns about software security issues, Microsoft agreed to give government officials controlled access to the source code for Windows and certain technical information.

Through a series of high-level meetings they also understood the importance the government placed on developing China’s software industry. This led in June 2002 to Microsoft agreeing to contribute US$750 million over three years to assist the development of China’s software industry through investment in joint ventures and university laboratories, training programs for teachers and software entrepreneurs, working with the Ministry of Education to finance 100 model computer classrooms in rural areas, and making Shanghai a global centre for responding to customer emails[31]. Microsoft also adapted its pricing strategy, starting to offer extremely low-priced software bundles for segments such as students.

Microsoft’s then newly appointed country head for China, Tim Chen, described the shift this way: "we started changing the perception that Microsoft is the company coming just to do antipiracy and sue people. We changed the company's image. We're the company that has the long-term vision. If a foreign company's strategy matches with the government's development agenda, the government will support you, even if they don't like you. There was synergy,

which we formalized, between the need of the Chinese economy to have local software capability and our need for an ecosystem of companies around us using our technology and platform."[32]

The strategy began to pay dividends. The Chinese government required central, provincial, and local governments to begin using legal software. By 2006 city of Beijing, for example, completed this shift and now pays for software used by its employees (most whom never adopted Linux but were using pirated version of Windows). The government also required local PC manufacturers to load legal software on their computers (previously even the market leader, Lenovo, had been shipping 90% of its machines "naked" – without an operating system installed – a practice often also followed by foreign brands of PCs in China. By 2007 Microsoft estimated that number of new machines shipped with legal software nationwide has risen from about 20% to more than 40%.

There are certainly compromises and costs in aligning IP protection strategy with government policy in China. Not least is the fact that Microsoft's China revenues are reported to average no more than US$7 for every PC in use (compared with US$100 to US$200 in developed countries)[33]. In 2012 Microsoft also brought cases against Shanghai Gome, a branch of one of China's largest electric goods retailers, and Beijing Chaoyang Buynow, a large computer mall, alleging that they were selling PC with pirated copies of Windows installed[34]. Overall, however, their experience suggests alignment of IP strategy with government policy is a valuable part of the toolkit for navigating China's IP minefield, even if not a panacea.

Conclusion: The Art of the Possible

The Boards of many companies are understandably counting on winning share in the China market to support their top-line growth in coming years. This will require ever more of their high-value technologies, trade secrets and know-how being exposed to the risks of IP leakage as winning in China requires state-of-the art technology and knowledge to be deployed there and more R&D and design to take place locally. China has strong legislation to protect IP, but a combination of patchy and sometimes inconsistent enforcement, combined with

the importance of trade secrets that are difficult to protect by legal means the world over, means that rigorous management of IPR needs to be complemented with pragmatic strategies to navigate China's IP minefield.

Serious efforts should be made to make sure your company has the option to successfully utilise the legal protection that is available, both inside China and abroad, where possible. But this alone is almost certain to be insufficient to mitigate the risks of IP leakage. Nor do we believe that simply refusing to transfer IP to China or relying solely on exports is a viable long-term solution to the problem. The increasing need for local adaptation, opportunities to access R&D resources and knowledge in China and intense competition from both Chinese and foreign rivals are rendering pure export strategies less viable. Attempts to protect IP by keeping it walled off back at home are also becoming less effective as more knowledge moves globally and competitors find alternative ways to deliver similar product advantages using other sources of technology or alternative approaches.

Instead, we believe companies need to follow a pragmatic approach, using multiple strategies in concert to mitigate their IP risks. These strategies include: compartmentalising proprietary know-how (that may be protected through secrecy or, less satisfactorily, through contract) and other rights such as patents, only some of which are transferred to China; up-front agreements to share markets internationally with a Chinese partner; staged timetables for technology transfer in discrete packages; reciprocal obligations for Chinese partners to share complementary innovations or incremental improvements; implementing complementary HRM policies; and taking the initiative to align IP protection strategy with Chinese government policy.

The combination of these approaches can substantially reduce the risks of exposing IP to a difficult and uncertain Chinese environment. At the same time it needs to be accepted that the risks can never be entirely eliminated: indeed, doing business anywhere involves legal risk of some form or another. Ultimately the best protection is to stay ahead of the competition as each new cycle of innovation unfolds. A well-crafted and pragmatic strategy to navigate China's IP

minefield, however, can help make sure you enjoy the benefits of clear water before the competition catches up with the last wave.

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