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Citation: Goold, P. (2020). Patent Accidents: Questioning Strict Liability in Patent Law. *Indiana Law Journal*, 95(4), pp. 1075-1135.

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Patent Accidents: Questioning Strict Liability in Patent Law

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Accidental infringement of patent rights is a pervasive and growing problem in the Information Age. As IP rights proliferate and expand in scope, it is becoming increasingly easy for companies and individuals to inadvertently infringe patents. When such accidental infringement occurs, patent law holds the infringer strictly liable. This contrasts with many areas of tort law where defendants are only liable if they act negligently.

This Article questions the normative desirability of strict liability in patent law. Assuming the primary value of patent law is utilitarian, this Article poses the research question: What liability rule will maximize social welfare? This Article answers the question theoretically by applying economic models of accidents developed in tort law literature. The research finds that a negligence rule is preferable. Unlike strict liability, negligence liability will encourage both patentees and technology users to take reasonable measures to prevent accidental infringement, and thus minimize the social cost of patent accidents. Therefore, this Article recommends reforms to the liability rule in direct patent infringement cases. Defendants should be liable for accidental patent infringement only when they fail to adopt reasonable care to avoid the infringement.

INTRODUCTION

In 1999, Canadian company, Research in Motion (RIM), launched the Blackberry e-mail pager.¹ The pager was an instant commercial success amongst businesspeople and politicians alike. Behind the Blackberry's success was its wireless e-mail technology. No longer were e-mails confined to the desktop but were now easily accessible on-the-go. The technology for which had been invented by RIM founder Mike Lazaridis in the mid-1990s, or so Lazaridis thought. The following year, RIM received a letter from a small Virginia-based company called NTP.² The letter alleged that the Blackberry infringed patents NTP held covering wireless technology that an engineer, Thomas Campana, had invented in the mid-1980s. This infringement letter came as a shock to RIM. Only a few months earlier RIM had

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1. See JACQUIE MCNISH & SEAN SILCOFF, *LOSING THE SIGNAL: THE UNTOLD STORY BEHIND THE EXTRAORDINARY RISE AND SPECTACULAR FALL OF BLACKBERRY* 67–78 (2018). Later, in 2002–2003, the Blackberry would evolve into the more famous mobile cell phone. *Id.* at 106–11.

2. *Id.* at 123.

received its own U.S. patent on Blackberry's e-mail technology.³ As far as RIM was concerned, they had created the technology and had the patent to prove it! Yet NTP won their infringement case in Virginia, securing an injunction that threatened to bring the production of Blackberrys to a halt.⁴ To avoid a complete shutdown, RIM ultimately paid NTP an exorbitant license fee of \$612.5 million in 2006.⁵ But should RIM have been held responsible for this patent infringement? Ought we to hold companies liable for infringing patents of which they were unaware and could not reasonably have been expected to know about? In most areas of civil law, one is only liable for such accidents if one has behaved negligently.⁶ Run a pedestrian over in your car and you will only be accountable if you failed to take the care of a reasonable person. But infringe a patent accidentally and you are liable even if you behaved exactly as society would expect. Why is patent law the exception?

Accidental patent infringement is a pervasive, ignored, and growing problem.⁷ Property rights in tangible property can only be infringed by a limited number of individuals who are in close physical proximity to the tangible good. By contrast, due to the nature of intangibles, patents can be infringed by multiple people regardless of their location. Furthermore, unlike physical goods, with readily ascertainable boundaries, the scope of patent boundaries is unpredictable. Ideally, a nation's patent register ought to give the public a clear picture of what is, and what is not, subject to a patent. But patent law literature already provides evidence of a number of barriers and obstacles which prevent registers performing this function as well as we would hope.⁸ As a result, it is all too easy for even a diligent company to become an accidental infringer, and the amount of such infringement is worrisome. Scholars of patent law today describe the problem of inadvertent patent infringement as "significant" and "getting worse."⁹ Recent empirical evidence hints that perhaps as much as 89% of litigated patent infringements are unintentional and inadvertent.¹⁰ Buy a wireless router to use in your small business, and you may unknowingly use technology that was not licensed by the proprietor; incorporate Bluetooth technology into a new cell phone after searching the patent register, and you may be inadvertently manufacturing a technology whose patent information was buried under a mountain of similar patents; grow crops on your farm and you may later find

3. *Id.* at 94.

4. NTP, Inc. v. Research in Motion, Ltd., 270 F. Supp. 2d 751 (E.D. Va. 2003).

5. Rob Cox, Mike Verdin, Jonathan Ford & Edward Hadas, *RIM's Sensible Patent Payout Keeps BlackBerry Users Hooked*, WALL ST. J. (Mar. 6, 2006, 12:01 AM), <https://www.wsj.com/articles/SB114160357490989930>.

6. 1 DAN B. DOBBS, PAUL T. HAYDEN & ELLEN M. BUBLICK, *THE LAW OF TORTS* 842 (2d ed. 2011); JOHN C.P. GOLDBERG & BENJAMIN C. ZIPURSKY, *THE OXFORD INTRODUCTIONS TO U.S. LAW: TORTS* 265–66 (2010) (stating that strict liability exists at "the margins of tort," and is applicable in "a few special situations").

7. While the idea of "inadvertent" patent infringement is not ignored, the nature of these cases as *accidents*, and the consequence of that nature, is underexplored. This Article offers reconceptualization of these cases as accidents. *See infra* Section I.A.

8. *See infra* Section II.B.

9. JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 47 (2008).

10. Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1443 (2009).

such crops germinated from patented seeds which were blown by the wind from nearby farm land.

This Article questions the role of strict liability in accidental infringement cases. This is not an uncontroversial question. The strict liability standard in patent law is hotly debated.¹¹ Those in favor of a strict liability standard have argued that a fault-based liability rule would be too administratively costly to implement, that such a rule may harm the diffusion of new ideas in research environments, and that strict liability is necessary to ensure the patent holder's incentives. On the other end of the spectrum, some argue that patent law ought to include an "independent invention" defense, under which no liability would attach to making, using, or selling a patented technology if the defendant independently recreated the patented technology. Commentators who propose this rule argue that strict liability impedes research and development and leads to higher patent litigation costs. Some scholars, such as Chiang¹² and Blair and Cotter,¹³ fall somewhere in the middle of these two poles; it is on their work that this present Article builds.¹⁴

Assuming the primary justification for patent rights is utilitarian, this Article provides a theoretical economic analysis of accidental patent infringement.¹⁵ Patent scholars have already argued that transaction costs prevent technology users and patentees from ex ante bargaining in cases of patent accidents, and that these cases should be governed by a liability rule rather than a property rule.¹⁶ By asking what *type* of liability rule is most appropriate (strict liability or negligence), this Article extends that analysis one step further. Following models developed in the economics of accidents literature,¹⁷ the Article determines which liability rule will reduce the total cost society spends on accidental patent infringement. The Article concludes that a negligence rule best fulfills this goal. Under a strict liability rule, technology users will adopt reasonable care to avoid accidentally incurring liability, but the patentee's incentives to avoid such accidents (e.g., through providing appropriate notice of their rights) is less than optimal. By contrast, a negligence rule is preferable because it creates incentives for *both* technology users and patentees to adopt reasonable, cost-justified care to avoid accidents. As a result, the number of patent accidents is reduced, saving society's resources. More difficult is the question: Which version of a negligence rule will best achieve this goal? While both a simple negligence rule and a contributory negligence rule could feasibly improve social

11. See *infra* Part II.C.

12. See Tun-Jen Chiang, *The Reciprocity of Search*, 66 VAND. L. REV. 1 (2013).

13. See Roger D. Blair & Thomas F. Cotter, *Strict Liability and its Alternatives in Patent Law*, 17 BERKELEY TECH. L.J. 799 (2002).

14. See *infra* Part I.

15. See *infra* Part III.

16. Mark A. Lemley & Philip J. Weiser, *Should Property or Liability Rules Govern Information?* 85 TEX. L. REV. 783, 786–88 (2007) (following the theoretical framework in Guido Calabresi & Douglas Melamed, *Property Rules, Liability Rules and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972)). BJ Ard has further argued that property law adopts less property rules than IP lawyers commonly appreciate, and that IP should likewise shift to a more liability rule regime. See BJ Ard, *More Property Rules than Property: Revisiting the Right to Exclude in Patent and Copyright*, 68 EMORY L.J. 685 (2019).

17. See *infra* Part III.

welfare, this Article presents various reasons for preferring a simple negligence rule.¹⁸

To implement such a liability rule, the Article recommends that patent law adopt a “patent negligence” defense.¹⁹ In accident cases, a defendant ought to avoid liability by proving that she adopted all reasonable care to prevent any accidental patent infringement. Reasonable care may include performing a diligent search of the patent register, inspecting relevant products for patent information, or reviewing the patent portfolios of competitor companies, for example. Implementing such a reform would involve a modest change to judicial practice. Indeed, United Kingdom courts already adopt a “quasi-negligence” rule by denying damages in cases where the defendants did not know of the patent and had no “reasonable grounds” for supposing such a patent existed.²⁰ In such cases, courts should also use their equitable discretion to deny injunctive relief. In the United States, under section 287 of the Patent Act, courts deny damages in cases where the patentee has failed to appropriately mark patented products.²¹ As will be seen, this current rule imperfectly approximates a strict liability rule accompanied by a contributory negligence defense.²² However, rather than focus on the patentee’s level of care, this Article recommends instead that U.S. courts focus on the user’s level of care, and deny damages and injunctions when the technology user has taken all reasonable measures to avoid the infringement occurring. This modification is not only well within the judiciary’s authority but would also provide a satisfactory middle ground between proposals to retain the strict liability standard and proposals to adopt an independent invention defense.

Adopting such a modification has the potential to alleviate many problems in the contemporary patent system.²³ In particular, the proposal would help curb abusive behavior of nonpracticing entities (or patent “trolls”). Currently, nonpracticing entities can prey on the inadvertent infringer: by sending a cease and desist letter, the troll can threaten to shut down small businesses who accidentally infringe the patent.²⁴ The patent negligence defense, by contrast, would provide a powerful tool for small businesses in fighting patent troll behavior. Businesses will be able insulate themselves from litigation claims from trolls by taking steps that a reasonable company would in order to prevent any accidental infringement; leaving only those who behave negligently to fight such claims in court. Furthermore, a negligence rule

18. This Article does also find, however, that the case for negligence in patent law is weaker than in copyright law due to the existence of mandatory registration in the former but not the latter. See Oren Bracha & Patrick R. Goold, *Copyright Accidents*, 96 B.U. L. REV. 1025 (2016).

19. See *infra* Part IV.B.

20. See *infra* Part IV.A.

21. 35 U.S.C. § 287 (2018).

22. See *infra* Part IV.A.

23. See *infra* Part IV.A.

24. See Markus Reitzig, Joachim Henkel & Christopher Heath, *On Sharks, Trolls, and Their Patent Prey—Unrealistic Damage Awards and Firms’ Strategies of “Being Infringed,”* 36 RES. POL’Y 134, 135 (2007) (“[T]he even greater concern of today’s leading R&D multilaterals of potentially overlooking these (often small) inventors’ patents and being caught in the trap of inadvertent infringement.”).

would provide patentees with incentives to write clearer patent claims, and thus help address the contemporary concern that the patent system encourages patentees to strategically word claims in ambiguous ways to receive expanded protection.

At this point, some may object that eliminating strict liability in accident cases may depress incentives for innovation and thus harm society in the future. This Article responds by demonstrating that adopting a negligence rule may in some instances cause economic harm to the patentee, but society as a whole will benefit. In 1970, Guido Calabresi famously demonstrated that the optimal level of personal injury accidents in tort law was not, contrary to public opinion, zero.²⁵ Road traffic accidents, in particular, cause severe harm to individuals and broader society. However, adopting measures to prevent those accidents is also costly. In many cases, the cost of the measures required to prevent accidents would be greater than the expected harm caused by the accidents themselves.²⁶ As a result, society makes a choice to tolerate some road traffic accidents because it is better for society as a whole. Our goal is not to eliminate all accidents, but instead encourage parties to invest reasonable, cost-justified levels of resources into accident avoidance.²⁷ The same is true of patent infringement today. Accidental infringement of patent rights harms the patentee and, in turn, future society. However, the measures required to prevent accidental infringement can at times be onerous. In some cases where the chances of an accident are slim but the costs of avoidance are high, society would be economically better off by simply letting the accident happen, rather than investing inefficiently in avoidance mechanisms. As explored in this Article, a negligence rule achieves this delicate balancing goal.

This Article continues in four Parts. Part I defines accidental infringement of patents and offers a number of illustrations. This Part explains in more detail the causes of such accidental infringements and summarizes the literature on the optimal liability rule in patent law. Part II applies economic theory of accidents to the issue of patent accidents. The analysis reveals the case for some version of a negligence liability rule. Part III discusses how best to implement a negligence rule and applies the suggested rule to demonstrate how such a law would solve a number of contemporary patent problems. Part IV provides reform recommendations in relation to U.S. and U.K. law only, with the expectation that lawyers in other jurisdictions will translate these recommendations into their own domestic laws. Part V briefly concludes.

I. PATENT ACCIDENTS

Anglo-American patent law holds all infringers strictly liable.²⁸ Since the nineteenth century, courts have imposed liability upon anyone who makes, uses, or

25. GUIDO CALABRESI, *THE COSTS OF ACCIDENTS* 17–23 (1970).

26. *Id.*

27. *Id.*

28. For an alternative interpretation, see Saurabh Vishnubhakat, *An Intentional Tort Theory of Patents*, 68 FLA. L. REV. 571 (2016) (arguing that patent infringement requires intentional conduct). *Cf.* Patrick R. Goold, *Intent in Patent Infringement*, 68 FLA. L. REV. FORUM 93 (2016) (arguing that intentional conduct, in both trespass and patent infringement, is not a fault standard). For a related discussion of “objective” fault standards in the area of

sells a patented invention, regardless of whether the defendant's infringement was committed intentionally, negligently, or entirely innocently.²⁹ This stands in contrast to many areas of civil law where a defendant is only accountable for unintentional injuries if she failed to take reasonable care.³⁰ Yet, as this Part demonstrates, accidental infringement of patents is all too common. Section A describes accidental infringement of patents in greater detail. Section B discusses some of the main causes of patent accidents. Section C reviews the academic literature debating whether patent liability ought to be imposed strictly or whether some form of a fault standard should be introduced.

A. *The Anatomy of Patent Accidents*

Broadly speaking, patent infringement can be usefully divided into two types: intentional and accidental. For the purposes of this Article, patent infringement is "intentional" when, prior to the infringement, the defendant was aware that her planned course of action would involve patent infringement but nevertheless engaged in such conduct. For example, if A owns a patent on a new type of mousetrap, and B knowingly sells copies of the mousetrap in order to undercut A in the market.³¹ Like all forms of intentional tort, determining whether the wrongdoing is intentional requires, in theory, an understanding of the defendant's subjective state of mind.³²

indirect patent infringement, see Jason A. Rantanen, *An Objective View of Fault in Patent Infringement*, 60 AM. U. L. REV. 1575 (2011).

29. *Hogg v. Emerson*, 52 U.S. 587, 607–08 (1850) ("The intent not to [infringe] . . . never exonerates . . . from all damage for the actual injury or encroachment, though it may mitigate [damages]."); ALBERT H. WALKER, TEXT-BOOK OF THE PATENT LAWS OF THE UNITED STATES OF AMERICA 292 (1883) ("To constitute an infringement of a patent, it is not necessary that the infringer should have known of the existence of the patent at the time he infringed it; or, knowing of its existence, it is not necessary that he should have known his doings to constitute an infringement."). See generally Lynda J. Oswald, *The "Strict Liability" of Direct Patent Infringement*, 19 VA. J. ENT. & TECH. L. 993, 999–1005 (2017).

30. GOLDBERG & ZIPURSKY, *supra* note 6 and accompanying text.

31. The concept of "intent" in patent law, as in law and philosophy generally, is debated. Peter Cane describes the concept of intent as being used "loosely" in tort law, sometimes used to refer to voluntariness, sometimes used to refer to describe motive. Peter Cane, *Mens Rea in Tort Law*, 20 OXFORD J. LEGAL STUD. 533, 555 (2000). Nevertheless, the use of "intent" in this article is relatively definite. As used here, the term intent is used synonymously with the use of "willfulness" when assessing patent damages. See generally Matthew D. Powers & Steven C. Carlson, *The Evolution and Impact of the Doctrine of Willful Patent Infringement*, 51 SYRACUSE L. REV. 53 (2001). Thus, intentional patent infringement, as used here, involves some element of mens rea in the literal sense of a *guilty* or blameworthy mental state. As a result, simply performing some conduct deliberately which later turns out to be a patent infringement but without awareness of the wrongfulness of the conduct at the time of acting, is not regarded as intentional here (and accordingly this Article's use of intent is not to be confused with that in Vishnubhakat, *supra* note 28). However, this Article is not a work of conceptual analysis, and I do not claim that this is the only, or in some sense "right," understanding of intent in patent law. The intentional-accidental divide the Article draws is used primarily to define the boundaries of a class of accidental infringement cases which, as we shall see, requires a separate consideration if the law is to reach an efficient allocation of resources.

32. See Cane, *supra* note 31, at 534 (describing the core of intent as involving some element of "choice," which is necessarily subjective).

However, as it is difficult to accurately discern the content of a defendant's mental state, in common judicial practice, intent is typically inferred from more objective factors which serve as suitable proxies.³³ Courts routinely find intent in patent infringement cases by examining the probabilistic relationship between the defendant's conduct and the likelihood of infringement; if prior to commencing the conduct there was a near certainty that such conduct would involve a patent infringement, courts are likely to find patent infringement was intended.³⁴

Equally, however, patent infringement may be accidental. While patent lawyers are aware that infringement may be "inadvertent,"³⁵ the nature of these cases as *accidents*, and their connection to other types of legal accidents, has not been explored. Frequently in social life, individuals engage in activities which are overall beneficial for society but which, as a by-product, pose a risk of harm to others around us. At the time the individual engages in the relevant conduct, it is far from certain that the conduct will harm someone else, although it is surely possible. Sometimes that risk materializes into a reality and causes harm to others, even though that is not our desire or intention.³⁶ A classic example is driving automobiles: on balance this activity is beneficial, though it imposes risk of harm on others. Sometimes those risks materialize and individuals are injured, although that was an outcome that no one wished to occur. The same situation occurs frequently in patent law. The process of innovation is socially beneficial, but it comes with risks attached: every time an inventor creates or commercializes a product or process, there is a *risk* that doing so might infringe the patent rights of an earlier inventor. As we shall see in the following examples, sometimes that risk materializes and patent infringements occur, although that was clearly not the desire of any party. Given the choice, both parties would have tried to avoid this unfortunate outcome. These cases in turn pose an important and thorny policy question. Who should bear the cost of the accident, the innocent patentee, or the innocent user who did not wish for this outcome to happen? Should the harm lie where it falls, or ought we use the law to shift the responsibility to the user?

33. Famously, in legal literature, Oliver Wendell Holmes, Jr. argued this point. OLIVER WENDELL HOLMES, *THE COMMON LAW* 27 (1881). Albeit, Holmes may well have been arguing that the law never truly imposes liability depending on subjective mental states, but in fact 'really' imposes external and objective standards of conduct. This idea has continued through many economists' understanding of intentional tort law to today. See, e.g., WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 149–59 (1987).

34. See *Halo Elec., Inc. v. Pulse Elec., Inc.* 126 S. Ct. 1923, 1933 (2016) (describing culpability in tort law as "generally measured against the knowledge of the actor at the time of the challenged conduct").

35. See, e.g., BESSEN & MEURER, *supra* note 9, at 46–72.

36. STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* 1 (1987) ("[B]y 'accidents' I mean harmful outcomes that neither injurers nor victims wished to occur—although either might have affected the likelihood or severity of the outcomes."). Following this definition provided by Shavell, both negligent and non-negligent unintentional wrongs are described in this Article as accidental. This may differ from some ordinary uses of the term 'accident' which, for some, may refer only to non-negligent unintentional wrongs. This Article prefers to follow the more specific definition of accident found in the economic literature as opposed to the ordinary language interpretation of the term.

Accidental infringement takes a number of forms. These can be grouped into three broad categories. The most basic form of accidental infringement occurs when the user of the patented invention is aware that he or she is using some form of technology, but is unaware of the existence of a patent. Perhaps the most discussed example of this occurring is the *NTP* case described in the introduction.³⁷ In this case, RIM was engaged in a beneficial activity: inventing new types of pagers and cell phones that allowed individuals to receive e-mails wirelessly.³⁸ When they started this activity, RIM was, or at the very least ought to have been, aware that such technical activity could possibly infringe the patents of a prior inventor. Ultimately, this risk materialized and a patent infringement did result. However, this was clearly not RIM's intention; quite the opposite in fact.³⁹ RIM did not desire to commit a patent infringement, and if it was reasonably certain to them that their conduct would have amounted to a patent infringement, they likely would have avoided such infringement by licensing the technology from NTP. However, such *ex ante* bargaining was impossible due lack of ownership information available to RIM. This resulted in RIM not only making and selling an infringing product but also investing substantial and irretrievable resources into a telecommunications network on which the phones would operate.⁴⁰

Similar problems arise when the technology user is the end consumer. At the start of twentieth century, patent attorney and inventor George Selden owned a U.S. patent for an "improved road engine" powered by a "liquid-hydrocarbon engine of the compression type."⁴¹ Selden claimed that Ford's Model T automobile infringed the patent.⁴² While Selden sued Ford, he also threatened Ford consumers, advertising that anyone who bought a Model T would also "buy a lawsuit."⁴³ Many consumers were likely unaware that, by using the Model T, they were "using" technology allegedly subject to a patent and thus possibly themselves infringing the patent. From their perspective, these consumers were merely engaged in a socially beneficial activity—driving—and were largely unaware that this doing so came with a risk of patent infringement. Ironically, Selden's threat to sue consumers for using the Model T helpfully limited the risk of such accidental infringements of the patent occurring!

37. *Supra* text accompanying notes 1–6.

38. *NTP, Inc. v. Research in Motion, Ltd.*, 270 F. Supp. 2d 751 (D. Va. 2003).

39. *Id.* at 755 (noting that RIM invented the technology before awareness of NTP's patents).

40. *See* RESEARCH IN MOTION, HISTORY (2006) (RIM had signed wireless handheld supply contracts with American Mobile, IBM, and Rogers Cantel (now AT&T)).

41. U.S. Patent No. 549,160 (filed May 8, 1879).

42. JAMES J. FLINK, THE AUTOMOBILE AGE 51–55 (1988).

43. *Id.* Ford subsequently countered by offering to bond his customers against any patent infringement suit.

The problem of suing unwary consumers continues today.⁴⁴ Consider for example, the case of the Innovatio lawsuits.⁴⁵ Innovatio acquired patent rights to certain wireless internet technologies from Broadcom.⁴⁶ Rather than sue the manufacturers of wireless devices such as routers, like Motorola and Cisco, Innovatio instead sued consumers for buying and using the devices.⁴⁷ Innovatio then sent more than 8000 infringement letters to, and initiated twenty-three lawsuits against, small businesses that had bought the wireless devices and were using them, for example, to provide internet to their consumers.⁴⁸ Restaurants, cafes, hotels, bakeries, etc. were alleged to be “using” the patented technology and thus infringing their rights.⁴⁹ Much like the purchasers of the Model T, most, if not all, of the consumers Innovatio threatened were completely unaware of the existence of a patent on the technology they used.

A variation on this form of accidental infringement occurs when the user of the technology is aware of the patent, but is unaware of a relevant patent claim. A famous example of such a situation is the *Rambus* case.⁵⁰ Rambus developed and patented computer memory technology used in semiconductor memory devices.⁵¹ Like NTP, Rambus was a patent assertion entity whose primary business was the licensing of the patented technology.⁵² In 1990, Rambus applied to the U.S. Patent & Trademark Office (USPTO) for a patent over its “Dynamic Random Access Memory” technology.⁵³ In 1992, Rambus joined the Joint Electronic Devices Engineering Council (JEDEC), a standard setting organization that developed standards for semiconductor technologies.⁵⁴ JEDEC had a written patent policy encouraging the adoption of standards free of patented items or processes. Furthermore, the policy also required members to disclose patents and patent applications “related to” the standardization of the work of the Council. In 1993, Rambus disclosed their patent to the group.⁵⁵ While Rambus was a member, JEDEC adopted a standard for

44. See generally Gaia Bernstein, *The Rise of the End User in Patent Litigation*, 55 B.C. L. REV. 1443 (2014); Colleen Chien & Edward Reines, *Why Technology Customers Are Being Sued En Masse for Patent Infringement & What Can Be Done*, 49 WAKE FOREST L. REV. 235 (2014) (chronicling the increasing importance of end users over time in patent conflicts). For further examples of end users being brought into patent litigation, see Daniel Nazer, *Actually, Mr. Waxman, Consumers are Sued for Patent Infringement All the Time*, ELECTRONIC FRONTIER FOUND. (Apr. 30, 2014), <https://www.eff.org/deeplinks/2014/04/actually-mr-waxman-consumers-are-sued-patent-infringement-all-time>.

45. *In re Innovatio IP Ventures, LLC Patent Litig.*, 921 F. Supp 2d 903, 906 (N.D. Ill. 2013).

46. *Id.* at 907.

47. *Id.*

48. *Id.*

49. *Id.*

50. *Rambus, Inc. v. Infineon Techs. AG*, 318 F.3d 1081 (Fed. Cir. 2003), *cert. denied*, 540 U.S. 874 (2003).

51. *Id.* at 1084.

52. *Id.*

53. *Id.*

54. *Id.* at 1085.

55. Namely U.S. Patent No. 5,243,703 (filed Mar. 5, 1992), a divisional of the patent application Serial No. 07/510,898.

synchronous dynamic random access memory (SDRAM) to be used by semiconductor manufacturers.⁵⁶ Semiconductor manufacturers then began to manufacture chips using SDRAM technology.⁵⁷ In 1995, Rambus withdrew from JEDEC and filed a number of “continuations” on the original patent (continuations allow the patent holder to modify or add additional claims to the patent at a later date in order to broaden its scope).⁵⁸ These continuations ripened into issued patents between 1997 and 1999. Rambus then sued Infineon, a manufacturer of semiconductor memory devices (including SDRAM), and a member of JEDEC, for infringement of the recently issued patents. While antitrust and fraud actions began against Rambus, the patent was successfully enforced against Infineon, despite their lack of knowledge of the patent claim. More broadly, the story highlights how strategically hiding claims, particularly through the use of continuations, can contribute to patent accidents.⁵⁹

The second form of accidental infringement occurs when the defendant is aware that she is using technology that is subject to a patent but believes that she is operating outside the patent’s scope. A classic example of this is the *Polaroid v. Kodak* case.⁶⁰ Polaroid had long dominated the instant camera market until Kodak decided to enter the sector in the 1970s. Kodak was aware that Polaroid owned several patents on instant camera technology and that inventing their own instant camera came with a substantial risk of patent infringement. To reduce this risk, Kodak hired a top patent lawyer to work with their technical staff.⁶¹ The patent lawyer gave advice about design choices to avoid infringement.⁶² At the end of the process, Kodak produced a camera that worked in a way entirely in reverse of the Polaroid product.⁶³ Nevertheless, Polaroid sued Kodak and received significant damages.⁶⁴ The judge praised Kodak for taking such care to avoid infringement, but

56. Rambus, 318 F.3d at 1085.

57. *Id.*

58. *Id.* at 1084. Perhaps even more unsettling, Rambus learned information through their participation in the standard setting process that allowed them to write claims that covered the standard. BESSEN & MEURER, *supra* note 9, at 62.

59. Many proposals have been made to end such abuse. See, e.g., Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63 (2004). But yet the problem of hidden claims remains. Particularly troublesome are cases where the patentee adds or modifies claims (to the extent their initial written description allows) to anticipate new products produced by competitors. See *id.* at 74–76.

60. *Polaroid Corp v. Eastman Kodak Co.*, 789 F.2d 1556 (Fed. Cir. 1986); see also RONALD K. FIERSTEIN, *A TRIUMPH OF GENIUS: EDWIN LAND, POLAROID, AND THE KODAK PATENT WAR* 117–250 (2015) (outlining the initial conflict and early stages of litigation in this case).

61. *Polaroid Corp v. Eastman Kodak Co.*, No. 76–1634–MA, 1990 WL 324105, at *76 (D. Mass. 1990) (“During the lengthy and detailed patent clearance process he performed for Kodak, Mr. Carr considered over 250 Polaroid and non-Polaroid patents and rendered 67 written and countless oral opinions on both the film and camera patents.”).

62. *Id.*

63. *Id.* at *76–79 (comparing the Kodak and Polaroid products).

64. *Id.*

nevertheless found them liable.⁶⁵ These types of accidental infringement may be called “boundary accidents” rather than “ownership accidents,” as the defendant is aware of who owns the technology, but is simply unaware of the scope of the patent right. In this Article, we shall put “boundary accidents” to one side, and thus avoid assessing the merits of “designing around patents” for the time being. The focus in this Article is more firmly on ownership accidents.

Of course, the boundaries between ownership and boundary accidents blur in some cases, as illustrated by the E-Data controversy. In the 1980s, Charles Freney invented a kiosk that was used by consumers in retail stores to create digital audio tapes.⁶⁶ However, the patent issued on the technology was vaguely and amorphously written.⁶⁷ The U.S. patent provided the patent holder with the exclusive rights to a “system for reproducing information in material objects at a point of sale location.”⁶⁸ In the early 2000s, the patent holding company E-Data argued that the scope of this patent’s monopoly covered a wide range of e-commerce.⁶⁹ Companies such as Microsoft and IBM were, allegedly, infringing the patent by selling downloadable music and software over the internet.⁷⁰ E-Data sent out seventy-five thousand letters to websites, offering licenses and, in return, promising not to bring legal action.⁷¹ Certainly, a large amount of these companies were unaware of the Freney patent (and had committed an “ownership accident”). The boundaries of the patent were so vaguely demarcated that companies such as Microsoft and IBM were not aware that the technology they had adopted was subject to a patent right. These types of accidents accordingly fall within the scope of this Article’s concern.

Lastly, in some cases the user is completely unaware he or she is using the underlying technology. A famous, albeit controversial, example of this concerns the Monsanto Roundup Ready Canola seeds. In 2005, Percy Schmeiser, a Canadian farmer, was subject to a Canadian Supreme Court case.⁷² Monsanto found canola on Schmeiser’s farm which had been grown from Monsanto’s patented Roundup Ready Canola seeds.⁷³ Schmeiser maintained that he had grown this genetically modified crop accidentally.⁷⁴ Schmeiser argued that other farmers in the area were growing Roundup Ready Canola and that the wind had moved seeds from the neighbors’ crops

65. *Id.* at *79 (stating that the record “shows a patent clearance process that could serve as a model for what the law requires.”).

66. BESSEN & MEURER, *supra* note 9, at 8–10.

67. *Id.*; see also Seth Shulman, *IP’s Bleak House*, MIT TECH. REV. (Mar. 1, 2001), <https://www.technologyreview.com/s/400914/ips-bleak-house> (citing the Freney patent as an example of an “absurdly broad patent” that is “fuzzy” and “likely to stymie innovation”).

68. U.S. Patent No. 4,528,643 col. 1 (filed July 9, 1985).

69. See BESSEN & MEURER, *supra* note 9, at 8–10.

70. *Id.*

71. See McNISH & SILCOFF, *supra* note 2, at 2.

72. *Monsanto Can. Inc. v. Schmeiser*, [2004] 1 S.C.R. 902 (Can.). The case was controversial because after the seeds had “accidentally” blown onto Schmeiser’s land, Schmeiser replanted the seeds in a way that was arguably an intentional infringement of the patent. This case has received much academic commentary. See, e.g., Jessica Lynd, *Gone with the Wind: Why Even Utility Patents Cannot Fence In Self-Replicating Technologies*, 62 AM. U. L. REV. 663 (2013).

73. *Monsanto Can. Inc.* [2004] 1 S.C.R. at 911 para. 5.

74. *Id.* at 912 para. 6.

onto his land, causing him to inadvertently grow the crop.⁷⁵ While this account of events was disputed, the issue presented has long concerned farmers. In the United States, the Organic Seeds Growers and Trade Association sued Monsanto alleging that preventing this form of “contamination” of their organic crops required significant expenditure on their part (e.g., erecting hedges and wind barriers, rotating special and temporal crops).⁷⁶ Both the Canadian and U.S. Supreme Courts have declined to determine the patent liability of those who accidentally grow patented seeds.⁷⁷

B. The Causes of Patent Accidents

There are many causes of the patent accident problem, most of which are well-documented.⁷⁸ In part, the problem is somewhat unavoidable due to the innate difficulties in assigning property rights in intangibles. The boundaries of patent rights will always be elusive simply because of the fundamental difficulties of describing an invention in words. This fundamental problem contributes significantly to cases such as *Polaroid Corp. v. Eastman Kodak Co.*⁷⁹ However, beyond these difficulties, there are further causes which are less intractable; causes which, with appropriate policy responses, could be counteracted.

One notable cause is the presence of “patent thickets.” Some industry sectors contain “dense web[s] of overlapping intellectual property rights” that companies must spend countless hours scouring in order to commercialize a new product.⁸⁰ A classic example of this problem is the smartphone industry. One estimate suggests that 250,000 active patents impact the smartphone industry today.⁸¹ Incorporating Bluetooth 3.0 technology into a phone requires the producer to locate and license over 30,000 patents alone.⁸² Finding all the relevant patents and their owners is for

75. *See id.*

76. *See Organic Seeds Growers & Trade Ass’n v. Monsanto Co.*, 851 F. Supp. 2d 544, 548 (S.D.N.Y. 2012) (“Seed businesses and farmers may, at some expense, test their seeds and crops to ensure that no contamination has occurred, and non-transgenic farmers may establish buffer zones between themselves and farmers using transgenic seed in order to reduce the risk of cross-transmission.”).

77. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1769 (2013) (declining to rule on the issue of patent exhaustion in cases of technologies which replicate outside direct human control); *Monsanto Can. Inc.*, [2004] 1 S.C.R. at 911 para. 2 (Can.) (“In reaching this conclusion, we emphasize from the outset that we are not concerned here with the innocent discovery by farmers of ‘blow-by’ patented plants on their land or in their cultivated fields.”).

78. *See generally* BESSEN & MEURER, *supra* note 9, at 38–45 (describing why property rights fail at times).

79. 789 F.2d 1556 (Fed. Cir. 1986).

80. Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POL’Y & ECON. 120 (2000).

81. Mike Masnick, *There Are 250,000 Active Patents that Impact Smartphones; Representing One in Six Active Patents Today*, TECHDIRT (Oct. 18, 2012, 8:28 AM), <https://www.techdirt.com/articles/20121017/10480520734/there-are-250000-active-patents-that-impact-s>.

82. Evan Engstrom, *So How Many Patents Are in a Smartphone?*, ENGINE (Jan. 19, 2017), <https://www.engine.is/news/category/so-how-many-patents-are-in-a-smartphone> (“Consider

most smartphone producers a Sisyphean task. As a result, some commentators go as far as to say that full patent clearance is simply impossible.⁸³ Under such circumstances, some accidental infringement is very hard to avoid.⁸⁴ Producing new smartphones is clearly a socially valuable activity, but doing so imposes very obvious risks of accidentally infringing the patent of another company. While there are measures one can take to reduce those risks (e.g., by searching the register), those measures are of dubious efficacy and would involve a very significant investment of resources. Furthermore, the problem is hardly limited to smartphones but affects “virtually every modern device, such as a computer, television, or car.”⁸⁵ In the United Kingdom, Ian Hargreaves’s “Digital Opportunity: A Review of Intellectual Property and Growth” found that emerging patent thickets were obstructing entry to some key markets and thus impeding innovation.⁸⁶

The second cause of note is the “notice failure” problem.⁸⁷ Ideally, patents on the patent register should give others in society accurate information about the existence and boundaries of the patent. The clearer the description of the claimed invention, the easier it is for producers to avoid patent infringement. However, Bessen and Meurer find the U.S. patent system to be “critically deficient in this regard.”⁸⁸ As the *E-Data* and *Kodak* cases illustrate, patent documents often do not provide sufficient notice to the public of the scope of patents. Judge Learned Hand once stated that patent claims can be “such a waste of abstract verbiage” that it “takes the scholastic ingenuity of a St. Thomas with the patience of a yogi to decipher their meaning.”⁸⁹ The result is not only that accidental “boundary” type infringements occur (as in *Kodak*) but also producers find it more difficult to discover whether a technology is owned and by whom (leading to the “ownership” type accidents). As Bessen and Meurer continue to describe, notice failure plays a “crucial role” in

Bluetooth 3.0—a technology incorporating the contributions of more than 30,000 patent holders, including 200 universities . . .”).

83. See Chiang, *supra* note 12, at 15–17.

84. However, some have also questioned how significant the patent thicket problem really is. See Jonathan M. Barnett, *Has the Academy Led Patent Law Astray?*, 32 *BERKELEY TECH. L.J.* 1313 (2017); Jonathan M. Barnett, *Are There Really Patent Thickets?*, *REGULATION*, Winter 2016–17, at 14, <https://gould.usc.edu/assets/docs/directory/1000201.pdf> (doubting that patent thickets persist for any significant period of time because the market has incentives to arrange ways to avoid the problems—e.g., patent pools).

85. Chiang, *supra* note 12, at 16.

86. Ian Hargreaves, *Digital Opportunity: A Review of Intellectual Property and Growth* 10 (May 2011), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32563/ipreview-finalreport.pdf. For alternative solutions to the patent thicket issue, see Miriam Marcowitz-Biton, Yotam Kapan & Maayan Perel, *Recoupment Patent*, 98 *N.C. L. REV.* (forthcoming 2020).

87. See BESSEN & MEURER, *supra* note 9, at 147 (“Simply put, notice failure and the resulting inadvertent infringement are central to the failure of patents to provide positive innovation incentives.”); Peter S. Menell & Michael J. Meurer, *Notice Failure and Notice Externalities*, 5 *J. LEGAL ANALYSIS* 1, 14 (2013).

88. BESSEN & MEURER, *supra* note 9, at 46.

89. *Victor Talking Mach. Co. v. Thomas A. Edison, Inc.*, 229 F. 999, 1001 (2d Cir. 1916).

leading to inadvertent infringement, which is central to the “pattern of litigation over time” and ensuing rising costs of the patent system.⁹⁰

Furthermore, the notice failure problem is not attributable simply to the innate difficulties of demarcating property rights in intangibles, but is, in large measure, a problem of institutional design. As Menell and Meurer demonstrate, the current patent system does not provide patent holders with sufficient incentives to provide the public with adequate notice.⁹¹ Instead, frequently inventors can “benefit from obfuscating the scope of rights and keeping others in the dark about their intellectual property.”⁹² At the root of the problem is an externality-based market failure: ownership and boundary information is a public good; when the patentee supplies this information, she benefits others in society but does not benefit from doing so herself.⁹³ As a result, the patentee faces suboptimal incentives to provide this information to the public.⁹⁴ In fact, the opposite is the case: often the patentee can “benefit from strategically hiding, obfuscating, and distorting such information.”⁹⁵ For example, in relation to the *NTP* case, Menell and Meurer highlight how NTP was in a stronger bargaining position after RIM had “unwittingly invested heavily in a potentially infringing wireless e-mail technology.”⁹⁶ As a result, NTP “clearly benefited from its patents not being easily known.”⁹⁷ *Rambus* provides a similar example of such behavior.

Similarly, by seeking broad and vague claims, the patentee “maximizes the likelihood that the patent can be stretched to reach unforeseen competing technologies,” (as illustrated by the *E-Data* case).⁹⁸ A “good” patent drafter will therefore try to construct claims to be ambiguous enough so that they can be read narrowly during patent examination and broadly during patent litigation. In some cases, this involves cynical obfuscation techniques. Janet Freilich recently demonstrated the problem of “patent clutter.”⁹⁹ An astonishing 25% of claim language in her sample of U.S. patents was not about the patent’s core invention.¹⁰⁰ While there are many potential reasons why patent holders may choose to “pad” their patent claims with irrelevant language, one clear reason is that doing so makes the patent document harder to read and understand, thus introducing ambiguity that may be exploited in litigation to ensure the broadest scope of protection possible.¹⁰¹

90. BESSEN & MEURER, *supra* note 9, at 147.

91. See Menell & Meurer, *supra* note 87, at 6.

92. *Id.* at 1.

93. *Id.* at 5.

94. *Id.*

95. *Id.*

96. *Id.* at 8–9.

97. *Id.* at 9.

98. *Id.* at 33.

99. Janet Freilich, *Patent Clutter*, 103 IOWA L. REV. 925 (2018).

100. *Id.* at 948.

101. *Id.* at 968.

C. Literature Review

A number of commentators have questioned the liability rule applying to unintentional patent infringements. Broadly, these scholars have proposed three different solutions. The first two solutions are the most fully explored. These are either to maintain the strict liability standard, or alternatively, to adopt an independent invention defense. The last option is to adopt some form of negligence rule. This Section outlines these proposals in turn.

1. Strict Liability Proposals

The first option is to maintain the current strict liability rule for one who accidentally makes, uses, or sells a patented product. Writing in 2002, Blair and Cotter compared strict liability rules and negligence rules for governing patent infringement.¹⁰² The authors concluded that strict liability was preferable to negligence liability for administrative cost reasons.¹⁰³ If patent law adopted a negligence rule, courts would be required to assess whether the defendant behaved reasonably.¹⁰⁴ This would require courts to make a decision about the optimal amount of care the defendant should exercise (e.g., how much time should the patent holder search the register for or whether it would be reasonable for the patent holder to seek an infringement opinion letter from an attorney or patent office). As strict liability does not require such a costly judicial analysis, they concluded strict liability was preferable to negligence.

Nevertheless, Blair and Cotter did find that a “modified” strict liability rule, wherein liability was strictly imposed but damages were eliminated for those who infringed without actual or constructive notice of the patent, was the optimal rule.¹⁰⁵ In particular, the authors argued that conditioning damages upon constructive notice (through product marking) would incentivize the patentee to take care to reduce the chances of inadvertent infringement.¹⁰⁶ Furthermore, the authors found that in some instances placing the entire responsibility to avoid inadvertent infringement upon the technology user could lead to the technology user taking socially excessive care.¹⁰⁷ As a result, although literature routinely cites Blair and Cotter for supporting the strict liability regime, their proposed liability regime is in fact closer to a negligence rule than is commonly perceived. As will be expanded upon in Part IV, the Blair and Cotter proposal is best described as a strict liability rule accompanied by a contributory negligence defense (i.e. the user will be strictly liable for damages unless she can show the patent holder failed to take reasonable care to avoid the infringement by providing adequate notice).¹⁰⁸ As later sections explore more fully, this proposal has many of the same benefits of a more straightforward negligence rule. Nevertheless, the proposal differs from such a rule in the following ways: the

102. Blair & Cotter, *supra* note 13.

103. *See id.* at 821–29.

104. *Id.* at 826.

105. *See id.* at 830.

106. *Id.* at 834.

107. *Id.* at 825.

108. *See infra* Section IV.A.

contributory negligence standard is defined using a bright line rule (i.e. appropriate marking) rather than a vague standard (i.e. did the patentee take “reasonable care”) and the patentee who is contributorily negligent nevertheless receives injunctive relief.¹⁰⁹

More recently, Robert Merges has partially defended the strict liability rule.¹¹⁰ Merges focused particularly on whether courts should hold those who do not deliberately copy a patented invention strictly liable, or alternatively, not liable at all (absent proof of deliberate copying).¹¹¹ Merges concludes, tentatively, that such innocent infringers ought to be held liable. Merges asked the question: whether “there is *anything* to be said for the absolute liability standard”?¹¹² To answer, Merges makes a “tentative start in the direction of defending the current doctrine.”¹¹³ The strict liability rule was defended for two reasons. First, in many cases, the cost for the patent holder of proving copying would be very high, thus limiting the compensation they receive from their invention.¹¹⁴ Second, the strict liability standard may increase the dissemination of the technology.¹¹⁵ If an independent invention defense is introduced in patent law, defendant companies would limit their contact with patent holders and the information its researchers have access to in order to increase the chances that, should an infringement occur, the independent invention defense would apply.¹¹⁶ By contrast, under strict liability, the defendant’s liability does not depend on their level of knowledge, and thus companies have less incentive to keep their researchers in the dark about existing patents.¹¹⁷

Lastly, some commentators have suggested introducing compulsory licensing regime in cases of accidental patent infringement. For example, Lemley and Weiser argue that in cases where transaction costs significantly reduce the ability of the patentee and the technology user from bargaining for a license, a “liability rule” ought to be implemented (e.g., an obligation to pay damages rather than a “property rule”; an obligation to stop using the technology until receiving the owner’s permission).¹¹⁸ This proposal would cover accident cases wherein the technology owner and the patentee often cannot bargain *ex ante*. What the authors do not question is what *type* of liability rule ought to be in place: strict liability or negligence? This Article agrees that a property rule ought to give way to a liability rule. But a compulsory licensing regime, where damages must be paid upon every accidental infringement, is a version of a *strict* liability regime. Part III considers whether the duty to pay damages ought not be so strictly imposed but instead only

109. *Id.*

110. Robert Merges, *A Few Kind Words for Absolute Infringement Liability in Patent Law*, 31 BERKELEY TECH. L.J. 1 (2016).

111. *Id.*

112. *Id.* at 10 (emphasis in original).

113. *Id.*

114. *See id.* at 6.

115. *Id.* at 6–7.

116. *Id.*

117. *Id.* at 37.

118. Lemley & Wiser, *supra* note **Error! Bookmark not defined.**; *see also* Ard, *supra* note 16, at 697–700 (making the case for why IP ought to adopt liability rules).

awarded where the defendant failed to take reasonable care to prevent the infringement.

2. Independent Invention Proposals

On the other end of the spectrum, some commentators argue that patent law should adopt an “independent invention” defense (i.e., a defense for making, using, or selling patented technology when the user has independently recreated the technology, rather than copying it from an existing technology). In 2002, Maurer and Scotchmer proposed that such a defense would be beneficial for social welfare.¹¹⁹ The authors posited that two positive consequences would occur, should such a defense be introduced. First, the authors found that the threat of entry by independent invention would encourage patent holders to license patented technology more frequently and at lower prices, thus increasing access to the technology.¹²⁰ In a system with an independent invention defense, it would make financial sense for the patentee to deter independent investors from entering the market through licensing the technology below the price set in a regime without an independent invention defense. The authors argue that while the patentee would receive a lower profit, his licensing revenue would still exceed the amount necessary to cover research and development (R&D) costs. Second, the authors posit that such a doctrine would limit the amount of investment into patent “races.”¹²¹

The common counterargument to any proposal to adopt an independent invention defense is that such a doctrine would negatively affect inventors’ incentives to create. This was partially a concern raised in the original Maurer and Scotchmer article.¹²² The Maurer-Scotchmer proposals were based on a model of innovation wherein the costs of R&D was relatively low.¹²³ If this assumption is relaxed and R&D costs are particularly high (e.g., such as pharmaceutical research where ex ante probability of success of producing a patentable invention are low), then the authors found that an independent invention defense could indeed undercut incentives to invent. To avoid this problem, Maurer and Scotchmer speculate that a legislature could, should it desire, adopt a series of statutory exemptions to the independent invention defense.¹²⁴ But this raises the problem, as stated by Blair and Cotter, that it leads to rent-seeking as certain industries lobby to be qualified as an exempted industry.¹²⁵

Subsequent commentators have debated whether such a doctrine would diminish inventors’ profits too greatly. In 2006, Samson Vermont offered a novel argument in

119. Stephen M. Maurer & Suzanne Scotchmer, *The Independent Invention Defence in Intellectual Property*, 69 *ECONOMICA* 535, 541 (2002). For another proposal relating to independent inventions, see Oskar Liivak, *Rethinking the Concept of Exclusion in Patent Law*, 98 *GEO. L.J.* 1643 (2010) (explaining and analyzing a “free entry” reform proposal initially put forth by Judge Learned Hand).

120. See Maurer & Scotchmer, *supra* note 119, at 535–36.

121. *Id.* at 540–41.

122. See *id.* at 543–44.

123. *Id.* at 543.

124. See *id.* at 544.

125. Blair & Cotter, *supra* note 13, at 813.

favor of an independent-invention defense.¹²⁶ While acknowledging that such a defense would limit patent holder profits, Vermont concluded that the reduction in expected profit is likely to have only a moderate effect on incentives to invent.¹²⁷ Vermont argues that many inventions are created by more than one person in quick succession, and this is particularly true of highly socially valuable inventions (for example, the lightbulb by Edison and Swann or the telephone by Bell and Gray).¹²⁸ Vermont argues the fact that an invention could be invented by multiple people is evidence that a moderate reduction in profits, such as that which would come from allowing an independent invention defense, is unlikely to harm incentives to create; it is likely that the reduced profits will be enough to motivate at least one inventor to create the invention. However, some commentators are not convinced by this argument. While acknowledging the reasoning, Mark Lemley responds that the “stakes are quite high” and that, if an independent invention defense would significantly reduce the incentives to innovate, then “the potential losses for society are substantial”, and this is particularly relevant in the class of high social utility inventions that Vermont discusses.¹²⁹ Lemley concludes that he is “not yet confident that an independent invention defense will have no undue effect on incentives.”¹³⁰

3. Negligence Proposals

Relatively few commentators have explicitly explored the use of negligence liability in patent law. However, there has been some recent thought in this direction. In 2012, Stewart Sterk suggested that property law in general, and intellectual property law in specific, should adopt negligence rules more frequently.¹³¹ Indeed, Sterk highlighted that, contrary to common wisdom, property law often relies on negligence rules (or “proxies” for negligence rules) in certain circumstances.¹³² These rules apply often “where ascertaining the scope of boundaries is costly.”¹³³ Sterk cites “reasonable encroachers” as an example: where a defendant inadvertently builds on the land of another after commissioning a survey to determine the precise boundary between the land, courts will often use doctrines such as “relative hardship” to defeat any claim brought on behalf of the property owner.¹³⁴ Sterk argues that courts recognize that, in such circumstances, the defendant has taken reasonable care to avoid the infringement and proxy rules are applied to excuse the infringement.¹³⁵ By contrast, if a defendant builds on a neighbor’s land in direct

126. See Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 MICH. L. REV. 475 (2006).

127. *Id.* at 480.

128. *Id.* at 478–79.

129. Mark A. Lemley, *Should Patent Infringement Require Proof of Copying?*, 105 MICH. L. REV. 1525, 1528 (2007).

130. *Id.* at 1530.

131. Stewart E. Sterk, *Strict Liability and Negligence in Property Theory*, 160 U. PA. L. REV. 2129 (2012).

132. *Id.* at 2133.

133. *Id.*

134. *Id.* at 2146–47.

135. See *id.* at 2136.

contrast to the survey's conclusions, courts typically require the defendant to remove the encroachment.¹³⁶

Nevertheless, Sterk's article, while presenting a novel and interesting argument, is incomplete in some important respects. Most importantly, the analytical-theoretical framework used to decide whether a negligence rule ought to be imposed could be improved. Sterk accurately highlights how it is costly to discern the existence and scope of IP rights.¹³⁷ But that itself does not explain why a negligence rule, as opposed to a strict liability rule, is appropriate.¹³⁸ There is a justificatory "gap" in the paper. To fill in this gap, we require a more defined and robust normative framework in place before we can answer these questions fully. Part III of this Article supplies and applies that analytical-normative framework.

In a similar vein, Tun-Jen Chiang recommends that patent law, in theory, should adopt a "contributory search" defense to infringement actions (akin to a contributory negligence defense).¹³⁹ While patent doctrine typically expects producers to search for patentees, Chiang argues that, in some circumstances, it is in fact easier for patentees to search for producers.¹⁴⁰ Consider for example, the *Rambus* case discussed earlier.¹⁴¹ As Rambus was aware of the patent and the potential for infringement, it was easier for Rambus to alert Infineon to the presence of the patent claims than it was for Infineon to discover Rambus's entitlements.¹⁴² Likewise, in some industries, such as the smartphone industry where there are many patentees but relatively few producers, it may also be easier for the patentees to keep track of the use of their proprietary technology than require producers to clear all patents.¹⁴³ To

136. *Id.* at 2145.

137. *Id.*

138. Sterk's article does make some moves to justify the use of negligence rules by appealing to the concept of information costs. However, information cost theory is more helpful when determining how to define property rights, than on the question of fault. As discussed in the work of Henry Smith, property rights can be delineated using either exclusion or governance strategies. See Henry E. Smith, *Exclusion Versus Governance: Two Strategies for Delineating Property Rights*, 31 J. LEGAL. STUD. S453, S453 (2002). The choice of an exclusion strategy or a governance strategy ought to be made by comparing the benefit that more precisely delineated property rights would provide against the cost of acquiring the additional information required to delineate such rights. Once property rights are so defined, there is a separate question, discussed in this Article, i.e., whether all infringements of those rights should result in liability or only those infringements which result from carelessness. As Part III elaborates upon, this decision must be made by examining the possible effects that liability rules have on parties' incentives to invest efficient levels of resources in accident avoidance.

139. Chiang, *supra* note 12, at 36. Practical difficulties with contributory search defenses lead Chiang to ultimately adopt a more modest proposal of amending the current damages framework. *Id.* at 43–50.

140. *See id.* at 12.

141. *Rambus Inc. v. Infineon Techs. AG*, 318 F.3d 1081 (Fed. Cir. 2003), *cert denied*, 540 U.S. 227 (2003). *See supra* text accompanying notes 50–59.

142. *Rambus*, 318 F.3d at 1102–05; *see* Chiang, *supra* note 12, at 12–13.

143. Chiang, *supra* note 12, at 5 (“[I]f there are a small number of well-known producers (e.g., a few large companies dominate an industry) but thousands of small and unknown

reduce the chances of inadvertent infringement, Chiang argues that patent law needs some doctrinal mechanism to encourage the least cost searcher—whether that is patentee or producer—to conduct appropriate searches. The tool for the job is, theoretically, a contributory search (or contributory negligence) defense. Inadvertent infringers ought to be able to avoid liability if they can show that in fact the patentee was best placed to avoid the infringement. By introducing such a defense, companies like Rambus would no longer benefit from hiding their patent claims, and thus the chances of inadvertent infringement would be minimized.

Nevertheless, questions remain post-Chiang's article. Like Sterk's article, there is the question of which type of negligence rule is preferable. Why, for example, is a strict liability rule accompanied by a contributory negligence defense preferable when a simple negligence rule (or indeed a comparative negligence rule) would be equally capable of encouraging the producer search? Furthermore, neither Sterk nor Chiang directly address a number of "secondary considerations" which need to be considered before proposing some form of negligence rule. These include, for example, the administrative cost of such a rule and the likelihood of judicial errors. Similarly, Chiang's article is also somewhat limited in scope. The article is focused primarily on encouraging patent holders to search for technology users.¹⁴⁴ However, there are arguably other ways that the patent holder could prevent accidents outside of searching for technology users, such as by fixing appropriate notice to the work or by writing clearer patent claims. Ideally, the question of strict liability versus negligence should consider whether the chosen liability rule encourages the patent holder to take these other important precautionary measures as well.¹⁴⁵ Lastly, as will be elaborated upon in Part III, this Article employs a slightly different, but arguably more standard, set of theoretical models to analyze the problem.¹⁴⁶

What is needed at this stage is a more analytical approach to the question of strict liability versus negligence in patent law. While Sterk's and Chiang's research provides important insights, this Article builds on their work by providing a less analogical approach (that focuses on highlighting similarities with tort law) and a more analytical dissection of the costs and benefits associated with a negligence rule in patent law. It is to that analysis that the Article now turns.

III. THE CASE FOR NEGLIGENCE

The primary justification for patent rights is utilitarian: patent rights are desirable to the extent they maximize the common good.¹⁴⁷ In this Article, it is assumed that

patentees, then it would be more efficient to have patentees look for producers than to have producers look for patentees.").

144. *Id.* at 64.

145. *See also* Liivak, *supra* note 14 (similarly arguing that accidental patent infringement is a bilateral accident wherein incentives need to be set for both parties to take adequate precautionary measures).

146. In particular, this Article departs from the "least cost-avoider" model. *See infra* note 157 and accompanying text.

147. *See, e.g.,* *Graham v. John Deere Co.*, 383 U.S. 1, 7–11 (1966) (citing *Letter from Thomas Jefferson to Isaac McPherson* (Aug. 13, 1813) in *THE WRITINGS OF THOMAS JEFFERSON* 326, 334–35 (Andrew A. Lipscomb ed., 1903) (describing Jefferson's argument

an efficient use of resources will maximize society's welfare and thus contribute to the common good. But what liability rule will incentivize an efficient use of resources? Using economic models of accidents from the law of torts, Section A begins by fleshing out the concept of welfare maximization in this context. Contrary to common belief, society's welfare will not be best served by attempting to stop all accidental infringements. Instead, the goal for policymakers should be to encourage parties to take *cost-justified* measures to avoid accidental infringement. Sections B and C compare various liability rules in relation to this goal. Section D concludes that some form of a negligence liability rule is optimal because a negligence rule incentivizes cost-justified accident prevention from all relevant parties. This Part finds that the best liability rule is either a simple negligence rule or a strict liability rule accompanied by a contributory negligence defense, and explains some further reasons for preferring a simple negligence rule.

A. The Social Cost of Patent Accidents

Accidental infringement of patents is harmful to society. However, spending time and resources on preventing accidental infringement is also harmful. Therefore, maximizing the common good requires members of society to minimize the aggregate harm (hereinafter "cost") flowing from these two sources. This Section explains each of these points in turn.

1. Accident Costs

Inventions are almost universally beneficial for society but, due to a public-goods market failure, are likely to be underproduced in a competitive market.¹⁴⁸ Patent rights redress this issue by providing a time-limited monopoly right. During the patent term, anyone who wishes to use the invention must negotiate a license with the patent holder and pay the inventor a supracompetitive price. The ability to charge a supracompetitive price enables the inventor to recover the fixed research and development costs of the invention, and thus encourages inventors to supply inventions at a more socially optimal rate.

Accidental infringement of patents hampers this goal. In accident cases, it is impossible for the technology user to negotiate a license *ex ante* because, at that point in time, it is not clear whether the technology is patented or who the patent holder is. As a result, accidental infringement of patents occurs, resulting in the patentee's invention being used without the patentee receiving compensation. This lost revenue represents a private cost to the patentee. More importantly, the lost revenue of the patentee may reduce innovation incentives for future inventors, resulting in a social cost to the wider public at a later time. For the time being, we shall assume that the private cost the patentee suffers in lost license fees is a decent proxy for the lost future social welfare resulting from decreased innovation incentives.

that society ought only suffer the "embarrassment of an exclusive patent" if it "benefits society"))).

148. See generally WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 294–333 (2003) (describing the economic theories behind patent law).

Let us call the private cost imposed on the patentee the *accident costs* or A , and let us further assume that if the accident costs are \$100, this will reduce incentives for future innovation also by \$100. Prior to the accident occurring, the technology user cannot say with certainty what the accident costs will be, but she can roughly calculate the *expected accident costs*, or pA , by multiplying the probability of an accident occurring (p) by the amount of private harm (A) that such an accident would cause if it were to occur.

2. Precaution Costs

The technology user can take steps to prevent such accidental infringement occurring. Assuming the parties are operating in a country with a publicly accessible register of all granted patents, someone engaging in a technical activity can search the register to determine whether her activity would infringe a valid patent. Such users can also inspect any relevant physical products to see whether they are labeled with patent information (e.g., a patent number). Furthermore, users can keep up to date with the patent portfolios of competitors and perform other searches (such as simple Google searches). Let us call this *user care*, or C_u .

Equally, the patent holder can also take care to prevent such accidents. Most importantly, the patent holder can mark any products she produces with the relevant patent information¹⁴⁹ (including products which are not themselves patented, but which are produced by a patented method).¹⁵⁰ This traditionally has required physical marking of patented products, but since the America Invents Acts, the patentee's ability to provide notice through marking has substantially increased via the use of "virtual marking" (i.e., affixing onto articles the word "patent" or "pat" followed by a URL address directing the user to a website containing patented information).¹⁵¹ Likewise, patent holders can maintain websites providing "standardized information about all intellectual property rights associated with [protected] products"¹⁵² and update those websites as new IPRs are acquired. The patent holder can also write clearer patent claims, thus increasing the chances that a user searching the registry will find the relevant patent information. Or, as argued by Chiang, patent holders can also search for users. In some markets where there are many patentees but only a few

149. See, e.g., Claire Curran, *A Simple Guide to Marking Your IP Rights*, UDL INTELL. PROP. (May 21, 2018), <https://www.udl.co.uk/insights/a-simple-guide-to-marking-your-ip-rights>.

150. Christina Sharkey, *Strategic Assertions: Evading the Patent Marking Requirement*, 12 NW. J. TECH. & INTELL. PROP. 103, 103 (2014).

151. See Gaetan de Rassenfosse, *Notice Failure Revisited: Evidence on the Use of Virtual Patent Marking*, (Nat'l Bureau of Econ. Research, Working Paper No. 24288, 2018), <https://www.nber.org/papers/w24288.pdf>; see generally U.S. PATENT & TRADEMARK OFFICE, REPORT ON VIRTUAL MARKING (2014) (discussing patent marketing online). It is questionable whether the marking requirements currently provide adequate incentives to innovators to mark. See Menell & Meurer, *supra* note 87, at 37 ("[B]oth patent and copyright law have weakened marking requirements over the past several decades as well as penalties for failure to provide accurate notice information.").

152. Menell & Meurer, *supra* note 87, at 37. Menell and Meurer consider the possibility of Congress mandating this precautionary measure from all companies.

users of the technology (e.g., the semiconductor industry where there are many patentees but only a handful of producers), then it may be relatively easy for the patentee to locate producers and initiate negotiations.¹⁵³ In some cases, particularly where unwary consumers may be involved, the patentee can effectively “spread the word” (as George Selden did) about the hazards created by upstream unlawful uses of their works.¹⁵⁴ While it is certainly conceivable that, in some cases, the patentee does not have any truly reasonable precautionary measures available to her, this is not true of the majority of cases. In most cases, the probability of a patent accident is determined not simply by the actions of the technology user, but also by the actions of the patentee. Let us call this *patentee care* or C_p .

It is often underappreciated that these measures are themselves costly; it costs the technology user resources to search the register, and it costs the patentee resources to appropriately mark products. Let us call this cost the *prevention costs* or B (i.e., the parties select a level of care, C , thus imposing a level of cost, B). Let us call the technology user’s prevention costs B_u and the patentee’s prevention costs B_p .

3. Minimizing the Total Costs

If the user takes care, C , the probability of an accident goes down, and so too does expected accident costs, pA . Thus, care has a positive effect on society’s welfare. Simultaneously however, as the level of care rises, so too do the prevention costs, B . As a result, taking more care, or trying to prevent all accidental infringements, is not necessarily the best social outcome. In order to minimize the total cost society loses on accidental infringement, the user must select a level of care that results in the least overall cost, taking into account both the probable accident costs and the prevention costs.¹⁵⁵ As a rule of thumb, it is safe to say that in most cases taking some care will help reduce total cost, but that beyond a point, taking more care becomes wasteful and has a negative effect on society’s purse.

153. See *supra* notes 42–43 and accompanying text.

154. See *id.*

155. Arguably, the cost of patent accidents involves an additional cost, i.e., the cost of duplicative R&D efforts. The social cost of the patent accident is not merely the cost to the patentee and the subsequent depression of innovation incentives, but also includes the resources society spends on recreating a technology which already exists. See generally WILLIAM LANDES & RICHARD POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY* 302–10 (2003) (characterizing the rules that reduce the social costs of patent protection). However, for a number of reasons, the Article brackets this potential cost. It is not clear whether the majority of accidental infringement cases involve any significant duplication costs. For example, of the *Schmeiser* case, *supra* text accompanying note 72, the *Innovatio* cases, *supra* text accompanying note 45, or the *Rambus* case, *supra* text accompanying note 50, none involved any wasteful duplication efforts on behalf of the technology user. Furthermore, when some duplication is involved, such as in *NTP*, the second-comer’s R&D can equally lead to benefits in terms of slightly differentiated products with the capacity to better supply consumer demand. See generally Christopher S. Yoo, *Intellectual Property and the Economics of Product Differentiation*, in 1 *RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW* (Ben Depoorter & Peter Menell eds., 2018). As a result, it is difficult to say to what extent duplicative efforts exist and impose cost on the patent system, and how these costs factor into the basic analysis is left to another day.

As an analogy, consider road traffic accidents. If motorists drive slower, that will beneficially reduce the probability of accidents. But this reasoning would not justify a complete ban on driving; clearly, if we were to ban driving completely society would be worse off. As Guido Calabresi famously pointed out in 1970, if we were to ban driving, the precautionary measure used to avoid the accidents would impose more cost on society than simply allowing the accidents to occur.¹⁵⁶ To put it bluntly, we accept that some level of road traffic accidents will occur because it would be too costly to prevent them from happening.

The same is true in patent law today. If technology users take some level of care (e.g., by searching the patent register), that will often reduce the chances of an accident occurring and help lower total accident costs. At a certain point, however, the reverse is true and the costs of preventing the patent infringement outweigh the benefit it produces. For example, it would obviously be negative for society if all inventors were required to “down tools” and stop inventing whenever there was a risk that such technical activity would infringe a patent. Therefore, our goal ought not to be the complete eradication of patent accidents altogether. Instead, the optimal situation is for users to adopt a *reasonable* (i.e., *cost-justified*) level of care. More formally, the user ought to take care up to the point that when the marginal cost of such care equals the marginal benefit represented by the reduction in expected accident cost; the user ought not to go beyond that point.

Table 1 illustrates this principle. Consider a hypothetical situation in which only the technology user can take care to prevent the patent accident occurring. For example, the technology user has invented a new type of mousetrap and is considering whether to commercially sell this product, but she is concerned that the mousetrap may already be patented. If she does not compensate the patentee for the use of the mousetrap, the patentee will suffer a private cost of \$100. At this point, she has three options: (1) she could not search the patent register, (2) she could spend one hour searching the register, or (3) she could spend two hours searching the register. The probability of accident plus the costs associated with the level of care are depicted in the table.

Table 1: User Care

	Cost of Care	Probability of Accident	Expected Accident Loss	Total Social Cost
0 Hour Search	0	15%	15	15
1 Hour Search	3	10%	10	13
2 Hour Search	6	8%	8	14

156. See CALABRESI, *supra* note 25, at 17–20.

In this scenario, the total social cost is minimized if the user spends one hour searching the register for the patentee. Spending one hour searching is cost-justified because, while it imposes a marginal cost of \$3, it produces a marginal benefit of \$5 (i.e., the expected accident costs reduce by \$5). However, spending a second hour searching is not cost-justified. A second hour searching imposes a marginal cost of \$3 but only produces a marginal benefit of \$2. Thus, social cost is minimized if, and only if, the user takes cost-justified care.

In most real-world situations, both the technology user and the patentee can take some cost-justified precautions to avoid the accident. Minimizing the total social cost of patent accidents not only often requires the technology user to perform a patent register search but also requires the patent holder to provide appropriate notice of the patent rights by drafting clear claims, by marking the product in an accessible manner, and by searching for technology users. Table 2 illustrates this intuition. Consider, once again, the technology user that is considering whether to sell her mousetrap and has the option to spend between zero and two hours searching the patent register. Further, imagine that the patentee also has the ability to take care at the same cost: the patentee also can spend between zero and two hours searching for potential users of her patented mousetrap. These “care options” are laid out below.

In a case such as this, the optimal situation is e: both parties take one hour of care. As in the previous table, the cost-justified level of precaution for the user is to select one hour of care. Any less care (options a-c) or any more care (options g-i) would result in higher social cost. Likewise, it is also cost-justified for the patentee to spend one hour searching: the marginal benefit of \$4 in reduced expected accident costs exceeds the marginal cost it imposes of \$3. However, spending the second hour searching is not cost-justified because the marginal cost it imposes outweighs the reduction in expected accident costs.

Table 2: User Care and Patentee Care

	User Care (Hours Search)	Patentee Care (Hours Search)	User Care Cost	Patentee Care Cost	Probability of Accident	Expected Accident Costs	Total Social Cost
a.	0	0	0	0	15%	15	15
b.	0	1	0	3	11%	11	14
c.	0	2	0	6	10%	10	16
d.	1	0	3	0	10%	10	13
e.	1	1	3	3	6%	6	12
f.	1	2	3	6	5%	5	14
g.	2	0	6	0	8%	8	14

h.	2	1	6	3	5%	5	14
i.	2	2	6	6	5%	5	17

The table illustrates another important principle: minimizing the total social cost of patent accidents cannot be achieved by simply identifying the “least cost avoider.”¹⁵⁷ Sometimes the argument is made that, generally, the user can take more

157. Commonly, a least cost-avoider (LCA) model is used to allocate responsibility in unilateral rather than bilateral accidents. In patent law, accidents are bilateral because both parties can affect the probability of an accident. But what if only one party can take efficient precautionary measures? Or alternatively, what if both parties can take care, but because their care would be largely duplicative, it is better if only one party take care? In these cases, law and economics literature often recommends identifying the party which could avoid the accident at the least cost and allocate the responsibility wholly to that party. See SHAVELL, *supra* note 36, at 18 (“[B]oth injurers and victims generally ought to do something to avoid risk; the effect of liability rules is therefore different from that in the least-cost avoider model.”).

This version of the LCA analysis ought not to be confused with the analysis provided by Chiang, *supra* note 12. Chiang argues that patent law ought to place the burden on the party that can avoid the accident at the least cost. However, Chiang’s analysis is more sophisticated than most common versions of the LCA discussed in patent law. Chiang’s analysis is a *marginal* analysis. That is, the law will impose the responsibility on the LCA but will do so *ex post*. Parties will not know until litigation who is the LCA. The court will then compare the parties’ relative search costs and determine the LCA. Since the parties will not know in advance which party is the LCA, *both* parties will be incentivized to conduct reasonable cost-justified searches ahead of time. For example, a patentee, perceiving the possibility that she will be held to be the LCA and thus potentially contributorily negligent for failing to perform a reasonable search, will be incentivized to adopt reasonable precautionary measures. As a result, Chiang’s analysis aims to set incentives for bilateral care just as the analysis in this Article.

Nevertheless, some questions linger about the marginal LCA analysis. Most importantly, I find the analysis somewhat convoluted. Standard accounts of accidents typically split accidents into unilateral and bilateral accidents; in the former, economists suggest that the law should allocate the responsibility for avoiding the accident to the LCA, whereas in the latter, economists suggest the law should allocate the responsibility using a negligence rule. See SHAVELL, *supra* note 36, at 18. I worry that transporting the LCA concept into the bilateral accident arena makes matters more confusing than they need to be and, accordingly, invites misunderstandings. *Id.* (“The model of the least-cost avoider may be misleading for thinking about the class of bilateral accidents examined in this book.”). Chiang clearly tries to prevent those misunderstandings in the article, but the nuances of this analysis may very well be missed by even reasonably alert readers. Secondly, I am not entirely convinced that if a court were to determine the LCA *ex post*, this would always lead to adequate incentives for bilateral care *ex ante*. For example, imagine the user finds a product that she suspects is patented but lacks patent marking. The user may accurately predict that a court in such circumstances would hold the patentee to be the LCA on the grounds of inadequate patent marking. The user may still be able to take some reasonable measures in this case, such as performing a search of the registry. However, knowing in advance the likelihood that the patentee would be deemed the LCA, I have doubts that the user would still adopt these reasonable measures.

effective measures to prevent the accident than the patentee, and therefore the responsibility should wholly fall on that user to avoid the accident.¹⁵⁸ But while often true, this criticism is beside the point. Even if the user has generally more effective measures than the patentee, the patentee may still have some cost-justified precautionary measures which, if taken, would further reduce the accident costs. The goal should be to encourage all parties who can take non-duplicative, cost-effective care to do so, rather than simply set incentives for one party.

The table demonstrates this claim. In the scenario, the user has the more effective precautionary measures: in option d, the user takes one hour of care reducing the probability of the accident by 5%, whereas in option b, the patentee takes one hour of care thus reducing the accident probability by 4%. Therefore, if the choice is to make *either* the user *or* the patentee take one hour of care, then making the user take care is preferable because it results in less cost (i.e., \$13 instead of \$14). However, these two options are both less preferable to the optimal situation, option e, wherein *both* parties take one hour of care: this option reduces cost to \$12. This situation occurs because user care and patentee care often have a synergetic effect: the effect of the precautionary measures are not simply cumulative but have an effect greater than the sum of their parts.

Now that we understand our goal, the question becomes: what liability rule ought we impose to achieve this outcome? Subsequent to Calabresi, legal economists have analyzed when, and in what circumstances, different liability rules help minimize accident costs (most notably, Shavell,¹⁵⁹ Landes and Posner,¹⁶⁰ and Cooter and Ulen¹⁶¹). The following Sections apply the analytical frameworks and insights developed in this literature to the particular problem of minimizing the cost of patent accidents.

B. Liability Rules Compared: Primary Considerations

Having demonstrated that efficient use of resources requires the patentee and the user to take cost-justified preventative measures, the question we must answer next is: which liability rule will encourage the parties to take such care? This Section compares various liability rules in relation to this goal. The following Section introduces some further variables (or “secondary considerations”) into the analysis.

1. No Liability

Under a no liability rule, the user is not liable for the accidents she causes. Therefore, the accident costs remain with the patentee. Thus, the patentee pays for the costs of her precaution and the expected accident costs (i.e., $B_p + pA$). Meanwhile, the user only pays the costs of her precautions (B_u). Both patentee and user are assumed to be rational actors who will select a level of care (C) to minimize their own private cost.

158. See Chiang, *supra* note 12, at 10–14 (summarizing versions of this view).

159. See SHAVELL, *supra* note 36, at 18.

160. See LANDES & POSNER, *supra* note 33.

161. See ROBERT COOTER & THOMAS ULEN, *LAW AND ECONOMICS* (2016).

Using our mousetrap example from earlier, Table 3 demonstrates the private costs that the parties would bear under various different liability rules. The care options in Table 3 mimic those found in Table 2. From this table, we can see that under a no liability rule, the parties will not select the optimal levels of care, i.e., option e. While the *patentee* will take the appropriate care, the technology *user* will not.¹⁶² As the technology user is still liable for willful infringement, the patentee's best financial strategy is to alert the user to the patent, thus improve the chances of a licensing deal. On the other hand, in order to minimize her private costs, the technology user will select to spend zero hours searching, i.e., options a-c. From these options, the patentee will select to spend one hour searching because this minimizes her private expenditure (i.e., she spends \$14 rather than \$15 or \$16). Therefore, the equilibrium is that the parties will select option b and total social cost will be higher than optimal (e).

2. Strict Liability

Under a strict liability rule, the user must pay the patentee compensatory damages, or a liability award, L , which is equal to the accident costs. Therefore, the patentee only bears the cost of her own precaution (B_p), while the technology user pays the costs of her precaution and the expected liability award (i.e., $B_u + pL$). Once again, both parties select a level of care that will minimize these costs. The parties' private costs associated with this liability rule are found above in Table 3.

This rule will, once again, result in sub-optimal behavior. The patentee will minimize her costs by selecting zero hour search, i.e., options a, d, or g. Meanwhile, the defendant will select to perform one hour search because this minimizes her cost (she pays \$13 rather than \$14 or \$15). The resulting in equilibrium is option d and total social cost is higher than optimal.

162. This is, of course, a highly stylized analysis. In reality, a range of other doctrinal mechanisms (see, e.g., 35 U.S.C. § 112 (2012) (describing the definiteness requirement)) and practical realities encourage some patentee care. However, the preceding discussion reveals that these instruments alone lead to suboptimal incentives as evidenced by the high rate of accidental infringement. Therefore, this analysis strips those considerations away to first establish what liability rule is appropriate, and then later in Part IV analyzes some of the doctrines already in place to encourage such care.

Table 3: Private Cost Under Liability Rules

Comparative Neg.	P cost	7.5	3	6	10	9	11	8	8	11
	U cost	7.5	11	10	3	3	3	6	6	6
Neg. + Contributory Neg.	P cost	15	3	6	10	9	11	8	8	11
	U cost	0	11	10	3	3	3	6	6	6
Strict Liability + Contributory Neg.	P cost	51	3	6	10	3	6	8	3	6
	U cost	0	11	10	3	9	8	6	11	11
Simple Neg.	P cost	0	3	6	10	9	11	8	8	11
	U cost	15	11	10	3	3	3	6	6	6
Strict Liability	P cost	0	3	6	0	3	6	0	3	6
	U Cost	15	11	10	13	9	8	14	11	11
No Liability	P cost	15	14	16	10	9	11	8	8	11
	U cost	0	0	0	3	3	3	6	6	6
		a.	b.	c.	d.	e.	f.	g.	h.	i.

3. Negligence

In contrast to strict liability and no liability, this Section demonstrates that a negligence rule would encourage cost-justified care from both parties. A liability rule is categorized as a negligence rule if the decision to impose liability is conditional upon one or more party's level of preventative care falling below an acceptable level.¹⁶³ There are multiple different forms such a negligence rule could take, simple negligence, strict liability plus a contributory negligence defense, negligence plus a contributory negligence defense, or comparative negligence. Each one provides incentives for bilateral cost-justified care.¹⁶⁴

Under a simple negligence rule, the technology user pays compensatory damages if she fails to take all *reasonable* care.¹⁶⁵ Care is considered "reasonable" if it is cost-justified (this is the famous Learned Hand formula in which care is considered reasonable if the marginal benefit it produces is greater than the marginal cost it imposes).¹⁶⁶ Therefore, if a technology user fails to take all reasonable care, she will pay a liability award plus any care she does take (i.e., $B_u + pL$); meanwhile, the patentee in this situation will only pay for her own precaution costs (i.e., B_p). Alternatively, if a technology user does take all reasonable care, she will only pay for the cost of her care (i.e., B_u); meanwhile, the patentee will pay for her care and any remaining expected accident costs (i.e., $B_p + pA$). The private costs the parties face under a negligence rule are presented above in Table 3. Under this rule, a technology user will minimize her costs by selecting one hour search. Taking any care below this level exposes her to liability, while taking care above this level imposes extra prevention costs. Therefore, the technology user will select option d, e, or f. From these options, the patentee minimizes her costs by selecting one hour of care. The equilibrium is that both parties take the appropriate level of care and social cost is minimized.

Under a strict liability rule with a contributory negligence, the user is liable for all accidents she causes, unless the patentee is contributorily negligent.¹⁶⁷ If the patentee is contributorily negligent, the user is not liable. A defendant is contributorily negligent if she failed to take all reasonable care to prevent the accident. Once again, reasonable is equated with cost-justified precaution. Therefore, if the patentee takes reasonable care, then the patentee pays for her own care costs (B_p), while the technology user pays for her own care costs and expected liability ($B_u + pL$). If the patentee fails to take reasonable care, then the patentee pays for her own care plus any expected accident costs ($B_p + pA$), while the user pays for her care costs only (B_u). Table 3 lists the private costs the parties face under this rule. Under this rule, the patentee will select to perform one hour search (i.e., options b, e, or h) as this minimizes her costs (i.e., \$3). From these options, the user will select option e as this minimizes her costs. The result is the parties select option e and total costs are minimized.

163. See COOTER & ULEN, *supra* note 161, at 189–228.

164. *Id.*

165. *Id.* at 196.

166. *Id.* at 205–08.

167. *Id.* at 208–11.

Under a negligence rule with a contributory negligence defense, the user is liable for accidents caused by her negligence, unless the patentee was also negligent. Once again, negligence is defined as failure to take reasonable care according to the Learned Hand Formula.¹⁶⁸ Under this rule, the following options emerge: (1) if the user takes reasonable care, she bears the cost of her own precaution only (B_u); meanwhile the patentee bears the cost of her own precaution plus any remaining expected accident costs (i.e., $B_p + pA$); (2) if the user fails to take reasonable care, and the patentee takes reasonable care, then bears the cost of her own precaution and any expected liability costs ($B_u + pL$); meanwhile, the patentee pays for her own precaution costs (B_p); if the user fails to take reasonable care, and the patentee also fails to take reasonable care, then the user bears only her own precaution costs (B_u); meanwhile the patentee pays for her own precaution costs and any remaining expected accident costs ($B_p + pA$). Table 3 demonstrates the private costs associated with each liability rule. Under this rule, the patentee has an incentive to take cost-justified precaution. By searching for one hour, the patentee can minimize her own private costs (any less than this exposes her to the possibility of being held contributorily negligent and paying for the expected accident costs; any more than this unnecessarily increases her precaution costs). If the patentee can be expected to search for one hour, then the options for the technology user are options b, e and h. To minimize her private costs, she will select option e (any less exposes her to liability, any more than that is unnecessary to avoid liability). Once again, the optimal choice is reached.

Lastly, under a comparative negligence rule, the user is not liable when she takes due care. If she fails to take due care, then she will be liable. However, if she fails to take due care, and the patentee also fails to take due care, then the court will apportion the accidents costs between the two parties according to their level of fault.¹⁶⁹ Therefore, the following options emerge: (1) if the user takes reasonable care, she bears the cost of her own precaution only (B_u); meanwhile the patentee bears the cost of her own precaution plus any remaining expected accident costs (i.e., $B_p + pA$); (2) if the user fails to take reasonable care, and the patentee takes reasonable care, then the user bears the cost of her own precaution and any expected liability costs ($B_u + pL$); meanwhile, the patentee pays for her own precaution costs (B_p); (3) if the user fails to take reasonable care, and the patentee also fails to take reasonable care, then the user bears her own precaution costs and a *portion* (assumed here to be half) of the accident costs in liability ($B_u + pL/2$); meanwhile, the patentee pays for her own precaution costs and any remaining expected accident costs ($B_p + pA/2$). Table 3 demonstrates the private costs associated with each liability rule. Under this rule, the technology user minimizes her own costs by taking one hour of care (options d-f). Thereafter, the patentee minimizes her costs by selecting one hour of care. The equilibrium is option e, and total cost is minimized.

168. *Id.* This is distinct from the type of “contributory negligence” rule used in other common law systems, particularly the U.K. where “contributory negligence” refers to a reduction in damages proportional to the defendant’s fault. See Law Reform (Contributory Negligence) Act 1945 §1 (UK).

169. COOTER & ULEN, *supra* note 161, at 208–11.

C. Liability Rules Compared: Secondary Considerations

Thus far, the analysis has demonstrated that all versions of a negligence rule are preferable to a strict liability rule or no liability. Because negligence rules encourage both technology user and patentee to take cost-justified precautions, such rules help minimize total social cost. By selecting a level of care that conforms to the standard of reasonable care as defined by the Hand Formula, each party has the ability to shift the accident costs onto the other party, thus minimizing their own private costs. This Section introduces further considerations that complicate the analysis, but that also help us select which version of a negligence rule is preferable. Those secondary considerations are, activity levels, administrative costs, error costs, and externalities.

1. Activity Levels

Taking more precaution is not the only way the parties can reduce the chances of an accident occurring. The other option is for the parties to change their activity levels.¹⁷⁰ For example, in road traffic accident cases, drivers could reduce the possibility of an accident by not speaking on their cell phones while driving, but they could also reduce the probability of an accident simply by driving less. Likewise, in patent law, the technology user could reduce the probability of a patent accident by engaging in technical activities less often, and the patentee could also reduce the probability of an accident by reducing her level of innovation. However, the parties engage in these activities because doing so brings them utility. Therefore, while engaging in the activity less reduces the chances of harmful accidents, it also reduces the utility the parties receive. Table 4 illustrates this relationship.

Table 4: Activity Levels

	User Activity	User Utility	User Care Cost	Ptee Activity	Ptee Utility	Ptee Care Cost	Total Accident Losses	Total Social Welfare
1	1	40	3	1	40	3	20	54
2	2	60	6	2	60	6	40	68
3	3	69	9	3	69	9	60	60
4	4	75	12	4	75	12	80	42
5	5	70	15	5	70	15	100	10

Table 4 assumes that both the user and the patentee are now considering how much time to spend on the activity that may create patent accidents (i.e., innovation). Each party acts to maximize her own private utility. Total social welfare is calculated by adding the user utility and the patentee utility and subtracting the user care costs, the patentee care costs, and the total accident costs. Option 2—both parties engage

170. *Id.* at 210–12.

in the activity two times—is optimal as this maximizes social welfare. Table 5 depicts the utility each party would receive under various different liability rules.

Table 5: Activity Levels under Liability Rules

	No Liability		Strict Liability		Simple Negligence		Strict Liability + Contributory Negligence	
	User Utility	Ptee Utility	User Utility	Ptee Utility	User Utility	Ptee Utility	User Utility	Ptee Utility
1	40	17	17	40	37	17	17	37
2	60	14	14	60	54	14	14	54
3	69	0	0	69	60	0	0	60
4	75	-21	-17	71	63	-21	-21	63
5	70	-45	-45	70	55	-45	-45	55

Under no liability, the user will engage in too much technical activity (in addition to not taking sufficient care), whereas the patentee will engage in the optimal amount of technical activity.¹⁷¹ The user maximizes her utility by simply selecting an option which yields the highest utility, i.e., option 4. Meanwhile, the patentee bears the cost of any care she takes and the expected accident costs. To maximize utility, the patentee sets an activity level that yields the highest utility minus the cost of care and the expected accident costs, i.e., option 2. Meanwhile, a strict liability rule yields the opposite conclusion. The user sets an activity level that maximizes her utility minus the cost of care and the expected accident costs, i.e., option 2, while the patentee selects an activity level that yields simply the highest utility, i.e., option 4.

More important, however, is the difference between the activity levels under a simple negligence rule and a strict liability rule with a contributory negligence defense. Under the simple negligence rule, the user will select an activity level that maximizes her utility minus the cost of care, i.e., option 4; the patentee, meanwhile, selects an activity level that maximizes her utility minus the cost of care and any remaining accident costs, i.e., option 2.¹⁷² Therefore, the user engages in the activity too frequently, but the patentee does so at the optimal level. This is because the patentee is the *residual bearer of the harm*.¹⁷³ Under a negligence rule, as demonstrated earlier, both parties will take cost-justified precautions. Nevertheless, there is still an expected accident cost when both take such precautions. The question is: who bears this cost? In negligence, it is the patentee who bears this cost: as the user takes due care, she is not liable, and the expected costs remain with the patentee.

171. *Id.*

172. *Id.*

173. *Id.*

Under a strict liability rule with contributory negligence, the opposite result is achieved because now the *user* and not the patentee is the residual bearer of the harm. Under this rule, the patentee will set her activity level that maximizes utility minus the cost of care. Meanwhile, the user will set an activity level that maximizes her utility minus the cost of care and the expected accident costs.¹⁷⁴ As a result, the user will engage in the activity at the optimal level, but the patentee will not. Likewise, under a negligence rule with contributory negligence, the patentee is the residual bearer of harm, therefore will take the appropriate activity level, but the user will not. The same is true for comparative negligence.

What this demonstrates is that no liability rule yields incentives for both bilateral care and optimal bilateral activity levels. Any form of negligence rule will result in only one party internalizing the benefit of adopting an appropriate activity level, and as a result, the other party will engage in the activity at too great an extent. The only theoretical exception to this would be if judges take activity levels into account when defining reasonable care under the Hand Formula. However, it is generally agreed that judges do not have the institutional ability to determine how much of an activity a private party ought to engage in (e.g., how many miles someone ought to drive their car).

The normal response to this by economists of tort law is to make the party whose activity is more likely to yield accidents the residual bearer of the harm.¹⁷⁵ For example, accidents involving motors and bicycles involve bilateral care: cars can drive slower and with more observations, cyclists can wear appropriate colors and lights; it is optimal for both parties to take some level of care. However, the party who has the most control over the accident is likely the motorist—no amount of brightly colored vests will prevent the accident if the motorist drives with very little awareness of her surroundings. Ideally therefore, a contributory negligence rule ought to be adopted. In which case, both motorists and cyclists will take an optimal care level, and, because the motorist is the residual bearer of the harm, the motorist will select the appropriate activity level; the cyclist will not take the appropriate activity level and spend too much time cycling, but this is less dangerous than motorists spending extra hours on the road.

What does this mean for patent accidents? The answer is: surprisingly little! Having already established in Section B that it is preferable to adopt some form of negligence rule to ensure bilateral care, the pressing question is: which version of the negligence rule is preferable? However, we see that whatever version we choose will result in one party selecting an activity level that is higher than optimal. If a simple negligence rule is adopted, the user will engage in too much technical activity because she is not the residual bearer of harm (and the same for negligence plus contributory negligence or comparative negligence); whereas if a strict liability rule with a contributory negligence defense is adopted, the patentee will engage in too much technical activity. Therefore, we need to pick between the lesser of two evils: too much activity from the patentee or from the user.

The problem this presents is twofold. First, I am unconvinced that controlling the level of activity—innovation—is, as a practical matter, likely to improve social

174. *Id.*

175. *Id.*

welfare. Innovations come with very significant positive externalities (or “spillovers”). New innovations spur future innovations in unpredictable and often very significant ways, and much of this value is not captured by the patentee.¹⁷⁶ While the law of diminishing marginal utility makes it clear that at some point investing in further innovation must become socially excessive, it seems unlikely that we are at such a point today. As a practical concern, the level of compound growth created by innovation suggests that the positive externalities associated with greater innovation will nearly always be greater than the social loss flowing from increased accident costs.¹⁷⁷ Thus the “optimal” activity level seems of minor significance.

However, put this concern to one side and assume that there is an optimal level of innovation that the parties ought to be engaging in from a welfare point. Even if we assume this, it is not clear that either party’s activities are more important to control in order to better reach the social optimal. To decrease the expected accident costs, is it more important for the *user* to engage in less innovation, or is it more important for the *patentee* to engage in less innovation and to patent less frequently? I do not see a clear answer to this question. It seems initially that both parties’ activities have an equal effect on the probability of an accident occurring. While there certainly may be individual cases in which one party’s activities may contribute more greatly to the chances of an accident, it is hard to say with any confidence whether, globally, across the whole range of patent infringement, controlling the patentee’s or user’s activities is comparatively more important.¹⁷⁸

Therefore, the importance of activity levels ought to be largely bracketed when asking which is the optimal liability rule. To determine which is the best form of liability rule, we will need to spend more time focusing on the following criteria: administrative cost, error cost, and externalities.

2. Administrative Cost

Whatever rule is selected, actors in the legal system will need to apply the rule to real world cases. Different liability rules lead to greater or lesser amounts of such administrative costs.¹⁷⁹ The cost of application depends on a number of factors, the most important of which are the complexity of the rules, and the number of cases requiring resolution.

Strict liability is a relatively straight forward rule to apply, but it also leads to a high number of infringement cases.¹⁸⁰ The rule is straightforward in application because, unlike in negligence, the court is not required to conduct a complex factual

176. See Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 259 (2007).

177. ROBERT COOTER, *THE FALCON’S GYRE: LEGAL FOUNDATIONS OF ECONOMIC INNOVATION AND GROWTH* (2014) (arguing that “[i]nnovation causes compound growth that swamps static inefficiency like a tsunami swamps a scow”).

178. This conclusion seems to stand even if the technology user is merely a non-innovative manufacturer/distributor. Society would not seem particularly well-served by trying to control the number of products that are made and distributed any more than it would be by limiting the amount of innovation.

179. See COOTER AND ULEN, *supra* note 161, at 223–25.

180. *Id.*

inquiry into the reasonableness of the defendant's behavior.¹⁸¹ However, this initial cost saving is diminished because the strict liability rule results in more cases of infringement. Under a strict liability rule, nearly all cases of infringement will require some form of resolution. At its most costly, that resolution will take the form of litigation and adjudication. But even cases which do not involve litigation will produce additional costs. In all cases of infringement, the patentee will attempt to shift the cost to the technology user, and this will involve procedure and associated costs. In the absence of litigation, that cost will come through alternative dispute resolution, inter-party negotiation, damage calculations, and transferring monetary compensation. By contrast, a negligence rule has the benefit of removing a subset of infringement cases and eliminating their associated resolution costs. Thus, a negligence rule has the benefit of reducing the amount of case resolution, although each case of infringement involves increased complexity.¹⁸²

Which would involve less administrative costs overall? It is difficult to say with confidence. The question depends on whether more frequent litigation, or more complex litigation, is a more significant contributor to the cost of the patent system. When comparing liability rules generally, strict liability is typically seen as the least administratively costly rule. On the other hand, existing empirical evidence suggests that the administrative costs of patent liability are currently very high, and this may be in part due to the current strict liability rule. Bessen and Meurer's empirical analysis of the U.S. patent system found that patent litigation costs have "exploded" over past decades.¹⁸³ The cost of the patent litigation annually for firms (excluding chemical and pharmaceutical firms) increased six-fold from 1984 to 1999 (from less than \$184 billion to \$1,104 billion).¹⁸⁴ What is driving this explosion? The authors conclude that the "increase in aggregate litigation cost is mainly driven by the increasing frequency of litigation, which has roughly tripled since the 1980s."¹⁸⁵ Litigation cost is exploding, not only because trials are becoming more complex and time consuming,¹⁸⁶ but primarily because the volume of litigation is increasing. While ultimately, we do not have sufficient empirical evidence to fully determine the

181. Furthermore, the rule is easier to apply for individual parties. Currently, under strict liability, patentees do not need to assess the technology user's level of care prior to deciding to take action or not, whereas they would under a negligence rule. Under a negligence rule, not only would courts in litigation need to spend more resources on examining the defendant's care, patentees would spend more resources on discovery and exploratory litigation to determine the defendant's level of care.

182. While negligence can increase the complexity of cases, it also has the potential to limit their complexity. In a subset of cases, it will be relatively easy for a court or fact finder to determine whether the defendant behaved negligently. In such cases, the decision maker can potentially determine the outcome of the case by examining the negligence issue only, without making a ruling on typically complicated matters such as claim construction.

183. BESSEN & MEURER, *supra* note 9, at 16.

184. *Id.*

185. *Id.*

186. Although, that indeed is happening due to the increasing complexities of claim construction. See generally Dan L. Burke & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743 (2009); Tun-Jen Chiang & Lawrence B. Solum, *The Interpretation-Construction Distinction in Patent Law*, 123 YALE L.J. 530, 572–92 (2013).

administrative costs of each liability rule, we can certainly say that a strict liability regime is not conclusively less administratively costly than a negligence liability rule.¹⁸⁷

Finally, it is worth noting that, to the extent that a negligence rule is more complicated to apply, this cost is mitigated by the doctrine of *stare decisis*. Over time, courts, applying a negligence standard, will develop categories and clearer proxy rules for identifying negligence. This will aid in reducing the cost of applying the reasonableness test in future cases.

3. Error Cost

Courts are likely to make errors when applying the liability rule. In particular, courts may make errors when calculating the level of damages, or courts may make errors in defining the reasonable care standard.¹⁸⁸ Both of these errors, if made consistently, could lead to the parties adopting sub-optimal levels of care.

A strict liability rule is highly prone to erroneous damage calculations. As demonstrated above in Table 3, a strict liability rule will incentivize the technology user to adopt an appropriate level of care. However, this assumes the liability award, *L*, is set equal to the accident costs. If the liability award is greater or less than the accident cost, *A*, then the user will take more or less than the optimal care level. Currently, under a strict liability rule, it is assumed that the patentee will take no care, and the user has a choice of taking zero hours of care, one hour of care, or two hours of care. One hour of care is optimal, and because this option lowers the user's costs (this option costs her \$14 whereas option a costs \$16 and option g costs \$15), she will take this care. However, if the court erroneously calculates the damages and the liability award is double the actual damages, then the user has a choice of taking zero hours of care (for \$30), one hour of care (for \$25), or two hours of care (for \$24). In this scenario, the user will take greater than optimal care because the liability award is much higher than the compensatory level. Therefore, while errors in judging reasonable care are impossible when applying a strict liability rule, errors in calculating damages are a significant challenge to setting the appropriate incentives for care.

A simple negligence rule is the mirror image of a strict liability rule: while courts will make errors in applying the standard of care, errors in calculating damages are

187. One potential counter-argument is that the increased uncertainty of a negligence rule will increase the amount of litigation, following the Priest-Klein hypothesis that win rates for plaintiffs tend towards 50% in cases where litigants have symmetric stakes, see George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 4 (1984). However, to the extent that this is true, the effect must be balanced against the counter-veiling effect that the scope of infringement is decreased under negligence, that negligence sets better incentives for accident precaution, and that in many cases defendants will know in advance whether they have successfully adopted reasonable care, thus limiting the uncertainty of the rule. When appreciated globally, it seems more likely that infringement cases will decrease under negligence. However, the margin of such decrease will likely be smaller given the small potential for increased litigation flowing from uncertainty in the negligence rule.

188. See COOTER & ULEN, *supra* note 161, at 217–20.

far less significant than in strict liability.¹⁸⁹ Errors in applying the standard of care are highly significant. If the court sets the standard too high, technology users will over-invest in care. For example, in Table 3, imagine the court miscalculates the cost of the technology user's patent search, and believes the cost of the second hour of searching is only \$1 (not \$3). Under the Hand formula, a court would find that a reasonable person would take this extra hour searching (because now the marginal benefit of \$2 in expected accident cost saved is greater than its marginal cost of \$1).¹⁹⁰ As a result, the user would have an incentive to conform to that higher standard, and take two hours of care, to avoid a liability award, even though doing so deviates from the optimal care level. Likewise, if courts routinely set the standard of care too low, defendants will frequently under-invest in care.¹⁹¹

On the other hand, the incentives for care set by a negligence rule are far less susceptible to distortions created by erroneous damage calculations, so long as the standard of care is optimally set. If the standard of care is set at the correct level, the defendant has an incentive to conform to that standard, and thus avoid a liability award, regardless of the level of damages. For example, consider the case just introduced in which the court sets the liability award at double the accident costs. But, now consider the case under a negligence rule in which the court accurately sets the standard of care. In this case, if the user adopts zero hours of care, her expected liability is \$30. But if she takes one hour of care, she is not liable and only pays her cost of care, i.e., \$3. If she adopts two hours of care, she is once again not liable and pays only the cost of care, i.e., \$6. Thus, if the standard of care is set correctly, errors in damage calculations are insignificant, because the parties have the incentive to conform to the cost-justified care required by the negligence rule.¹⁹²

189. *Id.*

190. *Id.*

191. A related point is that a negligence defense rule may open the door to opportunistic behavior. Defendants who know of the patent may nevertheless document efforts at reasonable accident precaution in the hope that the paper trail may hide their intentional infringement. However, this would be a risky strategy for a defendant to adopt. In such cases, their infringement is willful. If the willfulness is discovered, they will face enhanced damages. The risk of hiding their intentional infringement in this manner would need to be weighed against the risk of enhanced damages. *See generally* Dmitry Karshedt, *Enhancing Patent Damages*, 51 U.C. DAVIS L. REV. 1427 (2018).

192. Theoretically, it is possible for too low damages to result in distortions even under a negligence regime. It is not impossible, for example, for a technology user to prefer to select pay incorrectly low damages rather than invest in cost-justified precautionary measures, *see* Ariel Porat, *Misalignments in Tort Law*, 121 YALE L.J. 82, 136 (2011) (assuming when the standard of care is optimal, injurers will be under deterred with too-low damages but will be optimally deterred with efficient and too-high damages). However, this problem would seem to occur infrequently in patent law. The miscalculation of damages would need to be very significant to result in a case where the technology user would prefer to select damages rather than take precaution. For example, take the case where the expected accident (pA) costs are \$110,000, and the defendant can take care for a cost of \$10,000 which will reduce the expected accident costs by 10%. In such a case, care is efficient as \$10,000 in care will result in a \$11,000 reduction in expected harm. Therefore, under a negligence rule, the defendant's choice is to either take care for \$10,000 or expect to pay \$110,000 in liability. If the court incorrectly sets the liability award at, e.g., \$100,000, or \$75,000, or \$50,000, the same result

Unfortunately, strict liability plus contributory negligence is the worst of both worlds. As the technology user is subject to strict liability, her incentives are highly affected by miscalculations in calculating damages. In the example just discussed, distortions would likely occur in user care under such a liability rule. The patentee avoids liability only by conforming to the reasonable care standard. As a result, the user assumes the patentee takes such care, and that she will be held strictly liable. Thus, her options are to take zero hours of care (for \$30), one hour of care (for \$25), or two hours of care (for \$24). She will minimize her costs by taking two hours of care, even though this is higher than optimal. Meanwhile, if the standard of reasonable care is set incorrectly in the contributory negligence analysis, then the patentee will have an incentive to conform to that sub-optimal standard. Thus, as compared to strict liability and negligence liability, strict liability plus contributory negligence yields both types of error cost.

A negligence rule with a contributory negligence defense and a comparative negligence rule are also problematic. Compared to a simple negligence rule, which would distort the incentives for the technology user only, errors in setting the negligence standard under these rules would distort the incentives bilaterally.

4. Externalities

Until now, the analysis has assumed that the private harm suffered by the patent owner is a perfect proxy for the public harm suffered when an accidental infringement occurs. However, frequently this is not the case. Often inventions come with significant positive externalities (or spillovers) which cannot be captured by the patent monopoly.¹⁹³ For example, imagine in our scenario in Table 2, the patent at issue is a drug which alleviates the symptoms of the common cold. The patent enables the inventor to charge producers of the drug \$100. However, frequent use of the medicine by people in society may have the further benefit of reducing the spread of the cold virus (due to less frequent coughing and sneezing). Thus, the value to society that accompanies the production of the drug may be higher than the patentee's private value, e.g., \$200. In order for society to minimize the cost of accidents, the user must take cost-justified care, taking into account the cost of the precautions and the expected accident costs. But the expected accident costs must reflect the social loss that would accompany the patent accident, not merely the private loss caused to the patentee.

Similarly, we have so far assumed that the utility the user receives from production of her product is a perfect proxy for the public good associated with the user's technical activity. Once again, this is not necessarily the case. The technical activity of the user may provide significant positive externalities beyond that captured in the user's private utility. For example, if the invention is a wireless network technology, a user may create a type of cell phone employing wireless e-mails. The user's product may be a commercial success, yielding private utility for herself, but widespread use of this product may have even greater social benefits,

will occur. Only if the damages are set very significantly too low, i.e., below \$10,000 will the technology user's incentives be distorted.

193. See Frischman & Lemley, *supra* note 176.

because the new product enables faster communication between people in society leading to better information transfer. When seeking to minimize the social costs of accidents, the user should take cost-justified precautions taking into account the public, not merely the private, benefit produced by the user's technical activity.

However, under a strict liability rule, users will not take into account positive externalities. Take the cold medicine example to illustrate. The private harm that the user's use causes the patentee remains \$100. Thus, prior to the accident occurring, the expected accident costs, and thus the expected liability costs, are the same as those presented in Table 3. Thus, the user will still adopt one hour of care. However, this is no longer optimal. Assuming the probability of the accident occurring remains the same, if the user takes zero hours of care, the expected accident costs are now \$30; if the user takes one hour of care, the expected accident costs are \$20; and if the user takes two hours of care, the expected accident costs are \$16. Thus, zero hours of care yields a social loss of 30; one hour of care yields a total social cost of \$17; and two hours of care yields a total social cost of \$10. Accordingly, taking a second hour of care would be cost justified and minimize society's total social cost. Nevertheless, the user will not take this optimal level because the court has not considered the public harm caused by the infringement.

One way to rectify this problem would be for the court to alter the liability award to reflect the public harm rather than the merely private harm.¹⁹⁴ But there are significant practical obstacles to doing so. Patent infringement usually results in a compensatory damage award, in which the remedy seeks to redress the private harm.¹⁹⁵ Altering this would require the court to provide a supra-compensatory remedy. This leads to a "windfall" problem i.e., the patentee receives more damages through a court-imposed remedy than the patent allows her to get on the open market through licensing.¹⁹⁶ The patentee thus has an incentive to sue for damages rather than license the technology. If reducing accident costs is the goal, it is counter-intuitive, at best, to provide patentees with an incentive not to license the invention, but instead to prefer for damages once an accidental infringement occurs. Unless the patent right could be altered in some way to enable the rights holder to capture the

194. One interesting example of such damages recalibration can be found in William F. Lee and A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV., 385 (2016) (arguing that damages need to be reformed in various ways because of the inability in many fields to preclear patents). As a result of this, and similar proposals on patent damage reforms, see, e.g., John M. Golden, *Principles for Patent Remedies*, 88 TEX. L. REV. 505 (2010), this Article is assuming that courts are capable of adjusting damages roughly in proportion to the positive externality. An alternative assumption and analysis was made in Bracha & Goold, *supra* note 18, at 1051–56.

195. See, e.g., 35 U.S.C. § 284 (2012) ("[T]he court shall award . . . damages adequate to compensate for the infringement . . . in no event less than a reasonable royalty for the use made of the invention by the infringer . . ."). For criticism, see Ted Sichleman, *Purging Patent Law of 'Private Law' Remedies*, 92 TEX. L. REV. 517 (2014); see also Golden, *supra* note 194.

196. See generally Note, *An Economic Analysis of the Plaintiff's Windfall from Punitive Damage Litigation*, 105 HARV. L. REV. 1900 (1992).

full social value of the invention (a suggestion itself of dubious value),¹⁹⁷ then avoiding perverse incentives would require avoiding higher damage awards.

On the other hand, a negligence rule can be adjusted to reflect externalities, and thus incentivize the user to take such external cost into account. If the patented invention produces substantial positive externalities, then the court can take this into account when assessing the harm caused by the accidental infringement. As a result, the user would be required to take a greater level of care in order to avoid liability. Alternatively, if the user's own activities involve substantial positive externalities, the court can increase the cost of the precaution in the reasonable care standard to reflect this value; once again the user would conform to this appropriate standard.

However, a negligence standard will not encourage the patentee to take appropriate care, taking into account positive externalities. Assuming the user conforms to the standard of care, the patentee only bears the private costs of the accident (her private care costs and the private expected accident costs) and not the public costs of the accident (the private cost of preventing the accident plus the public expected accident costs). As a result, the patentee will select a level of care that minimizes the private cost of the patent accident but not necessarily the public cost. Both a negligence rule with a contributory negligence defense and a comparative negligence rule have the same unfortunate outcome.

Strict liability with a contributory negligence defense is arguably the best rule for internalizing third-party externalities. The patentee must take reasonable care to avoid being held contributorily negligent. The standard of reasonable care can be adjusted to reflect public externalities caused by the patented invention (the cost of care is increased) or on the user's side (the cost of precaution is increased). Assuming the patentee takes due care, the user is then held strictly liable, and the damages can be changed to reflect either the value of the user's or the patentee's technical activity for society. Unlike a simple strict liability rule, however, this does not yield a windfall problem. In order to receive a liability award, the patentee must take reasonable care to avoid the accident. Thus, if a patentee were to take less than optimal care in the hope of claiming large damage awards, she would receive no damage award at all.

D. Summary

Table 6 summarizes the discussion from Sections B and C. Analyzing the table reveals not only that some form of negligence rule is preferable to a strict liability rule, but also that the optimal liability rule is either a simple negligence rule, or a strict liability rule with a contributory negligence defense. After discussing these options, this Section concludes with some additional considerations that, in this author's view, tip the scales in favor of a simple negligence rule.

197. See Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031 (2005).

Table 6: A summary of primary and secondary considerations

	User Care	Patent Owner Care	Externalities Internalized	Administrative Cost	Error Cost
No Liability	Not Optimal	Optimal	No	None	None
Strict Liability	Optimal	Not Optimal	User Internalizes	Moderate	Moderate
Simple Negligence	Optimal	Optimal	User Internalizes	Moderate	Moderate
Strict Liability + Contributory Negligence	Optimal	Optimal	Owner + User Internalizes	Moderate	High
Negligence + Contributory Negligence	Optimal	Optimal	User Internalizes	High	High
Comparative Negligence	Optimal	Optimal	User Internalizes	High	High

Some version of a negligence liability rule is preferable to either a strict liability or no liability rule because such a rule generates incentives for bilateral care. As this is the primary consideration and most important value, strict liability and no liability can easily be rejected as inappropriate liability rules. On the other hand, both comparative negligence and negligence with a contributory negligence defense also provide incentives for bilateral care, but each come with high error and administrative costs; these two liability rules can therefore be easily rejected because of the secondary considerations.

Therefore, the best option is either a simple negligence rule or a strict liability plus contributory negligence defense liability rule. Both of these rules encourage the technology user and the patent owner to take cost-justified precautions to avoid the accident occurring, and thus are likely to limit social cost. On the most important criterion, these rules perform equally well. It is therefore down to secondary considerations to help determine which rule is preferable. However, the secondary considerations do not provide a clear winner. The most important secondary consideration, activity levels, is unhelpful in this context, as the activities of both the patent owner and the technology user affect the probability of accidental infringement approximately equally. The remaining secondary considerations cut in different directions: while a strict liability plus contributory negligence rule involves higher error costs than a negligence rule, such a rule also seems better placed to internalize third party positive externalities associated with the technical activity.

Although both rules have a legitimate claim to optimality, three additional considerations tip the scales in favor of a simple negligence rule. First, from the discussion in Part II, it emerged that the contemporary patent accidents problem is

caused significantly by patent owners taking less than optimal care. As the discussion of “notice failure” highlighted, the current patent system does not provide sufficient incentives for the patentee to provide full ownership information to the public.¹⁹⁸ On the other hand, there is very little suggestion that the patent accident problem is the result of users taking less than optimal care.¹⁹⁹ Therefore, while an optimal liability rule ought to ensure both parties have the right incentives, there is reason to believe that increasing the incentives for the patent owner is comparatively the most important goal. A simple negligence rule is preferable to strict liability plus contributory negligence rule from this perspective. Crucially, a simple negligence rule makes the *patent owner* the residual bearer of the harm, whereas strict liability plus contributory negligence makes the *user* the residual bearer of the harm. As a result, under a strict liability rule with contributory negligence defense, the patentee will only take the precautions necessary to conform to the due care standard. Under a negligence rule, the patentee will internalize the value of any *additional* cost-effective precautions that are not accounted for in the negligence standard (such as activity levels or any other unforeseen variables). This is desirable in the contemporary environment where the patentee’s lack of incentives for care are a comparatively significant contributor to the accident problem.

Second, a negligence rule is preferable in situations where the patentee and user select their levels of care sequentially.²⁰⁰ In many situations, the patentee has the opportunity to select the level of care before the technology user. The patentee has the opportunity to decide whether to attach markings to a product, and in what form, and how to write the patent specification. Only later does the user decide how much time she will invest in searching for the patentee. Under a strict liability plus contributory negligence rule, this may lead to less than optimal incentives for the user. If the patentee is contributorily negligent and if the user can see this *ex ante*, then the user may fail to take reasonable care (knowing that any accidents which do occur will be attributed to the patentee’s carelessness). For example, if a patentee fails to attach notice to a product, a user, upon inspecting the product, may decide not to spend any further time searching for the patentee, even though doing so would

198. *Supra* text accompanying notes 87–90.

199. Some anecdotal evidence to the contrary suggests that some firms instruct their employees not to read patents, in the hope of avoiding intentional infringement of patents, although doing so increases the risk of accidental infringement. *See, e.g.*, Edwin H. Taylor & Glenn E. Von Tersch, *A Proposal to Shore Up the Foundations of Patent Law that the Underwater Line Eroded*, 20 HASTINGS COMM. & ENT. L.J. 721, 737 (1998) (“As matters now stand many companies discourage employees from reading patents. This presumably lessens the chance that the company will be found to have knowledge of a patent. However, this defeats the basic purpose of the patents [sic] laws, dissemination of information.”). However, unlike the scale of the problems presented by notice failure, which are empirically well-documented, *see* BESSEN & MEURER, *supra* note 9, the scale of the problem of such deliberate shielding is not empirically well-grounded. Furthermore, under a negligence rule, the incentives for such behavior may be limited. Rather than instruct employees to refrain from reading patents, companies would be better served by employees being aware of neighboring patents and taking reasonable precautions to avoid infringement, as this would provide a complete defense.

200. On sequential decision making to the choice of liability rule, *see* LANDES & POSNER, *supra* note 33, at 76–77; SHAVELL, *supra* note 36, at 15 n.14.

help reduce accident costs, because the user accurately predicts that, if she does infringe a patent, she will not be held liable on account of the patentee's contributory negligence. On the other hand, under a negligence rule, the user would still have the incentive to conform to the due care standard.

The third concern is litigation costs. So far, we have assumed that the strict liability and negligence rules lead to moderate administrative costs because, while strict liability is easier for judges to apply than a negligence rule, the strict liability rule leads to more infringement cases which need to be resolved. However, we have also explored the possibility that limiting the overall volume of patent infringement cases would minimize costs, even if the complexity of some litigation would increase.²⁰¹ Extending that line of analysis further, my hunch is that a simple negligence rule would not only be less costly than a strict liability rule, but would also be less costly than a strict liability rule accompanied by a contributory negligence defense. This suspicion flows from a problem of information asymmetries. If a simple negligence rule is imposed, users can avoid litigation (or alternative dispute resolution) by responding to infringement allegations simply by stating what level of care they have taken. However, users do not necessarily have the same option under a strict liability plus contributory negligence rule. In many cases, users will not know what level of care the patentee has taken (especially if the patentee's level of search was negligent). Often this information will only come out into the open at trial. As a result, without this information, many users will need to go to trial to establish the contributory negligence defense, whereas they would not need to do so to prove their lack of negligence. If this is true in a substantial amount of cases, administrative costs would be lowest if a simple negligence rule were to be adopted.

IV. IMPLEMENTING NEGLIGENCE

Part III demonstrated that either a simple negligence rule or a strict liability rule accompanied by a contributory negligence defense minimizes the social loss associated with patent accidents. Furthermore, Part III concluded with a number of reasons for preferring a simple negligence rule. This Part turns to issues of implementation. Section A examines two legal regimes in more detail—the United States and United Kingdom—and asks: How closely do these current legal regimes approximate the ideal liability rule? It demonstrates that the U.K. regime comes closer to the ideal regime because U.K. law denies damages in cases where the defendant did not know nor had “reasonable grounds” for supposing that the patent existed.²⁰² Armed with these insights, Section B proposes a “patent negligence” defense. In accident cases, defendants ought not be held liable when they have taken reasonable care to avoid the accidental infringement. Section C illustrates how this rule would apply to a range of accidental infringement cases.

201. *Supra* notes 181–82 and accompanying text.

202. *See infra* notes 220–222.

A. Existing Legal Regimes

We shall first turn our attention to U.S. patent law (which may be described as a “quasi-contributory negligence regime”), and thereafter to U.K. patent law (which may be described as a “quasi-negligence regime”).

1. U.S. Patent Act

Under current U.S. law, one who accidentally infringes a patent will be held strictly liable. Typically, the patent holder is awarded damages and an injunction.²⁰³ However, there is an exception in section 287 of the Patent Act.²⁰⁴ This section states that “patentees, and persons making, offering for sale, or selling within the United States any patented article” may give notice to the public of the patent by attaching the word “patent” and the patent number; if such marking is not given, then the patent holder will not receive damages unless she has given the infringer actual notice (but will still receive an injunction).²⁰⁵ The purpose of this marking requirement was introduced to reduce the frequency of inadvertent patent infringement.²⁰⁶

However, the marking requirement has been interpreted narrowly by courts.²⁰⁷ In particular, the requirement only applies in cases where the patentee produces *products*.²⁰⁸ As a result, the marking “duty” does not apply in cases where the patentee does not produce a product. Therefore, as interpreted by courts, there is no duty to mark nor give notice in cases where the patent covers a process rather than a product.²⁰⁹ Furthermore, there is no marking duty in cases of idle or non-commercialized patents (that is, patents relating to products, but where the patent holder does not commercially market any products).²¹⁰ These types of patents—both process and idle patents—are particularly relevant in the context of patent assertion entities (or patent “trolls”). Patent assertion entities by definition do not produce any products, and therefore are under no marking duty; their revenue instead flows from licensing the patented technology. In these cases, there is currently no marking duty, and accordingly, this business model encourages patent accidents.

How does the U.S. liability regime compare to the ideal negligence rule? To answer this, it is helpful to split the cases into two groups: those where the marking

203. 35 U.S.C. §§ 283–284 (2012).

204. *Id.* § 287.

205. *Id.*

206. *Wine Ry. Appliance Co. v. Enter. Ry. Equip. Co.*, 297 U.S. 387, 398 (1936) (stating that the purpose of patent marking is to provide “protection against deception by unmarked patented articles, and requires nothing unreasonable of patentees”); *Motorola, Inc. v. United States*, 729 F.2d 765, 772 (Fed. Cir. 1984) (“[A] fundamental rationale supporting section 287—supplying notice in order to prevent innocent infringement.”); *Bandag, Inc. v. Gerrard Tire Co.*, 704 F.2d 1578, 1581 (Fed. Cir. 1983) (stating that “[t]he purpose of this provision is to give patentees the proper incentive to mark their products and thus place the world on notice of the existence of the patent”).

207. See Blair & Cotter, *supra* note 13, at 840–45; Chiang, *supra* note 12, at 43–49.

208. *Wine Ry. Appliance Co.*, 297 U.S. at 398.

209. *Supra* note 207.

210. *Id.*

duty does not apply, and those where the marking duty does apply. In the former, the liability regime is a straightforward strict liability rule: damages and injunctions are awarded regardless of the level of care either party has taken to prevent the accidents occurring. On the other hand, in cases where the marking duty applies, the liability rule comes close to a strict liability rule accompanied by a contributory negligence defense. That is, the user will be liable unless she can demonstrate that the patentee was contributorily negligent in failing to provide appropriate notice.

Nevertheless, there are two ways in which the current liability regime—governing cases in which the marking duty applies—differs from that of a standard contributory negligence rule. First, the contributory negligence defense is implemented using rules rather than standards. Legal theory demonstrates how the same legal directive can be implemented in a variety of more or less precise ways.²¹¹ For example, in order to encourage drivers to drive at a reasonable speed, a legal rule could be drafted using a vague and flexible standard (i.e., drivers must drive “reasonably”), or alternatively, a more precise and more rigid rule could be adopted (i.e., drivers must drive under 30mph). The benefits and costs of each regime are discussed in detail in a voluminous literature.²¹² Typically, when legal scholars discuss contributory negligence, they make reference to a contributory negligence rule drafted using standards (i.e., the defendant will be liable unless the plaintiff failed to take “reasonable care”). However, in section 287, the contributory negligence standard is not drafted using a vague and flexible standard, but instead using a bright line rule: the patentee will be contributorily negligent if she failed to appropriately mark the product or provide the user with actual notice.²¹³

Second, and more significantly, even if the plaintiff is contributorily negligent, she may still be awarded an injunction. This is unusual for a negligence rule. As Calabresi and Melamed demonstrated, “property rules” (i.e., entitlements protected by injunctive relief) are appropriate in cases where the parties can bargain ex ante.²¹⁴ This allows the market to allocate goods to the actors that value them the most. However, where transaction costs prevent ex ante bargaining, then a liability rule ought to be imposed, i.e., injunctive relief ought to be denied and damages imposed.²¹⁵ The question thereafter becomes *what type* of liability rule ought to be imposed: strict liability or some form of negligence liability rule? As highlighted by others previously, patent accidents involve cases where ex ante bargaining cannot take place, and therefore a property rule is unhelpful, and a liability rule ought to be imposed.²¹⁶ This current Article is concerned with the next step of the analysis and suggests a negligence rule is preferable to a strict liability rule. However, the current Section 287 rule is a hybrid in that it denies damages when the patentee was contributorily negligent but nevertheless allows the patentee to receive an injunction.

211. See generally, Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557 (1992); Isaac Ehrlich & Richard A. Posner, *An Economic Analysis of Legal Rulemaking*, 3 J. LEGAL STUD. 257 (1974).

212. See *supra* note 211.

213. See *supra* note 211.

214. Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1089–90 (1972).

215. *Id.* at 1105–10.

216. See *supra* note 16 and accompanying text.

Presumably, this difference can be explained on the grounds that after a court has found infringement, the transaction costs between the user and the patentee are reduced: the user now knows whom to contact to license the technology.²¹⁷ Therefore, while the court should impose a negligence liability rule for past conduct, future conduct ought to be treated as non-accidental and thus governed by a property rule to encourage effective market transactions.

Yet this reasoning leaves much to be desired. In many instances, injunctive relief will lead to a “hold-up” problem.²¹⁸ Frequently by this point, the technology user will have built a business around the use of the technology and therefore not be in a position to easily carry on business without it. There is a substantial chance that technology users who become accidental infringers will become “locked in” and be unable to change their business to avoid the patent infringement. In such circumstances, injunctive relief allows the patentee to shut the user’s business down, unless the user pays a very high licensing fee (i.e., above the rate that the user would have paid if they had truly bargained ex ante). To illustrate, in the *RIM v. NTP* case, NTP’s injunctive relief enabled them to extract a \$613 million license fee from RIM.²¹⁹ The potential for receiving a highly lucrative injunction in turn distorts the incentives for patentee care: by taking less than optimal care, they may lose the possibility of obtaining damages but may increase their ability to receive an injunction, which may be even more profitable. Thus, the presence of ex post injunctions threatens the very goal the law should achieve (i.e., that both parties take an appropriate level of care to prevent accidents ex ante).

2. U.K. Patent Act

Like the in the United States, liability for accidental infringement in the United Kingdom is imposed strictly. But also like the in United States, damages will be refused in some cases. Section 62 of the Patent Act 1977 states that no damages will be awarded against a defendant who was not aware of the infringement “and had no reasonable grounds for supposing” that the patent existed.²²⁰ If a patented product contains the word “patent” and the relevant patent number, then the user shall be deemed to have reasonable grounds for supposing the patent existed.²²¹ Courts have held that the “reasonable grounds” test is objective, and, in many cases, compared it to the “reasonable person” negligence standard.²²²

217. This reasoning was implicit in *Monsanto Canada Inc. v. Schmeiser*, where the court focused not on the initial potentially accidental infringement, but instead on what actions Schmeiser ought to have taken *after* having found the patented seeds on his farm land. [2004] 1 S.C.R. 902 (Can.).

218. See generally Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007).

219. *RIM’s Sensible Patent Payout Keeps BlackBerry Users Hooked*, WALL STREET J. (Mar. 6, 2006, 12:01 AM), <https://www.wsj.com/articles/SB114160357490989930>.

220. Patent Act 1977, c. 37, § .62.

221. *Id.*

222. See, e.g., *Schenck Rotec GmbH v. Universal Balancing Ltd.* [2012] EWHC 1920 (Pat) (“The facts known to Universal Balancing at the time were not such that would lead a reasonable person to think the patent existed.”).

Recent cases illustrate the rule's scope. In *Collingwood Lightning Ltd v. Aurora*,²²³ the patentee produced a fire-resistant LED downlight. The defendants alleged they had no grounds to know of the patent, but the court disagreed: the patented product had been featured in a trade magazine (as the magazine's "Innovative Product of the Year") with wide circulation, and which was frequently read by the defendant's technical staff.²²⁴

In contrast, the defense was successfully argued in *Micromatic A/S*.²²⁵ In this case, the claimant produced a patented valve coupling to stop valves in pressurized containers (e.g., beer kegs) from "shooting out" when removed.²²⁶ Crucial to the functioning of the invention was a "lower pin."²²⁷ However, the patent did not explain the function of this lower pin.²²⁸ After the function of the lower pin was established at trial, the court held that the patent was invalid for lack of novelty and inventive step.²²⁹ But the court went one step further and stated that had it found the patent valid, it nevertheless would not have awarded damages because, in not explaining the functioning of the lower pin, the patent was not drafted with "reasonable skill and knowledge." Thus, the defendants had no reasonable grounds for supposing they infringed the patent.²³⁰

Finally, in *Schenck Rotec v. Universal Balancing*, the plaintiff produced a device and a method for fixing balancing weights to a rotor.²³¹ The defendants were a competitor in the market.²³² The claimant alleged infringement in 2010, and the defendants claimed section 62 applied.²³³ Schenck argued that the defendants ought to have performed a search of the patent register; they argued that there were only four significant players in the propshaft balancing industry and that all other incumbents patented their inventions. However, the judge disagreed.²³⁴ The judge found that the "possibility for new developments in this field is limited,"²³⁵ and that the defendants had not seen the patentee's brochures or literature describing their product as "patented."²³⁶ As a result, the court found that the facts known to the defendants "at the time were not such that would lead to a reasonable person to think the patent existed," nor "would these facts lead a reasonable person to think they should conduct patent searches" to see if their product infringed a competitor's patents.²³⁷

223. [2014] EWHC 228 (Pat).

224. *Id.*

225. *Micromatic A/S v. Dispense Sys. Int'l BV* [2001] 5 WLUK 209 (Ch D (Patents Ct)).

226. *Id.*

227. *Id.*

228. *Id.*

229. *Id.*

230. *Id.*

231. [2012] EWHC 1920 (Pat).

232. *Id.*

233. *Id.*

234. *Id.*

235. *Id.* at ¶ 223.

236. *Id.*

237. *Id.* at ¶ 224.

The U.K. provision is best described as a “quasi-negligence” rule where the burden of proof is on the defendant to prove their lack of negligence. Unlike the U.S. courts, U.K. courts examine the user’s level of care rather than the patentee’s. In cases where the patentee markets products, there is an additional evidentiary rule: if the patentee attached appropriate notice, the court may infer the defendant behaved negligently. But, unlike the U.S. provision, the negligence rule is not limited to these cases, and, accordingly, the rule is broader in scope than Section 287 of the U.S. Patent Act. The negligence rule applies to all forms of accidental patent infringement and not merely infringement of patented products. However, like the U.S. law, injunctions are still routinely awarded to restrain future activity.

In sum, both the U.K. and U.S. law already adopt some mechanisms to encourage bilateral care, and, in this sense, approximate some form of negligence rule. However, both legal regimes implement that negligence rule imperfectly. Armed with this insight, we can turn to reform proposals.

B. A Patent Negligence Defense

This Article recommends that countries dealing with the problem of patent accidents adopt some version of a “patent negligence” defense.²³⁸ Implementing such a rule would require courts to first determine whether the infringement was accidental or not. This would require the judge to consider the *ex ante* position of the defendant. If a reasonable person would have foreseen that the planned conduct would almost certainly infringe a patent, the infringement should be classed as intentional and subject to the normal procedures (including supra-compensatory damages for willful infringement). In these cases, nothing need change. On the other hand, if the court determines that a reasonable person would only have foreseen a substantial risk that the planned conduct may amount to a patent infringement, then courts ought to apply a negligence rule. Courts in these cases should be directed to assess whether the technology user adopted all reasonable care to mitigate the risk, using the Learned Hand formula as a guide to determining whether a given precautionary measure was reasonable or not. If a defendant is deemed to have failed to take all reasonable care available, then the defendant ought to be held liable for damages. If, however, the defendant did take all reasonable care, then the defendant ought to be held not liable and subject to neither damages nor injunction.

This proposal recommends implementing a negligence rule via legal standards rather than a more precise set of rules. Courts ought to have broad discretion to consider whether the defendant adopted all “reasonable” precautionary measures in the circumstances. The alternative would be to define a set of precise rules which approximate the negligence determination (e.g., the defendant must be found negligent if she failed to search the patent registry). The pros and cons of such rules are well established in the literature.²³⁹ While proxy rules provide more legal certainty, their inflexibility frequently leads to over- and under-inclusiveness.²⁴⁰ For

238. *Cf.* Ard, *supra* note 16 at 733–35 (proposing a compulsory license after reasonable search efforts).

239. *See supra* note 211.

240. *See supra* note 211.

example, courts could adopt a rule that any user who fails to perform a search of the patent register will be considered negligent. However, such a rule is overinclusive: it holds liable those who fail to search when it would not be reasonable to do so (such as the defendant in *Schenck*).²⁴¹ The rule would also be under-inclusive: some users would be held not liable for infringement on the grounds that they searched the register, even though they failed to take some alternative care measure which may have been cost-justified in the circumstances (e.g., inspecting products for patent information).

A good example of the potential for over- and underinclusiveness in this area comes from contemporary U.S. law. Section 287 was drafted to encourage patentee care and prevent accidental infringement.²⁴² But it is underinclusive in that the rule does not encourage patentee care from those who hold patents on processes or noncommercialized products, and it is overinclusive in exempting from liability defendants who have not infringed accidentally (i.e., those who knowingly infringe but are shielded from damages because the patentee has failed to provide appropriate notice). While this over- and underinclusivity could theoretically be resolved by creating an even more fine-grained set of rules, I am unconvinced this would be an efficient approach to legal design. As demonstrated in Part II, the situations in which accidental patent infringement occurs are highly heterogeneous, and, accordingly accidental infringement, like accidents in other parts of tort law, is a problem best solved by increasing judicial discretion to apply a flexible standard.²⁴³

Nevertheless, rules will still play a part in the patent negligence defense. Over time, courts will undoubtedly formulate evidentiary rules that indicate when a user has behaved negligently.²⁴⁴ This will increase certainty incrementally to an appropriate level. A starting point should be the example in contemporary U.K. law. In cases of patented products, courts should adopt an evidentiary rule that, if the patentee has attached the word “patent” and a patent number, then the defendant is presumably negligent. This, however, ought to take the form of a rebuttable presumption. If the defendant can prove that, despite the existence of the patent information marking, they took all reasonable care, then they nevertheless ought not to be held liable.

The proposed defense is an affirmative defense. The burden of proof falls on the user to establish the defense once a *prima facie* case of infringement has been established. While clearly a change to patent doctrine, this would provide the simplest and least intrusive intervention into the existing system. Under this proposal, most patent cases would remain unaltered: in nonaccident cases, patent cases would proceed as they currently do. Indeed, in many accident cases, there would be very little change: many defendants who do not have the required evidence to prove reasonable care are more likely to reach a settlement, rather than attempt defense. The only cases that would change are those in which the defendant has a plausible argument that they adopted all reasonable care.

241. *Schenck* [2012] EWHC 1920 (Pat).

242. See *supra* note 206.

243. See Ehrlich & Posner, *supra* note 211, at 270 (“The problems of overinclusion and underinclusion are more serious the greater the heterogeneity (or ambiguity, or uncertainty) of the conduct intended to be affected.”).

244. See Kaplow, *supra* note 211, at 577–79.

As will be recalled from Part II.C, a number of authors raised concerns about the feasibility of adopting a negligence rule. At this point, we can see how adopting a patent negligence affirmative defense would avoid or mitigate those concerns. Blair and Cotter argue that the administrative costs of a negligence rule are too high.²⁴⁵ The first, and most important, response to this concern is that the administrative costs of strict liability are already very high: strict liability leads to large numbers of infringement claims which would not reach court under a negligence liability rule.²⁴⁶ Given the Bessen and Meurer findings on the explosion of patent litigation in recent years due to the number of infringement claims, the claim that strict liability is administratively less costly than a negligence rule invites questions.²⁴⁷ Furthermore, not only will those administrative costs be mitigated by the doctrine of stare decisis, but these “extra” costs will only apply in a subset of patent infringement cases, namely accident cases.

Similarly, Robert Merges defends strict liability on two grounds.²⁴⁸ First, Merges argues that proving “copying” would be costly for patent holders.²⁴⁹ But, while there is certainly truth in Merges’s concern, this Article does not make such a proposal. Instead, this Article proposes that the defendant avoid liability by proving they took reasonable care to prevent infringement. Accordingly, the legal costs for the patent holder will not be significantly altered. Secondly, Merges argues that if knowledge of the patent is a precondition for patent infringement, then technology users will have an incentive to shield their research staff from technology subject to a patent in order to prevent those researchers from copying patented material.²⁵⁰ However, in the vast majority of cases, shielding researchers will not qualify as a “reasonable” precautionary measure. Indeed, as Merges highlights, the costs of shielding in terms of lost knowledge transfer will be great, and the benefits in terms of reduced accident prevention will often be slight.²⁵¹ Accordingly, a defendant who fails to adopt such shielding tactics would not be deemed negligent. As a result, innovative companies would not have an incentive to take such inefficient measures.

By far the best way for such a rule to be implemented would be through legislation. Ideally, the legislator ought to enact a provision stating that in cases of accidental infringement, the defendant will be subject to compensatory damages and an injunction if she has failed to take all reasonable care. The legislation should then further define an infringement as accidental if, prior to performing the technical activity, the defendant could not establish with reasonable certainty whether the technical activity would be infringing behavior or not. The legislation should also establish the Hand Formula as the test for whether a precautionary measure is reasonable or not. In the United States, an ideal place for this defense would be Section 271 of the Patent Act, which currently defines infringement (proposed

245. Blair & Cotter, *supra* note 13, at 821–29.

246. *See supra* notes 179–82 and accompanying text.

247. *See supra* notes 179–82 and accompanying text.

248. *See supra* text accompanying notes 110–17.

249. *See supra* text accompanying notes 110–17.

250. *See supra* text accompanying notes 110–17.

251. *See supra* text accompanying notes 110–17.

subsection i.).²⁵² Likewise, in the United Kingdom, section 62 (on the “Meaning of Infringement”) would serve as an appropriate destination.²⁵³

Alternatively, courts could also take the lead implementing a negligence rule. In the United Kingdom, this would require only a modest change in practice. The law already directs the court to deny damages in cases where the defendant behaved reasonably.²⁵⁴ The only additional step required would be for courts to deny injunctions in the same cases. Currently, while routinely awarded, injunctions will be denied in certain cases, such as where the injunction would be oppressive on the defendant.²⁵⁵ In cases where the defendant could not be certain of the infringement *ex ante* and has taken the care of a reasonable person in ascertaining the status of the technology, it would be oppressive to award an injunction and thereby threaten to shut down a socially desirable business. Moreover, article 3(2) of the EU Enforcement Directive requires that remedial measures be imposed on the basis of their proportionality, amongst other things.²⁵⁶ Denying the injunction in such cases would arguably be proportional to the user’s level of culpability.

In the United States, courts would need to adopt a more interventionist approach. Unlike the United Kingdom, in many cases, the liability standard in the United States is strict, and only in some cases is a contributory negligence defense partially adopted.²⁵⁷ Yet, the Patent Act does not at any point state that the liability for patents must be strict.²⁵⁸ The question of fault in patent law has long been a judicial decision. Lynda J. Oswald demonstrates in her history of patent infringement that U.S. courts adopted strict liability for patent infringement in the nineteenth century.²⁵⁹ Courts and early treatise writers argued that patents were a form of property and imported concepts into patent from property law, including the strict liability infringement rule.²⁶⁰ This rule was upheld by the U.S. Supreme Court in *Hogg v. Emerson* in 1850 and has remained part of patent law ever since.²⁶¹ When Congress revised statutory patent law, there was little questioning of whether accidental infringement ought to be strict or fault based.²⁶² Courts today retain the authority to modify this judicially created rule. Both the U.S. Supreme Court and the Federal Circuit have the authority to hold that a defendant only be held liable for negligent accidental infringements of patent rights. Therefore, in the absence of congressional action, courts could find that in accidental infringement cases, a defendant who proves that she has taken all reasonable care is not within the definition of an infringer and thus not liable. Section 287 would thereafter layer over this basic liability rule. The underlying liability rule

252. 35 U.S.C. §271 (2012 & Supp. 2019).

253. Patent Act 1977, c. 37, § 62.

254. *Id.*

255. See *Navitaire Inc. v. EasyJet Airline Co. Ltd.* (No. 2) [2005] EWHC 0282 (Ch); [2006] RPC 4 (Eng.); *Sterwin A.G. v. Brocades Ltd.* [1979] RPC 22 (Gr. Brit.).

256. Council Directive 2004/48/EC, 2004 O.J. (L 195) 16.

257. See *supra* notes 208–11 and accompanying text.

258. Indeed, as Oswald points out, no U.S. patent legislation in the past two centuries uses such language. See Oswald, *supra* note 29, at 995.

259. Oswald, *supra* note 29 at 995–99.

260. *Id.*

261. 52 U.S. 587, 607–08 (1850).

262. Oswald, *supra* note 29, at 1013–21.

would be negligence, and section 287 would provide an evidentiary rule that, in cases of products, a defendant is taken to be liable if the patentee attached appropriate marking to the product.

C. Illustrative Applications

Having proposed the introduction of a “patent negligence” defense, this Section considers how such a defense would apply in certain high-profile accident cases. In particular, the cases of *NTP v. RIM*, *Rambus v. Infineon*, and *Monsanto v. Schmeiser* will be examined. These cases are selected because together they illustrate how the negligence rule would apply to a number of areas of contemporary concern in patent law: patent thickets, patent trolls, strategic behavior, and self-replicating technologies. The analysis shows how these are not isolated problems facing the patent system, but instead are the emanations of a deeper, more significant accident crisis that remains unaddressed.

1. NTP v. RIM: Patent Thickets and Patent Trolls

As previously highlighted, the *NTP* case is illustrative of the problems caused by patent thickets, particularly in the smartphone sector, and is further interesting because the plaintiff was a non-practicing entity.²⁶³ How would such a case be analyzed under this Article’s proposed negligence rule? To answer that question, we must ask: Did RIM take all reasonable measures to avoid the infringement? In other words, did RIM behave negligently? Or were there any precautionary measures that NTP could have adopted that would have helped avoid this particular accident? The following section tentatively sketches the argument that RIM did not behave negligently. However, this conclusion is tentative. As will be seen, whether RIM behaved without due care is a difficult question, with finely balanced arguments on either side.

What precautionary measures were available to RIM to prevent the Blackberry’s infringement of NTP’s patents? One obvious precautionary measure would be to complete a search of the patent register. Under normal circumstances, searching the patent register is a reasonable precautionary measure and one we would expect technology users to perform. In most cases, the benefit of searching the register will far outweigh the cost doing so imposes: the reduction in expected accident costs will often be great compared to a relatively modest cost. From my investigation into the case, I cannot find evidence that RIM did in fact perform a patent search. Assuming that they did not, then we normally would conclude that RIM failed to take all reasonable precautions for preventing the accident.

However, the RIM case is not an ordinary one. In this case, it is conceivable that performing a patent search would have been largely ineffective due to the existence of a patent thicket. As highlighted earlier, the smartphone sector is one that suffers

263. *NTP, Inc. v. Research in Motion, Ltd.*, 270 F. Supp. 2d 751 (D. Va. 2003). For examples of other solutions designed to mitigate perceived consequences of non-practicing entities, see, e.g., Oskar Liivak & Eduardo M. Peñalver, *The Right Not to Use in Property and Patent Law*, 98 CORNELL L. REV. 1437 (2013).

heavily from the existence of multiple overlapping patents.²⁶⁴ Accordingly, the ability for RIM to find all of the relevant patents through searching the register would have been very low indeed. If RIM attempted to find all the relevant patents, it would require a very significant amount of investment of time and labor into the searching process. Before RIM produced the Blackberry, therefore, their option was to perform a costly patent search that was likely to yield little marginal benefit in terms of reduction in expected accident costs (as demonstrated by the fact that when the USPTO searched the register during RIM's later patent application, it too did not uncover NTP's patent). This may explain why RIM seemingly did not perform the search. As we have seen, under a strict liability rule, the user has an incentive to take cost-justified precautionary measures. This precautionary measure was arguably not cost justified, and thus it is little surprise it was not taken.²⁶⁵ Accordingly, Bessen and Meurer conclude that it was likely inefficient for RIM to perform such a search.²⁶⁶

Was searching the register the only possible precautionary measure? Perhaps not. In January 2000, NTP sent RIM a letter explaining their belief that RIM was infringing their technology.²⁶⁷ This arrived sixteen months before NTP initiated a patent infringement suit in Virginia.²⁶⁸ How ought a reasonable company respond to such a letter? Upon receiving an infringement notice, it is arguable that a reasonable precautionary measure would be to hire patent attorneys to analyze the claims made by the patent holder and determine whether there was indeed any infringement. It is not clear, however, whether RIM adopted such measures. At trial, some evidence was introduced to suggest that RIM had carefully considered the claims, while other evidence was presented that RIM ignored the letter.²⁶⁹ Assuming the letter was ignored, was that evidence that RIM failed to take all reasonable precautions? Perhaps. Although the argument could also be made that such letter arrived *after* RIM had commenced the patent infringement. By this point, the Blackberry device was being sold commercially. It is conceivable that analyzing the claims made in the letter would have imposed a cost on RIM, which due to the timing of the letter, would not have helped prevent the infringement in the first instance.

On the other hand, what, if anything could NTP have done to prevent the infringement? Most importantly, NTP could have informed RIM of their patents

264. See *supra* notes 80–81 and accompanying text.

265. An interesting comparison can be made between the RIM case and the British *Schenck* case discussed earlier. See *Schenck Rotec v. Universal Balancing* [2012] EWHC 1920 (Pat). In *Schenck* it was concluded that there was no evidence that would lead a reasonable person to think they should conclude a patent search, and thus search was not considered a reasonable measure to take. It is plausible that RIM's actions were similarly reasonable. *Id.*

266. BESSEN & MEURER, *supra* note 9, at 50 (“The costs of sorting through a large number of uncertain property rights is larger than the expected cost incurred when any one patent is asserted against the innovator. We cannot be sure, but we would not be surprised if RIM's failure to do a patent search was, at the time, the best business decision available to the company.”).

267. *NTP, Inc.*, 270 F. Supp. 2d at 755.

268. *Id.*

269. *Id.* at 755–58 (discussing the sufficiency of RIM's investigation and the conflicting testimony presented).

before RIM started selling the Blackberry. To demonstrate this point, we need some context surrounding the introduction of the Blackberry. From 1995 to 1999, there were only a handful of producers selling pagers incorporating wireless technology: Motorola, US Robotics, Nokia, and RIM.²⁷⁰ After becoming a publicly traded company on the Toronto Stock Exchange in 1997,²⁷¹ RIM entered this market with the production of the Inter@ctive 900 two-way pager, which allowed users to send and receive messages over the internet via a wireless data network known as Mobitex.²⁷² This product was commercially successful and in 1997 was named the Top Product by “Wireless for the Corporate User” magazine.²⁷³ This was just one in a string of high publicity awards. Between 1997 and 1999, RIM won awards for Excellence in Innovation from the Network Computing Magazine, was voted High Technology Entrepreneur of the Year by the Canadian Advanced Technology Association, received the Editor’s Choice Award by CNET, and received the Mobility Award for Mobile Insights from the Smithsonian, to name just a few.²⁷⁴ During the same time, RIM had signed wireless handheld supply contracts with American Mobile, IBM, and Rogers Cantel (now AT&T).²⁷⁵ The two-way pager was so successful that by 1998 RIM were concerned about copycats producing similar pagers, and accordingly applied for a patent on their wireless technology.²⁷⁶ By 1999, the Blackberry was introduced and was already a heavily publicized and established product. *Business Week* called it the close to perfect pocket e-mail, while celebrities such as Bill Gates and Pamela Anderson were already adopting it and promoting it.²⁷⁷

In these circumstances, it would have been reasonable for NTP to inform RIM of their patents at an earlier date. NTP was a patent assertion entity, with a very limited number of patents related to wireless technology. A reasonable patent holder in these circumstances should consider who in the industry may potentially be using their patented technology, and take simple measures to ensure that those potential users do not become accidental infringers—especially when, in areas affected by patent thickets, it is unreasonable to expect the patent register alone to fulfill this task. In this case, NTP only had to keep track of a handful of companies who were potentially infringing their patents—those few companies endeavoring to produce wireless email pagers. These companies, and RIM in particular, were not hidden from public view. Rather, as the proceeding discussion shows, their wireless pagers were very well publicized and discussed in magazines dedicated to wireless technology. In these circumstances, if NTP adopted a little more care in monitoring the market and

270. MCNISH & SILCOFF, *supra* note 1, at 44. As a result, this situation squarely falls within the fact pattern that Chiang identified wherein it is easier for patentees to search for producers than vice versa. See *supra* notes 139–43 and accompanying text.

271. RESEARCH IN MOTION, *supra* note 40.

272. RESEARCH IN MOTION, *supra* note 40.

273. Press Release, RIM, Research in Motion Increases Contract with RAM Mobile Data to \$90 Million (Jan. 7, 1998) (on file with author).

274. RESEARCH IN MOTION, *supra* note 40.

275. RESEARCH IN MOTION, *supra* note 40.

276. Andrew Zipern, *Hardware: Pager Maker Wins Key Patent*, NY TIMES (May 18, 2001), <https://www.nytimes.com/2001/05/18/business/technology-briefing-hardware-pager-maker-wins-key-patent.html>.

277. MCNISH & SILCOFF, *supra* note 1, at 75.

keeping wireless technology producers aware of their patent rights, then we would expect to see a reduction in the chances of a patent accident occurring. If RIM were exculpated from liability, NTP and those similarly situated in the future would have a clear incentive to take these precautionary measures.

The conclusion that RIM was not negligent is, however, tentative. Clearly more knowledge of the case facts would be necessary to come to a final conclusion. Under the current strict liability rule, the court is not obligated to assess the level of care taken by the parties. As a result, the court record in the RIM case does not clearly demonstrate the level of care RIM adopted nor the variables necessary to determining whether such care was reasonable. Therefore, it is possible that the defendant's level of care was unreasonable. This is particularly true in relation to RIM's failure to search the patent register. If so, then the defendant did indeed behave negligently and ought to be subject to a damages award (but not injunction).

Crucially, however, even if RIM was found to be liable under a negligence rule, this would still help create incentives for bilateral care. In the future, parties in RIM's situation could avoid damages by performing a reasonable patent search. Meanwhile, parties in NTP's situation would also take precautionary measures—perceiving the likelihood that most users will perform a patent search and thus be found non-negligent, the patentee will increase their chances of revenue by making their ownership information more readily apparent to users.

2. *Rambus v. Infineon*: Strategic Behavior

As discussed earlier, patentees can often “benefit from strategically hiding, obfuscating, and distorting” information contained in the patent.²⁷⁸ We discussed the *Rambus* case as an example. In this case, Rambus waited until Infineon was “locked in” to using a standards-essential patent before seeking and enforcing new patent claims.²⁷⁹ Only when Infineon adopted the SDRAM technological standard did Rambus disclose their new patent claims and bring an infringement action.²⁸⁰

Did Infineon behave negligently? The answer is almost certainly no! Infineon was an active participant in the JEDEC Standard Setting Organization (SSO) and responsibly inspected all patents that, according to the SSO's rules, were related to the relevant standards. That included inspecting the relevant dynamic random-access memory (DRAM) patent before making any manufacturing decisions. Having responsibly inspected the available patent information, Infineon began manufacturing. Only then did Rambus seek further claims, which, when later issued, would potentially enjoin Infineon's business. Of course, Infineon could have decided not to manufacture anything on the grounds that Rambus—a known patent assertion entity—may potentially seek continuations that would later enjoin their production. But such care would clearly have been excessive, resulting in a massive opportunity cost for both Infineon and its customers. We can be confident that Infineon, therefore, met its duty of care.

278. Menell & Meurer, *supra* note 87, at 5.

279. See Chiang, *supra* note 12, at 11–13.

280. See Chiang, *supra* note 12, at 11–13.

Under a negligence rule, the incentives for this type of strategic behavior would diminish. Having adopted all reasonable measures of care, Infineon would not be liable to Rambus. Not only would Infineon avoid damages, but they would also not be subject to an injunction. The consequence is that such strategic claiming would be completely unprofitable for Rambus. The financial incentive to secretly seek new claims, and to opportunistically trap the unwary, would be completely undercut.

3. *Montanto v. Schmeiser: Self-Replicating Technologies*

The *Schmeiser* case discussed above has generated much academic commentary. In particular, writers have questioned whether the defendant ought to have been subject to a strict liability rule if, as he claimed, the patented seeds accidentally made their way onto his land through cross-fertilization. British treatise writers, Bently, Sherman, Gangjee and Johnson argue that farmers, “through no fault of their own, may be liable for patent infringement when a patented plant ‘invades’ their property”²⁸¹ and highlight that similar problems could occur in relation to other self-replicating technologies, such as genetically modified animals. Similarly, Christopher Holman argues that “while strict liability might be acceptable for most technologies, the ease with which seeds can spread and reproduce relatively autonomously raises serious public policy concerns.”²⁸² But when viewed through the lens of accident law, one sees this is not an isolated incident affecting only biotechnology and self-replicating technologies. This is merely one instance of the broader phenomenon of accidental infringement. And once again, a negligence liability rule would be the appropriate response to such a case.

Assuming for now the case was truly one of accidental infringement, both Percy Schmeiser and Monsanto could have taken steps to prevent the infringement occurring. Farmers in Percy Schmeiser’s position can limit the chances of becoming accidental patent infringers by “fencing out” the invading seeds; this involves creating buffer zones, erecting hedges and other barriers, and “temporal spacing” (i.e., planting crops at different times of year from neighboring farms to limit the chance of cross-fertilization), or cleaning rented equipment thoroughly before use.²⁸³ All of these measures are costly but do effectively reduce the possibility of an accident occurring.

The patentee can equally take care to avoid the infringement. One famous example in the seed context is through employing “Gene Use Restriction Technologies” (GURTs).²⁸⁴ Genetically modified seeds can be further modified such

281. LIONEL BENTLY, BRAD SHERMAN, DEV GANGJEE, & PHILLIP JOHNSON, *INTELLECTUAL PROPERTY LAW* 640 (5th ed. 2018).

282. Christopher M. Holman, *Bowman v. Monsanto Co.: A Bellwether for the Emerging Issue of Patentable Self-Replicating Technologies and Inadvertent Infringement*, 80 *MO. L. REV.* 665, 680 (2015); see also Siddharth Khanijou, *Patent Inequity? Rethinking the Application of Strict Liability to Patent Law in the Nanotechnology Era*, 12 *J. TECH. L. & POL’Y* 179 (2007).

283. See generally JIM RIDDLE, *UNIV. MINN: SW. RESEARCH & OUTREACH CTR., GMO CONTAMINATION PREVENTION: WHAT DOES IT TAKE?* (2013).

284. See, e.g., Yi Sang, Reginald J. Millwood & C. Neal Stewart Jr., *Gene Use Restriction Technologies for Transgenic Plant Bioconfinement*, 11 *PLANT BIOTECH. J.* 649 (2013).

that the plant's offspring do not contain particular traits conferred by the transgenic seed; as a result, if the seed accidentally blows onto another's land, the resulting progeny are not patent-infringing.²⁸⁵ But the precautionary measures at the patent holder's disposal are not limited to complex technological measures. Like George Selden and the Model T, simply publicizing the nature of the risk to farmers would help.²⁸⁶ Farmers such as Schmeiser can only adopt effective precautionary measures if they are aware of the risk, and the patent holder can make this danger clearer through publicity. Likewise, the patent holder can also "fence in" the travelling seeds by erecting appropriate windbreaks or barriers. The patent holder could contribute financially to such initiatives or contractually require that users of their patented seeds do so as a condition of use. As a result, moral philosopher Zoë Robaey argues that the duty to prevent such contamination is not to be borne entirely by the farmer, nor entirely by the patent holder, but that there is a "collective, or joint, imperative to act responsibly to limit or avoid contamination" through such cross-pollination.²⁸⁷

How would adopting a negligence rule affect incentives in the *Schmeiser* case? Once again, the main difference would be that such a rule would create incentives for appropriate care on the patentee side. Under a strict liability rule, Schmeiser already faced incentives to adopt reasonable preventative measures. This would remain the case under a negligence rule. This is not only appropriate but provides a better solution than simply exculpating all "passive infringers." We should expect farmers in Schmeiser's position to adopt reasonable measures. Failure to do so should result in the farmer bearing partial responsibility for the accidental infringement. But equally, farmers who do take reasonable measures to avoid the infringement ought to be exculpated, thus shifting part of the responsibility back onto the patent owner.

CONCLUSION

Accidental patent infringement is a significant and growing problem. As the number of broad and amorphous patents grows, the probability that one will inadvertently infringe a patent increases. This Article has argued that, rather than deem all accidental infringers strictly liable, we ought to hold such defendants legally responsible only when they have failed to take reasonable care to avoid the infringement. Applying theoretical economic models found routinely in tort literature, the Article has analyzed the costs and benefits of the various liability rules that could apply to patent accidents. While current doctrine holds patentees strictly liable, this Article has found that either a strict liability rule with a contributory negligence defense or a simple negligence rule would improve social welfare. Accordingly, the Article recommends the introduction of a "patent negligence" defense. Defendants should be liable for accidental infringement of patents but only

285. *Id.*

286. *Supra* note 42.

287. Zoë Robaey, Seeding Moral Responsibility in Ownership: How to Deal with Uncertain Risks of GMOs (2017) (unpublished Masters dissertation, Universiteit Maastricht) (available at <https://ethicsandtechnology.eu/wp-content/uploads/downloadable-content/Robaey.pdf>); see also Zoë Robaey, *Gone with the Wind: Conceiving of Moral Responsibility in the Case of GMO Contamination*, 22 SCI. ENG. ETHICS 889 (2016).

when they have failed to take the care of a reasonable person. As Guido Calabresi, in relation to physical injury accidents, pointed out fifty years ago: “Our society is not committed to preserving life at any cost.”²⁸⁸ We should not be committed to preserving patents at any cost either!

288. CALABRESI, *supra* note 25, at 17.