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The Accession Insight and Patent Infringement Remedies

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How should property rights be allocated when one party, without authorization, substantially improves the property of another? According to the doctrine of accession, a good-faith improver may take title to such improved property, subject to compensating the original owner for the value of the source materials. While shifting title to a converter seems like a remarkable remedy, this merely highlights the equitable nature of accession, which aims for fair allocation of property rights and compensation between two parties who both have plausible claims to an improved asset.

This Article draws on accession—a physical property doctrine with roots in Roman civil law—to enhance patent law’s treatment of technological improvement. While patents and property exhibit significant differences, this Article argues that accession can provide helpful guidance for allocating rights and obligations when an infringer substantially improves upon another party’s patented technology. Drawing on the Supreme Court’s decision in eBay v. MercExchange, it proposes that courts apply accession in equitable determinations to deny injunctive relief and compel “substantially improving” infringers to compensate patentees through reasonable royalties. Accession would thus shift meaningful ownership of enhanced technologies to improvers based in part on their substantial contributions to them. Such liability rule protection would ameliorate holdup in “blocking patents” scenarios, provide a viable alternative to the rarely-used reverse doctrine of equivalents, and encourage the dissemination of improved technologies. While this proposal seems radical, this Article shows that elements of the “accession insight” already appear in eBay and its progeny. The Article concludes by exploring the theoretical implications of accession for the intersection of patents and property.

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INTRODUCTION

George Wetherbee probably thought he had a pretty good deal. Relying on a seemingly valid license, he cut down $25 worth of trees on land owned by another party and used the lumber to make barrel hoops valued at about $700.1 Unfortunately, Wetherbee’s license was faulty, and the true owners of the trees sued for return of the hoops derived from their wood.2 At trial, Wetherbee argued to keep the hoops, and he sought to introduce evidence that his efforts had significantly enhanced the value of the underlying lumber. The trial court refused this evidence, but the Supreme Court of Michigan reversed this decision on appeal.3 Invoking the doctrine of accession, the court observed, “[I]f a thing is changed into a different species, as by making wine out of another’s grapes . . . the product belongs to the new operator, who is only to make satisfaction to the former proprietor for the material converted.”4 Applying accession, the court held that if Wetherbee acted in good faith and substantially transformed the underlying wood, title to the hoops would transfer to Wetherbee as long as he compensated the original owners for the value of the underlying materials.5

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2 Id.
3 Id. at *5.
4 Id. at *2 (quoting 2 William Blackstone, Commentaries *404).
5 Id. at *5.
While George Wetherbee’s story is real, now consider the hypothetical story of his fictitious great-great-granddaughter, Dr. Georgiana Wetherbee. Dr. Wetherbee is an engineer who invents and patents a revolutionary new battery. After Dr. Wetherbee has invested in personnel and equipment to start large-scale production of her battery, a firm sues her for patent infringement. It turns out that Dr. Wetherbee’s patented invention literally infringes the broad, “genus” claims of a prior patent covering an older battery design. Given this scenario of “blocking patents,” Dr. Wetherbee and the firm attempt to negotiate a license to allow Dr. Wetherbee to manufacture the improved battery. However, high transaction costs, distrust between the parties, and the firm’s desire to extract as much surplus as possible derail negotiations. The firm presses on with its infringement suit, threatening to obtain and enforce an injunction against Dr. Wetherbee unless she pays an exorbitantly high licensing fee. In the meantime, the improved battery sits in limbo, and the prospects for introducing it to the marketplace grow dim.

These two examples, distinguishable on many grounds, nevertheless revolve around a central question: what allocation of property rights should arise when one party improves the property of another? In the physical property realm, this question informs a curious line of cases involving individuals who improve other people’s chattels and parties who build houses on land owned by others. In the patent sphere, this question is critical to technological improvement, particularly to instances where a substantial technological advance infringes an existing patent. While these situations are quite distinct, this Article argues that physical property doctrine can provide insightful guidance to enhance patent law’s treatment of technological improvement.

Patent law has a complicated relationship with property. While numerous authorities have long recognized conceptual similarities between patents and physical property, scholars have consistently questioned this comparison. An important Supreme Court case dealing with patent infringement remedies has further complicated the landscape. In eBay Inc. v. MercExchange, L.L.C., the Supreme Court first affirmed a conception of patents as property and then clarified that “the creation of a [property] right is distinct from the provision of remedies for violations of that right.” As such, the Court implicitly acknowledged that protecting a property right did not necessarily require a property rule (characterized by injunctive relief). In so doing, the Court rejected a per se rule favoring injunctions and established a multifactor equitable framework for determining the appropriateness of injunctive relief following a finding of patent infringement.

6 See infra Part I.A.
7 I use the term “physical property” to encompass the traditional categories of both real and personal property.
8 See infra Section III.A.
9 See infra notes 78-81 and accompanying text.
10 See infra notes 87-100 and accompanying text.
13 eBay, 547 U.S. at 391.
This Article builds on eBay to apply traditional property doctrine to patent law’s treatment of technological improvement. This Article fully acknowledges that the analogy between patents and physical property is not perfect. Rather than reject it wholesale, however, this Article explores a specific context in which the analogy is surprisingly befitting. In particular, it argues that the traditional doctrine of accession provides helpful guidance for determining remedies when a new technology substantially improves upon but infringes an existing patent. Working within the eBay framework, this Article proposes that courts apply accession to deny injunctive relief in cases where an infringing product substantially improves on a patented invention, instead compelling the infringer to compensate the patentee through reasonable royalties.

While accession takes many forms, this Article focuses on doctrines governing “mistaken improvement” of someone else’s personal property. Similar to Wetherbee, if A unknowingly trespasses on B’s land, chops down B’s trees, and fashions the resulting wood into an exquisite chair, the doctrine of accession grants title to that chair to A, subject to A’s compensation of B for the raw materials. Of course, shifting title to a party who converts personal property represents an extraordinary remedy. However, this merely underscores the equitable nature of accession, which aims for fair allocation of property rights and compensation between two parties who both have plausible claims to an improved item.

Under this proposal, courts would consider the value of an infringing improver’s contribution over the original patent in determining appropriate remedies. If the improvement is slight, then (all other things being equal) traditional equitable principles would favor enjoining infringement. Thus, in the vast majority of cases involving “incremental” improvement, accession would not arise. If, however, the improver’s contribution dominates the value of the improved technology, then courts applying the eBay framework could deny injunctive relief. This would be particularly apparent if the infringing technology significantly transformed (yet still infringed) the underlying patent. If the court denied an injunction, it would then direct the infringer and the pioneer patentee to negotiate a reasonable royalty. If parties failed to do so, the court would determine a royalty itself and compel the infringer to compensate the pioneer accordingly.

This proposal addresses several limitations in patent law’s treatment of technological improvement. In general, a patentee enjoys exclusive rights over any technology that infringes

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14 Cf. Anupam Chander, *Minorities, Shareholder and Otherwise*, 113 YALE L.J. 119, 152 (2003) (comparing minorities in the shareholder and constitutional contexts and noting that “[s]uch intradisciplinarity seems especially appropriate to law, a discipline that relies on analogical reasoning”).
15 See infra Section I.A.
16 See 2 WILLIAM BLACKSTONE, COMMENTARIES *404-07.
17 See infra Section I.A.
18 In this Article, I use the term “pioneer” in the context of a simple dynamic system where an original, or pioneer, inventor patents some technology that a subsequent party then improves. I do not confine my use of this term to the historical “pioneer patents” doctrine whereby groundbreaking inventions obtain broad judicial construction. See Michael J. Maurer & Craig Allen Nard, *Exchange: The Doctrine of Equivalents*, 93 GEO. L.J. 1947, 2002-03 (2005).
19 While this analysis focuses on injunctive relief, it necessarily intersects with recent doctrine clarifying the determination of royalties arising from patent infringement. See infra Subsection V.B.2.
her claims, even if that technology substantially improves upon her original creation.20 For certain improvements, patent law relies on “blocking patents” held by the pioneer and improver to motivate voluntary licensing, thus allowing one or both parties to practice the improved technology. However, as suggested above, transaction costs and strategic behavior may prevent such agreements from arising.21 Additionally, while in theory the “reverse doctrine of equivalents” eliminates infringement liability for those who radically improve on patented inventions, courts rarely invoke it.22 The current proposal mitigates the strict right to exclude normally enjoyed by patentees and thereby ameliorates the difficulties of negotiations under the blocking patents regime and offers a viable alternative to the reverse doctrine of equivalents. While this proposal seems radical at first glance, in many ways this notion of weighing relative technological contributions by multiple parties is already evident in eBay itself as well as several cases applying it.23

Part I surveys patent law’s treatment of technological improvement, exploring how a substantial improvement to a patented technology may nonetheless infringe the underlying patent. To begin to develop a new approach to technological improvement, Part II turns to the intersection of patents and property, and in particular to the flexible approach to property rights arising from the Supreme Court’s eBay decision. Part III introduces the traditional property concept of accession, which shifts title to an innocent improver based on his value-enhancing contributions to someone else’s property, contingent on compensating the prior owner for the value of the source materials. Part IV proposes applying accession doctrine to patent infringement remedies, extending liability rule protection when an infringer substantially improves upon an underlying patent. Among other considerations, this Part argues that this seemingly-radical proposal is conceptually consistent with early cases applying eBay. Part V explores the unique advantages of this proposal as well as responds to several prominent objections relating to valuation difficulties and perverse incentives. Part VI explores further implications of this proposal for patent law and the intersection of patents and property.

I.  PATENT LAW’S TREATMENT OF TECHNOLOGICAL IMPROVEMENT

Given the patent system’s objective of promoting technological progress,24 encouraging parties to improve on patented inventions would seem to be a high priority.25 After all, a significant amount of technological innovation is cumulative.26 However, in providing

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20 One exception to this general rule is the reverse doctrine of equivalents. See infra notes 68-72 and accompanying text.
21 Additionally, the agreement may allow the initial patentee to obtain an undue proportion of the rents arising from the improvement, thus diminishing incentives to improve.
22 See infra Part I.
23 See infra Section IV.B.
24 See U.S. CONST. art. I, § 8, cl. 8.
25 Indeed, the patent system expressly encourages one type of “improvement”: designing around existing patented inventions. See State Indus. v. A.O. Smith Corp., 751 F.2d 1226, 1236 (Fed. Cir. 1985).
incentives for individuals to invent new inventions, patents also provide inventors with significant control over subsequent developments of a protected technology. In so doing, they may significantly complicate attempts by other parties to improve upon existing patented inventions.  

To understand the broad control that patents confer over technological improvements, one must understand the nature of patent claiming. All patents conclude with one or more claims, which are highly stylized sentences “particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.” The scope of patent rights—and whether or not an accused product infringes those rights—depends on these claims, which may be much broader than any physical embodiment that the patentee actually created.

To use a fanciful example, the original inventor of the chair could claim “a flat sitting surface held parallel to the ground at a height conducive to sitting by at least three support structures.” Even if this inventor had only stuck three wooden legs on a wooden seat, she would have exclusive rights over a wide variety of chairs of different shapes, materials, and designs. Of course, the requirements of patent disclosure, particularly that a patent adequately describe an invention and enable a technical artisan to make and use it, constrain the scope of exclusive rights. Nevertheless, claim scope commonly ranges well beyond the physical embodiments (if any) created by the inventor. Thus, many “improvements” to this original chair, such as using metal instead of wood, attaching four legs instead of three, or creating a chair with a back and armrests, could conceivably infringe the original patent.

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28 Lemley, Economics of Improvement, supra note 26, at 1000 (“The key to understanding the treatment of improvements in patent law is recognizing that patents are legally defined by the language of the patent’s claims, not by what the patent owner has actually invented or built.”).


30 See In re Warmerdam, 33 F.3d 1354, 1360 (Fed. Cir. 1994) (noting that patent claims define the “metes and bounds” of an invention).

31 See Jeffrey A. Leftsin, The Formal Structure of Patent Law and the Limits of Enablement, 23 BERKELEY TECH. L.J. 1141, 1169 (2008) (“[P]atent claims define the scope of the inventor’s rights by reciting properties; all things having those properties fall within the scope of a patent’s claims.”).

32 Of course, this claim could be written in an infinite number of different ways. For an additional example, see id.

33 See, e.g., Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co., 598 F.3d 1336 (Fed. Cir. 2010) (en banc) (reaffirming that the written description requirement exists as a distinct criterion of patentability relative to enablement).

34 See, e.g., In re Wands, 858 F.2d 731 (Fed. Cir. 1988) (describing a set of factors used to determine whether a patent requires “undue experimentation” to practice, thus failing enablement).

35 See Merges & Nelson, supra note 26, at 845-52 (exploring the role of the disclosure requirements in calibrating patent scope).
In this fashion, a pioneer patentee’s right to exclude may extend to products and processes that “improve” on an original invention but still infringe the patent claims.\(^{36}\) One widely-cited case demonstrating this phenomenon involves satellite technology. In this case, Hughes had patented a system by which a satellite sent data to Earth for calculations and received back outputs that helped orient the satellite in space.\(^{37}\) Another party developed a more advanced system in which the satellite could perform several of these functions onboard.\(^{38}\) Although the latter invention represented an “improvement” over the original patent, the Court of Appeals for the Federal Circuit held that it infringed the original patent under the doctrine of equivalents.\(^{39}\) Thus Hughes, relying on its patent, had a right to exclude the infringer from practicing its improved product. As this example suggests, in conferring broad exclusive rights to pioneers, patent law may reduce incentives for other parties to improve patented inventions.\(^{40}\)

Before proceeding, it is important to clarify the term “improvement” for the purposes of this Article. Although technological improvement represents one instantiation of cumulative innovation, “improvement” as I use it is not synonymous with that broader term. Cumulative innovation may also encompass using one or more patented inventions as inputs into producing other inventions, such as when a scientist uses several patented gene fragments in research leading to a new biotechnology product.\(^{41}\) Cumulative innovation may also entail finding a new use for an existing patented invention, such as when an individual discovers that a patented leather tanning agent also cures AIDS.\(^{42}\) While both of these practices involve cumulative technological advance, they do not constitute “improvements” as this Article uses the term.

For present purposes, improving a patented invention occurs when a party creates a technology that serves a similar technical objective as the existing invention, but does so with greater efficiency or enhanced functionality. In particular, this Article focuses on an interesting

\(^{36}\) Patent law recognizes two types of infringement: 1) literal infringement, in which the accused product or process falls within the literal text of a patent claim, and 2) infringement under the doctrine of equivalents, which “casts around a claim a penumbra which also must be avoided. . . .” Autogiro Co. v. United States, 384 F.2d 391, 400 (Ct. Cl. 1967). For present purposes, the distinction between literal infringement and infringement under the doctrine of equivalents is largely irrelevant. However, one could argue that applying accession doctrine to remedies analysis is even more appropriate where an improver has not literally infringed a patent.

\(^{37}\) Hughes Aircraft Co. v. United States, 717 F.2d 1351 (Fed. Cir. 1983).

\(^{38}\) Id. at 1354.

\(^{39}\) Id. at 1366.

\(^{40}\) For this and other reasons, Robert Merges and Richard Nelson argue in favor of narrow patents in fields marked by cumulative innovation. Merges & Nelson, supra note 26, at 872.


subset of such improvements that infringe the patent upon which they improve. One typical pattern for such improvement arises when a pioneer inventor patents some broad technological “genus” that is then infringed by a subsequent, improved “species” falling within that genus.\(^{43}\) In this sense, the subsequent party “designs over” an existing patented invention as opposed to designing around it. As should be clear, improvement does not necessarily entail conscientiously modifying some known, patented invention. A subsequent party may create a technological “improvement” of a prior patented invention without even being aware of that prior invention’s existence.

A. The Framework in Theory

Mark Lemley offers a useful three-part structure for understanding patent law’s treatment of technological improvements that this Article will also adopt.\(^{44}\) First, “minor” improvements to a patented invention—notably improvements that do not satisfy the criteria for independent patentability—are largely dominated by the original patent.\(^{45}\) If the improvement infringes the patent, either literally or under the doctrine of equivalents, the pioneer patentee may bring suit, seeking an injunction and/or damages. Given that the improvement is not patented, the original patentee can freely practice it. In this sense, with minor exceptions, the original patentee essentially captures the value of the improver’s efforts.\(^{46}\)

Second, the dynamic becomes more interesting in the case of “significant” improvements that are independently patentable over the original patented invention.\(^{47}\) Suppose, for example, that a pioneer inventor patented the original design for a manual toothbrush. Then, a subsequent inventor develops and patents an electric toothbrush, a significant improvement that incorporates (and infringes) the earlier invention.\(^{48}\) This reflects the familiar situation of “blocking patents.” Generally, the pioneer patentee may prevent an improver from practicing any variation of the original patent (including the improvement), and the improver can prevent the original patentee from practicing the improvement. While overlapping exclusive rights seem like a perfect recipe for gridlock, they also provide incentives for the parties to negotiate a licensing agreement whereby one or both of the parties may practice the improved invention.

Third, under historical patent doctrine, “radical” improvements may completely avoid liability even though they literally infringe a patent.\(^{49}\) Under the so-called reverse doctrine of equivalents, an accused product may escape infringement liability if it is “so far changed in principle from a patented article that it performs the same or a similar function in a substantially

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\(^{44}\) Lemley, Economics of Improvement, supra note 26, at 1007-13.
\(^{45}\) Id. at 1007-08.
\(^{46}\) Id. at 1008.
\(^{47}\) Id. at 1008-10.
\(^{48}\) The wording of the patent statute clearly suggests that improvements to patented inventions may be independently patented. See 35 U.S.C. §101 (2006) (“Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.”) (emphasis added).
\(^{49}\) Id. at 1010-13; see Robert Merges, Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents, 62 TENN. L. REV. 75 (1994) [hereinafter Merges, Blocking Patents].
different way, but nevertheless falls within the literal words of the claim.” In effect, the doctrine applies equitable principles to excuse radical improvements from literal infringement.

For example, in Boyden Power-Brake Co. v. Westinghouse, Westinghouse accused Boyden of infringing its patent on an improved train brake. Westinghouse’s brakes used both a central air reservoir as well as auxiliary air reservoirs in each train car to generate force for the brake cylinders, and it also utilized a “tripe valve” to coordinate air flow and pressure in each brake. Notably, Westinghouse’s brake also featured a separate “auxiliary valve” that could simultaneously direct air from both the central and auxiliary reservoirs to the brake cylinders in case of emergency. Boyden’s allegedly infringing brake contained similar elements, including a triple valve. However, Boyden’s ingenious triple valve incorporated within it a valve that allowed air from both the central and auxiliary air reservoirs into a brake cylinder in case of emergency. Arguably, this element paralleled the separate “auxiliary valve” of Westinghouse’s brake, thus rendering Boyden’s brake a literal infringement of Westinghouse’s patent. However, noting the “manifest departure from the principle of the Westinghouse” patent, the Supreme Court denied liability under what is now understood as the reverse doctrine of equivalents. Even though Boyden’s improvement technically fell within Westinghouse’s claims, Boyden’s radically improved design avoided infringement. As a general matter, commentators have lauded the reverse doctrine of equivalents as maintaining incentives for inventors to radically improve upon existing patented technologies.

B. The Framework in Practice

While commentators have praised this tripartite system for addressing technological improvement, practice does not always parallel theory. In cases of “significant” improvement, blocking patents encourage pioneer and subsequent patentees to negotiate a license. However, licensing transactions are fraught with difficulties. Challenges include: identifying pioneer patentees and improvers; high transaction costs; uncertainty regarding the scope and value of patents; the inability of contracting parties to capture positive externalities, which reduces incentives to license; and noneconomic motivations, such as spite and “bad blood.”

51 Merges, Blocking Patents, supra note 49, at 91.
52 170 U.S. 537 (1898).
53 Id. at 538.
54 Id. at 541.
55 Id. at 564-65.
56 Id. at 572.
57 See also Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565 (Fed. Cir. 1991) (reversing the district court’s grant of summary judgment that a protein produced from recombinant DNA technology infringed a patent on the same protein obtained from purifying human blood).
58 Lemley, Economics of Improvement, supra note 26, at 1013; see Merges, Blocking Patents, supra note 49.
59 See Lemley, Economics of Improvement, supra note 26, at 1073 (suggesting that copyright law should adopt “blocking copyrights” and “radical improvers” doctrines modeled on analogous concepts in patent law).
60 Id. at 1048-61; see Merges, Blocking Patents, supra note 49, at 89-91.
Additionally, economic theory shows that strategic bargaining will sometimes cause negotiations to fail even in the presence of a potential cooperative surplus.\textsuperscript{61} These considerations especially apply to bilateral monopolies in which there is only one seller and one buyer of a resource, which is often the case in patent licensing.\textsuperscript{62} While much academic commentary has focused on the implications of patent “holdup” for integrated products composed of many patented components, such holdup may also apply to patent licensing negotiations for single-component products.\textsuperscript{63} In addition to these general licensing difficulties, there are specific challenges inherent to negotiations between technological pioneers and improvers. Valuing the contributions of two different parties to an improved technology is intrinsically difficult, and uncertainty over future technological developments can complicate negotiations.\textsuperscript{64}

To be sure, Lemley argues that blocking patents ameliorate these concerns, “not by reducing transaction costs or uncertainty, but by increasing the value to both parties of coming to an agreement.”\textsuperscript{65} Ultimately, however, because of lingering transactional and strategic difficulties, bargaining between pioneers and improvers “will occasionally break down even though they could both realize substantial gains from agreement.”\textsuperscript{66} Empirical accounts of the early radio and steel industries confirm that negotiations between pioneers and improvers sometimes fail and suggest that these failures cause high social welfare losses.\textsuperscript{67}

In addition, it is important to consider not only whether parties agree to a license, but the particular division of rents arising from their agreement. If an original patentee leverages her right to exclude to extract a disproportionate share of rents, then even though a licensing agreement is achieved, an improving patentee will face diminished incentives to invent. Ultimately, such chilled incentives may discourage future efforts to improve upon existing patented inventions.

Turning to “radical” improvements, courts rarely invoke the reverse doctrine of equivalents. In theory, the doctrine “serves as a judicial ‘safety valve’” that can ameliorate instances of bargaining breakdown between pioneers and improvers.\textsuperscript{68} However, the Federal Circuit has “effectively abrogate[d]” the doctrine.\textsuperscript{69} In 2002, it stated:

\begin{footnotesize}
\textsuperscript{62} See Merges, Property Rules, supra note 43, at 2659 (describing blocking patents as “a textbook case of bilateral monopoly in action”).
\textsuperscript{63} See, e.g., Lemley & Shapiro, supra note 41.
\textsuperscript{64} Merges, Blocking Patents, supra note 49, at 75.
\textsuperscript{65} Lemley, Economics of Improvement, supra note 26, at 1069.
\textsuperscript{66} Merges, Blocking Patents, supra note 49, at 75.
\textsuperscript{67} Id. at 84-89.
\textsuperscript{68} Id. at 75. While Robert Merges advocates excusing some holders of subservient blocking patents from infringement liability, most notably via the reverse doctrine of equivalents, I propose a more graduated approach in which such parties would face liability rule protection of the patents they infringe. See id.; Merges, Property Rules, supra note 43, at 2660.
\textsuperscript{69} Merges & Nelson, supra note 26, at 887.
\end{footnotesize}
Not once has this court affirmed a decision finding noninfringement based on the reverse doctrine of equivalents. And with good reason: when Congress enacted 35 U.S.C. § 112, after the decision in Graver Tank, it imposed requirements for the written description, enablement, definiteness, and means-plus-function claims that are coextensive with the broadest possible reach of the reverse doctrine of equivalents. Even were this court likely ever to affirm a defense to literal infringement based on the reverse doctrine of equivalents, the presence of one anachronistic exception, long mentioned but rarely applied, is hardly reason to create another. 70

According to the Federal Circuit, the disclosure and claiming requirements of patent law limit claim scope so as to provide essentially the same safeguard as the reverse doctrine of equivalents. However, given the vagueness of claims and the breadth with which courts often interpret them, 71 it seems doubtful that these “constraints” serve the same function as the reverse doctrine of equivalents. Nevertheless, as an empirical matter the doctrine is “seldom-used” and largely moribund. 72

The result is a tripartite scheme that operates in practice to favor original patentees considerably over subsequent improvers. “Minor” improvements are dominated by prior patents. “Significant” improvers, although wielding the leverage of their own patents, face difficult negotiations with pioneer patentees. And “radical” improvers may rarely avail themselves of the reverse doctrine of equivalents to escape infringement liability. Ultimately, improvers are still in many ways subject to the exclusive rights of pioneer patentees, thus dampening incentives to improve. To further shore up those incentives, and to provide a more equitable approach to technological improvement, this Article turns to doctrines from traditional property law.

II. PATENTS AS PROPERTY

A. Exclusive Rights over Productive Resources

As illustrated in the previous survey of technological improvement, the patent system generally confers strong exclusive rights over inventions. As noted, pioneer patentees dominate minor improvers, and such patentees also enjoy a high degree of leverage over significant improvers in the context of blocking patents. The reverse doctrine of equivalents is the exception that proves the rule; courts apply this limitation on a patentee’s strict right to exclude extremely rarely.

70 Tate Access Floors Inc. v. Interface Architectural Resources, Inc., 270 F.3d 1357, 1368 (Fed. Cir. 2002).
72 Merges, Blocking Patents, supra note 49, at 91; see Roche Palo Alto LLC v. Apotex Co., 531 F.3d 1372, 1378 (“The reverse doctrine of equivalents is rarely applied, and this court has never affirmed a finding of non-infringement under the reverse doctrine of equivalents.”); Ethyl Molded Prods. Co. v. Betts Package Inc., 9 U.S.P.Q.2d 1001, 1026 (E.D. Ky. 1988) (“The reverse doctrine of equivalents, although frequently argued by infringers, has never been applied by the Federal Circuit.”).
In embracing strong exclusive rights, clear parallels emerge between patent law and the law of physical property. Property, after all, has long been associated with the right to exclude.\(^{73}\) This Article further explores the similarities of patents and physical property, but in a manner that leads to some rather unexpected results. In so doing, it must proceed cautiously, for patent law has a complicated relationship with property. On the one hand, patents and property share certain unmistakable similarities in both ends and means. In terms of objectives, patent law’s goal of promoting technological progress parallels one of the most important objectives of property rights: to encourage productive exploitation of resources.\(^{74}\) In terms of mechanisms, patent law mirrors traditional formulations of property rights by conferring broad exclusive rights over such resources.\(^{75}\) Exclusive rights serve a number of functions in both contexts, including internalizing externalities\(^{76}\) and economizing on information costs when delineating acceptable uses of property.\(^{77}\)

Not surprisingly, numerous authorities have long compared patents to physical property. This is unsurprising given that the Patent Act itself states that “patents shall have the attributes of personal property.”\(^{78}\) The Supreme Court has noted that “[p]atents . . . have long been considered a species of property,”\(^{79}\) and it has described patent rights as encompassing “the

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\(^{73}\) 2 WILLIAM BLACKSTONE, COMMENTARIES *2 (describing property ownership as “that sole and despotic dominion which one man claims and exercises over the external things in the world, in total exclusion of the right to any other individual in the universe.”); Kaiser Aetna v. United States, 444 U.S. 164, 176 (1979) (noting that the right to exclude is “one the most essential sticks in the bundle of rights that are commonly characterized as property”); Coll. Sav. Bank v. Fla. Prepaid Postsecondary Educ. Expense Bd., 527 U.S. 666, 673 (1999) (“The hallmark of the protected property interest is a right to exclude others.”); Thomas Merrill, Property and the Right to Exclude, 77 Neb. L. Rev. 730, 730 (1998) (“[T]he right to exclude others is more than just ‘one of the most essential constituents’ of property—it is the \textit{sine qua non}.”).

\(^{74}\) This productive impulse is reflected, for example, in the doctrine of first possession. See, e.g., CAROL M ROSE, PROPERTY AND PERSUASION 20 (1994) (“[T]he common law gives preference to those who convince the world that they can catch the fish and hold it fast. This may be a reward for useful labor but it is more precisely the articulation of a specific vocabulary and structure of symbols understood by commercial people.”); see also Harold Demsetz, Toward a Theory of Property Rights, 57 AM. ECON. REV. 347 (1967). This is not, of course, the only purpose that property rights serve. See JESSE DUKEMINIER ET AL., PROPERTY 50-52 (7th ed. 2010).

\(^{75}\) See 35 U.S.C. § 271(a) (2006) (“[W]hoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”).

\(^{76}\) See Demsetz, supra note 74.


legitimate expectations of inventors in their property.”80 Furthermore, academic commentary is replete with comparisons of patents to physical property.81

In most contexts, this conception of patents as property bolsters normative claims that patents should confer strict exclusive rights.82 Just as trespass grants landowners a strong right to exclude unauthorized visitors, patents should enable inventors to enjoin all unauthorized uses of a patented technology.83 According to this view, strict exclusive rights provide the most robust incentives to invent and develop new inventions,84 facilitate technology transactions,85 and minimize information costs for outside parties.86

On the other hand, scholars have questioned the patents-as-property analogy by highlighting the fundamentally different natures of patented inventions and physical property. The technical information protected by patents is a public good, meaning that it is nonrival87 (multiple parties can use it without diminishing its availability) and nonexcludable88 (absent legal intervention, it is difficult if not impossible to exclude others from appropriating it).89 These attributes distinguish intellectual property from physical property such as land and chattels,

80 Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd., 535 U.S. 722, 739 (2002); see also eBay v. MercExchange, 547 U.S. 388, 392 (2006); Panduit Corp. v. Stahlin Bros. Fibre Works, 575 F.2d 1152, 1158 n.5 (“Patents must by law be given ‘the attributes of personal property.’ The right to exclude others is the essence of the human right called ‘property.’”) (6th Cir. 1978) (quoting 35 U.S.C. § 261). Indeed, courts’ perception of patents as property has even extended to applying the Takings Clause to government deprivations of patent rights. Adam Mossoff, Patents as Constitutional Private Property, The Historical Protection of Patents under the Takings Clause, 87 B.U. L. REV. 689, 690 (“Patents are property.”); but see Zoltek Corp. v. United States, 442 F.3d 1345 (Fed. Cir. 2006) (per curiam) (refusing to apply the Takings Clause to government deprivations of patents).


82 See Mark A. Lemley & Phillip J. Weiser, Should Property or Liability Rules Govern Information?, 85 TEX. L. REV. 783 (2007) (describing this argument); Lemley, Free Riding, supra note 81, at 1031-32 (same).

83 However, even Richard Epstein, a proponent of strong property rights, recognizes appropriate limitations on the right to exclude. See Richard Epstein, Property and Necessity, 13 HARV. J.L. & PUB. POL’Y 2, 7 (1990) (“Under certain localized circumstances . . . conferring these absolute rights to exclude does not advance competition in ordinary markets, but rather it creates bilateral monopoly, holdout problems, and transaction-cost obstacles of one sort or another. At common law it is just these various situations in which there is a systematic, intuitive willingness to back off the comprehensive ideal of property in favor of a system that is a little bit frayed at the edges.”).

84 See, e.g., Kieff, supra note 81, at 3 (noting the importance of strict exclusive rights in commercializing technology).


86 See Smith, Intellectual Property, supra note 77.

87 See VI THE WRITINGS OF THOMAS JEFFERSON 180-81 (H.A. Washington ed., 1871) (describing ideas as “expansible over all space, without lessening their density in any point”)

88 While firms may protect valuable information as a trade secret, without legal intervention such as enforceable nondisclosure agreements, it may be difficult to maintain the secrecy of information and still exploit it.

89 But see Robin Cowan et al., The Explicit Economics of Knowledge Codification and Tacitness, 9 INDUS. & CORP. CHANGE 211, 224 (2000) (noting the importance of tacit knowledge in practicing patented invention and challenging the conception of knowledge as nonrival and nonexcludable).
which are both rivalrous and more easily excludable.\textsuperscript{90} As such, traditional justifications for private property rights, such as to avoid a tragedy of the commons,\textsuperscript{91} are inapposite to intellectual property assets, which by their nature are not subject to overconsumption.\textsuperscript{92} The theoretical foundations for patent and property are thus quite distinct.\textsuperscript{93} Furthermore, natural rights justifications for property law\textsuperscript{94} do not apply with great force to patents, which exist not to reward effort or genius but to promote society-wide technological progress.\textsuperscript{95} Commentators also observe that the term “intellectual property” is of relatively recent vintage\textsuperscript{96} and that this linguistic similarity may imply more conceptual similarity than is warranted.

These distinctions between patents and property, moreover, motivate calls to limit the breadth and strength of patent rights. Viewed through an economic lens, the nonrival nature of technical designs means that an infinite number of people can simultaneously “consume” them without producing scarcity. Static allocative efficiency thus weighs in favor of open access to existing inventions, a regime that cuts directly against exclusive rights.\textsuperscript{97} While physical property law utilizes exclusive rights to internalize externalities,\textsuperscript{98} commentators note that full internalization of externalities would be highly deleterious in the intellectual property context.\textsuperscript{99} Indeed, positive externalities are crucial to the design of intellectual property regimes, which allows and encourages many forms of free riding.\textsuperscript{100}

This Article does not attempt to resolve the question of whether patents are property. However, rather than accept or reject the patents-as-property analogy wholesale, this Article takes a more granular approach. It contends that in certain contexts, property law and theory may be helpful in understanding, tailoring, and improving certain aspects of patent law. Continuing with the theme of granularity, this Article also challenges the implicit presumption of physical property law as categorically favoring strict exclusive rights. At a descriptive level,

\begin{itemize}
  \item \textsuperscript{90} Lemley, \textit{Free Riding}, supra note 81, at 1050-53.
  \item \textsuperscript{91} See Garrett Hardin, \textit{The Tragedy of the Commons}, 162 SCIENCE 1243 (1968); Demsetz, supra note 74.
  \item \textsuperscript{92} See Lemley, \textit{Free Riding}, supra note 81; see also Mossoff, supra note 80, at 719 (noting the challenge of applying the Takings Clause to patent law, given that government use of a patented invention does not physically dispossess the inventor of anything); \textit{but see} Robert P. Merges \textit{et al., Intellectual Property in the New Technological Age} 916 (rev. 4th ed. 2007) (noting “congestion externalities” that undermine the value of some intangible resource—such as a celebrity’s image—even though the underlying resource remains nonrival).
  \item \textsuperscript{93} Lemley, \textit{Free Riding}, supra note 81, at 1055 (“Intellectual property . . . is not a response to allocative distortions resulting from scarcity, as real property is. Rather, it is a conscious decision to create scarcity in a type of good which is ordinarily absent in order to artificially boost the economic returns to innovation.”).
  \item \textsuperscript{94} \textit{See} \textit{John Locke, Second Treatise of Government} (C.B. Macpherson ed., 1980).
  \item \textsuperscript{96} Lemley, \textit{Free Riding}, supra note 81, at 1033 n.4; cf. Lemley & Weiser, supra note 82, at 783-84 (describing the different origins and rationales of property and intellectual property law).
  \item \textsuperscript{97} Peter Lee, \textit{Toward a Distributive Commons in Patent Law}, 2009 Wis. L. REV. 917, 929.
  \item \textsuperscript{98} See Demsetz, supra note 74.
  \item \textsuperscript{100} Lemley & Frischmann, supra note 99.
\end{itemize}
“sole and despotic dominion” is a caricature of property rights. At a normative level, the ways in which property law confers less than strict exclusive rights may suggest curtailing patent rights as well. Before introducing a specific proposal applying these insights, this Article turns to a recent Supreme Court case shedding light on the nature of property rights conferred by patents.

B. eBay v. MercExchange

An important Supreme Court case dealing with patent infringement remedies has further complicated the relationship between patents and property. In eBay v. MercExchange, eBay and Half.com, a wholly owned subsidiary, infringed MercExchange’s business method patent on an electronic market. However, the district court denied MercExchange’s motion for permanent injunctive relief. The Federal Circuit reversed, applying its “general rule that courts will issue permanent injunctions against patent infringement absent exceptional circumstances.” On appeal, the Supreme Court reversed the Federal Circuit. The Court first affirmed a conception of patents as property but then clarified that “the creation of a [property] right is distinct from the provision of remedies for violations of that right.” As such, the Court implicitly acknowledged that protecting a property right did not necessarily require a property rule (characterized by injunctive relief).

The Court thus rejected a per se rule favoring injunctions in infringement actions and established a multifactor equitable framework for determining the appropriateness of injunctive relief. Within this framework,

A plaintiff must demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.109


104 Id. at 715.


106 Id. at 392.

107 See Calabresi & Melamed, supra note 12; see also Voda v. Cordis Corp., 2006 WL 2570614, *5 (W.D. Okla. 2006) (“[T]he Court clearly held the right to exclude does not, standing alone, justify a general rule in favor of injunctive relief.”) (citation omitted).

108 eBay, 547 U.S. at 391. In adopting its holistic framework, the Court thus reinvigorated the equitable nature of patent injunctions analysis. See 35 U.S.C. § 283 (2006) (“The several courts having jurisdiction of cases under this title may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable.”); Wendy R. Stein et al., The Supreme Court eBay Decision: Eliminating Special Rules in Patent Cases, Intell. Prop. Today, Oct. 2006, at 18.

109 eBay, 547 U.S. at 391.
eBay has significant implications for the relationship between patents and property. It also has significant implications for infringement remedies in the context of technological improvement. Courts are no longer shackled to a syllogism wherein a finding of infringement leads inexorably to the grant of an injunction, thus raising the possibility of continued infringement of a patent even after a finding of liability. Denying injunctive relief also raises the possibility of providing ongoing royalties to a patentee as compensation for prospective infringement, thus converting patent protection from a property rule to a liability rule. In order to apply this newfound flexibility to enhance patent law’s treatment of technological improvement, this Article first turns to the physical property principle of accession.

III. ACCESSION

A. Accession Generally

In general, the principle of accession refers to the granting of title to some resource based on its relationship to something that is already owned. Accession, which enjoys a long history extending from Roman civil law, encompasses a number of distinct legal doctrines sharing this conceptual basis. For example, under the doctrine of ratione soli, landowners enjoy constructive possession of wild animals that happen to be on their land. Similarly, the “rule of increase” holds that the owner of a female domestic animal also owns whatever offspring that animal produces. Similarly, under the doctrine of accretion, a riparian landowner takes title to alluvial deposits that augment her land. Accession further explains why farmers own the crops that grow on their soil, property owners hold title to oil deposits beneath their surface estates, and fixtures generally belong to the owner of the land and improvements to which they are affixed. In all of these cases, accession grants title to property based on its relationship to something that is already owned.

This Article focuses on a subset of accession doctrines dealing with one party’s improvement of someone else’s property. Here again, distinctions are in order. In the real property context, typical cases involve a trespasser who, perhaps mistakenly, improves someone

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110 See Calabresi & Melamed, supra note 12.
111 See Thomas W. Merrill, Accession and Original Ownership, 1 J. LEG. ANALYSIS 459, 460 (2009).
113 See Pierson v. Post, 3 Cai. R. 175 (Sup. Ct. N.Y. 1805) (discussing ratione soli).
114 Merrill, supra note 111, at 464-65.
115 Id. at 465-66; see Nebraska v. Iowa, 143 U.S. 359 (1892).
116 Merrill, supra note 111, at 465.
117 Id. at 467.
118 Id.
else’s land by building a house on it.119 This Article, however, focuses on a constellation of “mistaken improver” doctrines dealing with personal property.120

Commentators routinely group several related but distinct concepts together when discussing mistaken improvers of personal property.121 Such grouping is all the more confusing because one of these concepts has the name “accession.” First, “specification” applies when someone exerts labor or skill to create a new product out of the personal property of another, such as when one person uses someone else’s marble to carve a statue.122 Second, “accession” or “adjunction” applies where two or more items of personal property owned by different parties are joined but remain distinguishable.123 This arises, for example, when one individual’s diamond is encased in another individual’s ring.124 Finally, “confusion” applies when two similar kinds of property (from different owners) are combined, such that they cannot be distinguished.125 This occurs, for example, when wheat belonging to two different owners becomes intermixed. While this Article focuses most centrally on the concept of “specification,” it refers to this body of doctrine as “accession” in a manner consistent with modern usage.126

In certain circumstances, accession doctrine can cause a curious transfer of property rights. Under this doctrine, when an innocent party improves someone else’s personal property in a way that significantly enhances its value or changes its nature, the improver may take title to the improved item, contingent on compensating the original owner for the raw materials.127 In explaining this application of accession, Blackstone noted:

121 See generally Arnold, supra note 112 (distinguishing among specification, accession, and confusion).
122 Id. at 104-17.
123 Id. at 118.
124 JOHN BOUVIER, 1 INSTITUTES OF AMERICAN LAW 198 (1851).
125 Arnold, supra note 112, at 119.
126 In common parlance, “accession” has come to be associated with both the concepts of “specification” and “accession,” which are both distinct from “confusion.” Merrill, supra note 111, at 464 n.4; see also Christopher M. Newman, Patent Infringement as Nuisance, 59 CATH. U. L. REV. 61, 87 (2009).
127 See 2 WILLIAM BLACKSTONE, COMMENTARIES *404-07; see Arnold, supra note 112, at 120 (“In the absence of a statutory modification of the common law action of replevin, the plaintiff cannot recover his property in specie if its personal identity has been changed.”); see Ochoa v. Rogers, 234 S.W. 693, 694 (Ct. Civ. App. Tex. 1921) (“But if the one in wrongful possession be an innocent or unintentional trespasser, and in good faith improves and enhances the value of the property, and such improvements and additions exceed, or even substantially approach, the value of the article in its raw state when found, the property in dispute becomes merely accessory to the resulting product, and title thereto passes to the purchaser, who is liable to the original owner only for the market value of the lost article at the time it is found.”); Kirby Lumber Co. v. Temple Lumber Co., 125 Tex. 284, 300 (Tex. 1935) (“It is a well-settled rule of decision in other jurisdictions that when the appropriation of property is made in good faith under a mistake of facts, and the taker has by labor expended upon said property converted it into a thing entirely different from the original and of greatly increased value, the title to the property will pass to the person by whose labor the change has been wrought, and the original owner can only recover the value of the article at the time it was taken.”); Hamilton v. Rock, 191 P.2d 663, 668 (Mont. 1948) (“Therefore the plaintiff should not be permitted to enjoy the fruits of defendant’s labor without paying therefor.”); Drake Ins. Co. v. King, 606 S.W. 2d 812, 818 (Tex. 1980) (citing Ochoa v. Rogers with approval); Capitol Chevrolet Co. v. Earheart, 627 S.W. 2d 369, (Tex. 1982) (“Where the appropriation of the property was unintentional and labor or material have been expended or added
if the thing itself, by such operation, was changed into a different species, as by making wine, oil, or bread, out of another’s grapes, olives, or wheat, it belongs to the new operator, who has only to make a satisfaction to the former proprietor for the materials which he had so converted.\textsuperscript{128}

The canonical case of \textit{Wetherbee v. George}, discussed above,\textsuperscript{129} illustrates the doctrine of accession.\textsuperscript{130} Wetherbee, acting in good faith,\textsuperscript{131} cut a stand of trees and used the resulting lumber to fashion barrel hoops, thus increasing the value of the wood more than twenty-fold.\textsuperscript{132} The original property owners sued for replevin of the hoops. After reciting the general rule that one whose property has been misappropriated may recover it,\textsuperscript{133} the Supreme Court of Michigan identified an exception based on accession.\textsuperscript{134} Where an individual has transformed someone else’s property, thus significantly enhancing its value, title shifts to the improver as long as he compensates the original owner for the materials taken.\textsuperscript{135} In such instances of transformation, “the change in the species of the chattel is not an intentional wrong to the original owner. It is, therefore, regarded as destruction or consumption of the original materials, and the true owner is not permitted to trade the identity into the manufactured article, for the purposes of appropriating to his own use the labor and skill of the innocent occupant who wrought the change.”\textsuperscript{136} Extrapolating from these principles, Wetherbee could retain title to the improved property contingent upon paying damages to the original owners for the underlying wood.

In general, when a plaintiff sues for return of improved property, courts focus on whether sufficient “transformation” has occurred so as to trigger application of accession.\textsuperscript{137} Courts have which greatly enhances its value, and the value of the original article is insignificant in comparison with the value of the new product, the title to the property in its converted form will pass to the person who has thus expended or added his labor and materials, compensating the owner for the value of the original article or materials.”) (citing 1 C.J.S. \textsc{Accession} s.5; B.A. Ballou and Co. v. Citytrust, 591 A.2d 126, 130 n.4 (Conn. 1991) (“If, however, the identity of the item has been destroyed, its nature substantially changed, or value greatly enhanced, as between the manufacturer and the original owner, the owner loses his right of ownership and retains only an action of the value of the goods lost.”).\textsuperscript{128} 2 \textsc{William Blackstone, Commentaries *404.}
\textsuperscript{129} See supra notes 1-5 and accompanying text.
\textsuperscript{130} 22 Mich. 311 (Mich. 1871).
\textsuperscript{131} Wetherbee obtained a license from Sumner, a tenant in common with Green, who had authorized Sumner to grant licenses on behalf of both co-owners. However, before Sumner had granted a license to Wetherbee, Sumner had conveyed his interest to Camp and Brooks. Thus, at the time of Sumner’s license to Wetherbee, Sumner had no interest in the property. \textit{Id.} at *1.
\textsuperscript{132} \textit{Id.}
\textsuperscript{133} \textit{Id.} at *2; \textit{accord.} Silsbury & Calkins v. McCoon & Sherman, 3 N.Y. 379, 381 (Ct. Appeal. N.Y. 1850); \textit{see also} Arnold, \textit{supra} note 112, at 104.
\textsuperscript{134} Drawing in particular on the notion of specification, the court observed that there must “be some limit of the [property owner’s] right to follow and reclaim materials which have undergone a process of manufacture.” Wetherbee, 22 Mich. 311, at *2.
\textsuperscript{135} \textit{Id.}
\textsuperscript{136} \textit{Id.}
\textsuperscript{137} \textit{Id.} at *4 (“The important question . . . appears to us to be, whether standing trees, when cut and manufactured into hoops, are to be regarded as so far changed in character that their identity can be said to be destroyed within the meaning of the authorities.”); \textit{see also} Silsbury, 3 N.Y. at 386.
developed several approaches to evaluating transformation. First, courts applying “physical identity theory” consider whether an improved article has “changed into another species.” Within this approach, “a permanent alteration of the component parts must have been made, so that any attempt to change them again to their original form would cause so much damage in proportion to the value as to make it impracticable.” Notably, in some cases, this approach can transfer title from an original owner to an improver even when the original taking was willful. Second, many courts focus on the comparative value of the original and improved item to determine whether the improvement has produced the requisite transformation. This approach is generally only available when the original taking was not willful.

*Wetherbee* is indicative of the comparative value approach, which several modern courts have also adopted. If the value of the improver’s labor “has swallowed up and rendered insignificant the value of the original materials,” transformation has been achieved and title transfers to the improver. Within this analysis, courts focus on the actual values of the improver’s and original owner’s contributions to the improved item, not the cost of their respective contributions. Whichever party contributes the greater part of the value takes title to the improved item.

Here it is important to clarify a potential point of confusion regarding accession doctrine. As a general matter, the *principle* of accession grants title to some asset based on its relationship to something else that is already owned. In cases of mistaken improvement, this principle may suggest that the original owner should retain title to the improved item. (After all, the improved item is derived from resources already owned by that party.) However, the *doctrine* of accession shifts title to the improver in cases of transformative improvement. While this appears to be an exception to the general accession principle, it is in fact consistent with it. Abstracting somewhat, Thomas Merrill observes that the central question in accession cases is “which owner of inputs has supplied the larger or more valuable input—i.e., has established the most prominent connection” to the improved item. The operative “input” in cases of value-enhancing improvement is the labor of the improver. This labor establishes a more “prominent connection” to the improved item, thus trumping the other party’s original ownership of the source material.

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138 As a background consideration, several courts emphasize that no matter the degree of physical transformation, in cases of willful trespass, the original owner may recover the article as long as he can establish that it was made from his source material. Arnold, *supra* note 112, at 107.
139 *Id.* at 105.
140 *Id.*
141 *Id.* at 108.
142 *Id.* at 106.
143 *Id.*
144 *Wetherbee*, 22 Mich. 311, at *2 (“When the right to the improved article is the point in issue, the question, how much property or labor of each has contributed to make it what it is, must always be of first importance.”).
147 *Id.* at *5.
148 Merrill, *supra* note 111, at 466.
149 *Id.* at 481 n.16.
Of course, shifting title to a party who converted personal property is an extraordinary remedy. However, this merely underscores the equitable nature of accession, which aims for just allocation of property rights and compensation between two parties who both have plausible claims to an improved item.

Commentators have lauded accession on a number of fronts. Information costs are critical to property, and accession provides a low-cost, intuitive method for allocating property rights in some improved item. By vesting title in the improver, the doctrine of accession thus encourages (or at least does not unduly punish) productive exploitation of resources. However, the doctrine guards against potential strategic behavior by generally insisting on good faith by the mistaken improver. The doctrine of accession also appeals to notions of fairness. There is, as commentators have pointed out, a distinctly Lockean tenor to accession doctrine, which converts protection of a resource from a property rule to a liability rule based on an innocent improver’s significant and value-enhancing contributions to some source material. The doctrine parallels Locke’s notion that an improving laborer should receive title to property when the “labour makes the far greatest part of the value [of the asset].” As we will see, these benefits—notably efficiency and fairness—may provide a useful guide for revisiting the treatment of technological improvement in patent law.

B. Accession and Intellectual Property

Before turning to the proposal at hand, it is worthwhile to note that many areas of intellectual property law already exhibit accession-like features. Where accession arises in the intellectual property context, it generally operates to expand the scope of property rights for existing owners of intellectual property. However, as noted below, this need not be the case.

For example, one sees traces of accession in copyright law. This is most apparent in copyright’s awarding of “derivative work” rights to an initial author. Under standard copyright doctrine, an author who writes a book about a boy wizard who attends wizard school obtain not only exclusive rights in that written work, but also the right to prepare “derivative works” such as sequels and movie adaptations. Here, ownership of some resource (the derivative work) is allocated to the initial author based on its relationship to something else that is already owned (the copyright in the book).

Trademark law also reflects principles of accession, most notably in the doctrine of dilution. Dilution gives the owner of a famous mark the right to prohibit uses of the mark that may blur or tarnish it, even where consumer confusion is unlikely. For example, dilution

150 Wetherbee, 22 Mich. 311, at *5.
152 Merrill, supra note 111, at 477-78.
154 Id. at 1767.
156 See 17 U.S.C. §§ 101, 103 (2006); Merrill, supra note 111, at 486.
157 Lemley, Economics of Improvement, supra note 26, at 1018-20.
would likely prohibit a firm from calling its product “Rolls Royce Corndogs,” even though few consumers would be confused into thinking that the famous automaker makes this snack food. Dilution reflects principles of accession insofar as trademark law confers additional property rights to an individual because of her present ownership of a famous mark.159

Commentators have also identified elements of accession in patent law. Henry Smith draws an analogy between accession and the original grant of a patent to an inventor.160 Within this view, technical ideas are collectively owned in the public domain, and inventors add their ingenuity and labor to these ideas to produce privately-owned, patented inventions.161 This interaction parallels accession scenarios where one party improves someone else’s property. Within this formulation, the inventor receives title to the “improvement” (the patented invention) in exchange for compensating the public with technical disclosure.162

Elements of accession are reflected not only the initial grant of patent rights, but also in the broad control that patentees enjoy over subsequent technological developments. Related to the cases of “minor” and “significant” improvements described above,163 Thomas Merrill sees accession at play in allowing pioneer patentees to enjoy property rights over subsequent technological advances.164 In particular, minor improvements to a patented invention that are not themselves patentable effectively belong to the pioneer inventor, as she can “block anyone else from using an invention that incorporates the patent.”165 This view also relates to Edmund Kitch’s influential prospect theory, which justifies granting early, broad patents to inventors based on the notion that patentees may then rationally coordinate subsequent technological developments.166 An even more direct example of accession is the doctrine of equivalents, which effectively enhances patent scope beyond what an inventor literally claims.167 Here again, patent law allocates ownership of additional resources based on their relationship to something that is already owned (an existing patent).

While accession generally serves to expand (or initiate) the rights of patentees, it may also limit those rights.168 This is particularly relevant when two inventors both have claims on some technology, as when one party improves upon another’s invention. In an insightful article, Christopher Newman explores the possibility of applying accession to limit injunctive relief

159 Merrill, supra note 111, at 469. Mark Lemley and Mark McKenna challenge this view, and the broader notion of expansive ownership of marks in unrelated markets, on normative grounds. Mark A. Lemley & Mark P. McKenna, Owning Mark(et)s, 109 MICH. L. REV. 137, 177-80 (2010). Notably, Lemley and McKenna also criticize the application of physical property concepts like accession to intellectual property. Id.
160 Smith, Intellectual Property, supra note 77, at 1766-82.
161 Among other considerations, Smith distinguishes patent acquisition from first possession, which presumes that the underlying technical ideas are unowned, by emphasizing that society in general has preexisting rights in the public domain. Id. at 1767-68.
162 Id. at 1771.
163 See supra Part I.
164 Merrill, supra note 111, at 468-69.
165 Id.
167 Merrill, supra note 111, at 469; see Autogiro Co. v. United States, 384 F.2d 391, 400 (Ct. Cl. 1967).
168 In a proposal similar to the one advanced below, Gideon Parchomovsky and Alex Stein have suggested limiting copyright’s grant of derivative work rights based on accession. This proposal would allow the authors of derivative works to continue to infringe an underlying copyright work as long as they demonstrated a requisite level of originality in their works. Gideon Parchomovsky & Alex Stein, Originality, 95 VA. L. REV. 1505, 1525-42 (2009).
when a substantial improver infringes an underlying patent.\textsuperscript{169} While he notes the viability of such a proposal, he suggests cabining its application to somewhat limited contexts. Among other considerations, he argues that the thinness of licensing markets and concomitant valuation difficulties preclude widespread application of accession doctrine to limit injunctive relief.\textsuperscript{170} Even where reliable valuations are feasible, the risk of opportunistic behavior complicates potential applications of accession.\textsuperscript{171} Along these lines, he argues for only denying injunctive relief when an initial patentee has already nonexclusively licensed his patent\textsuperscript{172} or where enhanced damages from willful infringement are available to encourage negotiations between a pioneer patentee and improver.\textsuperscript{173}

While I share many of Newman’s concerns, I offer a more optimistic account of applying accession to cases of infringing technological improvement. In particular, this Article draws on recent developments in patent infringement remedies jurisprudence—addressing both injunctions and damages—to show that technical concerns are less vexing than first meets the eye. Additionally, I frame my proposal for liability rule protection of pioneer patents as an action-forcing mechanism that may actually encourage more voluntary negotiations between improvers and pioneer patentees. As such, I contend that accession offers a valuable guide for reforming the law of technological improvement.

IV. APPLYING ACCESSION DOCTRINE TO PATENT INFRINGEMENT REMEDIES

A. The Proposal

This Article proposes that courts apply accession within the \textit{eBay} framework to deny injunctive relief in cases where a good-faith infringer substantially improves on an underlying patented invention.\textsuperscript{174} “Substantial improvement” is, of course, a difficult concept to define and would generally arise where the value of the improvement clearly dominates the value of the underlying patent in some new technology. Such improvement is most likely to arise where an improved invention “transforms” an existing patented technology rather than simply incrementally modifying it. If courts apply accession and deny an injunction,\textsuperscript{175} they would then direct the pioneer and improver to negotiate a reasonable royalty to compensate for ongoing infringement. If such negotiations failed, courts would then determine and impose such a royalty on the defendant.\textsuperscript{176} Consistent with traditional property doctrine, accession in the patent context

\textsuperscript{169} Newman, \textit{supra} note 126. Newman largely focuses on the canonical case of “improvements” involving a multicomponent system that incorporates and infringes some underlying patent. This Article, however, focuses on situations approximating the reverse doctrine of equivalents, where an improved technology infringes a patent but operates substantially differently from it.

\textsuperscript{170} \textit{Id.} at 115.

\textsuperscript{171} \textit{Id.} at 115-20.

\textsuperscript{172} \textit{Id.} at 69.

\textsuperscript{173} \textit{Id.}

\textsuperscript{174} In this context, “substantial” improvements would encompass both “significant” and “radical” improvements as described above. \textit{See supra} Section I.A.

\textsuperscript{175} It bears emphasizing that the fact-specific, equitable \textit{eBay} framework allows for tailoring injunctions to particular circumstances. \textit{See, e.g.}, Transocean Offshore Deepwater Drilling, Inc. v. GlobalSantaFe Corp., 2006 WL 3813778, *10 (S.D. Tex. 2006) (granting an injunction mandating structural modifications to the accused product).

\textsuperscript{176} \textit{See} 35 U.S.C. § 284 (2006) (“Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement but in no event less than a reasonable royalty for use made of the invention by the infringer, together with interest and costs as fixed by the court.”). Both the \textit{eBay} framework and the damages
would effectively transfer title to some substantially improved resource to the improver, contingent on compensating the original property owner for the value of underlying resources. Such an approach would ameliorate current limitations in patent law’s treatment of technological improvement and accelerate the introduction of improved technologies in the marketplace.

In advancing this proposal, this Article does not argue for a precise analogy between the patent and physical property contexts. Indeed, several important distinctions exist. First, in the physical property context, accession operates as an equitable doctrine when return of some tangible asset is either impossible (because its physical identity has changed) or unjust. In the patent context, these concerns do not apply in the same manner: an infringer who substantially improves upon a patented invention does not alter the identity of the underlying patent. As such, it is both logically and legally possible for the original patentee to maintain full ownership of the same resource (the pioneer patent) even though it has been substantially transformed by another.

Second, the “default” condition that accession modifies in the physical property context is different from that in the patent context. In the former, the default rule gives the original property owner full and exclusive title to resources derived from his property, leaving the improver with nothing. In the patent context, the default condition already envisions (blocking) patent rights for the substantial improver; she thus has something even in the absence of the accession rule. This Article argues, however, that substantial improvements deserve more protection than the current blocking patents paradigm provides. This Article proposes that patent remedies analysis capture the accession insight that property rights may legitimately shift when one party makes substantial, value-enhancing improvements to the property of another.

Third, while satisfying the accession test is sufficient to transfer title to property in the physical context, this proposal offers the “accession insight” as one element to consider within the multifactor eBay framework. While substantial improvement of a patentee’s invention would weigh in favor of liability rule protection, other factors may make that conclusion more or less legally tenable.

This proposal would enhance patent law’s treatment of technological improvement in several ways. To begin, this proposal generally leaves untouched patent law’s treatment of “minor” improvements that are not independently patentable. If a subsequent party only trivially modifies some patented invention, the pioneer patent would continue to dominate that

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177 This proposal thus finds conceptual parallel in Gideon Parchomovsky and Alex Stein’s proposed “added-value doctrine” in copyright. Parchomovsky & Stein, supra note 168, at 1533.
178 This proposal thus represents a “simultaneous pliability rule” in which there are “at least two different stages of property or liability rule protection, and the fulfillment of some predetermined condition triggers a shift from one type of protection to the other.” Abraham Bell & Gideon Parchomovsky, Pliability Rules, 101 MICH. L. REV. 1, 49 (2002). Unlike other simultaneous pliability rules in intellectual property law, such as copyright’s fair use doctrine, this proposal would require the unauthorized user to compensate the original intellectual property owner.
179 For a fuller exposition of the benefits of this proposal, see infra Part V.
subpatentable improvement. This proposal, however, would change the landscape for certain classes of “significant” (i.e., independently patentable) as well as “radical” improvements. Recall that in the tripartite scheme outlined above, blocking patents encourage voluntary negotiations between a pioneer patentee and a subsequent inventor who independently patents her improvement. However, as we have seen, transaction costs and strategic behavior may prevent an agreement from arising. Even if one does arise, the split of rents may be skewed in a fashion that undermines incentives to improve. Enforcing the underlying patentee’s rights with a liability rule rather than a property rule would remove a significant source of leverage, thus facilitating an arrangement where one or both parties could practice the improved invention.

This proposal also ameliorates current limitations with respect to “radical” improvements. While in theory the reverse doctrine of equivalents relieves radical improvers from infringement liability, that doctrine is largely moribund. The current proposal allows such radical improvers to pay royalties instead of face an injunction if they continue to practice their new technologies. In general, the application of a liability rule can thus mitigate patent holdup predicated on the pioneer’s strict right to exclude.

1. Mental State

As with traditional accession doctrine, a critical element of this proposal is the mental state of the improver. Since the civil law origins of accession, courts applying the “mistaken improver” doctrine have placed great emphasis on the requirement of good faith. As a matter of doctrine, courts generally hold that those who improve property that they know belongs to someone else may not benefit from this equitable rule. As a matter of policy, the good-faith requirement plays an important role in discouraging strategic behavior. Absent this requirement, improvers would have strong incentives to knowingly and intentionally convert personal property owned others, secure in the knowledge that if they substantially improved that property, they could force a sale at a court-determined price. Such forced sales tend to undercompensate property owners and would provide a windfall for improvers.

Such strategic concerns regarding mental state apply as well to the patent realm. In the absence of a good-faith requirement, parties would be motivated to intentionally infringe patents

180 See supra Section I.A. In theory, it is possible that a “minor” improvement to a patented invention may be technically trivial, such that it does not satisfy the requirements of independent patentability (especially nonobviousness) yet economically substantial, such that the improved item derives a substantial majority of its value from the improvement rather than the underlying patented invention. Cf. Amy Landers, Patent Valuation Theory and the Economics of Improvement, 88 Tex. L. Rev. See also 163, 165 (2009) (“[A] modest technological advance may, due to luck or calculation, become economically significant simply because a market has opened for reasons unrelated to the invention.”). Even for inventions within this class, however, the case for applying accession is difficult to make, as the absence of independent patentability counsels in favor of allowing the pioneer patent to dominate the improvement.

181 See supra Part I.

182 See supra Part I.

183 Wetherbee, 22 Mich. 311, at *2; accord. Silsbury, 3 N.Y. at 391.

184 However, in some instances, courts have granted title even to improvers who willfully took someone else’s property. Arnold, supra note 112, at 105.

185 Id. at 107; see, e.g., Ochoa v. Rogers, 234 S.W. 693, 695 (Ct. Civ. App. Tex. 1921) (“The general rule is that the owner of property has the right to all that becomes united or attached to it by accession.”) (citation omitted).

186 See infra Subsection V.B.2.
on the expectation that they could avoid an injunction if they significantly improved the pioneer invention. Such a rule could systematically undercompensate patentees, depress incentives to invent, and engender a pernicious disregard for patents rights more generally. Given the equitable nature of both accession and the eBay framework, it would be anomalous to allow “bad faith,” intentional infringers to benefit from this protection.

For these reasons, I propose a good-faith requirement for applying accession in the patent context. As with physical accession, a truly “innocent” defendant who did not know and did not have good reason to know that she was infringing a valid, enforceable patent would be eligible for protection. This could arise, for example, if an improver operating in the normal course of business was simply unaware of a prior patent. Additionally, defendants would satisfy the mental state requirement even if they knew about a patent but had a good-faith belief that the patent was invalid, unenforceable, or not infringed by their product. This latter possibility is particularly likely given the notoriously indeterminate metes and bounds of many patent claims. One potential critique arising here is that such a rule may encourage potential improvers from searching patents. However, uncertainty over whether a court would apply accession doctrine, the high cost to defendants if it did not, the vagaries of judicially determined royalties, and the benefits of negotiating licenses with patentees would all counsel in favor of conducting standard patent searches.

While these rules provide general guidance for the mental state requirement of the accession rule, the eBay framework is decidedly holistic and cannot be cabined to bright-line rules. It is conceivable that a court could determine that a defendant was eligible for the accession rule (and thus meaningfully satisfied the good-faith requirement) even though he willfully infringed a patent. For example, courts may consider the good-faith attempt of an improving improver to negotiate a license with the pioneer patentee as well as the patentee’s unreasonable refusal to deal. Additionally, courts may consider whether an infringing improver became aware of its potential infringement only after it had already made substantial

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187 See infra Subsection V.B.4.
188 The perception that widespread disregard for patents was undermining incentives to innovate was one of several motivations for establishing the Court of Appeals for the Federal Circuit in the early 1980s. Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp., 383 F.3d 1337, 1342 (Fed. Cir. 2004).
189 Merges, Property Rules, supra note 43, at 2658 (“[A]n infringer may have no way of knowing that her own independent invention is an infringement, or that, at the time she makes her investment decisions, a patent even exists.”).
189 Such good-faith belief would most likely arise from consulting patent counsel. Cf. Hynix Semiconductor Inc. v. Rambus Inc., 609 F.Supp.2d 951, 970 (N.D. Cal. 2009) (“But where infringement is not willful, perhaps because of serious questions as to the patent’s validity . . . the potential destruction of an infringer’s business should carry some weight in the balancing of harms under the four-factor test reaffirmed in eBay.”)
190 See, e.g., Burk & Lemley, Fence Posts, supra note 71, at 1750; Dan L. Burk & Mark A. Lemley, Quantum Patent Mechanics, 9 LEWIS & CLARK L. REV. 29 (2005); Stewart E. Sterk, Property Rules, Liability Rules, and Uncertainty about Property Rights, 106 MICH. L. REV. 1285, 1331-33 (2008). By contrast, it is fairly easy (in most cases) to ascertain the boundaries of a real property right.
192 See generally In re Seagate, (Fed. Cir. 2007) (en banc) (articulating the current “objective recklessness” standard for willful infringement).
193 See Newman, supra note 126, at 120 (noting that courts should “avoid the mistake of assuming that a finding of willfulness for the purposes of assessing damages gives the infringer ‘unclean hands’ so as to preclude the equitable decision to withhold an injunction in accordance with the accession rule”).
“irreversible investments” toward marketing the improved product.194 Based on other equitable factors, denying injunctive relieve may be appropriate in these types of cases as well.

2. Mechanics

Under this proposal, elements critical to accession doctrine in the physical property context—such as considerations of value-enhancing improvement and the mental state of the infringing improver—would be subsumed within the four-factor eBay framework. It is important to stress that the plaintiff carries the burden of proving each of the four eBay factors to justify the grant of injunctive relief.195 While it is difficult to establish categorical rules for this holistic framework,196 it is worth highlighting how substantial improvement of a pioneer patent would weigh against enjoining infringement.

First, the plaintiff must establish that the improver’s infringement caused irreparable injury.197 In examining this factor, courts applying eBay have rejected a presumption of irreparable harm from the mere fact of patent infringement.198 In general, harm to the patentee is greatest in cases of direct competition with the infringer.199 However, where the patentee produces a “basic” technology and has no plans or technical capacity to market the improvement, direct competition may be absent, and irreparable injury may be more difficult to establish. Along these lines, even if the new technology is a substantial improvement, it may not necessarily displace the pioneer patentee’s product. In some cases, market bifurcation may arise whereby the original technology remains a viable “low-cost” alternative to the improvement.200 And even if the improvement completely displaces the legacy technology, courts must weigh this harm against the social benefits of competitive innovation.201 Depending on the circumstances, the lack of direct competition between a substantial improvement and an existing patented technology would generally weigh against a finding of irreparable injury.202

194 See id.
195 eBay, 547 U.S. at 391.
196 This proposal thus adheres to the principle of “nonabsolutism” in applying patent infringement remedies. See Golden, Remedies, supra note 27, at 553-55.
197 Id. As John Golden notes, it is somewhat curious why the Supreme Court framed this requirement in the past tense, as it seems that the operative question is whether the defendant’s ongoing infringement would constitute an irreparable injury. See John M. Golden, The Supreme Court as “Prime Percolator”: A Prescription for Appellate Review of Questions in Patent Law, 56 UCLA L. REV. 657, 695-96 (2009).
200 See Merges, Blocking Patents, supra note 49, at 79.
201 Cf. Keeble v. Hickeringill (Queen’s Bench 1707) (distinguishing legitimate economic competition from malicious interference with trade).
202 Cf. Gordon, supra note 27, at 238-48 (questioning the imposition of liability where a creator and free rider compete in separate markets and the plaintiff has no plan to enter the other’s market).
Second, a plaintiff must demonstrate that remedies at law, such as damages, are inadequate to compensate for the injury. Here, the accession insight weighs most strongly against enjoining a substantially improved technology. Where substantial improvements, rather than an original patent, contribute the majority of value to some new technology, enjoining the improvement because of patent infringement may be excessive. This is particularly the case for new technologies that fundamentally “transform” an underlying patented invention. Though analytically distinct, an analogy could be drawn to a complex, integrated system that infringes a patent covering a relatively minor component. In these cases, damages may be sufficient to compensate for infringement. As we will see, case law applying eBay has already recognized and applied this core concept.

Third, the plaintiff must show that the balance of hardships between the plaintiff and defendant favor an equitable remedy. As noted, this factor is likely to weigh in favor of a substantially infringing improver who has made reasonable and irreversible investments in practicing the improved technology. As Newman notes, such situations are ripe for patent holdup where a pioneer patentee may extract a disproportionate share of rents from parties who have few alternatives other than practicing the patented invention. Here as well, the mental state of the infringer is most relevant. If a party acted in bad faith when infringing a patent, whatever hardship may arise from an injunction would likely be seen as self-imposed, thus weighing against application of the accession rule.

Finally, the plaintiff must show that the public interest would not be disserved by a permanent injunction. The Federal Circuit has consistently articulated a public policy interest in maintaining incentives to invent by protecting patents with a strong right to exclude. However, on occasion, courts have determined that the public interest weighs against enjoining

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203 eBay, 547 U.S. at 391.
204 Cf. Hamilton v. Rock, 191 P.2d 663, 668 (Mont. 1948) (observing in an accession case that “the plaintiff should not be permitted to enjoy the fruits of defendant’s labor without paying therefor”); Sterk, supra note 191, at 1329 (“The problem is exacerbated when the infringing material represents a small fraction of the value of the significant infringing work.”); Gordon, supra note 27, at 259 (“[I]njunctions bring with them the threat of overdeterrence because a defendant’s product may mix inextricably the defendant’s own resources with those of the plaintiff.”); Lemley & Weiser, supra note 82, at 785 (noting that in some situations, “injunctive relief can systematically overcompensate plaintiffs and overdeter defendants, with significant negative consequences for innovation and economic growth”).
205 See Lemley & Shapiro, supra note 41.
207 See infra Section IV.B.
208 eBay, 547 U.S. at 391.
209 See supra note 194 and accompanying text; Hynix Semiconductor Inc. v. Rambus Inc., 609 F. Supp. 2d 951, 967 (N.D. Cal. 2009) (“Extensive sunk costs present another opportunity for a patent holder to extract a disproportionate sum from an infringer because the infringer cannot recover its existing investment.”).
210 Newman, supra note 126, at 69-70.
211 eBay, 547 U.S. at 391.
212 See, e.g., Patlex Corp. v. Mosinghoff, 758 F.2d 594, 599 (Fed. Cir. 1985) (noting that the “encouragement of investment-based risk is the fundamental purpose of the patent grant, and is based directly on the right to exclude.”); Tivo Inc. v. Echostar Comm’n Corp., 446 F. Supp. 2d 664, 670 (E.D. Tex. 1006) (“The public has an interest in maintaining a strong patent system.”).
patent infringement.\(^{213}\) In particular, courts have shown a special sensitivity to allowing continued infringement of an “upstream” patent to promote “downstream” productivity.\(^{214}\) Such interests are particularly at issue when a party seeks to practice a substantially improved technology that infringes an existing patent. In this case, the public would benefit considerably from the improved technology, and denying an injunction may in fact advance the patent system’s overall goal of promoting technological progress.\(^{215}\)

Under this proposal, accession would operate within the multifactor eBay framework to weigh against granting injunctive relief against substantial improvers of some underlying patent. However, denying the injunction is not the end of the story. In traditional accession doctrine, awarding title to the improved item to the defendant is contingent on the defendant compensating the original property owner for the value of the source material. By analogy, courts applying this proposal would generally compel a defendant to pay royalties to a pioneer patentee as a condition of ongoing infringement.\(^{216}\) Procedurally, as in other contexts, the patentee would bear the burden of establishing damages.\(^{217}\) Substantively, as current case law indicates, “when an injunction is not proper under eBay, the question then becomes: ‘what amount of money would reasonably compensate a patentee for giving up his right to exclude yet allow an ongoing willful infringer to make a reasonable profit?”\(^{218}\) Courts would then draw upon both established and emerging doctrine to analyze the appropriateness of a particular reasonable royalty.\(^{219}\)

However, as discussed further below, the difficulties of valuing technologies and determining appropriate compensation may complicate court-determined royalty awards.\(^{220}\) Therefore, in applying accession, courts denying injunctive relief should first direct the parties to negotiate a reasonable royalty between themselves.\(^{221}\) This approach would both decrease burdens on courts and enhance the accuracy of valuations,\(^{222}\) and it has become standard practice

\(^{213}\)This is most evident in cases involving health-related patents. See, e.g., Vitamin Technologists, Inc. v. Wis. Alumni Research Found., 146 F.2d 941, 945 (9th Cir. 1945); City of Milwaukee v. Activated Sludge, Inc., 69 F.2d 577, 593 (7th Cir. 1934); cf. Hybritech Inc. v. Abbott Labs., 4 U.S.P.Q.2d (BNA) 1001, 1015 (C.D. Cal. 1987) (“Whatever else the court does, it will not cut off the supply of [patented] monoclonal test kits for cancer patients who are now using the [infringing] Abbott product.”), aff’d, 849 F.2d 1446 (Fed. Cir. 1988).


\(^{215}\)See U.S. CONST. art. I, § 8, cl. 8.

\(^{216}\)As an additional lever, it is conceivable that a court could deny an injunction, calculate a reasonable royalty, but then enhance damages for ongoing infringement based on willfulness. 35 U.S.C. § 35 U.S.C. § 284 (2006). This could arise, for example, if the eBay analysis disfavored injunctive relief, but some aspect of ongoing infringement (such as extending infringement beyond a particular timeframe) warranted enhanced damages. See also Newman, supra note 126, at 119-20 (advocating enhanced damages to encourage voluntary negotiations between patentee and infringer).

\(^{217}\)Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1324 (Fed. Cir. 2009).


\(^{219}\)See infra Subsection V.B.2.

\(^{220}\)See infra Subsection V.B.2.


\(^{222}\)In a counterintuitive manner, liability rules may thus advance the principle of devolution, which favors allowing parties “closest to the facts” to resolve disputes rather than relying on higher-level institutions. See Golden, Remedies, supra note 27, at 564-69.
for courts applying eBay. As the Federal Circuit observed in *Paice LLC v. Toyota Motor Corp.*, 

In most cases, where the district court determines that a permanent injunction is not warranted, the district court may wish to allow the parties to negotiate a license amongst themselves regarding future use of a patented invention before imposing an ongoing royalty. Should the parties fail to come to an agreement, the district court could step in to assess a reasonable royalty in light of the ongoing infringement.

Ultimately, this proposal to limit injunctive relief is best understood not as a mechanism to displace private ordering. Rather, it seeks to encourage negotiations between private parties while modifying the balance of power between them by eliminating a pioneer’s categorical right to exclude. Under this proposal, parties would negotiate in the “shadow” of a court-imposed liability rule rather than strict exclusive rights.

To illustrate this proposal, consider a historical example involving radio technology. In the early twentieth century, the Marconi Wireless & Telegraph Company patented a series of oscillating radio diodes. Lee De Forest, a leading inventor of radio technology, patented a substantial improvement, the oscillating triode, which amplified electrical signals and thus exhibited much greater sensitivity in radio reception. Ultimately, AT&T obtained De Forest’s triode patents and attempted to commercialize the technology. However, Marconi sued for infringement, and the Southern District of New York held that De Forest’s triode infringed one of Marconi’s diode patents. Neither party would license the other, and no firm exploited this important technology for an extended period of time.

Under my proposal, a court applying the eBay framework would take greater account of the considerable technological and economic value of De Forest’s improvement over Marconi’s pioneer patent. Such considerations would weigh in favor of enforcing Marconi’s patent with a liability rule rather than a property rule. The court would direct the two parties to negotiate a reasonable royalty and impose one itself if they

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223 In so doing, courts may subtly (or not so subtly) coerce parties to negotiate a mutually satisfactory resolution. See Hynix Semiconductor Inc. v. Rambus Inc., 609 F.Supp.2d 951, 987 (N.D. Cal. 2009) (“And to be clear, the court ‘strongly encourages the parties to be reasonable in their negotiations.’”) (citing Telecordia Techs., Inc. v. Cisco Systems, Inc., 592 F.Supp.2d 727, 748 (D. Del. 2009)).

224 504 F.3d 1293, 1315 (Fed. Cir. 2007) (*Paice II*).

225 Merges, *Blocking Patents*, supra note 49, at 77 (noting that under historical, pro-injunction jurisprudence, the patentee may set the terms of a license agreement in an infringement settlement negotiation).

226 Cf. Lee, *Intellectual Infrastructure*, supra note 95, at 109; Merges, *Blocking Patents*, supra note 49, at 76 (observing that uncertainty regarding whether courts will apply the reverse doctrine of equivalents will encourage parties to strike deals in more cases).

227 Theoretical work by Ian Ayres and Eric Talley shows that, contrary to conventional sentiment, “untailored” liability rules (that is, liability rules that are somewhat divorced from actual damages) may encourage more negotiations between plaintiffs and defendants than property rules. Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitlement To Facilitate Coasean Trade*, 104 YALE L.J. 1027, 1036-72 (1995); see infra Subsection V.A.2.

228 See Ayres & Talley, supra note 227, at 1093; Merges & Nelson, supra note 26, at 891.

229 As an indication of the importance of De Forest’s invention, the triode has been called “the heart and soul of radio.” George H. Douglas, *The Early Days of Radio Broadcasting* 8 (1987).


231 Merges & Nelson, supra note 26, at 892.
failed to so. In this sense, through applying the accession insight, a court could enforce Marconi’s patent in a manner that facilitated dissemination of the substantial improvement.\textsuperscript{232}

B. Consistency with Recent Jurisprudence

While this proposal may appear radical, eBay and its progeny already reflect several elements of the accession insight. This proposal to apply accession doctrine relies critically on courts weighing the relative values of pioneer patents and accused improvements in determining whether to enjoin infringement.\textsuperscript{233} In a different sense, eBay itself already embraces this notion of comparing the relative values of patented inventions and accused products. In particular, Justice Kennedy’s eBay concurrence notes that “[w]hen the patented invention is but a small component of the product the companies seek to produce and the threat of an injunction is employed simply for undue leverage in negotiations, legal damages may well be sufficient to compensate for the infringement and an injunction may not serve the public interest.”\textsuperscript{234} Accordingly, courts applying eBay routinely consider the relative value of an infringing product versus an underlying patent when determining the appropriateness of injunctive relief.

Courts have applied Justice Kennedy’s instruction to deny injunctive relief in cases where a multifaceted product incorporates a relatively insignificant patented component. For example, in z4 Technologies, Inc. v. Microsoft Corp.,\textsuperscript{235} a jury found that Microsoft Windows and Office infringed z4’s patents on software activation technology.\textsuperscript{236} However, the district court denied z4’s request for injunctive relief. In analyzing irreparable harm, the court observed that “Microsoft only uses the infringing technology as a small component of its own software, and it is not likely that any consumer of Microsoft’s Windows or Office software purchases these products for their product activation functionality.”\textsuperscript{237} Thus the value of z4’s patent was quite small relative to the overall value of Microsoft’s allegedly infringing products. This consideration also informed the court’s analysis of the adequacy of legal remedies. Citing Justice Kennedy’s guidance, the court noted that “product activation is a very small component of the Microsoft Windows and Office software products” and “[t]he infringing product activation component of the software is in no way related to the core functionality for which the software is purchased by consumers.”\textsuperscript{238} Here, the fact that z4’s patented component contributed marginally to the overall value of Microsoft Windows and Office weighed against granting an injunction.

Similar considerations informed the district court’s denial of injunctive relief in Paice LLC v. Toyota Motor Corp.\textsuperscript{239} In that case, a jury found that Toyota had infringed Paice’s patents on hybrid engine technology by selling several lines of hybrid cars. However, the district

\textsuperscript{232} See Ayres & Talley, supra note 227, at 1093.

\textsuperscript{233} Cf. Daralyn J. Durie & Mark A. Lemley, A Structured Approach to Calculating Reasonable Royalties, 14 LEWIS & CLARK L. REV. 627, 637 (2010) (“[A] reasonable royalty designed to mimic the results of a hypothetical license negotiation between patentee and infringer should be strongly influenced by the value that the patented technology actually contributes.”).

\textsuperscript{234} eBay, 547 U.S. at 396-97 (Kennedy, J., concurring); see Lemley & Weiser, supra note 82, at 797-98 (describing this phenomenon).

\textsuperscript{235} 434 F. Supp. 2d 437 (E.D. Tex. 2006).

\textsuperscript{236} Id. at 438. The jury also found that co-defendant Autodesk had infringed z4’s patents. Id.

\textsuperscript{237} Id. at 440.

\textsuperscript{238} Id. at 441.

\textsuperscript{239} 2006 WL 2385139 (E.D. Tex. Aug. 16, 2006).
court denied Paice’s request for an injunction. In analyzing the adequacy of damages, the court observed, “The infringed claims relate to the hybrid transmission of the accused vehicles, but form only a small aspect of the overall vehicles. The jury’s damages award also indicates that the infringed claims constitute a very small part of the value of the overall vehicles.” In the court’s view, this disparity in value helped render damages adequate to compensate for Toyota’s infringement.

Thus, eBay and its progeny already exhibit elements of the proportionality analysis at the heart of accession doctrine. To be sure, important distinctions are in order. and Paice involved patentees seeking to enjoin multifaceted products (software and cars) that incorporated a relatively minor patented component. Analytically, this is distinct from the holder of a patented genus seeing to enjoin a party from practicing a substantially improved species that falls within that genus. Furthermore, distinguishing the values of, say, a product activation component and the rest of Microsoft Windows is likely to be easier than distinguishing the values of a patented genus and an improved species. Nonetheless, at a conceptual level, the notion of proportionality still governs. Where the value of some technology derives substantially from a party’s own technological contribution, rather than from some underlying patent that it infringes, the rationale behind protecting that pioneer patent with a strict property rule loses force.

V. ADVANTAGES, OBJECTIONS, AND RESPONSES

A. Advantages

1. Encouraging Technological Improvement

The principal advantage of applying accession to patent infringement remedies is to encourage technological improvement. This would occur in at least two ways. First, the proposal would facilitate technological improvement by parties other than an original patentee. Under the present system, transaction costs and strategic behavior may derail license negotiations in the blocking patents paradigm, and the reverse doctrine of equivalents is largely moribund. As such, substantial improvers invent and market new technologies at their own peril. While pioneer patentees may agree to a license, a strict right to exclude affords them significant leverage over the improvement. The current proposal would alter the playing field by allowing a substantially improving infringer to face liability rule rather than property rule

240 Id.
241 Id. at *6.
242 Id.
243 See also Laserdynamics, Inc. v. Quanta Computer, Inc., 2010 WL 2574059, *2 (E.D. Tex. 2010) (“Further, the claimed invention embodied in the disc-drive is but one relatively small component of the entire assembled computer. When the patented invention is but a small component of the accused product, it weights [sic] against a finding of a permanent injunction.”) (citation omitted); Hynix Semiconductor Inc. v. Rambus Inc., 609 F.Supp.2d 951, 966 (N.D. Cal. 2009) (“A patent to a technological sliver enables its owner to threaten or enjoin the manufacture of use of the entire device, and in turn, receive a payoff far greater than the value of its invention.”) (citation omitted).
244 Of course, this is a relative claim, and assigning specific values to components within an integrated system may be quite challenging. See Golden, Remedies, supra note 27, at 536.
245 See supra Section I.B.
protection of a patent. The result would recalibrate the balance of power between pioneers and improvers and enhance incentives for inventors to improve on existing patented technologies. Empirical studies have shown that rivalrous competition—rather than broad control by a single party—often leads to the most fruitful technological advance. Relaxing exclusive rights on the part of pioneer patentees may better achieve the conditions conducive to technological progress.

Second and relatedly, this proposal would spur original patentees to invest in improving their own patented inventions. As a general matter, overcompensating patentees diminishes incentives to improve. Along these lines, according to the Second Circuit, “[m]any people believe that possession of unchallenged economic power deadens initiative, discourages thrift and depresses energy; that immunity from competition is a narcotic, and rivalry is a stimulant, to industrial progress.” Under the current proposal, pioneer patentees, particularly those who obtain broad genus claims in a field, may not rest on their laurels. The prospect of a subsequent party substantially improving on their technology and appropriating a significant portion of the social value of those improvements would spur pioneer patentees to continue to refine, rethink, and extend their own inventions.

Tellingly, the patent statutes of several European and Asian nations include compulsory “dependency license” provisions that provide for liability rule protection where an improvement invention dominates an existing patent. While granting such licenses is rare, these statutory provisions reflect the accession insight that the emergence of a substantial improvement sometimes justifies curtailing a pioneer patentee’s right to exclude.

2. Promoting Private Ordering

Although counterintuitive, this proposal for court-determined liability rule protection of patents may actually encourage greater negotiations between pioneer patentees and improvers. As a preliminary matter, consistent with current eBay practice, a court applying this proposal would first direct litigants to negotiate a reasonable royalty before imposing one itself. Nevertheless, even if a court were forced to calculate a reasonable royalty, such liability rule protection may have unexpected benefits. Commentators routinely cite the difficulty of

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246 Merges & Nelson, supra note 26, at 872. This observation helps mitigate concerns over potentially wasteful “racing” in which multiple firms engage in duplicative effort to improve a technology. See Kitch, supra note 166. Whatever social losses arise from such racing must be weighed against the social benefits of more rapid technological improvement as well as positive externalities arising from the “race” to improve.

247 As a corollary benefit, liability-rule protection of pioneer patents may reduce the incentive for potential infringers to engage in inefficient patent searches. See Sterk, supra note 191, at 1333; see also Paul J. Heald, Optimal Remedies for Patent Infringement: A Transactional Model, 45 Hous. L. Rev. 1165, 1189 (2008) (“When switching costs are high enough and a substantial premium can be extracted by the patentee in a post-adjudication licensing negotiation, the exploiting firm may invest excessively in searching for the patentee.”).

248 Cf. Lemley, Free Riding, supra note 81, at 1058.

249 United States v. Aluminum Co. of Am., 148 F.2d 416, 427 (2d Cir. 1945).

250 In this fashion, this proposal avoids one primary objection to divided entitlements: that such arrangements tend to reduce incentives for a property owner to improve his property, as it may be subject to liability rule protection at a later date. See Ayres & Talley, supra note 227, at 1085. Under this proposal, because a pioneer may avoid application of the accession rule by improving her patented invention, she faces significant incentives to improve her intellectual property.

251 See Merges, Blocking Patents, supra note 49, at 104-05.
government bodies—whether courts or administrative tribunals—in accurately valuing damages, thus highlighting a significant deficiency of liability rules versus property rules. Within this view, the comparative advantage of private parties over courts in valuing patents favors protecting such assets with a property rule. Thus, property rule protection of patents is generally believed to be superior to liability rule protection for promoting voluntary negotiations between private parties. However, this may not necessarily be the case.

While private negotiations may yield more accurate valuations than courts, it is not clear that property rules actually encourage more negotiations than liability rules. This proposal to apply accession in remedies analysis thus parallels work by Ian Ayres and Eric Talley demonstrating the advantages of liability rules in promoting private ordering. This work shows that liability rules and other forms of “divided legal entitlements” encourage entitlement owners to disclose information regarding private valuations, thus reducing transaction costs related to imperfect information and facilitating voluntary agreements. Essentially, liability rules create a “you cut, I pick” scenario in which parties do not know if they will ultimately be the seller or purchaser of an asset, thus reducing incentives for strategic behavior. This analysis is particularly relevant to “thin markets” susceptible to strategic bargaining, which are often characteristic of patent licensing negotiations. Ultimately, according to this view, liability rules may actually encourage more private ordering than property rules.

Furthermore, while courts may not achieve completely accurate damages valuations, such imprecision may actually have salutary implications. Indeed, Ayres and Talley argue that un tailored liability rules—those that are divorced from actual measures of damages—function

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252 See, e.g., id. at 99-100.
253 Merges, Property Rules, supra note 43, at 2664; Kieff, supra note 81, at 733-34.
254 See Ayres & Talley, supra note 227, at 1037 (referring to the “folklore” that “property rules induce negotiation and contracting, while liability rules induce nonconsensual taking, subsequent litigation, and judicially determined prices”).
256 Ayres & Talley, supra note 227, at 1029-32.
257 Id. at 1030, 1034.
258 See Bell & Parchomovsky, supra note 178, at 15-16.

In addition, one potential limitation in applying Ayres and Talley’s theory to accession has to do with timing. In Ayres and Talley’s framework, an entitlement holder either bribes a potential taker to not take an entitlement or “sells” her entitlement at a price lower than the damages amount. Ayres & Talley, supra note 227. Thus, bargaining in this framework proceeds in the presence of some known damage amount authorized by a third party, usually a court. Such information, however, is not available if a court directs parties to negotiate a reasonable royalty before calculating one itself. This limitation can be overcome in two ways. First, a court can “signal” a nonbinding but likely reasonable royalty before directing parties to negotiate. Second, parties can engage in another round of negotiation after a court declares its reasonable royalty, thus determining whether or not it will be enforced.

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best to promote private information disclosure and thus efficient contracting.\textsuperscript{260} Put differently, perfect tailoring of damages reduces plaintiffs’ incentive to reveal information, as they are no worse off if there is a nonconsensual taking.\textsuperscript{261} As applied here, the inability of courts to accurately assess damages in a liability rule regime may have some unexpected benefits.

3. Realizing the Promise of Prospect Theory

Additionally, there may be efficiency gains to not subjecting a substantially improving infringer to a pioneer patentee’s strict right to exclude. As noted, prospect theory helps justify early, broad patents on the notion that an initial patentee can then coordinate the development of a technology, including related improvements.\textsuperscript{262} Commentators have questioned this assumption, noting the high information and transaction costs associated with a single party managing the development of an early-stage technological prospect.\textsuperscript{263} On a related note, it is far from clear that the initial patentee is the best party to develop an invention. This is especially the case if a subsequent inventor has substantially improved the invention in a manner in which the pioneer has not.\textsuperscript{264} In this context, accession doctrine would play a salutary function by shifting “unfettered” ownership of the improved invention to the party who has demonstrated a greater capacity to develop it.\textsuperscript{265} Put differently, accession helps ensure that the competence to develop an improved technology is internalized within its boundaries, thus optimizing modularity in the allocation of property rights.\textsuperscript{266}

Of course, the Coase theorem holds that in the absence of transaction costs, initial allocations do not matter, and costless transactions will allow resources to flow to their highest-valued use.\textsuperscript{267} However, a “true” reading of the Coase theorem emphasizes that transaction costs do matter, and so legal and regulatory systems should assign initial rights to the party best situated to make good use of them.\textsuperscript{268} Accession helps achieve this result by granting (relatively unobstructed) ownership of some technological improvement to a party that, from all external indicia, is well-positioned to develop it. Adapting Kitch’s argument, allowing the improver to coordinate the development of an improved technology may better achieve the efficiency gains normally associated with prospect theory.

4. Fairness

In addition, accession enjoys the virtue of fairness. There is, as commentators have pointed out, a distinctly Lockean tenor to accession, which converts protection of a resource from a property rule to a liability rule based on an innocent improver’s significant, value-

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\item \textsuperscript{260} Id. at 1065 (“Tailoring can exacerbate strategic impediments to bargaining because tailoring gives the parties private information about the legal consequences of nonconsensual taking.”).
\item \textsuperscript{261} Id. at 1066.
\item \textsuperscript{262} Kitch, supra note 166.
\item \textsuperscript{264} Merrill, supra note 111, at 490-91.
\item \textsuperscript{265} Cf. id. at 485, 489 (“Instead of holding a competition, ownership is awarded to someone who has already demonstrated that she has the capacity to function as the owner of some prominently connected asset.”).
\item \textsuperscript{266} Smith, Intellectual Property, supra note 77, at 1777.
\item \textsuperscript{268} Merges, Blocking Patents, supra note 49, at 82; Merges, Property Rules, supra note 43, at 2565-57; Clarisa Long, Proprietary Rights and Why Initial Allocations Matter, 49 EMORY L.J. 823, 823 (2000).
\end{itemize}
\end{footnotesize}
enhancing contributions to some source material.\textsuperscript{269} In similar fashion, the proposed application of accession doctrine grants a party who expends labor to improve an invention a substantial degree of unconstrained ownership of it.\textsuperscript{270} While modern patent law justifies itself on utilitarian grounds,\textsuperscript{271} historical conceptions of patent law placed more emphasis on rewarding labor and remunerating inventive effort.\textsuperscript{272} Along these lines, an interest in promoting fairness informs both accession as well as \textit{eBay}’s equitable framework.

Viewed from a different perspective, the accession doctrine may prevent unjust enrichment on the part of the initial patentee. The current regime is biased in favor of pioneer patentees, who generally enjoy strict exclusive rights vis à vis infringing improvers. In many cases, this allows pioneers to appropriate all or a significant share of the value of an improver’s work. However, principles of fairness weigh against allowing a patentee to command a disproportionately large share of gains resulting from another party’s substantial technological innovation.\textsuperscript{273}

Other elements of accession also appeal to fairness. First, as a threshold matter, the good-faith requirement limits opportunities to use this equitable doctrine in a strategic manner to compel the dispossession of some patentee’s intellectual property. Second, more prominently, an improver of someone’s property, whether an individual who converts wood to hoops or one who substantially improves upon some patented technology, does not take the improved resource for free. Accession requires that the subsequent party compensate the underlying property owner for the value of the source material. Although such compensation may exhibit certain inadequacies, accession nevertheless strives to “provide[] restitution as one intermediate solution to the problem of intertwined inputs.”\textsuperscript{274} This “splitting” function best achieves equity between two parties who both have legitimate claims to some improved property.

B. Objections and Responses

Of course, this proposal to protect pioneer patents with a liability rule when an infringer substantially improves upon a protected technology must address several prominent objections.

1. Disrupting Settled Expectations

First, critics might object to the seemingly radical nature of this proposal, which diverges from the longstanding practice of protecting patents with a right to exclude. As the Supreme Court has observed, courts should be reluctant to disrupt the “settled expectations” of the

\textsuperscript{269} See Smith, \textit{Intellectual Property}, supra note 77, at 1766-77; cf. Easterbrook, \textit{supra} note 81, at 113 (“Treating intellectual property as property should appeal not only to utilitarians but also libertarians. Intellectual property is no less the fruit of one’s labor than is physical property.”).

\textsuperscript{270} But see Merrill, \textit{supra} note 111, at 497-99 (arguing that accession challenges Lockean desert notions of property, for it “sweeps in” increments of value arising from happenstance and pure luck and assigns them to some original property owner). While Merrill’s critique applies to most instances of accession, it seems somewhat inapposite to \textit{specificatio}, wherein title to property transfers precisely because of some improver’s valuable, transformative labor.

\textsuperscript{271} See \textit{supra} note 95.

\textsuperscript{272} Mossoff, \textit{supra} note 80, at 718.

\textsuperscript{273} See Newman, \textit{supra} note 126, at 63.

\textsuperscript{274} Smith, \textit{Intellectual Property}, \textit{supra} note 77, at 1772.
inventive community.\textsuperscript{275} However, the law has never viewed consistency for consistency’s sake as a great virtue.\textsuperscript{276} Additionally, at least two considerations suggest that this criticism is misplaced.

First, properly understood, the present proposal is quite modest. If an infringing improvement is minor, then (all other things being equal) traditional equitable principles will continue to favor enjoining infringement. Furthermore, even for “significant” (i.e., independently patentable) inventions, courts would have to determine if the improver’s contributions relative to the underlying patent were substantial enough to justify the accession rule. Thus, the vast majority of infringing improvement cases would likely not implicate accession. Even if an improvement were substantial enough to trigger access, courts would first direct parties to voluntarily negotiate a license before imposing damages. The “remarkable” application of a court-ordered liability rules would thus be a remedy of last resort. As noted, this proposal is best understood as an “action forcing” mechanism that still encourages private ordering, though it changes the background conditions against which parties negotiate.\textsuperscript{277}

Second, after \textit{eBay}, the ground has already shifted. Notwithstanding the current proposal, \textit{eBay} has introduced a nontrivial degree of uncertainty in the prospect of obtaining an injunction after a finding of infringement. While statistics are limited, in the first thirty cases applying \textit{eBay}, district courts issued permanent injunctions seventy-seven percent of the time, compared to eighty-four percent for pre-\textit{eBay} cases.\textsuperscript{278} Additionally, certain patterns have begun to emerge, with denial of injunctive relief more likely if the plaintiff and defendant do not directly compete, the plaintiff is a nonpracticing entity, or the patented invention is only a small component of the accused device.\textsuperscript{279} A lower probability of obtaining injunctive relief is already a fact of life after \textit{eBay},\textsuperscript{280} and the current proposal merely applies this flexibility in a manner designed to promote technological improvement.

Against the notion of disrupting settled expectations, it is worth noting that reducing liability based on significantly improving some underlying resource finds parallel in other areas of intellectual property law. For example, one sees a similar dynamic in copyright’s fair use doctrine.\textsuperscript{281} In certain instances where copyrighted content forms only a small portion of a new

\textsuperscript{276} Cf. Oliver Wendell Holmes, \textit{The Path of the Law}, 10 HARV. L. REV. 457, 469 (1897) (“It is revolting to have no better reason for a rule of law than that it was laid down in the time of Henry IV. It is still more revolting if the grounds upon which it was laid down have vanished long since, and the rule simply persists from blind imitation of the past.”).
\textsuperscript{277} Cf. Lee, \textit{Intellectual Infrastructure}, supra note 95, at 107-08.
\textsuperscript{279} See Chao, \textit{supra} note 199, at 549-60.
work, courts have relied on fair use to find that the new work does not infringe.\textsuperscript{282} Additionally, when a subsequent party engages in “transformative use” of a copyrighted work, it may sometimes avoid liability under fair use.\textsuperscript{283} Along similar lines, Maureen O’Rourke has proposed a doctrine of fair use for patent law.\textsuperscript{284}

While I note fair use for conceptual comparison, my proposal is not a patent analog to that copyright doctrine. First, I propose accession as a narrow, tailored mechanism for addressing improving infringement rather than a broad standard for allowing unauthorized uses of patented inventions more generally. Second, while fair use eliminates liability (and any obligation to provide a remedy), under my proposal, defendants would still be liable for infringement and must compensate the plaintiff. Differences notwithstanding, however, fair use reflects the central insight that in some cases, transformative use of protected intellectual property should at least mitigate the full brunt of a pioneer’s right to exclude.

\section{2. Valuation and Technical Competence}

A prominent potential objection to this proposal centers on valuation difficulties and technical competence. Applying accession to patent infringement suits requires at least two complicated sets of valuations.\textsuperscript{285} First, courts must determine the relative value of a pioneer patent versus an infringing improvement. Second, if a court deems that accession is triggered and an injunction is not warranted, it must be prepared to calculate a reasonable royalty to compensate the pioneer patentee for ongoing infringement.\textsuperscript{286} As I’ve noted in other work, eBay’s use of a holistic standard instead of a bright-line rule equating infringement with injunctions tends to complicate patent adjudication.\textsuperscript{287} However, recent patent jurisprudence dealing with both injunctions and damages suggests that courts possess the tools and acumen to apply the accession insight.

First, as noted above, courts applying eBay have already gained experience in weighing the relative value of differing technological contributions to a composite product.\textsuperscript{288} This arises from Justice Kennedy’s (nonbinding) guidance that courts consider whether a patented invention is merely one component of a larger system when determining the appropriateness of injunctive

\begin{footnotes}
\item[282] See, e.g., Bill Graham Archives v. Dorling Kindersley Ltd., 448 F.3d 605 (2d Cir. 2006).
\item[284] Maureen O’Rourke, Toward a Doctrine of Fair Use in Patent law, 100 COLUM. L. REV. 1177 (2000).
\item[285] Newman, supra note 126, at 88.
\item[286] The difficulty of such calculations has attracted widespread academic attention. See, e.g., Golden, Patent Trolls, supra note 199, at 2116-17 (“Given courts’ difficulties with assessing reasonable royalties, there remains a strong argument for a rebuttable presumption of injunctive relief in all cases where infringement has been proven and there is a significant threat that it will continue or resume.”); Anthony T. Kronman, Specific Performance, 35 U. CHI. L. REV. 351, 360 (1978) (noting that “it would be very difficult and expensive for a court to acquire the information necessary” to tailor damages exactly to the harm suffered by a plaintiff). Such difficulty is compounded by the fact that juries rather than judges ordinarily calculate damages (including reasonable royalties). The highly factual nature of such determinations, as well as the frequent absence of detailed accounts of calculations, can render them difficult to review, either on a motion for judgment as a matter of law (JMOL) or appeal. Durie & Lemley, supra note 233, at 632. As we will see, however, courts are becoming more aggressive in reviewing reasonable royalty determinations. See infra notes 294–300 and accompanying text.
\item[287] Peter Lee, Patent Law and the Two Cultures, 120 YALE L.J. 2, 62-63 (2010). In a tautological sense, the difficulties of calculating damages are reflected in the eBay standard itself: the fact that damages are difficult to quantify is a factor weighing in favor of simply granting an injunction. \textit{Id}. at 58.
\item[288] See supra Section IV.B.
\end{footnotes}
relief. While accession involves an analytically distinct concern—weighing the relative value of an improved species relative to a claimed genus—assessing relative value is already part and parcel of the eBay analysis. It bears emphasizing as well that accession should only apply where the value of some improvement is substantial relative to the value of the patent upon which it improves. This is most likely to be apparent for “transformative” improvements that change the nature of some patented technology. However, in “close calls,” courts would be free to conclude that the equities favored traditional property rule protection of the pioneer patent.

Second, courts have become more sophisticated in determining reasonable royalties. As an initial matter, while commentators have doubted the authority of courts to issue ongoing royalties when denying an injunction, the Federal Circuit has affirmed that courts are empowered to grant this type of relief. In addition, courts may take additional evidence “to account for any additional economic factors arising from the imposition of an ongoing royalty.”

Recent Federal Circuit jurisprudence has enhanced the analytical rigor with which courts determine royalties. While calculating ongoing royalties for prospective infringement is different from calculating damages for past infringement, greater sophistication in the latter will also help courts perform the former. For example, in ResQNet.com, Inc. v. Lansa, the Federal Circuit reversed the district court’s calculation of royalties for both past and ongoing infringement. The Federal Circuit first articulated the general rule that “the trial court must carefully tie proof of damages to the claimed invention’s footprint in the marketplace.” The court then rejected the reasonable royalty calculation submitted by the patentee’s expert in the proceeding below, noting that the expert “used licenses with no relationship to the claimed

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289 eBay, 547 U.S. at 396 (Kennedy, J., concurring); see z4 Technologies v. Microsoft, 434 F. Supp. 2d 437 (E.D. Tex. 2006); Paice I, 2006 WL 2385139 (E.D. Tex. 2006).
290 Such evaluations may require courts to engage patented technologies more substantively and achieve a deeper understanding of their technological contributions rather than simply focusing on the literal text of patent claims. For a fuller exposition of substantive claim construction, see Peter Lee, Substantive Claim Construction as a Patent Scope Lever, 1 IP THEORY (forthcoming 2011).
291 See Chao, supra note 199, at 566-68.
293 Id. at 1315.
294 See, e.g., id. (reversing and remanding a district court’s reasonable royalty calculation because of inadequate support); see also Michael J. Kasdan & Joseph Casino, Federal Courts Closely Scrutinizing and Slashing Patent Damages Awards, 2010 PATENTLY-O PAT. L.J. 25. For past infringement, courts generally calculate reasonable royalties based on the fifteen-factor Georgia-Pacific test. See Georgia-Pacific Corp. v. United States Plywood Corp., 318 F. Supp. 1116, 1119-20 (S.D.N.Y. 1970), modified and aff'd, Georgia-Pacific Corp. v. United States Plywood-Champion Papers, Inc., 446 F.2d 295 (2d Cir. 1971). This test has received a fair share of criticism, and the Federal Circuit has observed that “[d]etermining a fair and reasonable royalty is often . . . a difficult judicial chore, seeming often to involve more the talents of a conjurer than those of a judge.” Fromson v. Western Litho Plate & Supply Co., 853 F.2d 1568, 1574 (Fed. Cir. 1988); see also Golden, Patent Trolls, supra note 199, at 2150-51 (noting the difficulties of calculating prospective reasonable royalties). In light of these difficulties, commentators have proposed improvements to reasonable royalty determinations that promise to enhance the accuracy of both past and prospective royalty calculations. See, e.g., Durie & Lemley, supra note 233 (distilling the Georgia-Pacific test to four central inquiries).
296 594 F.3d 860 (Fed. Cir. 2010).
297 Id. at 869.
invention to drive the royalty rate up to unjustified double-digit levels.”298 Similarly in, *Lucent Techs., Inc. v. Gateway*, 299 the Federal Circuit rejected the patentee’s proffered licenses because “some of the license agreements [were] radically different from the hypothetical agreement under consideration.”300 Together, these decisions promise greater scrutiny of reasonable royalty calculations and more accurate valuations of infringed patents.

Of course, valuation is complicated by the fact that patented inventions, and their improvements, are typically not fungible commodities traded on robust markets.301 However, the statute demands a *reasonable* royalty, not absolute precision.302 If an injunction is denied in a particular case, the patentee has ample motivation to provide the requisite analysis to justify a particular royalty.303 Ultimately, the greater scrutiny that courts now apply to royalty calculations promises more accurate valuations. To be sure, this proposal will apply more easily to some factual scenarios than others. In complex systems composed of a large number of patented and unpatented components (e.g., semiconductors), it may be prohibitively difficult to ascertain the relative value of some “improvement” compared to one or several patented inputs.304 However, for a subset of cases where calculating reasonable royalties is feasible, this proposal to apply accession doctrine holds significant promise.

3. Increasing Incentives to Infringe for Improvers

Critics may also argue that any rule that rewards (or decreases costs for) infringers will encourage more infringement. In so doing, critics might note the oft-cited public interest in maintaining respect for patents by enforcing strict rights to exclude.305 Substantial improvers, motivated by strategic considerations, may simply elect to infringe patents rather than seek licenses, content in the expectation that they would only face a reasonable royalty rather than an injunction upon a finding of infringement.

First, the accession rule’s good-faith requirement significantly ameliorates these concerns regarding intentional infringement. As a general matter, an infringing improver could only avail herself of this equitable rule if she had a good-faith belief that she was not infringing a valid, enforceable patent. This situation, and the balance of equities it implicates, parallels the classic case of the “mistaken improver” of personal property. On a case-by-case basis, courts could also extend the accession rule to knowing infringers who, for example, attempted to negotiate in good faith with a recalcitrant pioneer patentee. In no case could an intentionally infringing improver use the courts as an end-around good-faith negotiations with a known patentee. While not completely eliminated, the potential for strategic behavior is significantly mitigated by this

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298 Id. at 869-70. In general, relying on experts for valuations presents a challenge because of the confidential nature of the licensing agreements that often inform their calculations. *See* Lemley & Shapiro, *supra* note 41, at 2022-23.

299 580 F.3d 1301 (Fed. Cir. 2009).

300 Id. at 1327-28.

301 Id. Merges, *Blocking Patents, supra* note 49, at 77; Newman, *supra* note 126, at 114; Ayres & Talley, *supra* note 227, at 1092 ("Intellectual property often entails a significant amount of thin-market bargaining.").


303 Additionally, as a theoretical matter, *untailored* damages may have surprisingly salutary effects in reducing at least one type of transaction cost in negotiations between litigants. *See* supra notes 260–261 and accompanying text.


305 *See, e.g.*, Patlex Corp. v. Mossinghoff, 758 F.2d 594, 599 (Fed. Cir. 1985) (noting that the “encouragement of investment-based risk is the fundamental purpose of the patent grant, and is based directly on the right to exclude.”).
safeguard. In a wider sense, courts would retain broad discretion to analyze and weigh the behaviors of both the plaintiff and the defendant in determining whether to grant or deny equitable relief.

Second and more broadly, some types of infringement are not as socially harmful as others. The incentive-producing, investment-protecting rationale for strong patents is strongest in cases of direct copying,\(^306\) when one entity completely free rides on the inventive efforts of another. Such bad faith imitation also approaches the status of malum in se that could be condemned independently of economic reasons. However, substantial improvement of an existing technology, performed in good faith, represents a different kind of infringement. Here, the costs to the patentee and incentives to invent more generally must be weighed against the significant social gains from accelerating the introduction of a substantially improved technology. This is particularly the case given that the nature of patent claiming tends to “sweep in” broad parcels of technological territory beyond what a pioneer inventor may have actually created.\(^307\) Finally, if anything, moral considerations weigh against enjoining the improver to the extent that the pioneer patentee would be able to free ride on the improver’s innovative effort.

4. Decreasing Incentives to Invent for Pioneers

This proposal may impact incentives not only for improvers but also for pioneers.\(^308\) In particular, critics might contend that liability rule protection of patents would diminish initial incentives to invent. Along these lines, the economics literature suggests that liability rules typically undercompensate property owners.\(^309\) Among other considerations, such valuations do not capture idiosyncratic value, consequential losses, and value gaps between the best known uses of a resource and the best publicly verifiable uses of that resource.\(^310\) This gap between private and court-determined valuations may chill initial incentives to invent.

However, several considerations suggest that this critique may be overstated. First, although strategic value based on the threat of holdup may enhance incentives to invent, it is unclear that this is the type of value that the patent system should endeavor to compensate.\(^311\) Second, as noted, this proposal is best understood not as displacing private ordering, but as changing the baseline conditions against which negotiations take place. Private parties would still have ample opportunity to negotiate a mutually-beneficial agreement.\(^312\) Relatedly, as

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\(^{306}\) Of course, a patent regime cannot limit itself prohibiting exact imitation, for “the unscrupulous copyist” would “make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim.” Graver Mfg. Co. v. Linde Co., 339 U.S. 605, 608 (1950).

\(^{307}\) See supra Part I.A.

\(^{308}\) Merges, Blocking Patents, supra note 49, at 101-02 (“Any scholar who writes on intellectual property rights and who advocates that some rights should be scaled back can anticipate the criticism that incentives will be harmed.”).

\(^{309}\) See Richard A. Epstein, A Clear View of the Cathedral: The Dominance of Property Rules, 106 YALE L.J. 2091, 2093 (1997); Lemley & Weiser, supra note 82, at 787-88; Newman, supra note 126, at 76.

\(^{310}\) Newman, supra note 126, at 79-82; see Henry E. Smith, Property and Property Rules, 79 N.Y.U. L. REV. 1719, 1763-65 (2004). In addition to undercompensating property owners, liability rules also incur substantial administrative cost for the public body that must administer them. Newman, supra note 126, at 79-83.

\(^{311}\) See eBay, 547 U.S. at 396-97 (Kennedy, J., concurring); see also Golden, Patent Trolls, supra note 199, at 2140 (suggesting that rewarding “holdout” value is a cost against which the traditional benefits of injunctive relief should be weighed).

\(^{312}\) This is not to suggest that such agreements would necessarily be optimal for either party. In particular, John Golden observes that “information asymmetries appear most likely to disfavor the patent holder in negotiations,
between a world where no licensing agreement arises and one where a patentee obtains judicially-determined reasonable royalties, the patentee may be better off in the latter. This is particularly likely if, as Robert Merges suggests, a pioneer patentee can continue to market its basic technology even after the introduction of the improvement. 313 Third, the chain of events and probabilities necessary to reach liability rule protection of a patent is rather long and tenuous, which tends to dampen chilling effects on initial incentives to invent. 314 Finally, rather than characterizing this proposal as decreasing incentives to invent, it may be more accurate to say that it creates an additional incentive for pioneer patentees to continue working on and improving their inventions. 315 After all, if a pioneer patentee practices the same improved technology as an infringer, an injunction will typically be forthcoming.

VI. THEORETICAL IMPLICATIONS

In addition to pragmatically reforming patent law’s treatment of technological improvement, this proposal to apply accession in remedies analysis also holds several implications for patent law and theory.

A. Adapting the Principles of the Reverse Doctrine of Equivalents

Close observers of patent law will recognize that this proposal represents a subtle but significant variation on the reverse doctrine of equivalents. As noted, under the reverse doctrine of equivalents:

“Where a device is so far changed in principle from a patented article that it performs the same or a similar function in a substantially different way, but nevertheless falls within the literal words of the claim, the doctrine of equivalents may be used [in reverse] to restrict the claim and defeat the patentee’s action for infringement.”

In theory, the reverse doctrine of equivalents operates as a safety valve to excuse a radical improvement from liability even though it technically infringes the claims of an existing patent. 316 As we have seen, however, the Federal Circuit has essentially declared it a moribund doctrine. 317

However, this proposal to apply accession doctrine in remedies analysis captures much of the insight of the reverse doctrine of equivalents. Recall that in its starkest formulation, accession shifts title to some improved item when the improver has transformed it into a

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313 Merges, Blocking Patents, supra note 49, at 79-80. In this case, the extra royalty stream from the improvement may be “pure gravy” to the pioneer patentee. Id. at 80.
314 Cf. id. at 102-03. It bears emphasizing that for most factual predicates, patentees would continue to obtain property rule protection of their patents. Thus, the investment-dampening effect of this proposal is somewhat intermediate between that of a pure property-rule regime or a pure liability-rule regime, which is characteristic of so-called pliability rules. See Bell & Parchomovsky, supra note 178, at 27.
315 See supra notes 248–250 and accompanying text.
317 See supra notes 49–58 and accompanying text.
318 See supra note 70.
different “species,” as when an improve transforms grapes to wine. In this situation, return of the original property is literally impossible because its identity has fundamentally changed. Similarly, transformation is critical to classic descriptions of the reverse doctrine of equivalents. In *Boyd Power-Brake Co. v. Westinghouse*, the Supreme Court noted, “The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent.”

While technically one could still subject the transformed invention to the full exclusive rights of the underlying patent, equity weighs against so doing. Thus in both the accession and reverse doctrine of equivalents contexts, an infringer’s radical transformation of some existing (intellectual) property helps mitigate liability.

The key difference lies in the extent to which these approaches mitigate liability. In the reverse doctrine of equivalents, a party completely avoids liability and concomitantly bears no obligation to compensate the patentee for continuing to practice a noninfringing technology. However, under the current proposal, considerations similar to the reverse doctrine of equivalents would convert patent protection from a property rule to a liability rule. As such, the improver would be liable for patent infringement and must pay damages to the pioneer.

Considering “radical transformation” at the remedies stage rather than at the liability stage may mitigate the harshness of the reverse doctrine of equivalents. It bears emphasizing that this proposal does not intend to replace the reverse doctrine of equivalents, which plays an important role in limiting patent rights. However, given that the doctrine exists more in theory than in practice, the current proposal makes mitigating liability based on transformative infringement more palatable for courts. The drastic nature of the reverse equivalents doctrine—which completely relieves a party of any liability (and remedy) for literal infringement—likely contributes to courts’ reluctance in applying it. Liability rule protection may be particularly appropriate for improvements that demonstrate a substantial degree of transformation but yet do not meet the threshold for the reverse doctrine of equivalents. In essence, the accession rule offers courts a third zone of flexibility between the poles of no liability and full property-rule protection of a patent. Given the intermediate nature of liability rule protection, courts may be emboldened to actually inquire into the relative contributions of a pioneer and improving inventor in determining appropriate infringement remedies.

**B. Patents as Property Revisited**

While this Article offers a practical proposal to enhance patent law’s treatment of technological improvement, it also sheds light on the broader relationship between patents and

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319 See supra note 122 and accompanying text.
320 170 U.S. at 568; see also SRI Int’l v. Matsushita Elec. Corp. of America, 775 F.2d 1107, 1124 (Fed. Cir. 1985) (noting that the reverse doctrine of equivalents inquires “into whether a product has been so far changed in principle that it performs the same or similar function in a substantially different way”); Del Mar Avionics, Inc. v. Quinton Instr. Co., 836 F.2d 1320, 1325 (Fed. Cir. 1987) (observing that the reverse doctrine of equivalents applies where the accused device, though literally infringing, “has been so changed that it is no longer the same invention”).
321 See Parchomovsky & Stein, supra note 168, at 1528 (drawing an analogy between “expressive accession” in copyright and the reverse doctrine of equivalents in patent law).
As noted, many have criticized comparisons of patents and property through highlighting the fundamentally different subject matter falling within these domains. Patents cover nonrival, intangible technical designs while property covers rivalrous, tangible resources. Given the nonrival nature of patented inventions, moreover, common justifications for strict exclusive rights—such as averting a tragedy of the commons—lose significant force.  

However, this Article highlights a central irony: accession—a property doctrine—is arguably more appropriate for patents than for physical property. In the tangible property context, accession results in physical dispossession of some improved item from its “original” owner. Given the nonrival nature of patented inventions, however, the pioneer patentee who is subject to the accession rule does not physically lose anything. To be sure, she may lose some expectation value from her patent, but she can still make much productive use of her invention (as opposed to the landowner who loses his wood to the mistaken improver). Thus in some sense, the nonrival nature of intellectual property provides opportunities for shared access and simultaneous exploitation that physical property does not.

Social welfare concerns also render patents even more amenable to accession than physical property itself. Among the several rationales informing accession is one of protecting productive effort. George Wetherbee, for example, productively transformed $25 worth of trees into approximately $700 worth of barrel hoops. While his contribution to social welfare may have been significant, it is likely to be dwarfed by introducing a substantially improved technology in the marketplace. Encouraging the development of ingenious new train brakes, revolutionary triodes as opposed to diodes, and a host of other technological improvements promises significant social benefits. While chilling effects for pioneer patentees must be taken into account, accession doctrine can help accelerate the development and dissemination of such improvements. Ultimately, in the accession context, patents may be even better suited to property doctrine than property itself.

CONCLUSION

In the physical realm, good-faith improvement of someone else’s property may result in title shifting to the improver, contingent on compensating the original owner for the value of the underlying materials. This Article argues that recent developments in the law of patent infringement remedies suggest applying this insight to the intellectual property realm as well. In particular, it proposes applying accession doctrine to deny injunctive relief when an infringer substantially improves on some underlying patented invention. When the value of the technological improvement clearly dominates the value of the underlying patent, equity weighs against strict enforcement of the pioneer’s right to exclude and in favor of compelling the improver to compensate the pioneer for the market value of her patent.

This proposal would ameliorate the deficiencies of the current blocking patents regime as well as the reverse doctrine of equivalents. Regarding blocking patents, the prospect of property rule protection by a pioneer patentee may frustrate negotiations or result in skewed distributions of rents that diminish incentives to improve. While the reverse doctrine of equivalents exists in

322 See supra Section II.A.
theory to relieve liability where a literally infringing invention operates in a radically different manner, courts rarely invoke it. The current proposal for liability rule protection in the context of substantial technological improvement would both rationalize the balance of power in blocking patents scenarios as well as render the principles of the reverse doctrine of equivalents more palatable to courts and patentees alike. While patents and property diverge in many ways, accession is one area where patent law can benefit substantially from the insights of traditional property law.