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What Effects Do Legal Rules Have on Service Innovation?

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Abstract Intellectual property, contract, and tort laws likely have effects on levels of innovation in service sectors of the economy. Legal rules that are too strong or too strict may discourage investment in service innovation; yet, rules that are too weak or too loose may result in suboptimal investments in sound innovation. Intellectual property protections have traditionally been quite strong in protecting innovation in manufacturing sectors, but much less so in service sectors. Services have, for example, traditionally been unpatentable because they were perceived to be non-technological. Whether digital information services, such as web services, should be patentable is currently unsettled and highly controversial. Contract and tort rules are currently quite strict as to manufactured goods, but less so as to services. The emergence of digital information services raises questions about whether existing contract and tort rules governing goods or services should be applied to them, or whether some new legal rules are needed to promote innovation in digital information services and social welfare more generally.

1. Introduction

The first decade of the twenty-first century has witnessed phenomenal growth in the digital information services sector of the global services economy (Triplet and Bosworth 2004). This includes technology-enabled self-service systems, such as ATMs, online shopping, and online reservation systems, installation, customization, and maintenance of software systems, and computational or machine-to-machine services, such as those that drive supply chains or operate business systems (Cohen 2007).

Relatively little is known, however, about how much research and development (R&D) investment is necessary to promote socially optimal levels of innovation in digital information services. Nor is it clear what role that legal rules, such as

intellectual property (IP), contract, or tort liability rules, are playing or are likely to play in encouraging or discouraging innovation or investments in innovation in digital information services.¹

This chapter will consider whether the legal frameworks that promoted economic growth and innovation in the manufacturing era, whose heyday was in the nineteenth and twentieth centuries, are appropriate for the emerging digital information services sector. Should innovative digital information services, for example, be as patentable as mechanical innovations have been? Should the answer to this question depend on how “technological” the service innovation is? Should contract and tort liability rules that have historically protected consumers from defective products be extended to protect consumers when firms provide defective digital information services? To what extent will contract and tort rules foster or impede desirable levels of innovation in digital information services?

IP rules have long been recognized as providing important incentives to invest in innovation by establishing ownership rights in innovations and giving innovators the right to exclude unlicensed persons from commercially significant uses of them. But incentives to innovate are also deeply affected by contract and tort rules that establish who has responsibility for defective products or services. Too much liability is likely to dampen incentives to invest in innovation, but too little may lead to under-investments in safe products and services.

During the nineteenth and twentieth centuries, the law created a relatively sharp distinction between “goods” (i.e., manufactured products) and “services,” and this distinction continues to be very important in IP law as well as in contract and tort law. Digital information services are, in a sense, hybrid subject matters, with some characteristics of goods and some of services. Because of this, there is some uncertainty about how IP, contract, and tort rules will evolve to regulate this relatively new technologically intensive service sector.

2. IP Rules Affecting Goods and Services

IP laws have generally played a much more important role in promoting innovation in the manufacture of goods than in the provision of services. There are historical as well as economic and policy reasons for this. It is as yet unclear

¹ This article will focus on U.S. law because it is the law that the author knows best, but she believes that the legal principles articulated in the essay are generally applicable in other jurisdictions, particularly those in the developed world.

how IP law will evolve to regulate digital information services and whether there will be more innovation in such services with or without IP protection.

2.1 The Traditional Role of IP in Manufacturing Sectors

IP laws have been important in fostering high levels of investment in innovation in manufacturing industries. Manufacturing technologies are often expensive to develop and commercialize; once developed and marketed, however, the innovations they embody are often cheap and easy to copy, especially when products sold in the marketplace bear the know-how required to make them on the face of the product. A new or improved product feature, for example, may be readily apparent from inspection of the goods or easily discerned through reverse engineering.

In the absence of IP protection, competitors will be free to copy the innovations with impunity, which may undermine the ability of the innovator to recoup its R&D investments and have sufficient resources to invest in future innovations. Copyist-competitors will not have had to pay for the R&D required to produce the innovation, which allows them to capture sales that the innovator might otherwise have made by selling an identical or near-identical product at a lower price. IP laws address this problem by giving innovators a period of exclusive rights during which they can stop competitors from making market-destructive appropriations of their innovations. Innovators typically recoup R&D investments by being the only firm in the market that can lawfully sell products embodying the innovation or by licensing their IP rights to other firms.

Patent laws protect novel and inventive machines, manufactures, compositions of matter, and technological processes. To qualify for patent protection, firms have to apply to national patent offices and have their applications scrutinized by government examiners who must determine whether or not the claimed invention satisfies patent standards. Patent applicants must disclose what the innovation is, how it differs from the prior art, and how to instantiate it in sufficient detail so that someone skilled in the art could read the patent (a document issued by the government after a patent examiner is satisfied that the standards of patentability have been met) and implement the innovation from what he or she learned thereby. In exchange for this disclosure, the patentee will be able to exclude other people from making, using, or selling the invention for up to twenty years. Many widely used technologies are covered by patents.

Trade secrecy laws are also widely used to protect manufacturing innovations. Chemical formulas, blueprints, molds, tools for making products, and design details that cannot be easily reverse-engineered are examples of commercially significant manufacturing innovations that are often capable of being maintained

as trade secrets. Firms sometimes chose to keep innovations secret instead of seeking patents because trade secrecy is less costly and avoids patent disclosure requirements. However, some commercially significant innovations may be kept as trade secrets because they are ineligible for patent protection (as when the innovation is too modest a technical advance to qualify as an invention).

Copyrights and trademarks are also very important forms of protection for many manufactured products. Copyright protection attaches automatically by operation of law to original works of authorship. Among other things, it protects authors and publishers of books, photographers, sound recording companies, and makers of DVD movies against unauthorized copying of copyrighted works embodied in the goods they sell. Trademarks provide additional protection to manufacturers of goods because other firms cannot use in commerce the same or confusingly similar words or symbols that signify the origin of these particular goods. IBM for computers, Ford Motor Co. for cars, Xerox for photocopiers are among the many strong trademarks that protect manufacturers from unfair competition by those who might, in the absence of trademark protection, try to free-ride on the good will associated with the trademark owner's products.

2.2 The Traditional Role of IP in Service Sectors

IP laws have played a much less significant role in service sectors of the economy. This is not to say that IP laws have played no role at all. Many service providers (say, chefs at fancy restaurants or financial analysts) keep key innovations (e.g., recipe ingredients or algorithms) secret, and many rely heavily on trademarks (e.g., the Merrill Lynch bull for financial services or the McDonalds golden arches for fast food). But neither patent nor copyright protection has generally been available for service innovations.

Because services are not “machines,” “manufactures,” or “compositions of matter,”² they have generally been considered ineligible for patent protection. Although services can generally be described as methods of accomplishing some task, there was, until relatively recently, a longstanding consensus among judges and patent professionals that only technological processes are eligible for patent protection (Pollack 2002). Services have generally been viewed as non-technological in nature. Indeed, so novel is the conception of services as having technological dimensions that a recent paper entitled “Technology Infusion of Service Encounters” became an instant classic with hundreds of citations (Bitner et al. 2000).

² 35 U.S.C. sec. 101 (setting forth these categories of patentable subject matter).

Services have also generally been unprotectable by copyright law. Many innovative services (e.g., original ways of providing banking, consulting, automobile repair, hair styling, or lawyering services) are simply not “expressive” in a copyright sense (that is, they aren’t creative expressions of artistic or literary ideas), and so fail on subject matter grounds under copyright law.³ Yet, the inherent intangibility of services has often caused service providers to proffer tangible artifacts to signal the delivery or co-creation of a particular service (such as a diploma to certify that a particular service customer has completed a certain service experience) (Bitner et al. 2008).

Even when a service is expressive in a copyright sense (that is, when it expresses artistic and literary sentiments, as in a lecture or dramatic performance), it may not qualify for protection under the copyright laws of the U.S. and some other countries because these laws often require a work of authorship (e.g., a song, a dramatic play, or a dance) to be “fixed” in some tangible medium of expression (e.g., written down, captured on tape, or painted on some surface) to be eligible for protection.⁴ In essence, this fixation requirement transforms “the work” from an intangible entity or service into a manufactured object. Once the fixed (i.e., manufactured) copy exists, copyright may be implicated by the service of rendering the work, for example, by public performances of a play or a song. Copyright law thus regulates competition in the provision of some kinds of services, although this is rare.

2.3 Why Is the Role of IP So Different in Manufacturing and Service Sectors?

There are several reasons why service providers have relied so much less on IP protection than manufacturing industries. For one thing, service innovation has typically not required substantial up-front investments—no engineering teams, no R&D labs, no expensive equipment, and no clinical trials—that undergird the perceived need for IP protection for manufacturing innovations. Without high up-front costs to recoup, there is simply less need for IP protection for service innovations. A departure from this traditional model can be found in a recent deci-

³ See 17 U.S.C. sec. 102(a) (copyright protection extends to original works of authorship), 102(b) (excluding methods and processes from the scope of copyright protection). If, however, one develops a computer program to carry out specific services, the program is eligible for copyright protection because the program itself is considered a “literary work” under U.S. and other national copyright laws.

⁴ 17 U.S.C. sec. 101 (defining “fixation”), 102(a) (requiring fixation). In some countries, however, a live performance of music or dance—that is, the service of providing them—do qualify for copyright protection.

sion by the German government to fund a first-of-its-kind service R&D lab to promote the development of service engineering techniques to improve service design (Spath et al. 2008). The ServLab, as it is known, will use virtual reality techniques to simulate physical service landscapes and enable more robust evaluation of service concepts before deployment.

In addition, service innovations may be more difficult to copy than manufacturing innovations. Many service innovators have unique characteristics (e.g., special training or experience that others cannot easily acquire) that make their services more attractive than those of would-be competitors. Service innovators may also enjoy lead-time and reputational advantages over their competitors that obviates the need for IP protection. Service innovators may have less need of IP protection because their innovations may lie in the application of expertise to a particular problem at hand (e.g., the doctor's skill at surgery, the hair stylist's creation of just the right cut for the person before her), rather than the repetition of identical items, which is characteristic of manufacturing. Service innovators may also excel at co-producing value with their customers (Lusch et al. 2008). Artifacts generated from service encounters, such as diplomas or restaurant receipts, may be easily duplicated, but these are easily distinguished from the service encounters themselves. Moreover, some types of services do not depend on IP because their providers have other means of recouping their investments. Lawyers, for example, may charge a retainer fee and handsome sums by the hour for their services.

Professional values may diminish the desirability of IP rights for some kinds of innovative service providers. Teachers, librarians, social workers, and child-care professionals may be as creative in their work as engineers or poets, but the social and professional values of their fields make it less likely that they will be relying on IP protections as a means of compensation.

Social norms within professional communities have sometimes even led to exemptions from IP protections. After one doctor sued another doctor for infringing his patent on a novel surgical technique, the American Medical Association and the overwhelming majority of its members persuaded Congress to amend patent law to exempt doctors from patent infringement liability for treating their patients.⁵ Congress has also created exemptions from copyright liability for some types of services (e.g., classroom performance of dramatic plays in the course of teaching at nonprofit educational institutions).⁶

2.4 How Should IP Rules Apply to Digital Information Services?

⁵ 35 U.S.C. sec. 287.

⁶ 17 U.S.C. sec. 110(5).

For more than fifty years, IP practitioners and scholars have heatedly debated whether patent or copyright protection should be available to digital information services. Much of this debate focused on how computer software should be protected (Samuelson 1984, Samuelson 1990).

The debate over software protection was especially intense during the 1960's and 1970's during which the prevailing view was one of skepticism. The Patent Office regarded software innovations, such as algorithms and data structures, as unpatentable because they were typically intellectual (or "mental") processes that could be carried out by hand calculations as well as by computer. In a landmark decision, *Gottschalk v. Benson*, in 1972, the U.S. Supreme Court rejected on subject matter grounds Benson's claims for patent protection for a method of transforming binary coded decimals to pure binary form.⁷ The Court suggested, although it did not so rule, that to be patentable, a process had to transform matter from one physical state to another.

Although the Copyright Office decided to accept registration of computer programs in the mid-1960's, it did so under its "rule of doubt" (which, in effect, said "here's your registration certificate, but we're not really convinced programs are copyrightable"). The Office doubted that copyright could protect machine-executable code because this code did not just convey information about the steps required to perform a particular task or service, but actually did the work or carried out the service. Copyright protection is generally not available for machine designs or mechanical processes (Samuelson 1984).

Although programs did not fit neatly into either the patent or copyright regimes, they were clearly expensive to develop and cheap to copy, so some IP protection for them seemed appropriate. After a brief flirtation with the idea of a "sui generis" (of its own kind) form of legal protection for software (Samuelson 1984), a consensus emerged during the 1980's that computer programs in machine-executable form should be protected by copyright law. The debate then shifted to whether the scope of copyright protection should be "thick" or "thin" (Samuelson, 2007). From the mid-1980's to the mid-1990's, some software companies sued others for copying the "structure, sequence, and organization" (then known as "SSO") of programs and program "look and feel."⁸

⁷ *Gottschalk v. Benson*, 409 U.S. 63 (1972).

⁸ The two major "SSO" and "look and feel" software cases were: *Whelan Associates, Inc. v. Jaslow Dental Lab., Inc.*, 797 F.2d 1222 (3d Cir. 1986)(copying of file and data structures and manner of operation of some sub-routines); *Lotus v. Paperback*, 740 F. Supp. 37 (D. Mass. 1990) (copying of command hierarchy and feel of spreadsheet program).

Concurrent with this copyright controversy was a debate on the patent side about the implications of the Supreme Court's 1981 decision in *Diamond v. Diehr*.⁹ *Diehr* applied for a patent on a rubber-curing process, one step of which involved a computer program. The PTO rejected the claim because the only novel element of the process was the computer program, which it regarded as unpatentable subject matter. By a 5-4 majority, the Court ruled that *Diehr* had claimed a patentable process. Many commentators initially thought *Diehr* did not make software itself patentable because *Diehr*'s process was the sort that transformed matter from one physical state to another (O'Rourke 2006).

By the mid-1990's, the copyright controversy had died down, as courts recognized that the predominantly functional nature of programs meant that copyright protection in them was necessarily "thin."¹⁰ That is, copyright protection is available for program code and expressive aspects of user interfaces, such as videogame graphics, but not for functional designs, such as "SSO" or the "look and feel" of program operations. Perceptions among software developers that copyright provided relatively little protection for program innovations seems to have spurred a surge in patent applications (Lerner and Zhu 2005). By the mid-1990's, many patents were issuing for software innovations, as the appellate court that oversees appeals in patent cases, known as the Court of Appeals for the Federal Circuit, developed an ever more expansive view of *Diehr* and of patentable subject matter.

The apogee of judicial endorsement of broad conceptions of patent subject matter came in 1998 in the Federal Circuit's decision in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, which ruled that methods of doing business, such as a hub and spoke design for organizing financial services, constituted patentable subject matter.¹¹ The court viewed "everything under the sun made by man" as patentable subject matter as long as it produced a "useful, concrete, and tangible result."¹²

The *State Street Bank* decision led to a surge in applications for and issuance of a business method patents, including patents covering auction methods, e-commerce techniques, banking and financial service methods, legal processes, and methods of diagnosing human health problems based on levels of a certain chemi-

⁹ 450 U.S. 175 (1981).

¹⁰ The main case is *Computer Assoc. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 693 (2d Cir. 1992) (Samuelson, 2007).

¹¹ 149 F.3d 1368 (Fed. Cir. 1998).

¹² *Id.* at 1373.

cal in a patient's blood stream.¹³ Metabolite, for example, obtained a patent that it claimed was infringed whenever a doctor made the connection between elevated levels of homocysteine in a patient's blood and vitamin deficiencies associated with heart disease. Metabolite sued Lab Corp. for contributory patent infringement because it provided the results of unpatented blood tests to doctors who infringed the patent when diagnosing the patient's health condition. The U.S. Supreme Court decided to accept Lab Corp.'s petition to review the adverse ruling against it before the Federal Circuit to consider whether the patent claimed a discovery of a natural phenomenon (which is not patentable subject matter).¹⁴

Although the Court ultimately changed its mind about hearing this case, three Justices dissented and asserted that Metabolite's patent was invalid for claiming a monopoly in a basic scientific discovery.¹⁵ The dissenters regarded scientific principles and natural phenomena as unpatentable not because these discoveries are not useful or costly to develop, but because "sometimes too much patent protection can impede rather than 'promote the Progress of Science and useful Arts,' the constitutional objective of patent and copyright protection."¹⁶ Patent law has traditionally "treated fundamental scientific principles as 'part of the storehouse of knowledge' and manifestations of laws of nature as 'free to all men and reserved exclusively to none.'"¹⁷ In response to Metabolite's claim that its patent was consistent with the Federal Circuit's *State Street Bank* decision because it produced a "useful, concrete, and tangible result," the dissenters pointed out that the Court had never endorsed this test for patentability, and it was, moreover, inconsistent with Supreme Court precedents.

In a different case decided that same year, Justice Kennedy criticized business method patents for their "potential vagueness and suspect validity" in *eBay, Inc. v. MercExchange, L.L.C.*¹⁸ The Court in *eBay* overturned the Federal Circuit's ruling that injunctions should virtually always issue in patent infringement cases. And during oral argument in another case that same year, which involved a software patent, several Justices questioned whether software was patentable, even though that was not the issue that the Court had granted the appeal to hear.

¹³ See, e.g., *In re Bilski*, 545 F.3d 943, 1001-03 (Fed. Cir. 2008)(Mayer dissent, giving examples of non-technological inventions that had been patented after *State Street Bank*).

¹⁴ See *Lab Corp. of Am. v. Metabolite, Inc.*, 548 U.S. 124 (2006) (Breyer, J., dissenting from dismissal of Lab Corp.'s appeal).

¹⁵ "In my view, claim 13 is invalid no matter how narrowly one reasonably interprets [the discovery of a natural phenomenon] doctrine." *Id.* at 135.

¹⁶ *Id.* at 126-27.

¹⁷ *Id.* at 127-28, quoting *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

¹⁸ 548 U.S. 388 (2006).

It did not take a genius to realize that the Supreme Court was signaling to the Federal Circuit that it was dissatisfied with that court's test for patentable subject matter and unless this court narrowed its conception of patentable subject matter, the Court would take an appeal in appropriate case soon, overturn the Federal Circuit's ruling, and articulate an alternative standard that the PTO should follow. The PTO quickly picked up on this signal and started rejecting patent claims on subject matter grounds.

Bernard Bilski was one of the disappointed applicants who appealed the PTO's denial of his business method claim to the Federal Circuit. Bilski argued that his claim for a method of hedging risks of fluctuation in prices of energy commodities was patentable subject matter under the *State Street Bank* decision because it yielded a "useful, concrete, and tangible result." In an unusual move, the Federal Circuit heard Bilski's appeal en banc (that is, with all twelve judges presiding, rather than in a three judge panel, as is the usual practice). A majority of the judges who heard Bilski's appeal ruled that his method was unpatentable because it didn't satisfy Supreme Court standards under which a process is only patentable if "(1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing."¹⁹

At least three Federal Circuit judges would have gone further and ruled that business methods and services per se are unpatentable.²⁰ Judge Mayer viewed Bilski as claiming a business method patent, but "[a]ffording patent protection to business methods lacks constitutional and statutory support, serves to hinder rather than promote innovation, and usurps that which rightfully belongs in the public domain."²¹ In his view, the *State Street Bank* decision had wrongly "jettisoned" the long-standing prohibition against patenting method of doing business.²² Only technological inventions are patentable under the U.S. Constitution and patent law, and business methods do not qualify "because they are not directed to any

¹⁹ In re Bilski, 545 F.3d 943, 954 (Fed. Cir. 2008).

²⁰ Id. at 966-76 (Dyk, J., Linn, J. concurring), at 998-1011 (Mayer, J. opinion). Mayer's opinion is characterized as a dissent, id. at 998, but he agreed with the majority that Bilski's method was unpatentable. However, he dissented from endorsing the machine/transformation test for patentability endorsed by the majority. Judge Rader similarly agreed that Bilski's method was unpatentable as an abstract idea, but disagreed with the machine/transformation test announced in the majority opinion. Id. at 1011-15. Only one of the judges would have upheld the patentability of Bilski's method and continued to endorse the *State Street Bank* test. Id. at 976-98 (Newman, J. dissenting).

²¹ Id. at 998.

²² Id. at 1000.

technological or scientific innovation.”²³ Since *Bilski*, the PTO has continued to reject claims for non-technological methods and even for many software innovations on the grounds that they do not claim patentable subject matter. The Federal Circuit has also affirmed some other PTO denials of business method, software and other non-technological claims on subject matter grounds. Notwithstanding the Federal Circuit’s ruling in *Bilski*, the U.S. Supreme Court has granted Bilski’s petition for review of the Federal Circuit’s decision. Chances are quite high that the Court will rule that Bilski’s method is unpatentable, but it may articulate a different test for patentable subject matter than the Federal Circuit articulated in its *Bilski* decision.

The pendulum of patentability has thus swung away from the broad *State Street Bank* conception and back toward more restrictive conceptions. It remains to be seen which, if any, digital information services will be patentable after the Court decides *Bilski*.

It is fair to observe that the doctrinal debates in which the courts and commentators have been engaged concerning the patentability of business methods and services do not directly address a key underlying question: are patents on services in general, or digital information services in particular, needed to promote adequate levels of investment in innovation? In *State Street Bank*, the Federal Circuit expressed confidence that patents on business methods were desirable in order to promote innovation, but it had no empirical basis on which to base this claim. The Supreme Court’s recent skepticism about business method and other non-technological patents assumes that such patents are likely to impede rather than promote innovation, but the Justices have no direct evidence of this either. In *Bilski*, the Federal Circuit repudiated its earlier *State Street Bank* decision, but this was largely driven by its perception that the Supreme Court would reverse it soon unless the Federal Circuit adopted a more restrictive interpretation of patent subject matter.

There is disagreement among academic commentators about whether patents on business methods and software are desirable to promote innovation in these sectors of the economy (Mann 2005; Samuelson 1994). A recent survey of high technology entrepreneurs, including software and e-commerce firms, indicates that about two-thirds of them do not own patents and have not applied for them by comparison with more than eighty percent of other high tech firms that either have patents or have applied for them (Samuelson & Graham 2009). Even the software and e-commerce firms that do have patents regard these patents as having little value as a source of competitive advantage. Yet some software and Internet firms

²³ Id. at 1000-01. Judge Mayer cited numerous cases as rejecting patent claims for business methods (i.e., services). Id. at 1001-03.

consider patents to have value as insurance against lawsuits or as an asset to aid financing (Mann 2005).

There does seem to be considerable innovation in the digital information services sector today. Web services are proliferating, and service providers are increasingly using technology back-end innovations to improve front-end experiences with customers (Glushko and Tabas 2009). Whether there would be more innovation if there was stronger IP protection for digital information services is a good question, but an unanswerable one. But consider these observations. First, some digital information service providers probably do not need patent protection. Firms like Salesforce.com, for example, that provide software as a service can keep the “sweet sauce” of their service innovations inside the firm. To the extent digital information services are customized for clients, patents are probably also not needed. Second, firms whose digital information services are widely marketed in a form that is vulnerable to cheap copying are those for whom patents are most likely to be important for recoupment of investments. Third, many factors, including first mover advantages, network effects, and reputation enhancement, allow innovative digital information service providers to develop competitive advantages in the marketplace (Graham et al. 2009). Fourth, to the extent some service-innovation patents have issued in the *State Street Bank* decade (1998-2008), they are probably invalid unless they meet the new test for patentability the Supreme Court announces in *Bilski*. Fifth, IP protection may play a smaller role in promoting innovation and investment in innovation in the services sector of the economy than some IP professionals assume.

3. Liability Rules for Defective Products and Services

The roles of contract and tort rules in promoting or impeding investments in innovation are less obvious than the role of IP protection, but they are nonetheless significant (Alces 1999). If contractual warranty rules and tort negligence rules are too strict—for example, by imposing unlimited liability for any losses that customers or other persons might suffer as a result of a defect in the product—firms may decide it is too risky to invest in making these products or too risky to introduce innovative new features to a stable and non-defective product.²⁴ Yet, if liability rules are very loose and there is little risk of being held responsible for defects, firms may not invest as much as would be socially optimal in refining new designs so that they are safe or otherwise sound. The proper policy goal is to find

²⁴ This is why some states have adopted “caps” (e.g., no more than \$5 million) on punitive damage awards for torts such as negligent design of products.

a middle ground in which the rules are strict enough to induce investment in innovations with few defects, yet loose or limited enough to allow firms to take some risks when innovating.

This section explains how contract and tort liability rules evolved in respect of goods and services in the nineteenth and twentieth centuries. There are some important historical reasons why goods have been subject to stricter contract and tort liability rules than services. There is some uncertainty and debate about how strict contract and tort liability rules should be as to digital information services. Although there is as yet no certain answer to the question whether they should be treated more like manufactured goods or more like traditional services, digital information service providers would be well-advised to be careful in how they contract with customers to limit their liability for defects that might affect the customers and exercise reasonable care in implementing services that, if defective, could harm the providers' customers.

3.1 Evolution of Contract and Tort Rules as to Goods

Until the mid-twentieth century, contract warranty rules were generally quite manufacturer-friendly because they substantially limited firms' exposure for harms caused by defective products (Gomulkiewicz et al. 2008). A manufacturer of goods could generally not be held liable for a defective product unless it had expressly warranted that its product would achieve some performance goal that it was later proven not to achieve (e.g., "I guarantee this car will go 150 mph"). A manufacturer could also insulate itself from liability by selling its goods through intermediaries (e.g., wholesalers and retailers) because old-fashioned contract law only extended protection to those who were "in privity" (that is, those who bought the goods directly from the manufacturer).

Even when manufacturers expressly warranted their products, contract law substantially limited the manufacturer's liability for defects. Breach of an express warranty allowed the customer to be compensated for the difference between the price the buyer actually paid for the goods (say, \$1000) and the value of the goods actually received (\$50 less because of the defect). Customers could not recover damages from the manufacturer for any lost productivity that may have been a consequence of the defective goods unless the customers had specially negotiated with the manufacturer to get consequential damages for breach of warranty.

Tort rules were similarly manufacturer-friendly until the mid-twentieth century (White 1980; Owen 2007). A defective product might cause physical injury to a person or to property, but liability for negligence depended on whether the firm being sued had failed to live up to a duty of care to the customer. As long as the manufacturer could show it had exercised some care in its design of the prod-

uct, it would generally be free from liability. Buyers were also supposed to exercise care in inspecting the goods or otherwise investigating the manufacturer's reputation. Tort privity rules often limited manufacturer liability for defective goods, for if the manufacturer did not sell directly to the end users, it would not be "in privity" with them, and hence owed them no duty of care. Nor did manufacturers generally owe a duty of care to outsiders (e.g., a passenger injured in the owner's car) up until the second half of the twentieth century.

Manufacturers of goods thus had relatively little reason to worry that an injured customer would be able to hold it liable for injuries sustained as a result of defective products. Consumer protection laws were rare until the mid-twentieth century, and mass media coverage was sufficiently limited in scope that firms had little reason to worry about bad publicity arising from harms caused by its defective products.

By the mid-twentieth century, however, both contract and tort rules changed significantly. "Privity" rules eroded, as courts recognized that direct sales between manufacturers and their customers were increasingly rare. If the wholesale and retail outlets through which customers bought defective goods had made no changes to the products, but simply resold them to customers, judges were persuaded that it was fair to hold manufacturers responsible for harms that resulted from, for example, defective brakes in a car that caused a crash that severely injured the customer and his family. It also made little sense to allow manufacturers to insulate themselves from liability simply by selling through intermediaries or to require end-users to sue retailers, who would then sue wholesalers, who would then sue the manufacturers for defects that caused injury. Increasingly, courts also recognized that manufacturers were in a better position to manage the risk of defective products, either through more careful designs or through insurance, and so imposing a burden on them to avoid defects was socially desirable.

Probably the most significant mid-twentieth century contract law development was the widespread adoption in the 1960's of the Uniform Commercial Code (UCC) by state legislatures. Article 2 of the UCC sets forth contract rules that regulate sales of goods. Sec. 2-313 of Article 2, for instance, provides that "any affirmation of fact or promise made by the seller to the buyer which relates to the goods and becomes part of the basis of the bargain creates an express warranty that the goods shall conform to the affirmation or promise." Descriptions of the goods, samples, and models of the goods were likewise deemed express warranties about the product's characteristics insofar as buyers relied upon them in contracting with the sellers. It was thus unnecessary to use formal words such as "warrant" or "guarantee" to create an express warranty.

Even more significant were the implied warranty provisions of Article 2. Sec. 2-314 provides that merchants who sell goods to the public impliedly warrant that

the goods are of fair and average quality for goods of that kind and that they are fit for ordinary purposes for which such goods are used. Moreover, when a seller has reason to know that a prospective buyer is relying on its expertise when purchasing goods for a particular purpose, Sec. 2-315 imposes on the transaction an implied warranty of fitness for a particular purpose.

While these provisions increase the potential liability of a manufacturer for defective goods, Sec. 2-316 gives sellers an opportunity to disclaim the implied warranties through use of expressions such as “as is” or “with all faults.” Sellers also have the right under Article 2 to limit their liability for breach of warranty through proper contractual language, such as liquidated damages provisions (e.g., buyer agrees that remedies for breach will be limited to \$100). Yet, Article 2 protects consumer interests by providing that if sellers limit their liability for breach of warranty so substantially as to cause the contract to fail of its essential purposes in protecting buyer as well as seller interests, the contractual limits will be ignored and all of the remedies that Article 2 normally provides for breach will apply.

The goal of Article 2 was to develop a balanced rule set from which buyers and sellers could know what default rules were, and to the extent they wished to deviate from them, they were free to do so, as long as the negotiated terms were consistent with general good faith obligations. Article 2 thus allows parties to manage their risks by how they configure their contracts.

The most significant mid-twentieth century development affecting manufacturers of goods in tort law was the widespread adoption by states of a strict liability in tort rule for makers of defective products that caused physical injury to persons or property (Owen 2007). No longer was liability dependent on whether a firm had exercised due care in designing its products; rather, manufacturers were held strictly liable for physical injuries caused by these defects. As with the stricter contract warranty rules, the strict liability in tort rules were regarded as important ways to induce manufacturers to invest in designing safe products, as they are in the best position to ensure product designs are safe. They are also better positioned than consumers to insure against injuries from defective products.

3.2 Contract and Tort Rules as to Services

Contract and tort rules affecting the provision of services are far less strict than comparable rules as to the provision of goods. There is, for example, no equivalent to Article 2 warranty rules for services. Warranties play little role in regulating services in part because it is more difficult to determine what baseline to use, as service providers do not typically make the kinds of objective statements about their services to customers akin to those that manufacturers routinely make about their products.

A hairdresser may promise her customer a stylish cut. A lawyer may promise her client that the will she drew up will achieve his objectives. An accountant may promise to file accurate tax returns. And a surgeon may promise to cut out a patient's tonsils or appendix. But none of these promises is really anything more than a promise to perform the service in a competent manner. Competence is then at the core of tort or contract rules for assessing liability for providing defective services (Geistfeld 2008). Customer satisfaction with services often depends on context; a hair cut may be experienced as stylish in part because of the smart salon in which the service is delivered. A client's satisfaction with professional services may likewise depend in part on the handsome office in which it is delivered, which may contribute to the client confidence in the professional.

From the standpoint of the law, a hair stylist, lawyer, accountant, surgeon or comparable service provider has a duty of care toward his or her customers only to perform the required service in a competent manner. Failure to live up to this duty of care that causes injury—a hair dresser's inadvertent gouging of her customer with scissors, a lawyer's failure to know of a certain state law inheritance rule, an accountant's mistake in calculating tax liability, a surgeon's neglect in leaving a sponge in the patient's wound—will result in liability for negligence.

There is also considerable variability among service providers and often no one standard way to provide a service. Indeed, until the emergence of automated self-service and computational services, whose inputs and outputs are standardized by design, variability in service delivery was perceived to be inevitable, and even desirable. Service providers often strived to “empower” their front-line employees to adapt services to each customer (Lashley 1995; Frei 2006). However, the variability of services contributes to difficulties in assessing service competence. Whether a particular haircut is stylish, for instance, may be a matter of taste. A particular lawyer may have interpreted a legal rule differently than another lawyer would have, but that doesn't necessarily mean the former interpretation is incompetent. An accountant may have taken an aggressive view of his client's eligibility for a deduction, but the fact that another accountant would have done otherwise does not necessarily make the aggressive accountant incompetent. Surgeons have to make difficult judgment calls quite frequently, and it may difficult to second-guess whether an alternative treatment, for instance, would have been successful.

Instead of product warranties akin to those provided by manufacturers of goods, service providers tend to promise customers a refund, discount, or future free service if they are not satisfied and sometimes an unconditional satisfaction guarantee (Hart 1988). Service satisfaction is often subjective, based on a gap between what the customer expected and then experienced with the service (Parasuraman et al. 1985). The exact same service may, in fact, be experienced different-

ly by different customers. Consider the first class seat on an airplane with which one customer might highly satisfied because she got an upgrade, while the customer sitting next to her might think of the same service as a disappointment compared with the private jet in which he was used to traveling.

Licensing of service providers is one common societal mechanism for ensuring a certain baseline of service quality. Hair stylists, lawyers, accountants, and surgeons are, for example, typically licensed by state authorities based on a demonstration that their training qualifies them for a license that is necessary to be a professional in their fields and/or by standardized examinations to demonstrate minimum levels of professional competence.

Reputation also plays a very important role in assuring certain levels of quality in the provision of services. Hotels, for instance, often seek to attract repeat customers by providing high quality service to frequent visitors. Bloomberg and Reuters, among others, have attained excellent reputations for providing high quality information services, and their competitive advantage over other firms depends on maintaining this quality. A BMW-endorsed motorcycle repair service is also more likely to draw customers than one that is not so endorsed, unless, of course, the latter attains a reputation for quality service that exceeds that provided by BMW-endorsed services. Service innovation often enhances the reputation of service innovators, and innovative firms may be able to recoup costs of these innovations by maintaining or extending their client bases based on reputational advantages derived from their innovations.

3.3 What Contract and Tort Rules Should Apply to Digital Information Services?

There is as yet some uncertainty about whether digital information services are or should be subject to the same kinds of contract and tort rules that have for decades governed the manufacture and sales of goods, those that govern the provision of services, or some yet-to-be-determined contract and tort rules. Two quick rules of thumb would predict, first, that the more deeply technological a digital information service is, the more likely it is the courts will use goods-like contract and tort rules, and second, the closer the service approximates or is adjunct to human-to-human services, the more likely it is that courts will apply contract and tort rules that have traditionally governed services. Yet, there is some reason to be optimistic that courts will, over time, develop rules that recognize digital information services as in need of some rules that are specially tailored to them.

The first digital information service to pose such questions was computer software. From the early 1980's, developers of software argued strenuously that computer programs are significantly different than manufactured goods—for ex-

ample, because every program has “bugs” and so inevitably has defects that would be problematic under Article 2 and strict-liability-in-tort rules—and hence, they should be governed by relaxed contract and tort rules (Gomulkiewicz et al. 2008). Because the American Law Institute had already agreed to relax some rules for leases of goods by adopting Article 2A to govern them, software developers lobbied for a new Article 2B to govern licensing of computer programs.

For more than ten years, a drafting committee worked on a proposed law, which by the 1990’s had expanded in scope as a model law to regulate all transactions involving computer information, which seemingly covers digital information services.²⁵ By 1998, proposed Article 2B had become quite controversial, in part because its rules were perceived to be too favorable to developers and inadequately protective of consumer interests. This, among other things, led to ALI’s withdrawal as a sponsor of the project, and the reconstitution of the law as the Uniform Computer Information Transaction Act (UCITA).²⁶ UCITA was adopted in two states in the first year after its promulgation, but its drafters’ ambition that it would become a uniform law for all such transactions was thwarted.

Notwithstanding the software developer arguments for somewhat looser contract rules, UCITA incorporated express and implied merchantability warranty rules that are substantially similar to Article 2 warranty rules.²⁷ UCITA applied looser rules, however, to warranties as to informational content. Merchants of computer information who collect, compile, process, provide, or transmit informational content warrant to their licensees only “that there is no inaccuracy in the informational content caused by the merchant’s failure to perform with reasonable care.”²⁸ No such warranty was created, however, if the informational content was published or if the person transmitting the information acted merely as a conduit of the information or provided no more than editorial services.²⁹ An information provider who had been paid for time and effort to supply information impliedly warranted under UCITA—unless adequately disclaimed—only “that the information will not fail to achieve the licensee’s particular purpose as a result of the licensor’s lack of reasonable effort.”³⁰ Note that both of these warranties are essentially built on tort principles of due care and reasonable efforts, not the stricter contract rules that apply to defective goods.

²⁵ Drafts and supporting materials on proposed Article 2B can be found at <http://www.law.upenn.edu/bll/archives/ulc/ulc.htm>

²⁶ The full text of UCITA can be found at <http://www.law.upenn.edu/bll/archives/ulc/ucita/ucita200.htm>.

²⁷ UCITA, secs. 402, 403.

²⁸ *Id.*, sec. 404(a).

²⁹ *Id.*, sec. 404(b).

³⁰ *Id.*, sec. 405(a).

One reason that UCITA did not fare well in the legislative arena was that it was over-ambitious in scope. It started out to be a law to regulate the licensing of software, but then morphed into a law that would regulate transactions of all kinds as to all kinds of computer information. Some groups that would have been affected by the law, such as the financial services and entertainment industries, asked to be excluded from its scope, but as different sectors asked for exclusions, UCITA lost the mantle of being a well-drafted comprehensive law and started to look like the product of special interest lobbying, which indeed it was becoming.³¹

In 2004, the ALI began a new project, more modest in scope, which aimed to articulate principles of software contracts. These principles should be useful to judges in applying contract law to software. Insofar as digital information services are software-implemented, the ALI principles are likely to apply to them (American Law Institute 2008). These principles adopt Article 2-like express and implied merchantability warranties, but create a new implied warranty that the software contains no material hidden defect of which the developer was aware at the time it transferred the software to its customers.³²

The development of these principles signals a new receptivity among lawyers to the idea that the current economic environment is more complicated than the bifurcation of “goods” vs. “services” vis-à-vis contract and tort rules that prevailed in the twentieth century. Digital information services are often hybrids, with some technology elements and some service elements. Some digital information services are clearly more like traditional services than they are like traditional goods. This is especially true as to services that are customized for particular customers or that provide back-end support for services provided to individuals, such as hotel service databases or online reservation systems. Machine-to-machine web services or other embedded software-implemented services, such as avionics support, are more like goods.

One policy option is to treat the more service-intensive digital information services the way services have been treated, and the more technologically-intensive services like goods have been treated. Another policy option is to recognize that digital information services deserve recognition as *sui generis* (of its own kind) phenomena to which contract and tort rules need to be adapted, rather than trying to fit them into pre-existing bins.

³¹ UCITA, sec. 103(d)(list of exclusions).

³² *Id.*, sec. 3.05.

4. Conclusion

This chapter has provided an overview of some legal rules affecting innovations in important sectors of the economy. Intellectual property protections have often been very important to development of innovative technologies. Without such protections, the risks have seemed high that investments in innovation would be less than is socially optimal. Services have rarely been protected by patent or copyright laws, although some back-end activities of service providers could be maintained as trade secrets and trademarks have been important to denote quality in service provision. While 1998-2008 was a decade in which patents began to issue for innovations in services, more recent developments have called into question the patentability of service innovations. There is, in any event, a dearth of empirical data to support either extending or denying patent protection to service innovation.

This chapter has also explained that contract and tort rules have evolved over time to provide protections to victims who suffer losses as a result of defective products. The law has been much stricter about defective products, particularly those that cause physical injury to persons or property, than about defective services, in part because it is generally easier to detect when a product is defective than when a service is. It remains to be seen whether the law will evolve new types of contract and tort rules to be applied to digital information services or whether courts will continue to apply either “goods” or “services” rules, depending on whether the digital information service is more like one or the other. At this point, it does not appear that liability risks are so severe that innovative designers of digital information services are under-investing in innovation, nor are the rules so weak that digital information services are seriously defective. So perhaps the right policy balance for contract and tort rules has been or soon will be found.

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