TAMING THE DOCTRINE OF EQUIVALENTS IN LIGHT OF *PATENT FAILURE*

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ABSTRACT

In their book *Patent Failure*, Jim Bessen and Michael Meurer show that patents outside the fields of chemistry and pharmaceuticals *discourage* innovation. One reason is that, outside these two fields, patents provide poor notice of what technology is owned and who owns it. Poor notice is due in part to the doctrine of equivalents (DOE). This essay argues against abolishing the DOE, and instead proposes two reforms to mitigate the DOE's interference with notice. First, courts should always stay permanent injunctions against DOE infringement for a modest period of time, *e.g.*, for one year from the date of final judgment. Second, courts should treat equivalents under 35 USC 112(6) the same as DOE equivalents. This essay also briefly reevaluates the doctrine of prosecution history estoppel in light of *Patent Failure*.

TAMING THE DOCTRINE OF EQUIVALENTS IN LIGHT OF *PATENT FAILURE*

Samson Vermont[*]

I. INTRODUCTION

If the notice provided by patents were twice as clear as it is, it would still be half as clear as it needs to be. This, loosely speaking, is the upshot of *Patent Failure*,[1] a book that should inspire bigger changes in patent law than did the birth in 1982 of the Court of Appeals for the Federal Circuit.

The authors, Jim Bessen and Michael Meurer, find that today patents in fields outside chemistry and pharmaceuticals *discourage* innovation overall.[2] More specifically, the authors find that, outside chem-pharma, innovators' patent litigation costs are four times higher than their patent profits, which implies, when combined with other findings,[3] that the patent system actually taxes innovation outside chem-pharma.[4]

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[1] *See* James Bessen & Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* (Princeton Press 2008) (as of July 1, 2008, chapters 1, 3 and 9 *available for free at* http://www.researchoninnovation.org/dopatentswork/); *See also* Maureen Farrell, *Roadblocks to Innovation*, Forbes.com (2008), Michail Fitzgerald, *A Patent is Worth Having, Right? Well, Maybe Not*, New York Times (2007), *Cf.* Michael Risch, *The Failure of Public Notice in Patent Prosecution*, 21 Harv. J. L. & Tech. 179 (2007).

[2] Bessen & Meurer, *Patent Failure* at 96-146; Bessen & Meurer, The Costs and Benefits of Patents to Innovation, Patently (March 18, 2008) http://www.patentlyo.com./patent/2008/03/the-costs-and-b.html. *See also* Carl Shapiro, *Patent System Reform: Economic Analysis & Critique*, 19 Berkeley Tech. L. J. 1017 (2004).

[3] Accused infringers tend to spend *more* on R&D than do the patentees who sue them. In other words, the more a firm spends on R&D, the more likely that firm is to be sued for infringement. *See* Bessen & Meurer, *Patent Failure*, at 123-26; James Bessen & Michael J. Meurer, *Patent Litigation with Endogenous Disputes*, 96 Amer. Econ. Rev. 77 (2006); James Bessen & Michael J. Meurer, *The Patent Litigation Explosion* (Boston Univ. Sch. of Law Working Paper No. 05-18, 2005), *available at ssrn.com*. Furthermore, the vast majority of accused infringers are not pirates. Outside pharmaceuticals, in less than one-

Outside chem-pharma, patent litigation costs tend to be high because the products tend to include many interrelated components and are thus covered by a patchwork of diverse patents, many of uncertain scope. For similar reasons, profits per patent tend to be low outside chem-pharma, where profits must be divvyed up among the patchwork.

Patent Failure is a clarion call for myriad reforms. The first order of business should be to change the current judicial standard for indefiniteness from "insolubly ambiguous" to something along the lines of "not particular and distinct."[5] Reform of continuation applications should also rank high on the agenda.[6] Reform of the doctrine of equivalents, the subject of this essay, should also rank high. When courts find a patent infringed, they usually find it literally infringed. In only about one of every five cases in which a patentee wins a judgment of infringement is that judgment a judgment of

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half of one percent of reported opinions does the court hold that the accused infringer actually copied the invention. *See* Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, Working Paper, pp.24, 32-33 (July 2008). *See also* Bessen & Meurer, *Patent Failure*, *supra* at 126, 277. Indeed, in only about five percent of non-pharmaceutical cases does the patentee *allege* that the infringer copied the patented invention, even though it is in the interests of a patentee to allege copying if the infringer in fact copied. Cotropia & Lemley, at 20, 24.

[4] *Cf.* Michael A. Heller and Rebecca A. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 Science 698 (May 1, 1998); Francesco Parisi, Ben Depoorter and Norbert Schulz, *Duality in Property: Commons and Anticommons*, 25 Int'l Rev. Law & Econ. (2005); Robert P. Merges & John F. Duffy, *Patent Law and Policy: Cases and Materials*, 4th ed., 198-200 (LexisNexis 2007) (discussing prisoner's dilemma logic of patents). *But see* Ted Buckley, *The Myth of the Anticommons*, Biotechnology Industry Organization (May 31, 2007).

[5] The Patent Act already requires that patents "conclude with one or more claims particularly pointing out and distinctly claiming" the invention. 35 USC 112(2).

[6] Applicants use continuations to sit and wait to see what competitors do. Applicants then amend the pending claims accordingly. The notice costs generated by continuations appear to be high enough to justify restricting if not eliminating them altogether. *See* Mark A. Lemley and Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U.L. Rev. 63 (2004); Harold C. Wegner, *Abolishing Continuation: A Four Part Program to Improve the Patent Process*, George Washington U. Law School (April 2, 2008). A possible alternative to eliminating continuations would be to allow them but not give them DOE protection, *i.e.*, to reserve DOE protection for claims of the original application.

infringement under the doctrine of equivalents (DOE).[7] This statistic implies that most patent rents are provided by the literal scope of patent claims. Yet, DOE scope is litigated frequently. One of every two (as opposed to one of every five) decisions on infringement is a decision on DOE infringement.[8] Furthermore, the DOE is relevant at some point in time in all actual and potential patent disputes other than those in which either literal infringement or invalidity is a slam dunk from the get-go.

Given that literal scope provides most of the incentives that patents provide, given that DOE scope is litigated disproportionately often, given the relevance of the DOE in most cases, and given the uncertainty created by the DOE, the DOE appears to generate high notice costs for every incremental incentive that it provides. The DOE appears to provide a modest minority of the patent rents while generating a large minority if not a majority of the notice costs.

Part II explains why we should not abolish the DOE, at least not without first trying reform. The DOE provides several social benefits. Indeed, within a narrow range, the DOE even has a tendency to improve patent notice. And, as discussed in Part II, there is no good substitute for the DOE.

Part III proposes that we soften the penalty for DOE infringement – by staying permanent injunctions against DOE infringement. For DOE infringement, the courts should always stay injunctions for a modest period of time (*e.g.*, one year). The stay should be long enough that, in most cases, the patentee's bargaining power in settlement negotiations remains strong only if the invention is technologically significant. That is, we want the patentee's bargaining power to rest more on the substantive merit of his invention and less on his ability to exploit the fact that the infringer will have to shut down operations to switch out the invention.

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[7] This statistic is based on the numbers reported in the PatStats database, *available at* http://www.patstats.org/Patstats2.html.

[8] From 2000 to 2006, US courts issued 1283 decisions on literal infringement and 687 decisions on DOE infringement. *See Id.* Of the 1283 decisions on literal infringement, 29 percent were in favor of the patentee; 71 percent were in favor of the accused infringer. Of the 687 decisions on DOE infringement, 15 percent were in favor of the patentee; 85 percent were in favor of the accused infringer. *Id.*

Part IV proposes that we treat equivalents under 35 USC 112(6) the same way that we treat equivalents under the DOE. Under current law, we have a separate jurisprudence for 112(6) equivalents that complicates doctrine without fine-tuning patent scope in a meaningful or salutary way. Dropping the pointless distinctions between DOE equivalents and 112(6) equivalents will remove some unnecessary complexity from the law without affecting the magnitude of equivalents protection.

Part V reassesses the rationales for the doctrine of prosecution history estoppel and offers thoughts on the issue of whether, in light of *Patent Failure*, the absolute bar of *Festo I*[9] beats the flexible bar of *Festo II*[10].

II. THE COSTS AND BENEFITS OF THE DOE

A. The Costs of the DOE

The DOE throws a wrench into the analysis of whether an activity infringes a patent. To exaggerate a bit, the DOE converts the question of infringement from a binary question of identity to a relative question of similarity. Let's briefly consider some famous cases.

In *Winans v. Denmead* 56 U.S. 330 (1853), the patentee claimed a coal car with a downward tapering body shaped like a "frustum of a cone."[11] The accused infringer made a coal car with a downward tapering body shaped like an upside-down octagonal pyramid, which is 8-sided rather than round in the horizontal plane. The accused car did not literally infringe. Is it equivalent? Is an 8-sided car equivalent to a cone-shaped car

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[9] *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 172 F.3d 1361 (Fed. Cir. 1999)

[10] *Festo Corp. v. Shoketsu Kinsoku Kogyo Kabushiki Co.*, 535 U.S. 722 (2002)

[11] Winans' claim read: "What I claim as my invention, and desire to secure by letters-patent is, making the body of a car for the transportation of coal, &c., in the form of a frustum of a cone, substantially as herein described, whereby the force exerted by the weight of the load presses equally in all directions, and does not tend to change the form thereof, so that every part resists its equal proportion, and by which also the lower part is so reduced as to pass down within the truck frame, and between the axles, to lower the centre of gravity of the load, without diminishing the capacity of the car as described." *Winans v. Denmead*, 56 U.S. 330 at 331; U.S. Patent No. 5,175.

for purposes of patent infringement?[12] What if the accused car were 5-sided? What if it were 100-sided?

In *Graver Tank v. Linde*, 339 U.S. 605 (1950), the patentee claimed a welding composition "containing a major proportion of alkaline earth metal silicate."[13] The accused infringer used a silicate of manganese, which is a transition metal and not one of the six alkaline earth metals. Clearly the accused composition did not literally infringe. For purposes of welding, however, the accused composition worked as well as the claimed composition. Also, the specification referred to silicates of manganese in a way that made them seem equivalent to silicates of certain alkaline earth metals.[14] So, is the accused composition equivalent to the claimed composition?[15]

In *Corning Glass v. Sumitomo*, 868 F.2d 1251 (Fed. Cir. 1989), the patentee claimed an optical fiber comprising a glass coating around a glass core, the core including a positive dopant that raised the core's refractive index above the coating's refractive index.[16] The fiber of the accused infringer had the converse: a negative dopant in the coating that lowered the coating's refractive index below the core's. Clearly the accused fiber did not literally infringe. Is it equivalent to the claimed fiber?[17]

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[12] The Court thought so. The Court held that the accused car was equivalent to the claimed car. *See Winans v. Denmead*, 56 U.S. 330 at 344. The prior art coal cars were shaped like cubes, having four sides in the horizontal plane, and the patentee disclosed no specific shapes other than the frustum of a cone but it was clear from the specification that the principle of the invention lay in the equal distribution of weight throughout the car. *Id.* at 339-44. This principle found its purest expression in the round frustum of a cone but, from a practical standpoint, an eight-sided car performed substantially the same function in substantially the same way to achieve substantially the same result. *Id.*

[13] *See Graver Tank & Mfg. Co. v. Linde Air Prods. Co*., 339 U.S. 605 at 613.

[14] The patent's specification stated: "we have used calcium silicate and silicates of sodium, barium, iron, <u>manganese</u>, cobalt, magnesium, nickel and aluminum… in various proportions." [emphasis added] U.S. Patent No. 2,043,960 (filed Feb. 21, 1933). Calcium, barium and magnesium are alkaline earth metals. Sodium is an alkali metal. Iron, Cobalt and Nickel are, like Manganese, transition metals.

[15] The Court thought so. *See Graver Tank, supra*.

[16] *See Corning Glass Works v. Sumitomo Electric USA Inc.*, 868 F.2d 1251 (Fed. Cir. 1989).

[17] The Federal Circuit thought so. Although Sumitomo's core included no positive dopant, the court denied violating the all-limitations rule. *See Corning Glass v.*

In *Warner-Jenkinson v. Hilton Davis*, 520 U.S. 17 (1997), the patentee claimed a filtration process performed "at a pH from approximately 6.0 to 9.0."[18] The accused infringer's filtration process performed at a pH of 5.0. The accused process did not literally infringe. Is it equivalent? Is a pH of 5.0 equivalent to a pH of "approximately 6.0" in the context of this technology?[19]

In *Festo II*, the patentee claimed a device having two sealing rings each with one lip.[20] The accused infringer's device had one seal with a two-way lip. The accused device did not literally infringe. Is one seal with a two-way lip equivalent to two sealing rings each with one lip?[21]

In *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046 (Fed. Cir. 2002), the patentee claimed a component, for use in printed circuit boards, comprising a "laminate constructed of a sheet of copper foil… and a sheet of aluminum…."[22] The accused component employed a steel sheet rather than an aluminum sheet. Clearly the accused component did not literally infringe. However, the specification stated that "While aluminum is currently the preferred material for the substrate, other metals, such as

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Sumitomo, 868 F.2d 1251 at 1261. The rule requires, wrote the court, that the claimed limitations (or their equivalents) appear in the accused device. *Id.* The rule does not necessarily require that the limitations appear in the same corresponding "component" of the accused device. Sometimes limitations can be transported to non-corresponding components of the accused device without destroying equivalence. *Id.* The court did not explain how a component differs from a limitation, when limitations can be transported, or how a limitation could both be transported and changed in sign (from positive to negative) and still satisfy the all-limitations rule.

[18] *See Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17 at 22.

[19] The Court thought so. *Id.*

[20] *See Festo II, supra* at 728-29.

[21] The Court thought so, although it remanded the case for a determination of whether the doctrine of prosecution history estoppel barred recovery under the DOE. *See Festo II* at 722, 741-42 .

[22] *Johnson & Johnston Assocs. Inc. v. R.E. Serv. Co.*, 285 F.3d 1046 at 1050.

stainless steel or nickel alloys, may be used."[23] Is the accused steel sheet equivalent to the claimed aluminum sheet?[24]

As these cases demonstrate, the DOE makes it hard to know what technology is owned and who owns it.[25] This uncertainty generates direct and indirect notice costs. The direct notice costs – or transaction costs – include the costs of determining that a patent search is warranted, finding the relevant patents and their owners, assessing infringement and validity, negotiating licenses, and litigating. The indirect notice costs come in the form of decreased incentives to innovate and the ensuing loss to society of innovations that would have been made but for the decreased incentives. How can the DOE possibly *decrease* incentives to innovate? Because the DOE increases both the reward of patent protection and the risk of patent infringement. The DOE increases both the chance that the inventor's patent will cover somebody else's product and the chance that the inventor's product will be covered by somebody else's patent.

There is a point beyond which the DOE degrades notice so much that the DOE decreases incentives to innovate more than it increases them. That is, at some point the DOE blurs claims so much that it increases an inventor's expected downside from infringing somebody else's patent more than it increases the inventor's expected upside from somebody else infringing the inventor's patent. Why don't the inventor's expected downside and expected upside cancel each other out? Because both patentees and infringers must incur transaction costs to transfer wealth between them, and because inventors are risk-averse and weigh losses more heavily than gains of numerically equal magnitude.

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[23] U.S. Patent No. 5,153,050 (filed Aug. 7, 1991) issued to Johnson.

[24] Steel may be technologically equivalent, but the Federal Circuit held that, by disclosing but never claiming steel, the patentee dedicated the use of steel to the public. *Johnson and Johnston*, 285 F.3d 1046 at 1050, 55. Thus steel was not legally equivalent to aluminum. *Id.* at 1055. The Federal Circuit distinguished *Graver Tank* by pointing out that Graver Tank's patent included other claims, claims 24 and 26, that literally encompassed a broad genus of metal silicates, of which manganese silicate is a species. *Id.* at 1053, n.1. Although claims 24 and 26 were invalid over prior art, the existence of the claims showed that the patentee did not dedicate manganese silicate to the public – manganese silicate was not unclaimed. *Id*.

[25] Bessen & Meurer, *Patent Failure*, *supra* at 61-62.

B. The Benefits of the DOE

Should we abolish the DOE in its entirety and limit all patent infringement to literal infringement? Probably not.[26] The DOE can provide benefits in four ways.

First, the DOE can increase incentives to innovate more than it decreases them. The DOE increases incentives by decreasing the risk that literal scope will fall short. The DOE decreases the risk faced by inventor Jones that his patent rents will come in below his costs of creating the invention. The DOE thus resembles insurance: it increases Jones's incentive to engage in risky activity (inventing) when he knows that he is exposed to a class of risk (the failure of literal scope) but can neither easily predict, nor adopt cheap precautions to obviate, the specific chain of events through which particular risks in the class could materialize. [27]

The rub is that, from the perspective of Smith, Jones's DOE scope resembles a minefield. The DOE scope afforded to Jones's patent *increases* the risk and uncertainty faced by Smith. Of course, Smith enjoys the security afforded by the DOE to Smith's patent, and others fear the DOE scope afforded to Smith's patent. This tension does not, however, preclude the possibility of the DOE improving incentives overall. Rather, this tension speaks to the need for a balance in the law of the DOE.

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[26] For an ostensibly opposing view, see Joshua D. Sarnoff, *Abolishing the Doctrine of Equivalents and Claiming the Future after Festo*, 19 Berkeley Tech. L.J. 1157 (2004); Chiang, *supra* at 54-57. Sarnoff's view is only ostensibly opposing because he distinguishes between the current DOE and a milder doctrine of non-literal claim scope, reserving the rubric "DOE" and his objection for the former. *See* Joshua Sarnoff, *Abolishing the Doctrine of Equivalents and Claiming the Future After Festo*, 19 Berkeley Tech. L.J. 1157, 1212-15 (2004). I use the term "DOE" more broadly to refer to all forms of non-literal claim scope.

[27] It does not follow from this that the DOE should never rescue patentees from their obvious errors. Obvious errors are not necessarily avoidable with cheap precautions. It is very expensive to always avoid all obvious errors. Failure to look in your rear-view mirror seems like an obvious error, and looking in your rear-view mirror on any given occasion seems like a cheap precaution. But going a lifetime without *ever* once failing to look in your rear-view mirror may be an expensive precaution. *See generally* Mark Grady, *Tort Reform: An Economic Approach, 2 Journal of Forensic Economics* 1, 5-7 (1988) (for some types of precautions, the most significant cost is the cost of remembering to always take the precaution); Mark Grady, *Why Are People Negligent?: Technology, Nondurable Precautions, and the Medical Malpractice Explosion*, 82 NW U. L. Rev. 293 (1988).

Second, the DOE cuts the costs of drafting claims.[28] The DOE allows the drafter to draft a claim as if the reader of the claim will be at least somewhat cooperative in interpreting its meaning.[29] Absent a cooperative reader – absent assurance that the relevant reader must interpret limitation X as "X and its equivalents" – the drafter will want to replace or supplement a straightforward claim to X with one or more of the following: (A) tortuous claims, worded like statutes, that aspire to literally encompass X and its equivalents; (B) functional claim language – such as "means of fastening" rather than "shoelace" – that aspires to literally encompass X and its equivalents; (C) claim language that literally lists X and all of the individual equivalents of X that the drafter can think up; or (D) a multitude of claims each individually reciting X or one of the equivalents of X that the drafter can think up. The resulting claims would be abstract, legalistic, repetitive, or numerous – in a word, "convoluted".

Convoluted claims, and specifications that support them, are harder to draft.[30] Try, for instance, to draft a claim for Winans using language that *literally* encompasses minor variants (like the accused 8-sided car) as well as the preferred cone-shaped car – without encompassing the prior art.[31] It is much easier to do what Winans apparently did – draft a straightforward claim to a cone-shaped car and rely on the courts to use their equitable powers to cover minor variants. Imagine also the additional disclosure that the Winans specification would have required to support a claim that literally encompasses

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[28] *See, e.g.*, Joseph S. Cianfrani, *Note: An Economic Analysis of the Doctrine of Equivalents*, 1 Va. J. L. & Tech. 1 (Spring 1997).

[29] According to the cooperative principle of linguistics, efficient communication requires that speakers observe various cooperative maxims, and that listeners assume that the speakers are observing those maxims. *See* Paul Grice, "Logic and conversation," in *Syntax and Semantics, 3: Speech Acts*, ed. P. Cole & J. Morgan. New York: Academic Press (1975), reprinted in *Studies in the Way of Words*, ed. H. P. Grice, pp. 22–40. Cambridge, MA: Harvard University Press (1989); http://en.wikipedia.org/wiki/Gricean_maxims (last visited July 18, 2008). *See also* Kristen Jakobsen Osenga, *The Patent Conversation*, Working Paper presented at Intellectual Property Scholars Conference, Stanford Law School (August 7, 2008).

[30] Convoluting claims would also convolute the specification. *Cf*. Craig A. Nard, *A Theory of Claim Interpretation*, 14 Harvard J. Law & Tech. 1, 69 (2000-01) ("It would simply be too burdensome and would unduly limit the scope of protection to require a patent applicant to disclose every possible equivalent in the patent application.")

[31] Winan's actual claim is reproduced *infra*, note 11.

minor variants as well as the preferred embodiment. How valuable to the examiner or to a person of skill in the art is this additional disclosure over and above the disclosure of the preferred cone-shaped car? Once a patent discloses an inventive concept and its best incarnation, why should the patent recite a litany of minor variants?

Third, although the DOE probably degrades notice overall, the DOE has at least a partially offsetting tendency to improve notice.[32] Just as the DOE has competing effects on incentives, it has competing effects on notice. When DOE scope hews close to literal scope, DOE scope might even hit a sweet spot where it clarifies claim boundaries more than it blurs them. The DOE can clarify claim boundaries for the same reason that the DOE cuts the costs of claim drafting. Absent assurance that the reader must interpret X as "X and its equivalents," the drafter will want to include convoluted claims. Convoluted claims not only cost more to draft, they also cost more for potential infringers to identify and to interpret. Furthermore, without DOE protection, drafters have greater incentives to draft deliberately ambiguous claims. *Ambiguous literal scope is itself a substitute for DOE scope*. Ambiguous literal scope gives patentees a shot at molding claim interpretation ex post, especially to cover after-arising technology and technology far outside the field of the patented invention.[33] Ambiguous literal scope is also harder to design around than clear literal scope.[34] If DOE scope is not available to buffer literal scope, drafters have greater incentives to create a buffer of uncertainty around their claims, by employing terms whose meanings cannot be pinned down with confidence.

Fourth, the DOE and the doctrine of prosecution history estoppel (PHE) constitute, respectively, a carrot and a stick that together discourage applicants from

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[32] *See also* Douglas Lichtman, *Substitutes for the Doctrine of Equivalents*, 93 Geo. L. J. 2013 (2005); Samson Vermont, *How Restricting the Doctrine of Equivalents Conflicts – Yes, Conflicts – With the Notice Function of Claims*, Law.com (May 31, 2001).

[33] *See also* Risch, *supra* at 180-81, 188-89.

[34] *See* Alan L. Durham, *Patent Symmetry*, 87 Boston U. L. Rev. 969, 983-84 (Dec. 2007) ("[T]here are occasions when claim language is sufficiently clear that competitors of the patentee can 'design around' it, confident that what they are doing does not literally infringe. That competitors cannot be equally confident in their freedom from liability is due to the long-established 'doctrine of equivalents.'")

overreaching during ex parte prosecution.[35] Under the doctrine of PHE, the DOE cannot cover what a patentee surrendered to obtain the claim. The doctrine of PHE comes into play if, during prosecution, the applicant amends a claim for a reason related to patentability and in so doing narrows the claim in some respect, or if, during prosecution, the applicant argues for a claim interpretation that is narrower in some respect than the claim's broadest reasonable interpretation. The doctrine of PHE deters overreaching by threatening to take away DOE scope from applicants who claim the world and leave the entire burden on the examiner to chisel down the claims to something approaching the true scope of the invention.

In other words, when applicants' words can later be used against them, and when applicants do not know which claim interpretations will later serve their interests, they become more humble and circumspect in their claiming and argument. If applicants could claim and argue whatever they wanted to, with no potential downside for overreaching that falls short of inequitable conduct, patents would become even less reliable records of who owns what technology.

C. The Lack of Good Substitutes for the DOE

Alleged substitutes for the DOE include reissue applications, continuation applications, claim amendments, and special techniques for drafting literal claims.[36] Unfortunately, none of the alleged substitutes is a good substitute. None reduces the costs of drafting claims, none discourages the drafting of convoluted claims, and none discourages overreaching during prosecution.[37]

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[35] *See infra* Part V.

[36] *See* Lichtman, *supra* (listing and rejecting alleged substitutes for the DOE).

[37] Also, amendments and reissues have short deadlines. Amendments must be made before the patent issues. Reissues that broaden claims must be filed within two years after the patent issues. We could extend or eliminate the deadline for broadening reissues, but it is far from evident that notice would improve if we allowed literal scope to be broadened throughout the patent term. Eliminating the two-year deadline for broadening reissue would extend the period in which innovators face the risk of new boundaries popping up out of nowhere. Of course, the DOE extends this time period de facto. Which regime is best: de facto extension via the DOE, or explicit extension via broadening reissue available throughout the patent term? We do not know for sure. It is hard to know for sure whether what we have now (the DOE and a short deadline for broadening literal scope) provides better or worse notice than what we could have (no

Further, none of the alleged substitutes is as useful as the DOE for capturing after-arising technology (AAT), *i.e.*, technology that does not come into existence until after the patent is filed or issues.[38] Some commentators argue that the substitutes cannot cover AAT because the substitutes require that the revised literal claims be enabled and described by the application, yet the application cannot enable and describe technology that did not exist when the application was filed.[39]

These commentators put too little faith in literal claims. Literal claims routinely cover AAT.[40] Otherwise blocking patents would be impossible.[41] It is more accurate to argue that, because the substitutes require that the revised literal claims be enabled and described, the substitutes cannot cover *as much* AAT as the DOE can.

Other commentators argue that applicants do not need the DOE to cover AAT because applicants can use special claim drafting techniques to literally cover AAT.[42] Specifically, applicants can use generic language (e.g., "light source" instead of "lamp"), terms of degree (e.g., "mostly"), broadening modifiers (e.g., "substantially"), functional limitations, negative limitations ("but not…"), and language of result.[43]

DOE and no deadline for broadening literal scope). However, the very fact that reissues are subject to intervening rights, in conjunction with our experience with continuations, suggests that having no deadline for broadening literal scope could be a bad idea.

[38] There appears to be disagreement about whether AAT is technology that arises after the filing date or after the issuance date. For example, compare *In re Hogan*, 559 F.2d 595, 605 (CCPA 1977) (after-arising technology is technology that comes "into existence after the filing date…") to *Al-Site*, *infra* note 52. On first pass, the inability of applicants to add new matter to pending applications suggests that the filing date should start the clock for AAT.

[39] Cotropia, *supra*. *Cf.* Nard, *supra* at 68-73.

[40] *See* Kevin Emerson Collins, *The Reach of Literal Claim Scope into After-Arising Technology: On the Construction of Things and Meanings*, forthcoming Connecticut L. Rev.

[41] *Id.*

[42] *See* Meurer & Nard; Amici Curiae Applera Corporation (Applied Biosystems and Celera Genomics), Applied Materials, Inc., Cisco Systems, Inc., Micron Technology, Inc. and Oracle Corporation in Support of Respondents, *Festo II* (No. 00-1543), *at* 2001 WL 1548692 [hereinafter Applera Brief].

[43] *See* Applera Brief, *supra* at 21-22; Meurer and Nard, *supra*.

These commentators put too much faith in literal claims. Applicants can sometimes use these techniques to literally cover AAT. These techniques do not always work because they tend to broaden claims both forwards to capture the future and backwards to capture the prior art. While these techniques help claims literally encompass AAT, they also increase the odds that claims literally encompass the prior art.

In any event, it is far from evident that we should encourage applicants to employ these techniques. These techniques increase the costs of drafting claims. Again, drafters cannot employ these techniques willy-nilly. Drafters must take care to ensure that they do not capture the prior art. When using these techniques, a drafter aims beyond a close trace around the embodiments specifically disclosed in the application. She aims to gerrymander a fragile silhouette of breadth and precision. This ambition demands creativity, exercise in logic, consultation with the inventor, and sometimes even independent research on the part of the drafter.

Moreover, by convoluting literal claims these techniques degrade the notice provided by literal claims. Which patent system would provide better notice – one in which literal claims are straightforward but enjoy a penumbra of equivalents, or one in which literal claims are convoluted and enjoy absolutely no penumbra of equivalents? I believe the former system can provide better notice, as long as the penumbra of equivalents hews close enough to the literal claims that DOE infringement remains very much the exception rather than the rule.

So far we have ignored the threshold question of whether the DOE *should* cover AAT. If the DOE should not cover AAT, the claim that the alleged substitutes are good substitutes strengthens a bit. Michael Meurer and Craig Nard argue that exclusive rights to AAT provide little incentive to invent – because AAT is unforeseeable to inventors ex ante and because inventors are little motivated by what they cannot foresee.[44]

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[44] *See* Michael J. Meurer & Craig A. Nard, *Invention, Refinement and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 Geo. L. J. 1947, 1992-93 (2005); Michael J. Meurer & Craig A. Nard, *Patent Policy Adrift in a Sea of Anecdote: A Reply to Lichtman*, 93 Geo. L. J. 2033 (2005); Tun-Jen Chiang, *Ex Post Claiming*, George Mason U. School of Law (July 14, 2008) [we'll know soon which law review Chiang's paper will come out in]. *See also* Shyamkrishna Balganesh, *Foreseeability and Copyright Incentives*, 122 Harv. L. Rev. (forthcoming 2009); Gideon Parchomovsky, Peter Siegelman & Steve Thel, *Of Equal Wrongs and Half Rights*, 82 N.Y.U. L. Rev.

Meanwhile, patent rights to AAT generate monopoly loss and ex post rent dissipation on par with that generated by patent rights to technology that does not qualify as after-arising. Accordingly, patent rights to AAT, especially those supplied by the DOE, provide little bang for the buck.

I disagree to the degree that foreseeability is a matter of degree. We can readily foresee events at high levels of generality; we cannot usually foresee the precise details of those events. You can readily foresee, for example, that you may be harmed in a car accident some day. You cannot readily foresee precisely when, where and how that accident would occur. Though, if you tend to engage in certain patterns of driving, you might have some idea about when, where or how such an accident would most likely occur.

Likewise, inventors ex ante cannot readily foresee the details of AAT, but they can readily foresee the general possibility of AAT and they may foresee the rough outlines of AAT. DOE coverage of AAT can incentivize inventions and save on claim drafting when inventors ex ante foresee the general risk of AAT or its broad contours, but cannot foresee the precise way in which the AAT will materialize and cannot otherwise draft claims at low cost to literally encompass the AAT. In other words, the DOE incentivizes invention and saves on claim drafting to the extent the inventor foresees a general risk that a valuable product could slip through his literal claims but cannot foresee, and thus cannot readily foreclose, the particular path by which the valuable product would slip through his literal claims.[45]

738, 756-57 (2007) (defining windfalls in terms of unforeseeable and thus un-incentivized gains)

[45] A possible second argument for DOE coverage of AAT is that patents depreciate rapidly in fields that change rapidly. By covering AAT, the DOE mitigates the depreciation of patents in these fields, which helps raise patent incentives in these fields closer to the patent incentives in fields that change more slowly. In short, so the argument goes, without the DOE, incentives to invent would be too weak in rapid fields. *See* Christopher A. Cotropia, *"After-Arising" Technologies and Tailoring Patent Scope*, 61 N.Y.U. Ann. Surv. Am. L. 151 (2005); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 Col. L. Rev. 839 (1990); Ted O'Donoghue, Suzanne Scotchmer, and Jacques-Francois Thisse, *Patent Breadth, Patent Life, and the Pace of Technological Progress*, 7 J. Econ. & Mngmt. Strat. 1 (Spring 1998). The jury is still out, however, on whether this particular argument has legs. This argument seems backward at first glance. At first glance, rapid fields seem like the fields we can worry

IV. STAY INJUNCTIONS AGAINST DOE INFRINGEMENT

Under current law, courts usually apply a bright line remedy to DOE infringement – permanent injunction. Yet, DOE scope is inherently blurry. Potential infringers thus face a daunting combination of blurry scope and a harsh remedy for trespassing onto it. They face the harsh remedy of property without the clear boundaries of property.

Softening the remedy for DOE infringement would mitigate this asymmetry. Of course, softening the remedy will soften inventors' faith in the DOE, which will result in less of the benefits that faith in the DOE provides. The larger question is whether softening the remedy will improve the DOE's ratio of social costs to social benefits. The answer depends on how we soften the remedy.

I propose that we reserve instant injunctions for literal infringers. DOE infringers should always enjoy a modest stay (*e.g.*, one year from final judgment) in which to come into compliance with the permanent injunction. This proposal reflects the middle position of DOE infringement on the continuum between liability rules and property rules. Property rules provide harsh remedies that strongly encourage would-be takers to obtain owners' consent in advance.[46] Property rules tend to reign where the parties can easily

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about least. The very fact that a field is rapid seems to imply that the incentives in that field cannot be very insufficient. If the incentives were very insufficient, the technology in the field would not change so rapidly. Also, in rapid fields (such as software and computer hardware) DOE scope seems to generate higher notice costs and to entangle relatively more improvement inventions. Perhaps the solution is to distinguish between AAT that derives most of its value from its technological merits and AAT that derives most of its commercial value from its ability to avoid the literal scope of the claims in question. Perhaps, in other words, we should focus not on the distinction between fields that change rapidly and fields that change slowly but on the distinction between literal claims that are evaded rapidly and literal claims that are evaded slowly.

[46] *See generally* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 Harv. L. Rev. 1089 (1972); Louis Kaplow and Steven Shavell, *Liability Rules: An Economic Analysis*, 109 Harv. L. Rev. 713 (1996); Michael I. Krauss, 'Property Rules vs. Liability Rules' in the *Encyclopedia of Law and Economics*, B. Bouckaert and G. De Geest (eds.) (1999); Abraham Bell and Gideon Parchomovsky, *Pliability Rules*, 101 Mich. L. Rev. 1 (2002-03); Ward Farnsworth, 'Liability Rules v. Property Rules' in *The Legal Analyst: A Toolkit for Thinking about the Law* (U. Chicago Press 2007); Stewart E. Sterk, *Property Rules, Liability Rules, and Uncertainty about Property Rights*, 106 Mich. L. Rev. 1285

bargain over the property in advance. Liability rules usually aim to award mere actual damages to entitlement holders, which does not much encourage takers to obtain consent in advance. Liability rules tend to reign where the parties cannot easily bargain over the entitlements in advance.

DOE infringement lies intermediate the archetypical domain of property rules and the archetypical domain of liability rules. Compared to real property, identifying the periphery of DOE scope and bargaining in advance for the right to traverse it is a nightmare. On the other hand, DOE scope is far more identifiable and amenable to bargaining than, say, the levels of precaution adopted by oncoming drivers.

Today this intermediacy of DOE infringement finds no expression in the law. That would change if we guaranteed DOE infringers a modest stay, or grace period, to comply with injunction. A modest stay would seldom rob the patentee of his ultimate right of exclusion. Nor would a modest stay increase the burden on courts of valuing inventions. In most cases, the court will have already assessed infringement damages for the year preceding the judgment.

What is the social harm of, in effect, granting the DOE infringer a compulsory license that lasts, say, one year from the date of judgment, combined with an order that the infringer not increase the level of infringement during that year? Of course, the stay will weaken the patentee's bargaining power, but it will do so more when the patentee's bargaining power is a function, not of the technological merit of his invention, but of the DOE infringer's sunk costs and of flaws in the patent system such as poor notice and porous gates against obvious patents. Compared to a patentee whose invention is technologically significant, a patentee whose invention is technologically trivial derives a greater proportion of his bargaining leverage from the ability to enjoin the infringer's operation. If the invention is trivial – in the sense of being easy to design around or not being better than the alternatives – the infringer will pay only a low royalty to continue using the invention after the stay expires. If the patented invention is significant – in the

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(2008); Christopher M. Newman, *Infringement as Nuisance: Avoidance Costs and Accession in Tangible and Intellectual Property*, George Mason U. School of Law (2008).

sense of being hard to design around or being better than its alternatives – the infringer will pay a high royalty to continue using the invention after the stay expires.

The threat of being enjoined from using something trivial would not be so problematic if infringers could reliably identify and interpret the relevant patents in advance. But infringers often cannot. Indeed, the more trivial is the thing in question, the less likely is a reasonable infringer to regard that thing as a potentially patentable thing that merits a patent search in advance of commercialization. In other words, the closer a thing is to being obvious, the higher are the odds that someone will not only infringe a patent on that thing but do so inadvertently. Not only is a reasonable infringer less likely to search for a patent on some thing that is borderline obvious, the infringer is also more likely to independently invent the thing.

V. USE THE SAME STANDARDS FOR 112(6) EQUIVALENTS

Under 35 USC 112(6), a claim that expresses a limitation as "a means or step for performing a specified function… shall be construed to cover the corresponding structure, material, or acts described in the specification *and equivalents thereof*."[47] The Federal Circuit has said that these "statutory equivalents" are subject to the same "insubstantial differences" test as the equitable equivalents available under the DOE.[48] Yet, the Federal Circuit distinguishes 112(6) equivalents from DOE equivalents. The Federal Circuit says that 112(6) equivalents define the *literal* (!) scope of the claim's functional language. Further, according to one Federal Circuit opinion, when using the function-way-result test for 112(6) equivalents, the functions must be identical, not merely substantially the same.[49] Another Federal Circuit opinion says otherwise.[50]

Can DOE equivalents be applied on top of 112(6) equivalents? The cases appear to agree that there can be no double expansion of a functional limitation, no "equivalents of

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[47] 35 USC 112(6) [emphasis added].

[48] *See Chiuminatta Concrete Concepts Inc. v. Cardinal Indus.*, 145 F.3d 1303, 1309 (Fed. Cir. 1998)

[49] *See Al-Site Corp. v. VSI Intern Inc.*, 174 F.3d 1308, 1321 n.2 (Fed Cir 1999)

[50] *See Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1381-82 (Fed. Cir. 2001).

equivalents." Yet, as a conceptual matter, it is not readily clear why the Federal Circuit forbids DOE equivalents of 112(6) equivalents. If 112(6) equivalents really define literal scope, why isn't that literal scope entitled to the DOE equivalents to which literal scope is normally entitled? If 112(6) equivalents really define literal scope, then "equivalents of equivalents" are really DOE equivalents of literal scope.

Can DOE equivalents be applied instead of 112(6) equivalents? Maybe. A few opinions suggest that DOE equivalents are available to expand a functional limitation in a direction that 112(6) equivalents cannot expand, namely, forward to cover after-arising technology (AAT).[51] In *Al-Site v. VSI* (Fed Cir 1999), the Federal Circuit said that literal scope is keyed to the issue date and, because 112(6) equivalents define literal scope, they cannot embrace AAT.[52] 112(6) equivalents can only embrace things available when the patent issued. In contrast, DOE equivalents are keyed to the date that infringement began and can encompass AAT. Thus, AAT could infringe under the DOE without infringing under 112(6).[53] In sum, *Al-Site* suggests that, for functional limitations, 112(6) equivalents should be applied to things available when the patent issued and that the DOE should be applied to things that arose later.

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[51] *See Id.*; *NOMOS Corp. v. BrainLab USA Inc.*, 357 F.3d 1364, 1369 (Fed. Cir. 2004).

[52] *Al-Site*, *supra*. "An equivalent structure or act under § 112 cannot embrace technology developed after the issuance of the patent because the *literal meaning of a claim is fixed upon its issuance*. An 'after arising equivalent' infringes, if at all, under the doctrine of equivalents. Thus, the *temporal difference* between patent issuance and infringement distinguish an equivalent under § 112 from an equivalent under the doctrine of equivalents. In other words, an equivalent structure or act under § 112 for literal infringement must have been available at the time of patent issuance while an equivalent under the doctrine of equivalents may arise after patent issuance and before the time of infringement. An 'after-arising' technology could thus infringe under the doctrine of equivalents without infringing literally as a § 112, ¶ 6 equivalent." *Id.* [emphasis added]

[53] Imagine a claim that recites "An athletic shoe comprising… a means for detachably fastening said left upper portion to said right upper portion." The specification discloses laces, buttons, hooks and zippers as means for detachably fastening. Velcro is invented years later. Under *Al-Site*, Velcro could not be a 112(6) equivalent but could be a DOE equivalent.

The jurisprudence of 112(6) equivalents is a mess that gets messier the more one looks at it.[54] To decide whether to apply the law of 112(6) equivalents or the law of DOE equivalents, the court must first determine whether the technology corresponding to the claim's functional language qualifies as after-arising. The answer is not always straightforward. Furthermore, claims with functional limitations typically also include non-functional limitations. In such cases, the court may have to apply the law of 112(6) equivalents to some limitations, the law of DOE equivalents to other limitations, and sometimes the law of both types of equivalents to the same limitations. Realistically speaking, however, the probability that an accused product infringes does not detectably depend on whether a court purports to apply the law of 112(6) equivalents or the law of the DOE.

The upshot is that the distinctions between 112(6) equivalents and DOE equivalents are not worth their weight. The distinctions complicate doctrine without fine-tuning patent scope in a meaningful, much less a salutary, way. The initial rationale for labeling 112(6) equivalents as statutory – and thus distinct from DOE equivalents – was simply that the patent statute refers to "equivalents" in 112(6).[55] This rationale puts too fine a point on the matter. Anyway, there is no evidence that Congress or the drafters of the Patent Act intended that 112(6) equivalents be treated differently.[56]

We should simply treat 112(6) equivalents the same as DOE equivalents. Only one difference in treatment seems justifiable. For functional limitations, we could apply the DOE not to the functional claim language per se but to the structure disclosed in the specification that corresponds to that claim language. In other words, if we want to retain some distinction between 112(6) equivalents and DOE equivalents, the distinction should reside solely in what gets compared to what. For the DOE, we compare the accused element to the claimed limitation and ask whether the accused element is equivalent to that claimed limitation. For 112(6), we could compare the accused element to the

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[54] *Cf.* Cyrill P. Rigamonti, *Conflicting Theories of Equivalence: 35 USC 112(6) in the Supreme Court and the Federal Circuit*, 40 IDEA 163 (2000); Paul M. Janicke, *The Crisis in Patent Coverage: Defining the Scope of an Invention by Function*, 8 Harv. J.L. & Tech. 155 (1994).

[55] *See* Rigamonti, *supra*

[56] *See Id*.

disclosed structure that corresponds to the claimed limitation and ask whether the accused element is equivalent to that disclosed structure.

V. REEVALUATE PROSECUTION HISTORY ESTOPPEL

Under the doctrine of prosecution history estoppel (PHE), the DOE cannot cover what a patentee surrendered to obtain the claim. The doctrine of PHE comes into play if, during prosecution, the applicant amends a claim for a reason related to patentability and in so doing narrows the claim in some respect, or if, during prosecution, the applicant argues for a claim interpretation that is narrower in some respect than the claim's broadest reasonable interpretation.

In *Festo II*, the Court held that any narrowing amendment is: (1) presumed to be for a reason related to patentability, and (2) presumed to bar all equivalents for the amended limitation.[57] If the patentee rebuts (1), the amendment does not bar equivalents. If the patentee cannot rebut (1), he may still capture equivalents ranging as far as the extent to which he rebuts (2). He can rebut (2) in three ways, by showing: that the equivalent was unforeseeable, that the reason for the amendment was unrelated to the purported equivalent, or "some other reason" that he could not reasonably be expected to literally claim the equivalent.

Jay Thomas argues that the doctrine of PHE is not worth the candle and that we should ignore the prosecution history.[58] First, he argues, in most areas of the law estoppel requires detrimental reliance. Generally, someone has to rely on the act or statement to their detriment. Yet, in patent cases courts do not ask whether the accused infringer actually relied on the prosecution history. Second, accused infringers do not usually examine the prosecution history until after they have been accused of infringement. Third, to the extent that accused infringers do rely in advance on the prosecution history,

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[57] *See Festo II*, *supra*.

[58] *See* John R. Thomas, *On Preparatory Texts and Proprietary Technologies: The Place of Prosecution Histories in Patent Claim Interpretation*, 47 UCLA L. Rev. 183 (1999); John Thomas, *Presentation: A Case Against Using the Doctrine of Equivalents and Prosecution History Estoppel*, CASRIP Publication Series: Rethinking Intellectual Property 97-100 (No.6) (2000).

they do so largely because the doctrine of PHE exists. If it did not exist, accused infringers would seldom rely on the prosecution history.

These arguments are compelling but they sidestep the main rationale of the doctrine of PHE. Its main rationale is to deter applicants from over-reaching during ex parte prosecution. When the applicant's words and representations can be used against him, and when he is unsure which claim interpretation will serve his interests in the future, he chooses his words and representations more carefully and with more fealty to the truth.

This rationale can be framed in terms of general reliance. In general, the threat posed by PHE allows examiners to rely more on applicant arguments and claims. If applicants could argue and claim whatever they wanted to, with no expected punishment for over-reaching, patent examination would become more difficult and patents would become even less reliable records for the public at large.

Thomas also argues that PHE is superfluous over the prior art limit on DOE scope. That is, PHE is an inferior proxy for the question of whether the purported equivalent falls into the prior art.[59] This argument is likewise compelling but likewise falls short. PHE is not superfluous over the prior art limit on DOE scope. As Thomas acknowledges, PHE applies not only to amendments and arguments that avoid prior art but also to amendments and arguments that head off other problems with patentability such as lack of written support. Further, PHE constrains DOE scope more than the prior art does. The prior art merely prevents the scope of equivalents from extending behind the forward edge of the prior art. Under the absolute bar of *Festo I*, PHE reduces DOE scope to zero. Under the flexible bar of *Festo II*, PHE need not reduce DOE scope to zero but, if there is any unrebutted PHE, DOE scope will not extend all the way to the forward edge of the prior art. Finally, as discussed above, we should care about what applicants say because what they say affects the chances that the claims they want will issue. That is, we should police what applicants say because what they say affects what examiners do.

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[59] "Let us look objectively at the prior art. Who cares what the applicant says? His opinion does not matter. We are not interested in the intentions of the applicant. What we want to know is what the instrument says, what the *content* of the prior art is." Thomas, A Case Against Using, *supra* at 99.

Of course, the doctrine of PHE has its costs. It complicates infringement analysis,[60] which directly increases the costs of patent clearance, licensing and litigation. Further, examiners often rely on PHE itself. Examiners often think it sufficient to record a narrowing amendment or argument somewhere in the prosecution history, rather than requiring that everything necessary to interpret a claim appear explicitly in the claim or the specification. This habit of examiners increases the burden on potential infringers and others who must analyze claims, because these amendments and arguments tend to be buried in long prosecution histories.[61] The doctrine of PHE also increases the costs of claim drafting and prosecution, because applicants strive to master the doctrine's fine points and to strategize at length to avoid an estoppel.

Do the benefits of the doctrine of PHE outweigh its costs? I want to conclude that the threat of penalty for overreaching promotes overall efficiency much the same way that the threat of, say, criminal punishment promotes efficiency net of the costs of apprehending and incarcerating criminals.

It is harder to conclude, however, that the doctrine will remain beneficial in the future. The overall process of patent acquisition is becoming more adversarial. Inter partes reexamination is now available and the US will may soon adopt more liberal means of post-grant review.[62] By deterring applicants from overreaching, these adversarial processes serve as at least partial substitutes that can take over some of the police work that the doctrine of PHE performs today. On the other hand, reformers have proposed reforms to the doctrine of inequitable conduct that would decrease the frequency of, or the consequences from, findings of inequitable conduct.[63] Both PHE and inequitable conduct discourage applicants from overreaching during ex parte prosecution. If reform of inequitable conduct renders inequitable conduct less

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[60] "[W]e are creating wheels within wheels of elaborate doctrine to try to figure out when there is an estoppel." *Id.*

[61] *But Cf.* Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495 (2001).

[62] *See* (Proposed) Patent Reform Act of 2007, S.1145 (Sections 5 and 7), HR.1908 (Sections 6 and 9).

[63] (Proposed) Patent Reform Act of 2007, S.1145 (Sections 11-12), HR.1908 (Section 11).

threatening to applicants, the doctrine of PHE may for that reason become more socially valuable – because the doctrine of PHE can take over some of the police work that inequitable conduct performs today.

More useful is to ask whether we can reform the doctrine of PHE to improve its ratio of costs to benefits. Below are some preliminary thoughts.

Patent Failure shows us that, in general, we need more bright lines, especially bright lines that facilitate bargaining in advance of R&D or commercialization.[64] Unfortunately, having bright lines is always in tension with having the flexibility later to reach the right result on the substantive merits in the case at hand. Bright lines are always in tension with substantive accuracy or justice in hard cases. Good law makes hard cases. To make the law better, we must be more willing to take hard stands and reach verdicts that seem *wrong* under the oddball facts before us in individual cases.

In deference to the notice function of claims, the Federal Circuit set forth a bright line in *Festo I*.[65] Under the absolute bar of *Festo I*, any narrowing amendment related to patentability irrebuttably bars all equivalents for the amended limitation. In *Festo II*, the Supreme Court re-blurred the line by holding that a patentee may rebut the bar and capture equivalents ranging as far as the extent to which the patentee can show that: the equivalent was unforeseeable, the amendment was unrelated to the purported equivalent, or some other reason that he could not have been expected to claim the purported equivalent.

On first pass, and with *Patent Failure* in mind, the absolute bar of *Festo I* seems more attractive than the flexible bar of *Festo II*. Under *Festo I*, the effects of PHE on DOE scope are easier to estimate in advance. Under *Festo I*, any narrowing amendment simply erases all DOE scope for the amended limitation.

Festo I also seems to go hand in hand with reform of the DOE. If DOE scope, or the penalty for violating it, is cut back, there will be less equivalency for PHE to take away in the first place. The absolute bar of *Festo I* would increase the average *relative* size of the chunk of equivalency that PHE takes away, which could offset what would otherwise be a drop in the applicant's expected downside from overreaching during

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[64] *See* Bessen & Meurer, *Patent Failure* at 24-26.

[65] *See Festo I, supra*.

prosecution. In other words, if we curtail the DOE through reform, the DOE pie will be smaller; but if we also adopt the absolute bar of *Festo I*, PHE will take away a proportionately larger slice of that smaller pie.

There is a problem, however, with the absolute bar of *Festo I*. It punishes minor overreaching just as harshly as it punishes egregious overreaching. Under *Festo I*, a small narrowing amendment and a big narrowing amendment bar the same amount of DOE scope for the amended limitation – all of it. The Supreme Court characterized this mismatch between the crime and the punishment as foreign to equity.[66] The mismatch may also be inefficient. If any narrowing amendment of any magnitude kills all DOE scope, applicants could respond in various ways. Some applicants could go to great lengths to avoid amending claims after filing. These applicants would search the prior art before filing, draft the original claims very carefully and look for alternative ways to influence examiners, thereby driving up the costs of claim drafting and prosecution. Other applicants could deliberately claim less than they have invented, in the belief that overly narrow literal scope plus DOE scope is broader than accurate literal scope plus zero DOE scope. Other applicants could overreach more egregiously, reasoning that, if the punishment for grand larceny is the same as the punishment for petty theft, they might as well commit grand larceny.

More thought, and perhaps data, are necessary before we can conclude that the absolute bar's benefits (from clarifying DOE scope and increasing the fraction of DOE scope that PHE withholds) outweigh the absolute bar's costs (from distorting claim drafting and failing to promote marginal deterrence). Accordingly, here I can offer no specific reform of the doctrine of PHE.

VI. CONCLUSION

Under current law, most patent suits are suits against inadvertent infringers as opposed to suits against pirates. Rarely does a court find that an infringer actually *copied*

[66] *See Festo II* at 722, 728, 738-39.

the patented invention.[67] Indeed, rarely does a patentee even allege that the infringer copied.[68] Furthermore, according to Bessen and Meurer, accused infringers tend to spend more on R&D than do the patentees who sue them.[69] This implies that the more a firm invests in new technology, the more that firm risks inadvertently infringing someone else's patent. The consequence, according to Bessen and Meurer, is that patents outside chemistry and pharmaceuticals actually discourage innovation and that most innovators would be better off with no patent system than with the one we have.[70]

If the authors' data holds up under scrutiny, dramatic reform should follow. Even if the revised figures are less damning of the status quo than the authors', it is difficult to believe that the revised figures would be so improved as to belie the take-home message of *Patent Failure*, which is that, in terms of magnitude and importance, the costs of poor notice swamp most things that most patent commentators spend most of their time worrying about.

We should worry about the DOE. It generates a big chunk of patent notice costs while providing only a modest chunk of patent incentives. At first glance, outright abolition of the DOE is tempting. A tamer version of the DOE, however, is likely better than no DOE at all. The competing effects of the DOE point to the need for a balance, not for abolition, at least not without first trying serious reform.

DOE scope is double-edged. To its owner, a patch of DOE scope is like an umbrella insurance policy. Jones's DOE scope increases Jones's incentive to engage in risky activity (inventing) and decreases his incentive to adopt costly precautions (like painstaking claim drafting), when Jones knows that he is exposed to a class of risk (failure of literal scope to recoup his cost of the invention) but can neither predict, nor otherwise adopt cheap precautions to obviate, the chain of events through which specific risks in the class could materialize. To Smith, a potential infringer, Jones's patch of DOE scope is like a minefield. Jones's DOE scope increases Smith's risk. Of course, Smith enjoys the security afforded by Smith's own patch of DOE scope, and other parties fear

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[67] *See infra*, note 3.

[68] *Id.*

[69] *Id.*

[70] *See Patent Failure* at 95-146.

Smith's DOE scope. Again, this tension – between the tendency of a patch of DOE scope to decrease the risk of inventing for its owner and to increase the risk of inventing and commercializing for others – calls for a balance in the DOE, a balance that ensures that the DOE lowers risk for inventors more than it increases it.

I have proposed that we soften the remedy for DOE infringement and collapse 112(6) equivalents into the DOE. These reforms are not enough by themselves to tame the DOE. The DOE needs a lot of work.[71] Nor is the doctrine of prosecution history estoppel the only legal limit on DOE scope that needs to be re-assessed.[72] Some of the legal limits seem inconsistent with each other, some seem redundant, and some seem to create perverse incentives.[73] Unsurprisingly, the courts apply them ad hoc.[74]

The tests for technological equivalence[75] are also vexing. The overarching test – are the differences between the claimed invention and the accused device "insubstantial"? –

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[71] *Cf.* Judge Paul R. Michel, *The Role and Responsibility of Patent Attorneys in Improving the Doctrine of Equivalents*, 40 IDEA 123 (2000) (the DOE "has proven to be the most difficult and least predictable of all doctrines in patent law to apply); Joshua D. Sarnoff, *Abolishing the Doctrine of Equivalents and Claiming the Future after* Festo, 19 Berkeley L. J. 1157 (2004).

[72] *See, e.g., Id.*; John Mills, *Three "Non-obvious" Modifications to Simplify and Rein in the Doctrine of Equivalents*, 14 Fed. Cir. B. J. 649 (2004-05); Jeremy T. Marr, *Foreseeability as a Bar to the Doctrine of Equivalents*, 2003 B.C. Intell. Prop. & Tech. F. 103101 (2003). *But Cf.* Paul M. Janicke, *On the Causes of Unpredictability of Federal Circuit Decisions in Patent Cases*, 3 NW J. Tech. & Intell. Prop. 93 (2005).

[73] With respect to perverse incentives, for example, consider the public dedication rule. Under this rule, the DOE cannot cover subject matter that the patentee disclosed but failed to claim. This rule increases the costs of drafting applications, because it encourages drafters both to think more deeply about the shape that the claims will eventually assume and to comb through draft applications to remove anything unnecessary to support that shape. Concomitantly, this rule also penalizes patentees who disclose more information than they need to support the claims, which seems perverse insofar as the information disclosure rationale for the patent system holds water.

[74] One can get a feel for the ad hoc jurisprudence of the legal limits by comparing *Graver Tank, supra*, to *Johnson & Johnston, supra*, and by comparing *Pennwalt Corp. v. Durand-Wayland Inc.* 833 F.2d 931(Fed. Cir. 1987) to *Corning Glass, supra*.

[75] The judge determines legal equivalence. The jury, or the judge in a bench trial, determines technological (or factual) equivalence. *See* Graver Tank, *supra*.

merely rephrases the question.[76] The function-way-result subtest[77] seems a bit more useful but it would be nice to know how its function prong differs from its result prong. If an accused device has substantially the same function as the claimed device, when would the accused device not achieve substantially the same result as the claimed device? A standard definition of the word "function" is "the purpose for which something is designed or exists." The standard definition seems to imply that referring to a thing's function is merely a way of referring to the result achieved by the thing. Is this three-prong subtest really a two-prong subtest?

[76] Durham, *supra* at 971, 992-93. Durham proposes that we partially merge the test for equivalents and the test for obviousness. "The test I will propose is this: the accused combination is equivalent to the claimed combination if, at the time the patent application was filed, a person of ordinary skill in the art, aware of both the claimed combination *and the substituted element*, would have found it obvious to make the substitution." *Id*. at 973-74. His proposal merits serious consideration.

[77] Under the function-way-result subtest, an accused element is technologically equivalent to the claimed element if the accused element performs substantially the same function in substantially the same way to achieve substantially the same result. *See Graver Tank*, *supra*.