

CAN CHINA PROMOTE ELECTRONIC COMMERCE THROUGH LAW REFORM? SOME PRELIMINARY CASE STUDY EVIDENCE

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I. INTRODUCTION

The government of the People's Republic of China (P.R.C.) has announced its intention to make China a global leader in innovation by 2020.¹ Many Chinese business leaders share this goal.² The primary

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focus of this national strategy is to transform China into an exporter of high-technology products based on Chinese designs rather than merely a low cost, high volume manufacturer of products based on technology developed in other countries.³ This paper will examine the implications for this strategy with regard to the use of computerized management information systems by Chinese businesses, and its relationship to recent law reform efforts intended to promote greater use of electronic commerce among Chinese businesses.

This paper considers three case studies of recent reforms of P.R.C. commercial law in light of their contributions to this strategy, and finds that the results so far are quite mixed. The first case study looks at a domestic standard for accounting software issued in 1989 that successfully removed obstacles to the greater use of computerized accounting systems by local businesses and promoted the growth of the domestic accounting software industry. The second and third case studies involve P.R.C. legislation based on model laws developed by United Nations Commission on International Trade Law (UNCITRAL) developed to assist legislators in trading nations to harmonize their national commercial laws in order to eliminate barriers to international trade.⁴ The second case study looks at the inclusion of general electronic commerce enabling legislation in the 1999 Contract Law which in theory removed impediments to the use of electronic commerce by Chinese businesses but in reality appears to be too abstract and general to provide much certainty to parties wishing to form contracts using electronic media. The third case study looks at the 2004 Electronic Signature Law which promotes the use of a specific type of technology for authentication. While it is too soon to know whether this law will achieve its intended objectives in China, evidence from other countries with similar laws suggests that it may not.

¹ Yang Lei, *China Sets Goal for Developing Science, Technology in 15 Years*, XINHUA, Feb. 9, 2006, available at http://www.gov.cn/english/2006-02/09/content_183774.htm (last visited May 8, 2007), referencing 国家中长期科学和技术发展规划纲要 [Guidelines on National Medium and Long Term Planning for Science and Technology Development] (2006-2020), St. Council, XINHUA, Feb. 9, 2006, at http://www.gov.cn/jrzq/2006-02/09/content_183787.htm.

² See, e.g., "Chinese companies must develop high technology and we must make our own technical standards if we hope to change from 'made in China' to 'made by China.'" Liu Qingtao, research and development department of Lenovo Group, quoted in Zhao Xiaohui, *Nation Strives for More Say in Technical Standards*, XINHUANET, May 14, 2005, at http://news.xinhuanet.com/english/2005-05/14/content_2956557.htm (last visited May 8, 2007).

³ See Richard P. Suttmeier & Yao Xiangkui, *China's Post-WTO Technology Policy: Standards, Software and the Changing Nature of Techno-Nationalism*, NBR SPECIAL REP. NO. 7, May 2004.

⁴ See Amelia H Boss, *Electronic Commerce and the Symbiotic Relationship Between International and Domestic Law Reform*, 72 TUL. L. REV. 1931 (1998).

Given the global nature of information technology markets, it may seem surprising that P.R.C. efforts to harmonize Chinese law with electronic commerce laws enacted in other countries have only modest prospects for success. Because Chinese businesses continue to struggle with the challenges of transforming a centrally planned economy into a market economy, their internal administrative systems often differ significantly from or are less well developed than the administrative systems of their counterparts in Western countries. This fact, together with the fact that 1999 and 2004 electronic commerce law reforms appear to have drawn heavily on foreign models, may explain why more recent P.R.C. law reforms may never enjoy the success of the 1989 standards. It does suggest, however, that government efforts to promote the use of electronic commerce among local businesses will require much more than transferring legislative models created for developed market economies to transition economies such as China's if they are to succeed.

II. COSTS AND BENEFITS OF ELECTRONIC COMMERCE

Although China's transition to a market economy has proceeded at an astonishing pace over the last three decades, Chinese companies today still face many significant administrative and regulatory challenges.⁵ P.R.C. government involvement in the economy is often more extensive than it is even in other newly-industrialized East Asian countries, and there may be fewer restraints on the exercise of discretion by government officials.⁶ Although Chinese policy of evolutionary transition from a centrally planned to a market economy may have avoided some of the worst excesses suffered by other former socialist states such as Russia, Chinese businesses nevertheless find themselves operating a very uncertain, dynamic institutional and regulatory framework.⁷ Many institutions that are essential to the operation of a market economy remain underdeveloped in the Chinese domestic economy. For example, accountants qualified to apply the generally accepted accounting standards of mature market economies rather than

⁵ See MINXIN PEI, CHINA'S TRAPPED TRANSITION 6-11 (2006).

⁶ See THOMAS G. MOORE, CHINA IN THE WORLD MARKET: CHINESE INDUSTRY AND INTERNATIONAL SOURCES OF REFORM IN THE POST-MAO ERA 287 (2002); LIN YIMIN, BETWEEN POLITICS AND MARKETS: FIRMS, COMPETITION AND INSTITUTIONAL CHANGE IN POST-MAO CHINA 198 (2001).

⁷ See ANDREW H. WEDEMAN, FROM MAO TO MARKET: RENT SEEKING, LOCAL PROTECTIONISM AND MARKETIZATION IN CHINA 12 (2003).

those of centrally planned economies are in short supply.⁸ Chinese firms make relatively little use of the kind of sophisticated software used by their competitors in developed economies to improve their management systems because the internal administrative structures of Chinese firms differ from those of the Western companies for whom much of the software was developed.⁹ In addition, Chinese managers often lack a clear understanding of what management information systems do and how they might benefit from implementing them; furthermore, because labor costs are lower than in the West, Chinese firms are not under the same pressure to replace employees with technology as their Western competitors.¹⁰ While tremendous strides have been made in expanding China's judicial system, courts suffer from serious shortages in funding, judges often lack professional training, and the judicial system as a whole remains under the shadow of its political masters.¹¹ The legal profession, like the accounting profession, is far from mature: for example, in the early 2000s, it was estimated that only about forty percent of China's lawyers had received a college education.¹² Under these circumstances, it is not surprising that many Chinese businesses have not yet embraced electronic commerce.

While Chinese businesses in the past have been able to compete in global markets because their lower labor or regulatory compliance costs permitted them to undercut competitors in developed economies, if they are going to compete in the future based on innovation and superior technology, greater use of electronic commerce will be essential. Electronic commerce technologies can benefit the companies that adopt them by reducing administrative overhead costs, by improving communications and marketing, and by providing management with better knowledge of the strengths and weaknesses of company operations, better information about market conditions, and better tools for collaboration with trading partners. There are costs associated with gaining these benefits, however. The most obvious is the initial cost of

⁸ Barney Jopson, *Accounting in China: Number-Crunchers Line Up for Boot Camp*, FIN. TIMES, Dec. 8, 2006, at 8.

⁹ See AnnaLee Saxenian, *Government and Guanxi: Chinese Software Industry in Transition*, in THE SOFTWARE INDUSTRY IN EMERGING MARKETS (Simon Commander ed., 2005).

¹⁰ See Deng Qin, *Inside the Chinese ERP Market*, AMR RES. REP., Sept. 2005; Deng Qin, *Profile of China's Manufacturing Community*, AMR RES. REP., Dec. 2005.

¹¹ Zhang Qianfan, *The People's Court in Transition: The Prospects for Chinese Judicial Reform*, in DEBATING POLITICAL REFORM IN CHINA: RULE OF LAW VS. DEMOCRATIZATION 139 (Zhao Suisheng ed., 2006).

¹² Cai Yonghsun & Yang Songcai, *State Power and Unbalanced Legal Development in China*, in DEBATING POLITICAL REFORM IN CHINA: RULE OF LAW VS. DEMOCRATIZATION 165 (Zhao Suisheng ed., 2006).

acquiring the technology, including hardware and software. In addition, there may be substantial costs associated with implementing new technologies.¹³ These implementation costs may include the cost of switching processes from human to computerized administration, and of customizing different programs to permit them to interoperate.¹⁴ Once business processes have been computerized, then businesses need to adopt information security policies to safeguard company assets housed inside computer systems, notwithstanding the cost and difficulty of implementing such policies.¹⁵

To assist in the analysis in this paper, electronic commerce technologies will be organized into two general groups: basic and advanced. Basic electronic commerce technologies include the use of e-mail in lieu of postal mail, telexes or faxes, the design of simple Web sites for marketing, and the utilization of basic productivity applications such as spreadsheets to monitor company processes. The popular Alibaba website provides an example of how basic electronic commerce applications are being used effectively by Chinese businesses. Foreign companies wishing to source goods and services in China can use the Alibaba website to identify local Chinese businesses that might be able to meet their needs, and to learn about the reputation of those businesses. The Alibaba site lowers the cost of searching the Chinese market for potential trading partners and of negotiating contracts, but has not provided tools for collaborative production after a contract has been formed. In 2007, Alisoft, one of Alibaba Group's companies, released its first software product, a piece of Web-based business software.¹⁶ This is part of a larger strategy of providing advanced as well as basic electronic commerce technologies to its members.¹⁷

¹³ See MICHAEL CUSUMANO, *THE BUSINESS OF SOFTWARE* (2004).

¹⁴ Only about half of the companies in developed economies that try to implement sophisticated electronic commerce systems succeed because many managers fail to recognize how difficult it is to implement them correctly and to allocate enough resources to the process. Kishore Kanakamedala, Glenn Ramsdell & Vats Srivatsan, *Getting Supply Chain Software Right*, 1 MCKINSEY Q. 78 (2003).

¹⁵ NATIONAL RESEARCH COUNCIL, *CYBERSECURITY TODAY AND TOMORROW: PAY NOW OR PAY LATER* (2002).

¹⁶ 阿里软件发布首款电子商务软件 [*Alisoft Releases Its First Electronic Commerce Software*], 新浪科技 [NEW WAVE SCIENCE], Apr. 13, 2007, available at <http://tech.sina.com.cn/i/2007-04-13/12461464530.shtml> (last visited May 14, 2007).

¹⁷ 阿里巴巴将推出免费电子商务流程解决方案 [*Alibaba to Introduce Free Electronic Commerce Processing Solution*], CNET NEWS, Apr. 18, 2006, at <http://www.cnetnews.com.cn/news/net/story/0,3800050307,39445704,00.htm> (last visited May 12, 2007).

Advanced electronic commerce technologies include the use of enterprise resource management software within firms and the use of information technology to promote seamless cooperation among trading partners within a supply chain in order to achieve “lean production.” Advanced electronic commerce technologies play an essential role in such business management systems as integrated supply chains, value chain systems, virtual organizations, virtual enterprises, collaborative networks, inter-organizational systems, and extended enterprises. For China to achieve its goals for economic growth through technological leadership, Chinese businesses will need to learn to use advanced electronic commerce technologies with domestic as well as foreign trading partners.

Because China is a country with a plentiful supply of labor, and relatively low penetration rates for new information technologies, Chinese businesses are more likely to use basic electronic commerce technologies than advanced, especially when dealing with other domestic Chinese firms. One of the primary motivations among firms in developed countries behind the use of electronic commerce technologies is to reduce dependence on expensive labor. In China, by contrast, where unskilled labor is plentiful but workers with knowledge of sophisticated information technology may be in short supply, labor-intensive manual administrative procedures may still be less expensive than new technologies that computerize those processes. A small number of Chinese firms who have close trading relationships with large foreign firms may use advanced electronic commerce technologies when dealing with their foreign trading partners because the foreign trading partner requires it. However, there is not much evidence that advanced electronic commerce technologies have yet been adopted widely within the domestic Chinese economy. Chinese companies that have successfully integrated new information technologies into their business processes are most likely to be using basic technologies such as e-mail for communications, and Web sites for marketing.¹⁸

For China to achieve its economic policy objective of moving beyond high volume, low cost labor-intensive production based on

¹⁸ Saxenian, *supra* note 9, at 22 (quoting one software consultant, “in today’s China, you can find \$30 billion multinationals with virtually no IT functionality besides e-mail and a marketing website”); see also Deng Qin, *Inside the Chinese ERP Market*, *supra* note 10; Deng Qin, *Profile of China’s Manufacturing Community*, *supra* note 10 (electronic commerce technologies widely in use among companies in developed countries include “customer relationship management” (CRM) systems, “materials requirement planning” (MRP) systems, “enterprise resource management” (ERM) systems and “knowledge management” systems). See also KENNETH C. LAUDON & JANE P. LAUDON, *MANAGEMENT INFORMATION SYSTEMS: MANAGING THE DIGITAL FIRM* 7 (8th ed. 2004) (use of accounting software is widespread among Chinese firms today, but use of more advanced forms of software is not).

technologies developed outside China to becoming a source of innovations that define the terms of trade in global markets, Chinese businesses will have to move from basic to advanced electronic commerce technologies. This is because advanced electronic commerce technologies play an important role not just in supporting the invention of new technologies, but also in providing a framework within which those technologies are successfully commercialized and marketed.¹⁹ The complexity of producing and implementing innovative technologies is so great that few organizations can manage these challenges without the help of collaborative relationships formed with trading partners. The development of the new Boeing 787 airplane is an example of successful innovation within a framework of collaborative relationships among Boeing and its suppliers: Boeing is now relying on its trading partners not just for production of parts that it has designed, but to assist in strategic research and development.²⁰ Many experts in developed countries believe that this kind of collaboration is often essential to helping a firm succeed in global competition, and such collaboration is not possible without the use of advanced electronic commerce technologies.²¹

In the three case studies that follow, Chinese law reforms designed to promote greater use of information technology among domestic businesses will be evaluated in terms of whether they promote the use of basic or advanced electronic commerce technologies. Using this standard to evaluate recent P.R.C. electronic commerce law reforms allows the impact of those law reforms to be assessed in light of their relationship to China's overarching goal of competing in global markets based on technological innovation.

III. PROMOTING THE USE OF ACCOUNTING SOFTWARE

The foundation of advanced electronic commerce is the automation of administrative processes within firms. The quantity and quality of information that can be exchanged with trading partners will be limited if a firm has not automated its internal administrative systems. Managers cannot develop a sophisticated grasp of conditions in domestic

¹⁹ See EDWARD W. DAVIS & ROBERT E. SPEKMAN, *THE EXTENDED ENTERPRISE: GAINING COMPETITIVE ADVANTAGE THROUGH COLLABORATIVE SUPPLY CHAINS* (2004).

²⁰ Richard L. Nolan & Suresh Kotha, *Boeing 787: The Dreamliner* (Harvard Business School Case Compilation 9-305-101), June 21, 2005.

²¹ See, e.g., Ge Dongsheng & Takahiro Fujimoto, *Quasi-Open Product Architecture and Technological Lock-In: An Exploratory Study on the Chinese Motorcycle Industry*, 3 ANNALS OF BUS. ADMIN. SCI. 15-24 (2004) (suggesting that innovation based in collaborative networks in China's motorcycle industry is limited to production efficiencies and not product innovation).

and global markets without at the same time having a sophisticated grasp of conditions within their own firms. The first case study focuses on a successful legal reform that provided Chinese firms with important incentives to adopt computerized accounting systems. Accounting software is a primary enabling technology that supports companies' use of both basic and advanced electronic commerce technologies.

China's software industry as a whole is underdeveloped and not globally competitive because it consists of thousands of small and undercapitalized firms.²² The products of foreign software developers dominate the market for software in China, although in many cases, this is due to rampant piracy rather than successful marketing by foreign firms. By contrast, within the market for accounting software in China, domestic firms account for ninety percent of the software in use. The software is produced by several large, well-capitalized software development firms including UFSOFT and Kingdee. Accounting software companies are considered leaders in China's software industry.²³ The success of this industry segment is attributable to the fact that Chinese companies are required to follow Chinese accounting practices, aspects of which differ from accounting practices in other countries, and to the fact that nearly 20 years ago, the P.R.C. government enacted regulations that successfully provided local businesses with concrete incentives to use software to prepare their accounts.

The development of the Chinese accounting software industry dates back to the end of the 1970s when the P.R.C. government began to implement the strategy of "accounting computerization" throughout the country. Part of this policy included issuing regulations aimed at promoting the use of accounting software by Chinese firms. In 1989, the Ministry of Finance (MOF) issued the Interim Regulations on Management of Accounting Software,²⁴ also called the *Xu Shi Tiao* by the accounting software industry.²⁵ The *Xu Shi Tiao* are regarded as the foundation of China's domestic accounting software industry even though they were not the first example of P.R.C. government regulations designed to promote greater use of computers in the industry. In 1987,

²² See generally Saxenian, *supra* note 9.

²³ See 刘国华, 国产财务软件雄霸九成中国市场真相 [Liu Guohua, *Why Domestic Accounting Software Dominates 90% of the Chinese Market*], ERP WORLD NET, Dec. 1, 2003, at <http://www.erpworld.net/2003/content.php?ID=8311> (last visited May 8, 2007).

²⁴ 会计核算软件管理的几项规定 (试行) [Regulations on Management of Accounting Software (Interim)] (promulgated by the Ministry of Fin., Dec. 9, 1989) (P.R.C.).

²⁵ The 徐十条 [*Xu Shi Tiao*], or "Ten Articles of Xu," were named after Xu Jiangang, director of the Computerization Division, Fiscal Department of P.R.C. Ministry of Finance, who was in charge of national accounting computerization and was the main drafter of the *Xu Shi Tiao*.

the MOF issued Provisions on Financial Issues During the Promotion of Computers at State-Owned Enterprises.²⁶ This regulation provided to state-owned enterprises favorable rules governing the amortization of costs of acquiring computer hardware, but did not include any equivalent rules governing the use of software. This regulation did not address the issues of the high cost of acquiring accounting software, of whether computerized accounting systems were at least as reliable as manual accounting systems in maintaining essential financial controls, or of whether regulators would accept the output of accounting programs as readily as accounting records prepared using traditional processes.

The *Xu Shi Tiao* were more successful in promoting the growth of China's accounting software industry than the earlier regulation governing amortization of computer hardware acquisition costs because it simultaneously addressed all three of those issues. It promoted greater standardization among accounting programs which made products available at lower costs, established minimum standards for reliability of accounting software, and also clarified under what conditions tax authorities would accept company accounting records prepared using such software. Both provisions provided improvements over a 1979 MOF pilot project, where RMB five million was allocated to develop accounting software at First Automobile Works (FAW).²⁷ From its inception through 1988, the application of accounting software was not as successful as the MOF had expected. From September 1988 to January 1989, the MOF conducted an investigation to discover what was undermining the success of the project. The investigation was not limited to the situation at FAW, but included analyses of accounting software needs at firms all over the country. The results of the investigation showed that most firms using accounting software were using custom developed programs that were too specifically tailored to the individual needs of one firm to be usable by other firms.²⁸ Customized software has

²⁶ 关于国营企业推广应用电子计算机工作中的若干财务问题的规定 [Provisions on Financial Issues During the Promotion of Computers at State-Owned Enterprises] (Promulgated by the Ministry of Fin., Sept. 8, 1987) CHINALAWINFO (last visited Dec. 21, 2006) (P.R.C.).

²⁷ FAW, established on July 15, 1953, laid the foundation for the Chinese automobile industry, and is considered the guiding figure of China's automobile industry. See FAW's website at <http://www.faw.com/webcontent/index.jsp>.

²⁸ The heavy reliance on custom development rather than mass distribution of standardized applications is characteristic of the early stages of development of the software industry in many countries, including China. See generally THE INTERNATIONAL COMPUTER SOFTWARE INDUSTRY: A COMPARATIVE STUDY OF INDUSTRY EVOLUTION AND STRUCTURE (David C. Mowry ed., 1996); 辛云勇, 本土财务软件的前世今生 [Xin Yunyong, *The Past and Present Incarnations of Domestic Accounting Software*], 知识经济 [THE KNOWLEDGE ECONOMY], Jan. 25, 2004, available at <http://news.chinabyte.com/343/1763843.shtml> (last visited May 8, 2007).

several disadvantages compared to standardized “off the shelf” software, including a lengthy and slow development process, higher acquisition costs, and higher maintenance costs.²⁹ The MOF investigation showed that there was considerable demand among Chinese firms for affordable standardized applications, but that managers of firms were concerned about the reliability of software accounting systems, and about whether accounting records produced using computerized accounting systems would be acceptable to tax authorities. After analyzing these findings, the MOF began working with industry representatives to draft a regulation that would promote greater standardization, lower licensing costs, and set minimum reliability standards that in turn would allow financial regulators to accept financial information from enterprises produced using accounting software.

In 1989, the MOF issued the *Xu Shi Tiao*, establishing ten requirements governing, among other software development issues, standards for writing code, entering and securing data, and correcting data entry errors.³⁰ These requirements were established through the cooperative efforts of developers, users, and regulators of this technology. Businesses that wanted to prepare their accounts using software were required to use software that had been certified compliant with the *Xu Shi Tiao*. By 1998, thirty-eight commercial accounting software programs had been so certified, and one hundred sixty programs had been certified compliant with the requirements of provincial financial departments.³¹ As Xu Jiangang, primary architect of the regulations, noted:

To accounting software companies, certification makes the users trust their software. To some extent, these companies freely enjoyed the intangible property of the MOF. That benefits both software companies and end users. At the beginning of the 1990s, software was not familiar to the users, let alone commercial software. Certification promoted the application of commercial accounting software and finally

²⁹ See CUSUMANO, *supra* note 13.

³⁰ The ten provisions are available listed in 吴晓伟, 财务软件: 一套标准和一个产业的诞生 [Wu Shaowei, *Accounting Software: The Emergence of a Set of Standards and of an Industry*], http://www2.ccw.com.cn/04/0426/g/0426g04_28.asp (last visited May 28, 2007).

³¹ 许健钢, 财务软件十年间 [Xu Jiangang, *A Decade of Accounting Software*], 中国计算机世界出版服务公司 [CHINA COMPUTER WORLD PUBLISHING], http://www.ccw.com.cn/hm/news1/topic/01_2_26_70.asp (last visited May 8, 2007).

promoted the development of the accounting software industry. This explains why China's accounting software industry developed rapidly during 1990's.³²

Part of the success of the *Xu Shi Tiao* is due to the fact that they are performance standards, not design standards, so competing software companies could develop unique products that would meet the standards, providing end users with a range of choices. Soon after the issuance of the *Xu Shi Tiao*, hundreds of thousands of businesses purchased accounting software programs and converted their traditional manual accounting management processes to computerized accounting systems.³³

In 1994, the new Provisions on Necessary Functions of Accounting Software³⁴ were issued to replace the *Xu Shi Tiao*. These Provisions built on those of the *Xu Shi Tiao*, but added thirty supplemental requirements to the original ten. In 1999, as a result of internal administrative changes at the MOF, the requirement that software be independently reviewed and certified prior to being marketed as compliant with the *Xu Shi Tiao* was suspended, and a system allowing software developers to self-certify was instituted in its place.³⁵ However, by the time the independent certification requirement was suspended, a vigorous market for accounting software programs was well established, and company managers no longer looked to the MOF to control access to the market for accounting software programs. The market failure the *Xu Shi Tiao* addressed had been corrected because businesses now had the sophistication to evaluate the strengths and weaknesses of various software programs, and the confidence that their accounting records maintained within computerized systems would be acceptable to regulators.

³² 何适, 许健钢: 当评审已成往事 [He Shi, *Xu Jiangang: Evaluating Affairs of the Past*], ERP 世界网 [ERP WORLD NET], Jan. 9, 2004, <http://news.erpworld.net/content.php?ID=9164> (last visited May 8, 2007).

³³ *Id.*

³⁴ 会计核算软件基本功能规范 [Provisions on Necessary Functions of Accounting Software] (promulgated by the Ministry of Fin., Jun 1, 1994, effective July 1, 1994) (P.R.C.).

³⁵ See Xin, *supra* note 28.

IV. REMOVING OBSTACLES TO ELECTRONIC CONTRACTING

The 1970s saw worldwide efforts to establish standards for formatting data in contracts so that businesses could exchange drafts in electronic form. These efforts produced “electronic data interchange” (EDI) standards in the 1980s, including the American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X12 standards, as well as the United Nations Economic Commission for Europe (UN/ECE) standard EDI for Administration, Commerce and Transport (EDIFACT), later adopted by the International Organization for Standards (ISO) as an international standard. Based on these standards, sophisticated electronic contracting applications have been developed and are now in use by hundreds of thousands of organizations around the world. Once businesses have EDI contracting systems in place with their trading partners, they are able to streamline their communications and increase the efficiency of their interactions. However, EDI contracting systems are notorious for being expensive to implement and difficult to maintain, and as a result, have not been popular with small and medium-sized enterprises in developed countries, or any local enterprises in developing countries.³⁶ Many multinational corporations that source products in China require their Chinese trading partners to use EDI contracting systems, but outside of exporting firms enjoying direct relationships with foreign multinationals, few businesses in China use them.

For companies in developing countries to make the transition from basic electronic commerce technologies to advanced ones, some means of lowering the cost of using sophisticated electronic contracting systems must be found. The growing popularity of the Internet as a medium of communication for electronic commerce contributed to interest in an Internet-based model of sophisticated business-to-business (B2B) electronic contracting that would be as effective as EDI but easier to use and less expensive to implement. Work has been underway since the 1990s to develop new standards to promote their growth of these new models, generally referred to as Web services.³⁷ The 1990s and 2000s saw the development of standards for new Web services B2B electronic contracting systems based on “eXtensible Markup Language” (XML)

³⁶ BRIAN GIBB & SURESH DAMODARAN, *EBXML: CONCEPTS AND APPLICATION* (2003).

³⁷ DOUG KAYE, *LOOSELY COUPLED: THE MISSING PIECES OF WEB SERVICES* (2003) (arguing that Web services will permit the move from expensive, complex, brittle advanced electronic commerce systems to less expensive, more flexible systems based on “loosely coupled” modular information systems).

technology. The Organization for the Advancement of Structured Information Standards (OASIS) and the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) jointly developed “ebXML” standards for XML electronic contracting, which were accepted as ISO standards in 2004. Web Services B2B systems based on ebXML or similar standards may make it possible for more enterprises in developing countries, and for small and medium-sized enterprises around the world, to form collaborative supply chains with their trading partners and compete more effectively in global markets.

Even if it becomes less expensive to acquire and maintain B2B electronic contracting technologies, businesses will be reluctant to make the switch from traditional administrative processes to electronic commerce if they think it would make their contracts unenforceable. To reduce the number of legal obstacles to the use of electronic contracting technologies in cross-border trade, UNCITRAL developed the Model Law on Electronic Commerce.³⁸ UNCITRAL is an organization that develops model laws and standard documents to facilitate international commercial transactions. Among its undertakings, UNCITRAL has produced the Vienna Convention on Contracts for the International Sale of Goods, the UNCITRAL Model Law on International Credit Transfers, the UNCITRAL Model Law on International Commercial Arbitration, and the UNCITRAL Arbitration Rules. The global scope of electronic commerce makes UNCITRAL an obvious and logical forum for developing consensus regarding the identification of appropriate reforms in existing contract law to facilitate the continued expansion of electronic contracting.

In 1984, UNCITRAL first identified the need for law reform in the area of cross-border trade and electronic contracts in a report by the Working Party on Facilitation of International Trade Procedures, and in 1988, the Working Party on Electronic Data Interchange was formed.³⁹ After nearly a decade of work by the Working Party, the Model Law was approved by the United Nations General Assembly in December 1996. The language of the Model Law reflects its initial inspiration, which was to remove obstacles to EDI contracting. Language in the draft was modified in an attempt to make it more generally applicable to electronic commerce conducted using either older EDI systems or newer Web-based systems. The drafters of the model law made every effort not to endorse any particular technology, but to maintain a “technology neutral”

³⁸ UNCITRAL Model Law on Electronic Commerce, U.N. Doc E.99.V.4 (1996), at http://www.uncitral.org/uncitral/en/uncitral_texts/electronic_commerce/1996Model.html.

³⁹ Boss, *supra* note 4, at 1950.

approach to commercial transactions by focusing on the principle of “functional equivalence” between paper and electronic documents.

The Model Law applies only to “data messages” used in commercial transactions, and does not override consumer protection laws.⁴⁰ The term “data message” includes information generated, sent, received or stored in electronic form, including EDI messages, e-mail, or faxes.⁴¹ The heart of the Model Law is found in Article Five, which provides that information shall not be denied legal effect, validity, or enforceability solely on the grounds that it is in the form of a data message. A data message may meet the legal requirement of a “writing” provided that it is in a format which may be accessed for subsequent reference.⁴² A data message can meet the legal requirement of a signature if a method is used to identify a person and indicate the person's approval of the contents of the message, and that method is as reliable as appropriate under the circumstances.⁴³ A data message may also meet the legal requirement that an original document be presented or retained.⁴⁴ A data message shall not be excluded from evidence in a legal proceeding solely on the grounds that it is electronic or is not in its original form.⁴⁵ Record-retention requirements may be met by retention of data messages, provided the information they contain may be accessed for subsequent reference, they can be demonstrated to represent accurately the information that was stored, and if possible, the provenance of the data message can be demonstrated.⁴⁶

Since 1996, the Model Law on Electronic Commerce has been enacted in full in the overseas territories of the United Kingdom and in the Hong Kong Special Administrative Region of China. Legislation implementing part of the Model Law has been enacted in Australia, China, Colombia, the Dominican Republic, Ecuador, France, India, Ireland, Jordan, Mauritius, Mexico, New Zealand, Pakistan, Panama, Philippines, Republic of Korea, Singapore, Slovenia, South Africa, Sri Lanka, Thailand and Venezuela. In the United States, the Electronic Signatures in Global and National Commerce Act of 2000 (E-SIGN Act)⁴⁷ and the Uniform Electronic Transactions Act, a model law that has

⁴⁰ UNCITRAL Model Law on Electronic Commerce, *supra* note 38, Art. 1.

⁴¹ *Id.* Art. 2(a).

⁴² *Id.* Art. 6(1).

⁴³ *Id.* Art. 7(1).

⁴⁴ *Id.* Art. 8.

⁴⁵ *Id.* Art. 9.

⁴⁶ *Id.* Art. 10.

⁴⁷ 15 U.S.C.S. § 7001 (2007).

been enacted in almost every state, include provisions based on the Model Law.⁴⁸

In 1999, China's new unified Contract Law took effect, replacing what had formerly been three separate laws covering domestic economic contracts, foreign-related economic contracts, and technology contracts.⁴⁹ The 1999 Contract Law was designed both to address the growing sophistication of China's market economy, and to remove obstacles to the use of new technology. With regard to whether a contract must be reduced to writing and signed in order to be enforceable, the Contract Law took a more flexible approach than the statutes that preceded it. Article Ten of the Contract Law provides that, unless a form requirement is imposed by other law, a contract may be oral, in writing or in other forms, which reduces contract formalities to an evidentiary consideration rather than a substantive requirement.⁵⁰ Several of the provisions regarding new technology took their inspiration from the provisions of the Model Law, although they are not simple copies of the language in the Model Law. The new Contract Law contains several provisions that address the use of electronic media in the formation of contracts, including the definition of what constitutes a "writing,"⁵¹ defining an offer to include electronic messages,⁵² and defining when and where a contract is formed by means of electronic messages.⁵³ The P.R.C. legislation that was inspired by the Model Law honors the principles of functional equivalence and technology neutrality, and thus fulfills the aims of the Model Law by removing obstacles to electronic commerce without introducing any new, technology-specific regulation.⁵⁴

It is possible that the electronic commerce enabling provisions of the Contract Law have made Chinese businesses more willing to use basic electronic commerce technologies such as e-mail and Web sites to form contracts. Given the relative lack of sophistication of electronic contracting technologies used by Chinese businesses, disputes involving

⁴⁸ National Conference of Commissioners on Uniform State Laws, *A Few Facts About the Uniform Electronic Transactions Act*, at http://www.nccusl.org/Update/uniformact_factsheets/uniformacts-fs-ueta.asp (last visited May 8, 2007).

⁴⁹ ZHANG MO, *CHINESE CONTRACT LAW: THEORY AND PRACTICE* 7-8 (2006); John H. Matheson, *Convergence, Culture and Contract Law in China*, 15 MINN. J. INT'L L. 329 (2006).

⁵⁰ ZHANG, *supra* note 49, at 112.

⁵¹ 中华人民共和国合同法 [Contract Law of the People's Republic of China] Art. 11 (promulgated by the Nat'l People's Cong., Mar. 15, 1999, effective Oct. 1, 1999) (P.R.C.).

⁵² *Id.* Art. 16.

⁵³ *Id.* Art. 33 & Art. 34.

⁵⁴ Gao Fuping, *The E-Commerce Legal Environment in China: Status Quo and Issues*, 18 TEMP. INT'L & COMP. L.J. 51 (2004).

electronic commerce are likely to arise in the context of contracts allegedly formed by exchange of e-mails or by using a Web-based graphical user interface (“click-through”) contracting system.⁵⁵ To prove the existence of such a contract and its terms, the parties will be required to submit evidence created and stored on computers. Under U.S. law, a party seeking to introduce such evidence is required to prove how the record was created, and that it was stored under conditions that permit the court to rely on the information it contains.⁵⁶

Under P.R.C. law, evidence is classified into seven traditional types,⁵⁷ but e-mail and other forms of electronic evidence are difficult to classify within the established categories of evidence. Given the current uncertainty with regard to the application of existing evidence law to new forms of electronic evidence, the local parties may feel concerned that a P.R.C. court would be reluctant to accept e-mails or log files showing online interactions as evidence that a contract was formed. The provisions of the new Contract Law are too abstract and general to provide concrete guidance to local courts and local litigating parties in how to evaluate such forms of evidence. Furthermore, temporary guidance issued by the P.R.C. Supreme Court to local courts in 2001 regarding the admissibility of evidence (Evidence Guidelines) actually counsels local courts to be skeptical of electronic media such as videos, and this guidance could be interpreted by local courts as encouraging skepticism about other forms of electronic evidence as well.⁵⁸

⁵⁵ See, e.g., 杨小姐 v 易趣网 [Miss Yang v. Ebay China] (Shanghai Hongkou District People's Ct.), discussed in 赵红 & 诸达鹤, 网上购物购来假货 公司赔款坚决不收 [Zhao Hong & Zhu Dahe, *Online Purchaser of Fake Goods Refuses Compensation from Company*], 新闻晨报 [SHANGHAI MORNING POST], Dec. 10, 2002, at <http://law.eastday.com/epublish/gb/paper26/20021210/class002600002/hwz593436.htm> (last visited May 8, 2007) (holding website providing “online shopping mall” has “some” responsibility for checking the authenticity of products sold on its platform, although it is not in privity with the buyer-seller transactions it facilitates).

⁵⁶ See generally JANE K. WINN & BENJAMIN WRIGHT, THE LAW OF ELECTRONIC COMMERCE § 20.05 (4th ed. 2007) (authentication of electronic evidence); *American Exp. Travel Related Servs. v. Vinhnee (In re Vinhnee)*, 336 B.R. 437 (Bankr. Fed. App. 2005) (claim by American Express in bankruptcy court was dismissed after printouts of customer account statements were offered as evidence with only vague, conclusory, and unpersuasive testimony to authenticate them).

⁵⁷ 中华人民共和国民事诉讼法 [Civil Procedure Law of the P.R.C.] Art. 63 (promulgated by the Nat'l People's Cong., May 9, 1991) (P.R.C.) (documentary evidence; material evidence; audio-visual material; testimony of witnesses; statements of the parties; expert conclusions and records of inspection).

⁵⁸ 最高人民法院关于民事诉讼证据的若干规定 [Rules of Evidence in Civil Procedures] 法释 [2001] 33 号 [Legal Explanation No. 33] § 22 (promulgated by the Sup. People's Ct., Dec. 6, 2001, effective Apr. 1, 2002) (P.R.C) (requiring provider of electronic data to provide the original carrier of data or if not feasible then report of outline of how reproduction was secured: “The investigators who investigate and collect computer data or audio and visual materials, such as sound recordings

It is not yet clear how Chinese courts will handle evidence offered in electronic contract disputes in light of the Evidence Guidelines. Anecdotal evidence of decisions in urban areas suggests that at least some courts are doing a reasonably good job of distinguishing between reliable and unreliable electronic evidence. The first reported case involving the application of the Evidence Guidelines to electronic evidence was decided in 2002.⁵⁹ In that case, the publisher of a book describing a computer-assisted categorization system sued another publisher that had released the same text on a CD. The defendant claimed that the work lacked the requisite originality to be copyrightable. In 2003, the Beijing Number One Intermediate People's Court applied Articles Ten and Eleven of the new Contract Law to hold that a "clickwrap" contract formed by a subscriber to Sina.com's free e-mail service was a valid contract.⁶⁰

In another case, widely discussed in the media, a Beijing court was asked to decide who had sent an e-mail in light of circumstantial evidence provided by network administrators.⁶¹ The case involved two graduate students at Beijing University who, together with several other graduate students, had access to an e-mail account registered in the name of an academic mentor. One of the graduate students received an offer of admission and a scholarship to attend the University of Michigan, but someone who was logged on to the mentor's e-mail account sent an e-mail to declining the offer, so the scholarship was awarded to another student before the intended recipient realized what had happened. The intended recipient sued a fellow graduate student who had been using the mentor's e-mail account at the time that the e-mail declining the offer was sent. Although the case was resolved through conciliation, evidence was taken regarding whether the computer from which the e-mail was sent

and visual recordings, etc., shall request the investigated person to provide the original device installing the relevant data. If it is too difficult to provide the original installation device, its duplicate may be provided. In case of providing duplicates, the investigators shall record the sources of the evidence and how to obtain the evidence in the investigation transcripts," translated in WEI LUO, THE CIVIL PROCEDURE LAW AND COURT RULES OF THE PEOPLE'S REPUBLIC OF CHINA 250 (2006).

⁵⁹ 国家图书馆 v 海洋出版社 [National Library v. Ocean Publishers] (Beijing Haidian District People's Ct.), discussed in 国图诉海洋出版社侵权案开庭: 光盘作为直接证据 [National Library Suit Against Ocean Publishers Begins, CD Admitted as Direct Evidence], 法制日报 [LEGAL DAILY], Jan. 25, 2002, available at http://www.legaldaily.com.cn/gb/content/2002-01/25/content_31052.htm (last visited May 8, 2007).

⁶⁰ 来云鹏 v. 北京四通利方信息技术有限公司 [Lai Yunpeng v. Beijing Stone Lifang Information Company, Inc.] (Sup. People's Ct., Mar. 31, 2003), in ZHANG, *supra* note 49, at 116.

⁶¹ 薛燕戈 v. 张男 [Xue Yange v. Zhang Nan] (Beijing Haidian District People's Ct.), discussed in 薛燕戈诉张男冒名发送电子邮件侵权案 [Xue Yange Sues Zhang Nan for Violation of Rights Through Impersonation in an e-mail], available at <http://www.lusin.cn/ebjichu/law/2006-5-23/k8429.htm> (last visited May 8, 2007).

could either have been shut down and then started up again at the time that the e-mail was sent, or left running, permitting a subsequent user to send an e-mail from the account in question, which were alternative explanations that the defendant offered in support of her claim that some unknown third party had sent the e-mail in question.

In still another case, an Internet publisher who had written assignments of copyrights from authors sued a second publisher for copyright infringement after he had downloaded the works and published them in hard copy.⁶² The court reviewed e-mails that the defendant offered into evidence to show copyright assignments that he claimed predated the written assignments to the Internet publisher. After determining that the defendant had not offered enough proof of the authenticity of the allegedly earlier assignments by e-mail, the court held the defendant liable.

Although the reasoning in these cases suggests that at least some Chinese courts are reaching sensible results with only the Evidence Guidelines to guide them, it is unclear whether these cases are representative of how Chinese courts generally will handle these issues. Efforts are underway in China to draft a modern law of evidence which will provide concrete and constructive guidance to contracting parties, lawyers and judges with regard to such issues, and the 1999 Electronic Signature Law now clarifies some questions regarding the admissibility of certain forms of electronic evidence.⁶³ However, in the absence of more detailed legislation establishing clearer standards for determining the evidentiary value of e-mail and online interactions, significant uncertainty surrounding the enforceability of online contracts is likely to remain. Under these circumstances, the reform of China's contract law to remove formal barriers to the use of electronic media to form contracts can be seen as a necessary but not sufficient condition for growth of electronic commerce in China.⁶⁴

⁶² 上海榕树下计算机有限公司 v. 中国社会出版社 [Shanghai Rongshuxia Computers, Ltd. v. China Society Publishing] (Beijing First Intern. People's Ct., 2000), available at <http://www.ebwh.cn/2004-9/2004928135539.htm> (last visited May 8, 2007).

⁶³ 中华人民共和国电子签名法 [Electronic Signature Law of the P.R.C.] Art. 7 (promulgated by the Nat'l People's Cong. Standing Comm., Aug. 28, 2004) (P.R.C.).

⁶⁴ RANDALL PEERENBOOM, CHINA'S LONG MARCH TOWARD RULE OF LAW 458 (2002).

V. CREATING INCENTIVES FOR THE USE OF ELECTRONIC SIGNATURES

In 2004, China enacted the Electronic Signature Law. This was the first P.R.C. law to focus exclusively on electronic commerce issues.⁶⁵ It contains many general electronic commerce provisions based on the UNCITRAL Model Law on Electronic Commerce: electronic communications may meet the statutory requirement that an agreement be in writing; an electronic file may be an “original” document; and a document stored and retrieved in a reliable manner may be preserved in electronic form. It also encourages the use of strong authentication technology by providing that, if electronic documents are authenticated using what the law deems to be a highly reliable technology, then that authentication will be treated as the equivalent of a traditional signature without any of the uncertainty that surrounds the admissibility of electronic evidence generally under P.R.C. law. To maintain minimum levels of reliability for such services, nearly half of the provisions of the law govern the licensing of organizations that provide electronic signature services to the public. Outside of China, electronic signatures are rarely if ever used in either basic or advanced electronic commerce, although their use is required in several countries as a condition to accessing certain “e-government” services.⁶⁶ However, the P.R.C. legislation sidesteps the issue of whether the use of electronic signatures should be required of Chinese citizens wishing to access public sector services online.

A. *Business and Technical Issues*

Before the 1990s, trading partners wishing to use advanced electronic commerce technologies had no alternative but to use expensive, private networks known as “value-added networks” (VAN) to communicate.⁶⁷ One of the many functions performed by operators of VANs was the authentication of parties accessing their networks, so trading parties did not need to worry about whether they were dealing with their trading partners or some imposter who had assumed that partner’s identity. The high cost of using VANs limited the growth of electronic commerce, and many businesses finally began using electronic

⁶⁵ See Zhang Chu & Lei Lingfei, *The Chinese Approach to Electronic Transactions Legislation*, 9 COMP. L. REV. & TECH. J. 333 (2005).

⁶⁶ Hermann-Josef Lamberti, *Securing Electronic Transactions*, ELECTRONIC BANKING L. & COM. REP., Sept. 2005, at 5.

⁶⁷ See WINN & WRIGHT, *supra* note 56, at § 1.04[B].

commerce only after growth of the Internet dramatically lowered the price of electronic communications. The Internet was designed to support the exchange of information between government agencies and research universities, and its architecture was not designed to provide the security normally deemed necessary for transaction processing. As a result, the low price of Internet communications may have obscured the true cost of using the Internet for commercial transactions because it did not include the cost of a system to reliably authenticate users.

To meet the needs of businesses engaged in Internet commerce for a reliable system of authenticating trading partners, as early as the late 1980s, some experts began advocating the use of “digital signature” technologies within a Public Key Infrastructure” (PKI).⁶⁸ Some of these advocates believed that a viable business model existed for issuance of digital signature certificates by Certificate Authorities (CA), trusted third parties who would act as intermediaries between Internet trading partners. Under this paradigm, CAs would review the identity documents of individuals to ensure that the identity contained in a digital signature certificate corresponded to the real world identity of the individual using it, and provide a central registry of certificates that had been revoked.

Digital signature technology has never enjoyed the success some experts predicted it would in the 1990s because it has turned out to be more complex, difficult and costly to use than its early proponents had imagined.⁶⁹ While some organizations have been able to make some aspects of the PKI model work in limited situations, attempts to establish a general framework for electronic commerce based on this technology have foundered.⁷⁰ This model also provides less security as an authentication system than anticipated as well. While digital signature technology can prove that a certain private key had been used to sign a document, and can make it clear whether a document had been modified since it was signed, at best it provides only a very partial solution to the problem of reliably authenticating parties to Internet commerce.⁷¹

⁶⁸ “Digital signature” here refers to a signature formed using asymmetric or public key cryptography, and PKI refers to a system within which trusted third parties issue certificates binding a real world identity to a public key. For more information, see Treasury Board Secretariat of Canada, *What is a PKI?*, GOVERNMENT OF CANADA PUBLIC KEY INFRASTRUCTURE, at http://www.tbs-sct.gc.ca/pki-icp/beginners/whatisapki/whatisapki_e.asp (last visited May 8, 2007).

⁶⁹ Jane K. Winn, *The Emperor’s New Clothes: The Shocking Truth About Digital Signatures and Internet Commerce*, 37 IDAHO L. REV. 353 (2001).

⁷⁰ Simson Garfinkel, *Design Principles and Patterns for Computer Systems That Are Simultaneously Secure and Usable* (May 2005) (Ph.D. dissertation, M.I.T.) available at <http://www.simson.net/thesis> (last visited May 8, 2007).

⁷¹ See, e.g., Carl M. Ellison & Bruce Schneier, *Ten Risks of PKI: What You’re Not Being Told About Public Key Infrastructure*, COMPUTER SECURITY J., Nov. 1, 2000, at 1-7.

The shortcomings of digital signature technology can best be understood with reference to a metaphor: computer security is like a chain that is only as strong as its weakest link.⁷² Digital signature technology hardens specific links in the chain of computer security, but leaves other links in the chain vulnerable to attack. If digital signature technology is used without a system for securing the other “links in the chain” of transaction processing, it does not provide a reliable system for authenticating online identities. Digital signature technology by itself cannot secure the hard drive of a personal computer connected to the Internet, or provide reliable information about who is actually using a computer to access the private key associated with a particular real world identity. If the means of creating a digital signature are stored on an insecure hard drive and can be accessed by entering a password, then all that is required to make unauthorized signatures is access to the password. This can be accomplished by surreptitiously loading software that includes a keystroke logger on the hard drive of the computer together with spyware that can transmit an intercepted password to a remote location for later use. The ease with which digital signatures stored on insecure personal computers may be forged is one reason that businesses engaged in electronic commerce in developed countries have lost interest in these approaches as a form of authentication technology.

Another reason that digital signatures are not widely used in electronic commerce is that, even though it is difficult to bind a person to an online identity, businesses will not pay for such a service unless it is bundled with other valuable services, such as a guarantee of payment.⁷³ For independent third parties to offer to check material world identity documents provided by unknown individuals before issuing online identity documents, and to form a judgment based solely on such documentation would be both a very expensive and a very risky business in which to engage, given that computer imaging technology has lowered the cost of forging identity documents. The high cost of providing such a service could be driven higher still if a CA could be held liable for the amount of a transaction if one of its certificates could later be shown to have been used by an imposter. Imposing liability for failed transactions

⁷² See, e.g., Bruce Schneier, *America's Flimsy Fortress*, WIRED.COM, Mar. 2004, at <http://www.wired.com/wired/archive/12.03/view.html?pg=2> (last visited May 8, 2007) (“Security is only as strong as its weakest link; three locks on the front door do little good if the back door is open”).

⁷³ Many vendors of digital signature products make their profits from providing electronic signature functions for closed systems, such as internal corporate information systems, or for providing certificates for Web servers to support Secure Socket Layer (SSL) security for transactions, which involves issuing a digital signature certificate to a Web server, not to the merchant operating the server. Neither of these functions is related to authenticating parties to electronic contracts.

on CAs under such circumstances in effect turns them into guarantors. However, no subscriber has ever shown much willingness to pay high fees to CAs for such broad risk-management services. In light of the low prices subscribers have been willing to pay for digital signature certificates, CAs have no choice but to disclaim any liability for accurately identifying subscribers or for a given subscriber's performance of the transaction. But if CAs disclaim all responsibility for how their certificates are used after they are issued, then their services have little or no value to contracting parties. This mismatch between services CAs can profitably provide and the needs of transacting parties explains why the only large PKIs established to date outside of China have been created by governments, and the certificates are only used when required as a condition to access e-government services.

Another reason that the conventional PKI business model has not been widely used in electronic commerce is the mismatch between the information stored in the certificate and the information needed by prospective trading parties to analyze the risks created by entering into the transaction. In transactions between companies, the question of whether an individual is authorized to act on behalf of a corporation is more important than the identity of the individual, but digital signature certificates are normally tied to the identity of an individual, not to that individual's status within an organization. There are not yet any widely adopted technical standards governing how information about the scope of an individual's authorization to form contracts may be communicated in a digital signature certificate, so trading partners trying to exchange such information would have difficulty making their systems interoperable. In addition, the information contained within a certificate is static and fixed for the duration of the certificate, but the roles played by individuals in conducting business on behalf of organizations may be quite dynamic. A certificate is also likely to provide information about an individual that is not relevant to a transaction, which will have a negative impact on the privacy of the personal information of individuals acting on behalf of organizations if there is no way to block the disclosure of some of the information in the certificate.

When it became obvious to U.S. technology companies that PKI business models were unworkable, they began work developing alternative systems. In 2001, a consortium known as Liberty Alliance was founded by global technology companies such as Sun Microsystems and Hewlett-Packard. Liberty Alliance has developed a model of "federated identity management" to support the model of Internet commerce known as web services. In 2002, another consortium with similar objectives, the Web Service Interoperability Organization, was

established by Microsoft and IBM together with other global technology companies and developed the “WS-*” standards for identity management systems. The “CardSpace” authentication technology incorporated into the new Microsoft Windows Vista operating system released in 2006 is based on the WS-* standards. In 2006, it is still too soon to declare the efforts of either of these U.S. standard developing organizations to be a success, industry experts have expressed guarded optimism that they were likely to have a significant impact within a few years.⁷⁴

These new identity management systems incorporate elements of digital signature technologies, but do not use them in the manner described in the Electronic Signature Law. In a simple form of these new identity management systems, an individual who wanted to enter into an online transaction could request that an Identity Provider (IdP) provide an online Service Provider (SP) with just enough information for the SP to complete the transaction.⁷⁵ The IdP would provide the SP with a digital “token” containing “assertions” of certain facts about the end user that the SP needs to know in order to decide whether to enter into the transaction. For example, the token might include assertions that the end user was over 21, a U.S. resident and can pay for the transaction with a valid credit card. If the SP knows and trusts the IdP (which might be run by a credit card issuer, for example), then the SP can decide to authorize the transaction and receive payment without ever learning the name of the end user or the credit card number. For the IdP and the SP to have confidence in the transaction, the SP may use a digital signature to sign its request for a token and the IdP may sign the token it sends in response. However, these “signatures” are machine generated and may only guarantee that the messages originated within the information systems controlled by the SP and IdP without constituting the signatures of either organization. Furthermore, the end user may be able to complete the entire transaction without ever affixing an electronic signature to anything.

⁷⁴ See Daniel Blum, Gerry Gebel & Doug Moench, *Burton Group Report on the Federal E-Authentication Initiative* (Aug. 30, 2004), available at <http://www.cio.gov/eauthentication/documents/BurtonGroupEAreport.pdf> (last visited May 8, 2007); LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE, *THE IDENTITY PROJECT: AN ASSESSMENT OF THE U.K. IDENTITY CARDS BILL AND ITS IMPLICATIONS* (2005), at <http://is2.lse.ac.uk/idcard/identityreport.pdf>.

⁷⁵ See generally David Chappell, *Introducing Windows Cardspace*, MICROSOFT DEVELOPER NETWORK, Apr. 2006, at <http://msdn2.microsoft.com/en-us/library/aa480189.aspx> (last visited May 8, 2007); Kim Cameron, *The Laws of Identity*, KIM CAMERON'S IDENTITY WEBLOG (May 2005), <http://www.identityblog.com/stories/2004/12/09/thelaws.html> (last visited May 8, 2007).

B. Technology Specific Digital Signature Laws

Before the shortcomings of digital signatures and PKI business models became widely known, some lawyers and technologists advocated enacting laws that would define digital signatures, PKIs, and the role of CAs.⁷⁶ These laws were intended to clarify the respective rights and responsibilities of CAs and the individuals to whom they issued certificates, and provide incentives for the use of digital signature technologies in Internet commerce. These early laws included requirements that CAs obtain licenses before issuing digital signature certificates. They provided that, if a document was signed with a certified digital signature and the party relying on the signature properly checked the validity of the signature, the relying party would enjoy a legal presumption that the digital signature was that of the person identified in the certificate. The first such law was enacted in 1995 in Utah. Several other U.S. states followed suit, as well as such countries as Germany and Italy. These laws that made explicit references to digital signature technologies were referred to as “technology specific” laws.

Technology specific digital signature laws were criticized on two grounds: that businesses, not government regulators, should be evaluating the usefulness of authentication technologies in such a dynamic environment as Internet commerce; and that, given the limitations of the technology, they placed too many risks on signing parties. The subsequent stagnation of PKI business models in every country that has enacted digital signature laws suggests that it is very difficult for government regulators to understand market conditions in Internet commerce well enough to influence the technology choices of contracting parties. Because storing digital signature keys on the hard drives of unsecured personal computers connected to the Internet creates a serious risk that the signature keys can be copied without authorization and used to make forgeries, the provisions of technology specific laws holding individuals responsible for unauthorized use of their digital signatures unfairly allocate the risk of loss from forgeries. This problem was described in the U.S. in the 1990s as “Grandma picks a bad password and loses her house.”⁷⁷

⁷⁶ See generally Jane K. Winn, *Open Systems, Free Markets and the Regulation of Internet Commerce*, 72 TULANE L. REV. 1179 (1998).

⁷⁷ See, e.g., Jane K. Winn, *The Hedgehog and the Fox: Distinguishing Public and Private Sector Approaches to Managing Risk for Internet Transactions*, 51 ADMIN. L. REV. 955 (1999); Jane K. Winn, *Couriers without Luggage: Negotiable Instruments and Digital Signatures*, 49 S.C. L. REV. 739 (1998).

During the 1990s, U.S. pundits and policy makers vigorously debated the merits of technology neutral electronic commerce enabling legislation, such as the UNCITRAL Model Law on Electronic Commerce, versus the merits of technology specific legislation. By 1999 and 2000, when the Uniform Electronic Transaction Act and the federal Electronic Signatures in Global and National Commerce Act were drafted, the tide of opinion had turned decisively against technology specific laws. U.S. legislators concluded that the technology used in electronic commerce was changing so rapidly and was so complex that any legislation promoting a specific technology was likely to become an anachronism and so create inefficiencies by distorting market behavior. The deference of U.S. law makers to competitive market forces is consistent with the U.S. tradition of limiting government intervention in the economy only when intervention is necessary to clear instances of market failure. The failure of technology specific digital signature laws in the U.S. was obvious when Utah introduced legislation in 2006 to repeal its law as an irrelevant anachronism.⁷⁸

C. *E.U. Electronic Signature Directive*

Not all governments are as deferential to market forces as the U.S. government, however; and many legislators in other countries were unwilling to wait years to see if reliable technologies to authenticate Internet trading partners would emerge and achieve widespread adoption as a result of competition alone. Regulators in the European Union (E.U.) were put in an awkward position by the fact that some E.U. member states (Germany and Italy, in particular) were ardent supporters of digital signature laws, while other E.U. member states (notably the United Kingdom) believed that legislation in this area was premature and, like their counterparts in the U.S., were inclined to refrain from legislating in the absence of incontrovertible evidence of market failure. Germany and Italy had passed laws based on the Utah law that required CAs to be licensed before issuing certificates, and E.U. regulators feared that such licensing requirements imposed by individual member states would create obstacles to the growth of electronic commerce in Europe as a whole.⁷⁹ To prevent the European internal market from becoming fractured by

⁷⁸ Wendy Leibowitz, *Utah Will Repeal Its Digital Signature Law, Never Used, as Tech, National Law Diverged*, BNA ELECTRONIC COM. & L. REP., Dec. 14, 2005, at <http://ipcenter.bna.com/pic2/ip.nsf/id/BNAP-6KCM2E> (last visited May 8, 2007).

⁷⁹ Jos Dumortier, *Legal Status of Qualified Electronic Signatures in Europe* in ISSE 2004 – SECURING ELECTRONIC BUSINESS PROCESSES 281 (Sacher Paulus, Norbert Pohlmann & Helmut Reimer eds., 2004).

national differences in electronic commerce legislation, the Commission developed an Electronic Signature Directive⁸⁰ to harmonize member state laws in this area.

When the Electronic Signature Directive was enacted in 1999, it firmly rejected the requests by some member states to impose licensing requirements on any organization wishing to offer services to support the use of digital signature certificates. It tried to diminish the significance of the split between member states favoring technology specific laws and those favoring technology neutral laws, as well as to address what had become by then the better-known shortcomings of digital signature technology used within a PKI as a system for online authentication. The Directive provides for three levels of electronic signature:

1. a general notion of electronic signatures which may consist of any technology the parties choose to use for that purpose;
2. an “advanced” electronic signature which purports to be a technology-neutral description of a highly secure form of authentication, but which in reality is merely an abstract description of a digital signature used within a PKI system;
3. and a “qualified” electronic signature, a digital signature created with a private key stored on a “secure signature creation device” consisting of a smart card or some similar means of storing private key data outside the computer used to sign a document.

The concept of a qualified electronic signature substantially reduces the risk that “Grandma picks a bad password and loses her house” because storing the means of creating a digital signature somewhere other than the hard drive of a personal computer greatly reduces the risk of forgeries.⁸¹ The Directive also includes four technical annexes which describe effective systems for using digital signatures in a PKI. After the Directive was enacted, the Commission sponsored the work of a standard development organization, the European Electronic Signature Standardization Initiative, to develop detailed technical standards corresponding to the general description provided in the annexes.

The Directive creates modest incentives for businesses to adopt digital signature technologies by providing that only *qualified* electronic

⁸⁰ European Union Electronic Signature Directive, E.U. Directive 1999/93/EC (Dec. 13, 1999), at http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l_013/l_01320000119en00120020.pdf (last visited May 8, 2007).

⁸¹ Bruce Schneier, *The Failure of Two-Factor Authentication*, SCHNEIER ON SECURITY, Mar. 15, 2005, http://www.schneier.com/blog/archives/2005/03/the_failure_of.html (last visited May 8, 2007).

signatures will be treated under law as equivalent to handwritten signatures. The scope of this incentive will diminish over time because another directive, the 2002 Electronic Commerce Directive, requires member states to eliminate any legal obstacles to the use of electronic contracts. As a result, the number of legal requirements for handwritten signatures can be expected to diminish over time and eventually to be eliminated altogether.⁸² The Electronic Signature Directive is clearly intended to be technology neutral because it prohibits member states from imposing any requirements that qualified electronic signatures be used. However, some member states, such as Germany, have mandated even higher levels of technological sophistication than those in the Directive, and require the use of these technologies in connection with the provision of e-government services.⁸³

Even though the Directive represented an improvement over early digital signature laws in several ways, it nevertheless has failed to promote the use of digital signature technology for electronic commerce in Europe. In 2003, the study, *Legal and Market Aspects of Electronic Signatures*, undertaken on behalf of the commission, was published.⁸⁴ This revealed that private parties were not using digital signatures to authenticate each other as part of a process of forming contracts when the respective parties had had no prior business relationship.⁸⁵ Those digital signatures and certificates that were in use were being used to access e-government services in those jurisdictions, such as Germany, Austria and Italy, where their use was a mandatory condition for access to certain e-government services. In 2006, these findings were echoed by a follow-up study by the Commission, which found that there was still no evidence that private parties were using digital signatures to authenticate trading partners in private transactions.⁸⁶ This is true even for businesses in

⁸² Dumortier, *supra* note 79.

⁸³ *Id.*

⁸⁴ Jos Dumortier et al., *The Legal and Market Aspects of Electronic Signatures* (2003), at http://europa.eu.int/information_society/eeurope/2005/all_about/security/electronic_sig_report.pdf (last visited May 8, 2007).

⁸⁵ These results were confirmed in an in-depth study of the impact of the Electronic Signature Directive in the U.K. in particular. Richard Wilsher & Jane Hill, *A Report Prepared on Behalf of the Department of Trade and Industry Into the Impact in the United Kingdom of the EC Electronic Signatures Framework Directive*, Dept. of Trade & Industry Doc. DTI TFB/C/003/006 IX, 2003, Dec. 12, 2003, at 7 (“[T]he study uncovered a far greater degree of indifference, cynicism and lack of faith in private sector use of electronic signatures than it did enthusiasm and belief in a burgeoning market”).

⁸⁶ Report on the Operation of Directive 1999/93/EC on a Community Framework for Electronic Signatures (Mar. 15, 2006), at http://ec.europa.eu/information_society/eeurope/i2010/docs/single_info_space/com_electronic_signatures_report_en.pdf (last visited May 8, 2007).

countries like Germany and Italy, where businesses have no choice but to acquire digital signature technology to access certain e-government services.

D. UNCITRAL Model Law on Electronic Signatures

Given the well-known shortcomings of digital signature technology, the persistence of legislators in promoting it is remarkable. Electronic signature technology appears to be particularly attractive to those who believe that business practices can be made to conform to law reforms more easily than law reforms can be made to conform to business practices, and who also believe that government regulation is less likely to fail than are markets. Electronic signature requirements also seem to be popular with regulators who believe that formal, technical legal requirements, such as signature requirements, impose an important cautionary obstacle to forming contracts, and that such formalities should be carried over to online markets where spontaneous, ill-considered acts may be even easier to perform than similar behavior in traditional markets. Countries that have such legal cultures and that have actively promoted the use of digital signature technologies include Germany, Japan, Singapore and Korea. Countries within the common law tradition such as the U.S. and U.K. generally have a different legal culture and tradition of government regulation of the economy, and greater skepticism about the value of government-led technological innovation, which makes them less likely to enact laws to promote digital signatures.

During the drafting process, participants were divided on whether UNCITRAL should promulgate a model law on electronic signatures. Representatives of countries such as the U.S. and U.K. with relatively open, flexible attitudes toward the legal proof of signatures, that tend to be skeptical about the value of legal formalism in certain contexts, and that were proponents of technology neutral electronic commerce legislation, opposed the drafting of the model law. Representatives of many developing countries were unconvinced by arguments that market forces would eventually lead to the widespread adoption of strong authentication technology, given that markets operate imperfectly in many developing countries. They may also have believed that businesses in their local economies both expect and require clear guidance from regulators about acceptable behavior in online markets, and that the absence of such clear guidance would inhibit the growth of electronic commerce in their domestic markets.

Representatives of the U.S. and U.K. were apparently unable to persuade the representatives of developing countries that digital signature

technology was not the “next big thing” in Internet commerce, and so were outmaneuvered and outvoted in the process of drafting the model law. They were especially concerned that the UNCITRAL Model Law provides incentives for the use of “reliable” electronic signatures, but unlike the EU Directive, does not provide any concrete guidance with regard to what constitutes “reliable,” such as by requiring that digital signature keys not be stored on the insecure hard drive of a personal computer. This use of legislative incentives to encourage the use of digital signatures without any corresponding minimum standards for reliability increases the risk that unsophisticated subscribers of digital signature services will be held liable for the actions of hackers. The efforts of digital signature skeptics from countries like the U.S. to block the drafting of the UNCITRAL Model Law on Electronic Signatures may have been undermined by the fact that, at the time the law was being drafted, they could not point to any alternative authentication technologies that could be seen as effective as digital signatures were believed to be, and that had achieved acceptance in the market. If new identity management technologies, such as CardSpace in Windows Vista, come into widespread use, regulators in developing countries may finally have convincing proof that markets can produce strong authentication systems that also respect end user privacy rights, and that such technologies may not conform to the legislative model of “electronic signature.”

E. P.R.C. Electronic Signature Law

By 2004, when China enacted an Electronic Signature Law based in large part on the UNCITRAL Model Law, the shortcomings of digital signature technologies were well known outside China. Developments outside China may have been less relevant to P.R.C. legislators than developments inside China, however. It seems likely that the Electronic Signature Law was intended to regulate the activities of CAs as much as to provide businesses with access to effective authentication technologies for online commerce. By the time the law was passed, there may have been more than 100 CAs operating in China.⁸⁷ Given the small volume of electronic commerce being conducted in China today, this seems like a large number, especially in light of the fact that, outside of China where electronic commerce is more developed, CAs have a hard time operating profitably. The large number of CAs operating in China may be a reflection of the incomplete marketization of the Chinese economy,

⁸⁷ See Zhang & Lei, *supra* note 65, at 336.

however, as many of these CAs may be operated by provincial and local government units, or by companies established by such units.

Given the dynamic environment for electronic commerce in China, it is unclear whether China's new Electronic Signature Law will suffer the same ignoble fate as similar laws enacted in more developed market economies. Chinese companies trying to use digital signatures in commercial transactions will face many of the same challenges that companies in the West have faced. Even after a decade of development, the lack of standardization among digital signature software applications makes cross-certification between applications and between organizations difficult and limits the usefulness of digital signatures in commerce. In the absence of standards, one way for Chinese businesses to make effective use of electronic signature technologies would be for all of them to use software from the same developer, but this strategy has obvious shortcomings in other areas. If Chinese businesses are unable to agree on either standards or a single software platform, then Chinese businesses may find that they have the expense of maintaining multiple electronic signatures to overcome interoperability problems. Furthermore, Chinese businesses will need to find ways to overcome the security flaws associated with the conventional digital signature/PKI model of implementation without making already serious interoperability problems worse. If Chinese businesses find that electronic signatures are difficult and expensive to use and provide few business benefits, they may simply follow the example of European businesses that have largely ignored the statutory framework for electronic signatures and invested in whatever technology they find is best suited to their needs.

VI. CAN CHINA PROMOTE ELECTRONIC COMMERCE THROUGH LAW REFORM?

*We recognize technology as the enabler, but the driver is truly the . . . customer[.]*⁸⁸

The conventional wisdom regarding electronic commerce in developed market economies is that business objectives must always remain the "driver" while technology can only "enable" those business objectives. If managers acquire technology in the mistaken belief that technological change itself can deliver success in business, they are

⁸⁸ Debby Hopkins, Citigroup Chief Technology and Operations Officer, *quoted in* Dan Briody, *Double Duty*, CIO INSIGHT, Jan. 5, 2005, available at <http://www.cioinsight.com/article2/0,1540,1753486,00.asp> (last visited May 8, 2007).

usually sorely disappointed.⁸⁹ Evidence from developed market economies as well as from these three case studies of the relationship between law reform and business behavior in China suggest that electronic commerce law reforms should also be thought of as only another enabler rather than as a driver for increasing the use of new technology by businesses. This mirrors the conventional wisdom in developed countries regarding the relationship between commercial law and business behavior. The primary purpose of American commercial law as it is embodied in the Uniform Commercial Code and as it was articulated by its principal architect Karl Llewellyn is to *facilitate* economic activity by tracking commercial practice rather *regulating* it.⁹⁰ U.S. electronic commerce law reforms have largely continued this model by focusing on “technology neutral” legislation designed to let the market determine which technology best enables viable new business models.⁹¹ The success of the *Xu Shi Tiao* regulations demonstrates that, under the right circumstances, this model of law reform can also be effective in China: market demand for accounting software was released by removing a legal impediment to its use in a way that promoted fair competition among software vendors.

Late industrializing countries may not always have the luxury of letting the market lead when the objective is upgrading local institutions to make them more competitive in global markets, however.⁹² The mismatch between the abstract terms of the technology-neutral provisions of China’s new Contract Law and the practical challenges that any business would face in trying to enforce a contract formed using electronic media in China illustrates the limitations of using law reform strategies designed to meet the needs of mature market economies in emerging market economies. In light of China’s strategic goal of helping Chinese industries compete in global markets with superior products and technology rather than with low-wage labor and lower environmental standards, it is reasonable to ask whether law reform could be an effective

⁸⁹ A study of attempts to implement sophisticated electronic commerce technologies by U.S. businesses revealed that a significant number ended up with higher unit costs after the implementation than before, which was the opposite of the intended result. Such outcomes usually reflect a failure to understand thoroughly the business objectives that the technology is capable of serving, and then target the implementation carefully to take advantage of those features. See Kanakamedala et al., *supra* note 14.

⁹⁰ WILLIAM TWINING, KARL LLEWELLYN AND THE REALIST MOVEMENT 307 (1973).

⁹¹ William J. Clinton & Albert Gore Jr., *Framework for Global Electronic Commerce* (July 1, 1997), available at <http://www.technology.gov/digeconomy/framewrk.htm> (last visited May 8, 2007).

⁹² See, e.g., ALICE H. AMSDEN & CHU WANWEN, *BEYOND LATE DEVELOPMENT: TAIWAN’S UPGRADING POLICIES* (2003).

policy instrument for the P.R.C. government to accelerate the embrace of electronic commerce by local businesses, even if it is clear that governments in developed market economies are not doing the same.⁹³ While increasing the use of basic electronic commerce technologies can expand China's consumer markets and lower the communication costs of Chinese businesses, increased use of advanced electronic commerce technologies can also increase the ability of Chinese businesses to compete in global markets based on innovation and quality. Law reform to promote the use of technologies that can in turn help improve management processes might therefore be one tool that the P.R.C. government could use to encourage Chinese businesses to move in this direction, although to date it has been less visible than other law reform efforts related to promoting technological innovation or WTO accession such as reform of China's intellectual property laws.⁹⁴

Before law reforms to promote electronic commerce can have much impact on Chinese business strategy, however, it may be necessary for China to make more progress in its transition to a market economy. Institutions such as credit reporting agencies and auditors help businesses in developed market economies search out new potential trading partners and assess their credibility quickly and for a modest price. Whenever a business in the U.S. tries to assess the costs and benefits of taking on a new customer or supplier, one of the first steps in the process is to pull a credit report on the other business.⁹⁵ As a practical matter, non-payment is perhaps the most common form of contractual breach, so finding a way to assess the likelihood that a prospective trading partner will fail to pay after goods or services have been provided is probably the single most important tool a business needs in order to expand into new markets. The contribution of private credit information bureaus to the growth of market

⁹³ See, e.g., KATHARINA PISTOR & PHILIP A. WELLONS, *THE ROLE OF LAW AND LEGAL INSTITUTIONS IN ASIAN ECONOMIC DEVELOPMENT, 1960-1995* (1999); John Ohnesorge, *The Rule of Law, Economic Development, and the Developmental States of Northeast Asia*, in *LAW AND DEVELOPMENT IN EAST AND SOUTHEAST ASIA* 91 (Christoph Antons ed., 2003); Donald C. Clarke, *Economic Development and the Rights Hypothesis: The China Problem*, 51 *AM. J. COMP. L.* 89 (2003).

⁹⁴ See, e.g., Shi Wei, *Cultural Perplexity in Intellectual Property: Is Stealing a Book an Elegant Offense?* 32 *N.C.J. INT'L L. & COM. REG.* 1 (2006) (summarizing relationship between China's recent economic development experience and IPR reform); cf. Daniel C.K. Chow, *Why China Does Not Take Commercial Piracy Seriously*, 32 *OHIO N.U.L. REV.* 203 (2006) (IPR piracy has become a major local industry in China which the P.R.C. government may be unwilling or unable to suppress for political reasons).

⁹⁵ See, e.g., Alison Pepper, *The Credit-Reporting Process in a Nutshell*, *ELECTRONIC BANKING L. & COM. REP.*, May 2006, at 9.

economies is recognized in development economics.⁹⁶ Although promoting the growth of credit reporting in the domestic economy is one element of China's overall strategy for building a market economy,⁹⁷ progress since the industry was first established in 1993 has been slow.⁹⁸ Access to reliable audited financial statements likewise plays an integral role in building trust between businesses that have not yet established a relationship, but will continue to be scarce in China as long as the shortage of qualified public accountants persists.⁹⁹

If Chinese businesses can only obtain the benefits of electronic commerce – greater efficiency, improved management decision making and closer cooperation with trading partners – by adopting electronic commerce technologies designed with sophisticated Western businesses in mind, then the costs of adopting those technologies may outweigh the benefits. Just as small and medium sized businesses in developed economies rarely use advanced electronic commerce technologies, so too may even large Chinese businesses find them too expensive and hard to use.¹⁰⁰ The architecture of electronic commerce is evolving rapidly, however. A newer generation of information technology designed to streamline and accelerate production and distribution systems is becoming available.¹⁰¹ Chinese firms may be able to achieve significant efficiency gains more quickly and at lower cost by adopting these newer, more flexible technologies. If so, then a better target than law reform for P.R.C. government policy makers might be finding ways to provide Chinese businesses with access to such technologies. Policies to achieve that goal might include promoting the growth of local electronic

⁹⁶ See, e.g., Nataliya Mylenko, Peer Stein, Stefano Stoppani & Oscar Madeddu, *Supporting the Development of Private Credit Information Bureaus*, ACCESS FIN., Apr. 2005, available at [http://www.ifc.org/ifcext/gfm.nsf/AttachmentsByTitle/FI-CB-AF4-Article/\\$FILE/FI-CB-AF4-Article.pdf](http://www.ifc.org/ifcext/gfm.nsf/AttachmentsByTitle/FI-CB-AF4-Article/$FILE/FI-CB-AF4-Article.pdf) (last visited May 8, 2007); International Financial Corporation Press Release, *IFC to Support Commercial Credit Bureau for Small and Medium Enterprises in Saudia Arabia*, June 27, 2005, available at <http://www.ifc.org/ifcext/pressroom/ifcpressroom.nsf/PressRelease?openform&C9A07166646A37208525702D0058057E> (last visited May 8, 2007).

⁹⁷ For example, the Beijing municipal government has established Capinfo, a credit reporting service that operates as a private company. See www.capinfo.com.cn (last visited May 8, 2007).

⁹⁸ China Steele Business Investigation Center, *Due Diligence in China*, available at <http://www.china-investigation.com/english/doc5.htm> (last visited May 8, 2007); In Brief, CHINA DAILY, Aug. 23, 2005, at 10, at http://www.chinadaily.com.cn/english/doc/2005-08/23/content_471312.htm; Geoff Dyer & Ellen Kelleher, *Experian Eyes China Car Market*, FIN. TIMES, Sept. 9, 2005, at 26.

⁹⁹ Jopson, *supra* note 8.

¹⁰⁰ See generally GIBB & DAMODARAN, *supra* note 36.

¹⁰¹ *Id.* See *supra* text at note 36 for a discussion of the move away from rigid EDI towards more flexible XML standards.

commerce technology software developers and service providers,¹⁰² and developing standards to lower the cost of implementing such technologies and achieving interoperability.¹⁰³

There is evidence that the Chinese government recognizes the importance of standards in promoting the growth of electronic commerce. In 2003, the Ministry of Science and Technology formed a strategic alliance with RosettaNet, a standard-developing organization that has produced a comprehensive set of XML standards for electronic commerce, to create an advanced electronic commerce portal for Chinese businesses to use with foreign trading partners.¹⁰⁴ However, because RosettaNet was originally designed to meet the electronic commerce needs of sophisticated, high-technology companies, it may be prohibitively expensive for small and medium-sized enterprises in developed countries or firms in developing countries.¹⁰⁵ Particular attention was paid to the needs of enterprises in developing countries during the development under the auspices of the UN of the ebXML standards for advanced electronic commerce, but these standards may never gain the necessary critical mass of adoptions by software developers; some of their original sponsors have withdrawn support for them.¹⁰⁶ Given the size of the Chinese domestic market and the sophistication of some leading Chinese technology companies and

¹⁰² Such a policy would be related to other policies, such as reform of IPR; *see, e.g.*, Li Yahong, *Pushing for Greater Protection: The Trend Toward Greater Protection of Intellectual Property in the Chinese Software Industry and the Implications for the Rule of Law in China*, 23 U. PA. J. INT'L ECON. L. 637 (2002).

¹⁰³ Such a policy would be related to other policies, such as reform of China's system for developing standards; *see, e.g.*, Scott Kennedy, *The Political Economy of Standards Coalitions: Explaining China's Involvement in High-Tech Standards Wars*, ASIA POL'Y, July 2006, at 41, available at http://nbr.org/publications/asia_policy/AP2/AP2_Kennedy.pdf (last visited May 8, 2007); Zhao Chaoyi & John M. Graham, *The P.R.C.'s Evolving Standards System: Institutions and Strategies*, ASIA POL'Y, July 2006, at 63, available at http://nbr.org/publications/asia_policy/AP2/AP2_Zhao.pdf (last visited May 8, 2007).

¹⁰⁴ Thor Olavsrud, *RosettaNet, P.R.C. to Open China Affiliate*, INTERNETNEWS.COM, Sept. 17, 2003, at <http://www.internetnews.com/dev-news/article.php/3078661> (last visited May 8, 2007).

¹⁰⁵ *See, e.g.*, Shuvranshu Pokhariyal, *New Technologies Bring RosettaNet to Smaller Businesses*, INTEL DEVELOPER UPDATE, Sept. 2001, available at <http://www.intel.com/technology/magazine/computing/it09015.pdf> (last visited May 8, 2007) ("RosettaNet is a complex standard that until now has been expensive to implement. In fact, current RosettaNet solutions can cost millions of dollars, hindering the proliferation of e-Business").

¹⁰⁶ John Markoff, *Microsoft Quits a U.N. Standards Group*, N.Y. TIMES, Aug. 24, 2004, at C4. Microsoft and IBM may have withdrawn their support for ebXML, an open standard, because they hoped that technologies based on their proprietary technologies or standards over which they had more influence, would succeed instead. *See, e.g.*, Martin LaMonica, *Microsoft Walks Out On Web Services Standards Group: Joins IBM in Private Dance Outside W3C 'Choreography' Group*, SILICON.COM, Mar. 25, 2003, at <http://software.silicon.com/webservices/0,39024657,10003461,00.htm> (last visited May 9, 2007).

research universities, the P.R.C. government and Chinese businesses could play a critical role in developing standards to support the “right sizing” of advanced electronic commerce technologies for use by less sophisticated Chinese domestic businesses as well as by local businesses in other developing countries. Increasing the availability of inexpensive technologies that can be used effectively without first requiring an overhaul of existing management systems is likely to have a greater impact on Chinese businesses’ adoption of advanced electronic commerce technology than further law reforms. Widespread use of such systems might also make it possible for Chinese businesses to rely less on P.R.C. legal institutions and more on information technology as a regulatory mechanism.¹⁰⁷

VII. CONCLUSION

The most important incentives for Chinese businesses to adopt electronic commerce technologies are likely to come from the market, not from law reform. It may be possible under certain circumstances for law reform to play an important role in removing obstacles to the greater use of electronic commerce technologies by Chinese firms, or to correct market failures that make it difficult for Chinese firms to compete in global markets. The *Xu Shi Tiao* appear to be an example of a law reform that did both successfully. Furthermore, once the objectives of government intervention had been accomplished, the requirement that accounting software be certified compliant prior to distribution was discontinued, reducing the role of regulation in the market for software.

Recent Chinese law reforms based on international model legislation appear likely to be less successful than the *Xu Shi Tiao*. The electronic commerce enabling provisions in the 1999 Contract Law may be too general to provide much certainty to local businesses concerned about the enforceability of electronic contracts. If anxiety about the enforceability of contracts formed using electronic media is inhibiting the use of electronic commerce technologies by Chinese businesses, Chinese courts may need much more specific guidance than that available in the Contract Law to assess the probative value of electronic records offered in contract disputes. Even if the Contract Law provisions have little impact on the rate of adoption of electronic commerce technologies by Chinese

¹⁰⁷ See generally, Jane K. Winn, *The Impact of XML on Contract Law and the Volume of Contract Litigation*, Nov. 2005, available at http://www.idealliance.org/proceedings/xml05/ship/115/contract_litigation.HTML (use of advanced electronic commerce technologies by U.S. businesses appears to suppress the rate of litigation among such businesses).

businesses, at least they are unlikely to distort the market for such technologies.

The prognosis for the 2004 Electronic Signature Law is less promising because it promotes the use of a technology that is not widely used outside China. Although the Electronic Signature Law was intended to be technology neutral, in reality, it is closely tied to the use of a specific form of authentication technology. It remains possible, however, that the law will enjoy more success in China than similar laws enacted in developed market economies have because of idiosyncratic conditions in the Chinese economy.

While three case studies is an inadequate basis to form a theory of how law reform can effectively promote technological innovation in commerce, the results of these case studies suggest the limitations of using law reform to promote the growth of electronic commerce during a period of transition to a market economy. Effective use of electronic commerce could help China achieve its goal of becoming a leading innovator in global markets by helping Chinese businesses compete more effectively in global markets. It might also help Chinese businesses transcend the limitations of China's incomplete transition to a market economy by supporting the growth of economic institutions linked directly with trading partners. While it will be difficult for P.R.C. regulators to find the right mix of policy instruments to promote greater use of electronic commerce technologies by Chinese businesses, law reform informed by concrete knowledge of current conditions in the domestic economy combined with finding ways to make appropriate technology more accessible could play a significant role.