NOTES

INNOVATION ON THE CUTTING EDGE OF *ARIAD*: REINVENTING THE WRITTEN DESCRIPTION REQUIREMENT

JONATHAN E. BARBEE*

For the great majority of its history, the written description requirement was an often-ignored relic of the patent statute. As technology advanced, the written description requirement developed teeth as a means for invalidating patent claims during litigation. Written description doctrine reached its peak in Ariad Pharmaceuticals, Inc. v. Eli Lilly & Co.*, when the Federal Circuit created a significant setback for groundbreaking innovation.* Ariad *demonstrated that the written description doctrine lacked sufficient recognition of the fundamental policies and purposes of the patent system and that this could have serious consequences for innovation. This Note attempts to rectify the written description doctrine by reorienting the doctrine in innovation policy. To do so, I first apply an alternative version of the "prospect theory" of patents to conventional patent policy. Based on this policy calculus, I then devise a reformed hypothetical innovation test that looks outside of the "four corners" of the patent and considers the larger impact that the written description has on the patent system. Without such doctrinal reform, the written description doctrine of* Ariad *and its legacy risks undermining the incentives that motivate inventors to undertake cutting-edge technology.*

INTRODUCTION

Imagine that your company has a cutting-edge invention, so groundbreaking that several aspects of the invention remain a mystery to you. You choose not to patent your innovation because you are afraid that a court would invalidate your patent because you did not understand your invention well enough, making your hard work and investment for naught. You are perplexed—it seems rather unfair that you could understand your invention well enough to receive a patent but not well enough to survive a lawsuit. After all, is it really possible to file a coherent patent application without really understanding the invention? To you, suggesting that a patentee can do so without fully understanding its invention is tantamount to directing someone

 J.D. 2011, New York University School of Law; B.S., 2008, Columbia University, The Fu Foundation School of Engineering and Applied Science. I would like to extend my sincere thanks to Professor Rochelle Dreyfuss for inspiring me to write on *Ariad* and for providing feedback as I developed my ideas. All errors are my own.

through a maze without fully knowing the turns of the maze. Is this possible? Yes.[1] Is it likely? No.[2]

This was the dilemma presented in *Ariad Pharmaceuticals, Inc. v. Eli Lilly & Co.*,[3] which ignited controversy around what was traditionally a very mundane relic of patent law: the written description requirement. In nature, this requirement is very simple and straightforward: It asks that patents recite the details of their inventions in regular prose as indicated in 35 U.S.C. § 112.[4] In *Ariad*, however, the Federal Circuit's application of the requirement produced a questionable result by ignoring the fundamental goal of patent law: encouraging innovation. Ariad, the owner of the patent, sued Eli Lilly for patent infringement. As a defense, Eli Lilly argued that the patent's inventor failed to satisfy the written description requirement.[5] Essentially, Eli Lilly argued that Ariad did not disclose in its written description the specific molecular "structure" of a protein activated during a method of cell therapy.[6] Ariad knew how to perform the therapy, but could only hypothesize about the exact composition of the active protein because the science involved was so far on the cutting edge.[7] In fact, Ariad did disclose the structure of one class of molecule, but this still did not satisfy the Federal Circuit.[8] The controversy was momentous enough for the Federal Circuit to grant a peti-

---

[1] *See, e.g.*, *In re* Alton, 76 F.3d 1168, 1172 & n.5 (Fed. Cir. 1996) (affirming rejection of a patent due to an inadequate written description, despite sufficiency of enablement); *In re* DiLeone, 436 F.2d 1404, 1405 (C.C.P.A. 1971) (same); *see also* ALAN L. DURHAM, PATENT LAW ESSENTIALS: A CONCISE GUIDE 87 (2d ed. 2004) (highlighting the possibility that patents may enable inventions without providing adequate written descriptions).

[2] *See* LizardTech, Inc. v. Earth Res. Mapping, Inc., 424 F.3d 1336, 1345 (Fed. Cir. 2005) ("Those two requirements usually rise and fall together.").

[3] Ariad Pharm., Inc. v. Eli Lilly & Co. (*Ariad I*), 560 F.3d 1366 (Fed. Cir. 2009), *aff'd in part*, *rev'd in part en banc*, 598 F.3d 1336 (Fed. Cir. 2010).

[4] Section 112, ¶ 1 reads: "The specification shall contain a *written description* of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention." 35 U.S.C. § 112, ¶ 1 (2006) (emphasis added).

[5] Ariad Pharm., Inc. v. Eli Lilly & Co. (*Ariad II*), 598 F.3d at 1340, 1354.

[6] *Id.* at 1350, 1354 ("We explained that an adequate written description requires a precise definition, such as by structure, formula, chemical name, physical properties, or other properties, of species falling within the genus sufficient to distinguish the genus from other materials.").

[7] *See Ariad I*, 560 F.3d at 1373–74.

[8] *Id.* at 1375 (explaining that "the specification proposes example structures for decoy molecules . . . [and that] there is little doubt that the specification adequately described the actual molecules to one of ordinary skill in the art" but that, nevertheless, "this does not answer the question whether the specification adequately describes *using* those molecules" (emphasis added)).

tion for rehearing en banc, where it subsequently invalidated the asserted claims on written description grounds.[9]

The en banc rehearing posed two questions: whether 35 U.S.C. § 112 actually required a written description separate from the enablement and, if so, what the "scope and purpose" of such a separate requirement was intended to be.[10] Defining the scope and purpose of the written description requirement would then illuminate the test that should apply for determining whether the requirement has been satisfied. Although the Federal Circuit ruled decisively that there was a separate written description requirement,[11] it left the second question largely unanswered. This Note deals with that second question and attempts to resolve what the Federal Circuit did not.

Ariad was monumental because the Federal Circuit gave itself a golden opportunity to overhaul or eliminate the written description doctrine.[12] This was greatly needed, in many respects, since the Federal Circuit had continually distorted the written description doctrine for years, all at the expense of innovation policy. Judge Rader, in his dissent from the denial of en banc rehearing of a previous written description case, aptly explained the imprudence of the warped written description doctrine and its consequences for innovation:

> The [Federal Circuit's written description] doctrine . . . seems to impose some illogical requirements on patent drafters today. . . . Must a biotechnological invention list every amino acid variation for a particular protein or protein function . . . ? Must a university or small biotech company expend scarce resources to produce every potential nucleotide sequence that exhibits their inventive functions? Perhaps more important for overall patent policy, must inventors spend their valuable time and resources fleshing out all

---

[9] Ariad Pharm., Inc. v. Eli Lilly & Co., 595 F.3d 1329, 1330 (Fed. Cir. 2009) (granting Ariad's petition for rehearing en banc). The court subsequently affirmed the patent's invalidation upon rehearing. *Ariad II*, 598 F.3d at 1340, 1358.

[10] *Ariad Pharm., Inc.*, 595 F.3d at 1330.

[11] *See Ariad II*, 598 F.3d at 1347 (concluding that the statutory language of 35 U.S.C. § 112, Supreme Court precedent, and stare decisis all support a written description requirement separate from the enablement requirement).

[12] The Federal Circuit had twice turned down such an opportunity in the past, but it finally convened the entire Federal Circuit bench for the *Ariad* rehearing. The Federal Circuit denied rehearing in *University of Rochester v. G.D. Searle & Co.* (*Univ. of Rochester II*), 375 F.3d 1303 (Fed. Cir. 2004), and in *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 970 (Fed. Cir. 2002). *See* Christopher M. Holman, *Is* Lilly *Written Description a Paper Tiger?: A Comprehensive Assessment of the Impact of* Eli Lilly *and Its Progeny in the Courts and PTO*, 17 ALB. L.J. SCI. & TECH. 1, 18, 23–24 (2007) (describing why *Univ. of Rochester* and *Enzo Biochem, Inc.* were not reheard en banc).

> the obvious variants of their last invention instead of pursuing their next significant advance . . . ?[13]

Despite Judge Rader's dissent, a considerable portion of the patent bar supports a heightened written description requirement due to fear that broad patents will inhibit innovation.[14] Nevertheless, this Note argues for a relaxed requirement and a reformation of the doctrine that observes the need to incentivize innovation.

The proper resolution to the written description dilemma, then, resides in innovation policy because written description disputes, as in *Ariad*, are really disputes over innovation. The written description requirement implicates innovation because the most innovative and nuanced features of a patent are often found in the written description and other requirements of § 112, ¶ 1.[15] In addition, the written description is largely determinative of the outer boundaries of a patent's scope since the written description helps to define the contours of the claims.[16] This also becomes apparent from observing that the Federal Circuit's written description doctrine was bereft of any serious consideration of innovation policy. Even Judge Lourie, writing for the majority in the en banc opinion, acknowledged briefly that innovation was a pertinent consideration and seemed to suggest that Ariad might have somehow prevailed had it presented "evidence of any discernable impact on the pace of innovation or the number of patents obtained by [similar patentees]" due to the current written description doctrine.[17] This is not to suggest that Ariad would certainly have succeeded upon more serious consideration of innovation

---

[13] *Univ. of Rochester II*, 375 F.3d at 1313–14 (Rader, J., dissenting) (explaining objections to denial of rehearing en banc).

[14] Many parties submitted amicus briefs to the Federal Circuit regarding *Ariad*, the vast majority of which supported Eli Lilly and upholding the current doctrine. *See Ariad II*, 598 F.3d at 1342 (noting that, of twenty-five amicus briefs, seventeen were filed in support of Eli Lilly while only one was filed in support of Ariad); *see, e.g.*, Brief of Amicus Curiae Medtronic Inc. in Support of Eli Lilly & Co. at 5–8, *Ariad II*, 598 F.3d 1336 (Fed. Cir. 2010) (No. 02-CV-11280) (defending the current written description doctrine). Medtronic actually argued that the written description requirement should be made stronger, proclaiming in a section heading that "THE WRITTEN DESCRIPTION REQUIREMENT SHOULD NOT JUST BE MAINTAINED, IT SHOULD BE STRENGTHENED." *Id.* See also *infra* notes 139–41, 147–48, and 156–58 and accompanying text for further explanation of the specific arguments put forth by amici who supported a heightened written description requirement.

[15] One of the more illustrative examples of this is the best mode requirement of § 112, ¶ 1, which is where the inventor is supposed to disclose the optimal way to practice the invention. *See infra* note 57 and accompanying text (summarizing the best mode requirement).

[16] *See infra* notes 45–57 and accompanying text (describing the interplay between the written description and the interpretation of claims).

[17] *Ariad II*, 598 F.3d at 1353.

policy, but it is worth exploring the possibility. Would the Federal Circuit have ruled differently if Ariad had presented such evidence of the nexus between innovation and the written description requirement? Would the Federal Circuit have shifted the "balance" of the written description doctrine in Ariad's favor?[18]

Despite forecasts otherwise, the written description turmoil has not yet abated. Judge Gajarsa dismissed the written description requirement as a closed issue,[19] but, since the rehearing, at least two cases have reached the Federal Circuit on written description issues.[20] Rochelle Dreyfuss, a leading patent law scholar, has even suggested that the written description issue might someday reach Supreme Court review.[21] During litigation, the written description requirement is more of a cancer than a flu: It does not happen often, but, when it hits, it is likely to do serious damage.[22] The Federal Circuit's decision to rehear *Ariad* en banc shows that the problems surrounding the written description requirement continue to fester.[23] Further, as technology becomes even more complex, the written description requirement will become an increasingly powerful litigation tool. Before the 1960s, the written description was not a highly litigated issue, but it has since become more pervasive and pressing as the field of biotech-

---

[18] *Id.* (characterizing the written description dilemma as finding "the right balance" between incentives to invent and costs imposed on other inventors by those incentives).

[19] *See id.* (Gajarsa, J., concurring) ("Empirical evidence demonstrates that outside the priority context the written description doctrine seldom serves as a separate vehicle for invalidating claims.").

[20] *See* Laryngeal Mask Co. v. Ambu Inc., 618 F.3d 1367, 1368–69 (Fed. Cir. 2010) (explaining that the case presented a genuine issue concerning the written description requirement); Goeddel v. Sugano, 617 F.3d 1350, 1357 (Fed. Cir. 2010) (deciding a priority dispute on written description grounds).

[21] *See* Rochelle Cooper Dreyfuss, *What the Federal Circuit Can Learn from the Supreme Court—and Vice Versa*, 59 AM. U. L. REV. 787, 806 (2010) (noting that the strong dissents by Judges Rader and Linn "may also lead to Supreme Court consideration of the issue").

[22] Christopher M. Holman conducted a study of cases since a prominent 1997 written description case and concluded that courts rarely decide patent lawsuits solely upon the written description requirement. *See* Holman, *supra* note 12, at 78–85. Nevertheless, the written description requirement is still a highly litigated point of law and often lethal when it is the decisive issue in a patent lawsuit, as pointed out in another (and more recent) study done by Aaron B. Rabinowitz. *See* Aaron B. Rabinowitz, *Ending the Invalidity Shell Game: Stabilizing the Application of the Written Description Requirement in Patent Litigation*, 12 MINN. J. L. SCI. & TECH. 127, 141 (2011) ("[P]atent litigation data reveals that over 2000–2009, parties that attacked a patent on written description grounds succeeded more than forty percent of the time.").

[23] Judge Lourie, writing for the majority, began the en banc opinion by stating that rehearing en banc was granted "[b]ecause of the importance of the issue." *Ariad II*, 598 F.3d at 1340.

nology has emerged and advanced.[24] Each advance presents a new challenge in satisfying the written description threshold. The threshold is set by a combination of the skill of art in the field and the nature of the invention, such that advances in technology increase both the skill of art and the complexity of the nature of inventions and duly require a new application of the doctrine.[25]

Part I of this Note situates the written description requirement within the patent system and tracks the court-developed doctrine regarding the requirement from its inception up to *Ariad*. Part II interprets conventional patent policies underlying the written description requirement through the lens of "prospect theory" to cohere a framework for innovation policy. Part III then devises a new written description inquiry—a "hypothetical innovation" test—based on innovation policy in order to allow courts to address written description cases more adequately and to best promote innovation.

I
THE FOUNDATIONS OF THE WRITTEN DESCRIPTION REQUIREMENT

A. The Patent System

The primary purpose of the patent system is "progress," otherwise known as innovation. Article I, Section 8 of the U.S. Constitution views technology as a community quilt, which grows as scientists and engineers build upon one another's research.[26] In order to compen-

---

[24] A review of the case law shows that the written description dilemma is a product of recent history and recent advances in technology. *See infra* Part I.B (recounting the genesis and evolution of the written description doctrine); *see also* Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1153 & n.39 (2008) (noting that the written description doctrine was first articulated in 1967). Arguably, gene patents and similarly complex biotechnology patents spurred the development of the written description doctrine in recent years. *See generally* Holman, *supra* note 12, at 13–23 (describing how the written description doctrine has changed due to the increase in biotechnology patents).

[25] *See Ariad I*, 560 F.3d 1366, 1372 (Fed. Cir. 2009), *aff'd in part*, *rev'd in part en banc*, 598 F.3d 1336 (Fed. Cir. 2010) (noting that the written description requirement entails consideration of factors including "the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science or technology, [and] the predictability of the aspect at issue" (alteration in original) (quoting Capon v. Eshhar, 418 F.3d 1349, 1357 (Fed. Cir. 2005)) (internal quotation marks omitted)).

[26] Article I, Section 8, Clause 8, states that Congress has the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their Respective Writings and Discoveries." U.S. CONST. art. I, § 8, cl. 8; *see* Max Stul Oppenheimer, *The Time and Place for "Technology-Shifting" Rights*, 14 MARQ. INTELL. PROP. L. REV. 269, 301–04 (2010) (remarking that the Intellectual Property Clause is "in effect a public domain provision"); Michael Risch, *Everything is Patentable*, 75 TENN. L. REV. 591, 635–36 (2008) (noting that the Supreme Court has said that protecting the public domain is of constitutional priority in patent law (citing Graham v. John Deere Co., 383 U.S. 1, 6 (1966))).

sate for the massive investments required for technological innovation,[27] the patent system provides for a quid pro quo exchange:[28] In return for disclosing inventions to the public through a patent, inventors receive a temporary monopoly to use the invention.[29] Ultimately, the goal of the patent system is to place more and more material into the public domain, the theoretical space where knowledge is collected and made accessible to the public.[30] Thus, the policy driving patent law is the promotion of innovation through the regulation of patent scope, the provision of adequate notice of patent rights, and the encouragement of inventors to seek patents.[31] All three of these policy considerations can be traced directly to the constitutional mandate in Article I, Section 8.[32]

1. The Patent Process

To obtain a patent, an inventor goes through an application process with the U.S. Patent and Trademark Office (PTO) known as "prosecution."[33] During prosecution, PTO examiners verify that the inventor has satisfied a set of substantive requirements (novelty, non-

---

[27] *See* F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 707–12 (2001) (quanitifying various costs associated with bringing ideas to market).

[28] *See* Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 377–78 (2010) (observing that courts have identified the quid pro quo exchange as a major aim of patent law); Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 125–26 (2006) (framing the quid pro quo exchange within patent law).

[29] The patent term lasts twenty years from the date of filing, after which the privilege to practice the patent is released to the public. 35 U.S.C. § 154(a)(2) (2006).

[30] Aside from patented technologies, the public domain includes patentable subject matter already accessible and known to the public (such as in magazine articles and products found at stores) along with all expired patents and unpatented material that is publicly available; the main category exempt from the public domain is unpatented material that is not publicly known, accessible, or available. *See* 35 U.S.C. § 102(a), (e) (stating the novelty requirement for patentability); Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523 (2010) (using "prior art," as defined under 35 U.S.C. § 102(a), (e), synonymously with "public domain"); *id.* at 535 ("These doctrines prevent the patentee from removing existing knowledge from the public domain. . . . [which includes] what is already known . . . or such an obvious variant of prior knowledge that it was effectively known . . . ."); *see also* Sean B. Seymore, *Rethinking Novelty in Patent Law*, 60 DUKE L.J. 919, 930 (2011) (noting that the notion of "public domain" is a fundamental principle of patent law). For instance, trade secrets are discouraged because they encourage inventors to keep their ideas from entering the public domain. Mark A. Lemley, *The Surprising Virtues of Treating Trade Secrets as IP Rights*, 61 STAN. L. REV. 311, 329–37 (2008).

[31] *See infra* Part II (discussing these three pillars of innovation policy in depth).

[32] *See infra* Part II.

[33] *See* ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 50–53 (4th ed. 2007) (describing the basic process of patent prosecution). PTO examiners follow the Manual of Patent Examining Procedure (MPEP), the guidelines of which track case law. *See generally* U.S. PATENT & TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE (2005) [hereinafter MPEP].

obviousness, and utility) and a separate set of disclosure requirements (written description, enablement, and best mode), which are all codified in Title 35 of the U.S. Code.[34]

Once granted, the patent maintains a "presumption of validity," which presumes that the patent has fully satisfied all of the substantive and disclosure requirements.[35] The patent may then be contested through litigation, where federal courts have the power to invalidate any patent and adverse parties have the opportunity to rebut the presumption of validity.[36] One notable facet of the patent system is that the overwhelming majority of patents are never litigated and thus maintain a presumption of validity through their entire term,[37] largely because most patents are not commercializable. Understood together, prosecution can be seen as a way of policing patents (ensuring that patentees follow patent requirements ex ante)[38] while litigation can be seen as a means of enforcing patent rights (ensuring that patentees hold only valid rights ex post).[39]

2. The Patent Itself

Patents come in different varieties, most notably "process" patents and "product" patents: The process is *how* one achieves a desired effect, whereas the product is *what* one uses to achieve that effect.[40] For instance, the recipe for chocolate chip cookies—what ingredients

---

[34] *See* 35 U.S.C. §§ 101–103, 112; *see also* DONALD S. CHISUM, CHISUM ON PATENTS § 11.01 (2010) (providing an overview of the patent prosecution process and the basic statutory requirements of a valid patent application); *infra* notes 121–24 and accompanying text (describing flaws in the patent system).

[35] 35 U.S.C. § 282; *see* MERGES & DUFFY, *supra* note 33, at 54 (explaining that the statutory presumption of validity requires that courts afford deference to the PTO's determination of patent validity).

[36] *See* CHISUM, *supra* note 34, §§ 21.01–.02 (discussing federal court jurisdiction and venue in patent litigation). During litigation, defendants are allowed to challenge the validity of the patent as an initial question because the inventor is only entitled to damages for infringement if her patent rights are valid. *See* MERGES & DUFFY, *supra* note 33, at 54.

[37] *See* Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571, 1610–11 (2009) (noting that 99% of patents are reportedly never litigated); Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1503, 1507–08 (2001) (explaining that the overwhelming majority of patents, approximately 98.5%, are never litigated).

[38] CHISUM, *supra* note 34, § 11.03; *see* Holman, *supra* note 12, at 5–6 (noting that the written description requirement originally served a policing role against the addition of new matter during patent prosecution).

[39] *See* MERGES & DUFFY, *supra* note 33, at 54–55. A patentee may bring a lawsuit to enforce her rights under a patent, but this permits accused infringers to challenge the validity of a patent before the question of infringement is reached. *Id.* at 54 (defining the lawsuit as an "enforcement action"). The opportunity to challenge the patent's validity is considered "fair" to accused infringers since prosecution is an ex parte proceeding. *See id.*

[40] *See* 35 U.S.C. § 101 ("Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter . . . may obtain a patent thereof . . . ."); *see*

to use and the order in which the ingredients are added—is the *process* for making the cookies. In contrast, the ingredients are the *products* used to perform the process of baking cookies. Innovation can occur with respect to a process (i.e., a recipe) or its products (i.e., its ingredients), making both useful and deserving of patent protection.[41]

Patents also vary in purpose, most notably "improvement patents" and "blocking patents." Improvements, such as superior variations of an existing invention, build significantly upon patented technologies to the point that they deserve independent patent protection.[42] Blocking patents are improvement patents that claim something necessary to practice another patented invention, such as shoelaces to a shoe since shoelaces are necessary to use shoes.[43] The term is illustrative because these patents "block" other inventors from using the desired technology without first licensing the blocking patent, which is required to practice that technology.

Improvement and blocking patents thus allow inventors to innovate around existing patents by offering opportunities to build upon a patent's technology without infringing it. Improvement patents allow for an inventor to invent *around* the claims of a patent, where an inventor takes a patent and invents something that is so much improved that it is considered a separate invention from its predecessor. Blocking patents, on the other hand, *overlap* with an existing patent, such that neither patented invention can be practiced without practicing the other—the blocking patent essentially acts as a tollbooth on the road that another patent has already paved.[44] Such blocking patents allow inventors to occupy the same technological space as patented technology since these blocking innovations fill the gaps in patents and subsequently avoid infringement.

Beyond the three fundamental requirements concerning an invention's substance (novelty, nonobviousness, and utility), the

---

also CHISUM, *supra* note 34, §§ 1.02–.03 (describing process and product claims); *id.* § 8.05 (describing product-by-process claims).

[41] Here, the cookies represent the end product or result achieved by an invention. A cookie itself may not be patentable because it would be obvious. Therefore, many inventors who have a new idea for some type of cookie will not patent the cookie itself but the process or products used to make the cookie. Similarly, it is unlikely that an inventor would try to patent a new type of computer because that inventor would likely patent a new product (for example, a new microprocessor) or process (for example, a new way of storing data) that is the key to what makes the inventor's computer new.

[42] *See* Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 860–61 & nn.96–97 (1990) (providing an overview of blocking patents and improvement patents).

[43] *See id.* at 860 ("In such a situation, the holder of the narrower ('subservient') patent cannot practice her invention without a license from the holder of the dominant patent.").

[44] *Id.* at 860–61.

patent document itself must also meet a separate set of disclosure requirements concerning its formal composition.[45] The most important of these requirements mandates that patents include a specification as recited in 35 U.S.C. § 112. The specification includes four constituent parts: the claims, a written description, enablement, and best mode.[46] Together, these components supply all relevant material needed to understand the scope and substance of the patented technology within the "four corners" of the patent. This allows analysis of a patent's scope and its claims to occur by looking primarily at the patent document itself.[47] More importantly, the disclosure from these components supports "progress" by leading others to innovate.[48]

The claims officially define what the patent covers, while the other components help to explain the claims.[49] This creates a hierarchy within the specification: The claims are the primary source of a patent's scope, and everything else, the written description requirement included, is always secondary.[50] As the Federal Circuit has expounded, the written description requirement is never to be read onto the claims such that the written description requirement supplants the claims.[51]

The written description, enablement, and best mode perform an explanatory function by ensuring that the claims can be understood without looking beyond the four corners of the patent.[52] Ironically, the highly technical language of the claims necessitates this additional disclosure so that a "person having ordinary skill in the art"—a bona

---

[45] *See* CHISUM, *supra* note 34, § 11.02 (describing components that inventors must include in every patent).

[46] 35 U.S.C. § 112 (2006).

[47] *See* Rabinowitz, *supra* note 22, at 136 (explaining that compliance with the written description requirement must be evaluated using the four corners of the patent document).

[48] *See, e.g.*, Holbrook, *supra* note 28, at 125 & n.4 (describing how disclosure leads to public knowledge, which allows innovators to build upon existing technology).

[49] *See* MERGES & DUFFY, *supra* note 33, at 26 (describing claims as "the most important part of the modern patent document" and "the portion of the patent document that defines the patentee's rights" (quoting Markman v. Westview Instruments, Inc., 517 U.S. 370, 372 (1996)) (internal quotation marks omitted)); *see also* Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 HARV. J.L. & TECH. 401, 409 (2010) (explaining that claims "demarcate the boundaries of the relevant invention").

[50] This principle has been edified in claim construction doctrine. *See, e.g.*, Phillips v. AWH Corp., 415 F.3d 1303, 1319–20 (Fed. Cir. 2005); *see also* MERGES & DUFFY, *supra* note 33, at 803; Devlin, *supra* note 49, at 410.

[51] *See Phillips*, 415 F.3d at 1319–20 (citing Tex. Digital Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193, 1204 (Fed. Cir. 2010)) (stating that reading a limitation from the written description onto the claim is one of the cardinal sins of patent law). However, as will be explained in Part I.C.2, such "reading onto the claims" is effectively what the Federal Circuit did in *Ariad*.

[52] For an outline of the purposes of the requirements, see Holbrook, *supra* note 28, at 127–30.

fide expert in that field of science—could use the patent.[53] Since the fundamental goal of patent law is to disseminate useful inventions to the public in furtherance of innovation, it would defeat the purpose of many patents if the written description and other parts of the specification did not distill the technical language of the claims into "plain English."[54]

Accordingly, the written description lays out in regular prose the invention and its most important details, thereby serving two functions: deciphering the claims of a patent and demonstrating that the patentee "possessed" her invention,[55] a concept that is discussed in Part I.A.3. Enablement discloses enough information and instructional material to allow a person having ordinary skill in the art to utilize the patent.[56] The best mode requires the inventor to note which possible version of her invention she believes is optimal at the time the patent application is filed.[57]

In practical effect, the enablement and written description requirements are closely related, such that fulfilling one generally fulfills the other. Often, by instructing a person of ordinary skill how to use her invention, an inventor will also prove that she possesses her invention.[58] After all, it is very difficult to teach an expert in the relevant field how to use an invention without thoroughly describing that invention in the process. This has become so apparent that some scholars have characterized the written description as a "super-enablement" requirement.[59]

3. Possession

In addition to aiding claim interpretation, the written description also proves that the inventor actually invented and understood the

---

[53] *E.g.*, Holbrook, *supra* note 28, at 127–28 (noting that the written description is applied during claim construction).

[54] *See, e.g.*, Standard Oil Co. v. Am. Cyanamid Co., 774 F.2d 448, 452 (Fed. Cir. 1985) ("The descriptive part of the specification aids in ascertaining the scope and meaning of the claims inasmuch as the words of the claims must be based upon the description. The specification is, thus, the primary basis for construing the claims.").

[55] *See* Charles W. Adams, *Allocating Patent Rights Between Earlier and Later Inventions*, 54 ST. LOUIS U. L.J. 55, 76 (2009).

[56] *See* CHISUM, *supra* note 34, § 7.03.

[57] *Id.* § 7.05; *see also* Randomex, Inc. v. Scopus Corp., 849 F.2d 585, 587 (Fed. Cir. 1988).

[58] *See, e.g.*, LizardTech, Inc. v. Earth Res. Mapping, Inc., 424 F.3d 1336, 1345 (Fed. Cir. 2005) (commenting that these "two requirements usually rise and fall together").

[59] *See, e.g.*, Timothy R. Holbrook, *Patents, Presumptions, and Public Notice*, 86 IND. L.J. 779, 795 (2011) (calling the written description "redundant" of enablement).

idea being claimed—a concept known as "possession."[60] Since claims often include highly technical and vague language, it is possible for an inventor to draft claims for something she did not actually invent. This possibility is one of the greatest concerns voiced by proponents of a heightened written description requirement. Thus understood, the written description requirement acts as a litmus test for possession: If an inventor actually possesses her invention, then she should be able to describe it in significant detail.[61] The trouble with possession is that it is hard to concretize, and it can have a different meaning with respect to different areas of technology (for example, what it means to possess a nucleotide sequence for DNA is very different from what it means to possess a new timing circuit). Fundamental distinctions in the substance of different technologies—both in the objects studied and in the research methodology—lead to differences in how various types of technology are understood.[62]

To grasp what possession means in patent law, it is helpful to understand that the patent system divides the process of invention into two phases: "conception" and "reduction to practice."[63] Conception occurs when the proverbial light bulb goes off in the inventor's head and she first recognizes a "definite and permanent" impression

---

[60] Since, theoretically, it is possible to provide enablement and a best mode *without* possessing an invention, the written description is the primary means of judging possession. *See supra* note 1 and accompanying text (noting the possibility of enabling an invention without possessing it). For instance, an inventor could have enough knowledge to direct someone to use her product and could even suggest the optimal way to use the product, but may not really *understand* how the invention works. Take, for example, a solvent for removing scratches from cars: An inventor may enable the invention by explaining which chemicals to mix and in which proportions, and may offer a best mode by explaining that the solvent is most efficient when mixed in a particular manner. But the inventor may not *possess* the invention in the doctrinal sense because she may not understand *how* the chemicals in the solvent react and operate to remove the scratches or *why* they are effective.

[61] *See* Chiang, *supra* note 30, at 535–36 (noting that enablement is meant to prevent patentees from claiming more than they invented). Although enablement may suffice to show possession when it overlaps with the written description, the written description has been the primary method of proving possession since enablement may not be sufficient in the minority of cases where there is no overlap. *See supra* note 1 and accompanying text (noting the overlap between these two requirements).

[62] For instance, an electrical engineer may "possess" how a circuit works by measuring voltages and currents and describing the circuit with equations. Meanwhile, a geneticist may "possess" how a protein works by observing how it affects other proteins in the body and decoding the molecular structure of the protein. Duly, possession must be gauged differently for each.

[63] *See* MERGES & DUFFY, *supra* note 33, at 441. "Reduction to practice" describes the inventor's act of transforming the abstract idea of an invention into a concrete form. For instance, an inventor having an idea for a new bicycle does not reduce the idea to practice until she builds a prototype of the new bicycle or, at least, understands how all the gears, chains, and cables function to make the bicycle work.

of her idea.[64] Yet, at this point, the inventor's idea is still too unrefined and abstract to patent. How will the idea work in practice? What materials are needed to construct it? Thus, reduction to practice must happen, occurring when an inventor "knows that the invention will work."[65] "Possession," therefore, generally occurs after the invention is reduced to practice since that is the most likely point at which inventors develop a full and comprehensive understanding of their inventions.[66] This does not necessarily mean physical embodiment of the invention but rather any demonstration sufficient to prove to a person of ordinary skill in the art that the inventor understands her invention. What, exactly, qualifies as sufficient is usually unique and varies technology-by-technology, case-by-case, and patent-by-patent.[67]

B. The Written Description Doctrine

Due to the need to assess possession, the written description doctrine has grown from a routine checkpoint during prosecution into a significant burden during litigation. Although the doctrine stems from § 112, the Federal Circuit has constructed most of the doctrine itself since the statute provides little guidance. Section 112, paragraph 1, requires three separate elements in the specification: a written description, enablement, and best mode. The patent statute clarifies that enablement must explain the "manner and process of making and

---

[64] *See* Brown v. Barbacid, 276 F.3d 1327, 1335–36 (Fed. Cir. 2002) ("Conception is 'the formation in the mind of the inventor[ ] of a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice.'" (quoting Singh v. Brake, 222 F.3d 1362, 1367 (Fed. Cir. 2000))).

[65] *See* Estee Lauder Inc. v. L'Oreal, S.A., 129 F.3d 588, 593 (Fed. Cir. 1997) ("[A]n inventor must establish that he 'knew it would work,' to reduce the invention to practice." (quoting Hahn v. Wong, 892 F.2d 1028, 1032 (Fed. Cir. 1989))).

[66] *See* Holbrook, *supra* note 28, at 162–63 (explaining that reduction to practice is one way to show possession). This is also the case because the patent system does not reward conception alone since conception, without more, is not useful to the public domain—an invention is only useful if it can be put into practice and actually works. Janice M. Mueller, *At Sea in a Black Box: Charting a Clearer Court for Juries Through the Perilous Straits of Patent Invalidity*, 1 J. MARSHALL REV. INTELL. PROP. L. 3, 17 (2001) (noting that later inventors must work diligently to reduce to practice). However, importantly, possession under patent law does not always require physical reduction to practice and can instead consist of a "constructive" reduction to practice that involves filing a sufficiently definite patent application. *See* MPEP, *supra* note 33, § 2138.05 (detailing the availability of constructive reduction to practice through the patent application and the requirements that the application must meet in order to achieve it); MERGES & DUFFY, *supra* note 33, at 452 ("[T]he filing of a valid patent application has long been recognized as a 'constructive reduction to practice.'").

[67] *See In re* Alton, 76 F.3d 1168, 1172 (Fed. Cir. 1996) (explaining that the nature of the written description can vary and that compliance with the requirement must be determined on a case-by-case basis).

using the invention" with "full, clear, concise, and exact terms."[68] The statute less clearly explains that the best mode is the best formulation of the invention "contemplated by the inventor of carrying out his invention."[69] But the statute provides no clarification of what is meant by a written description.[70]

1. Origins

The written description doctrine was originally most relevant to the prosecution of patents as a way to ensure that applicants did not overstep the boundaries of their claims at the time of filing.[71] *In re Ruschig*, one of the first articulations of the current doctrine, is characteristic of this earlier class of written description cases, when the requirement policed claims during prosecution.[72] Over time, litigants changed the entire identity of the requirement as they realized that the written description was a promising vulnerability in patents and began using it as a means to invalidate patents during litigation.[73] In *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, the Federal Circuit recognized this shift in legal strategy and resultant shift in doctrine, noting that, "[a]s for the lack of earlier cases on the issue, it regularly happens . . . that issues do not arise until counsel raise them."[74]

---

[68] 35 U.S.C. § 112 (2006); *Ariad II*, 598 F.3d 1336, 1344 (Fed. Cir. 2010) (explaining the interpretation of statutory text).

[69] 35 U.S.C. § 112.

[70] *Id.*

[71] *See* Holbrook, *supra* note 28, at 161–62 & n.216 (noting the historic origins of the written description requirement in priority contests during prosecution); Holman, *supra* note 12, at 6 (same); *see, e.g.*, *In re* Smith, 481 F.2d 910, 914 (C.C.P.A. 1973) (requiring that the applicant's claim be no broader than the written description); *In re* Robins, 429 F.2d 452, 457 n.8 (C.C.P.A. 1970) (same); *In re* Sus, 306 F.2d 494, 497 (C.C.P.A. 1962) (same).

[72] 379 F.2d 990, 991–93 (C.C.P.A. 1967). In *In re Ruschig*, the patentee had added an amendment to its patent application that exceeded the scope of its original written description. The court then used the written description requirement to police the patentee's application by ensuring that the patentee followed the proper application procedures. *Id.* at 995–96; *see also* DURHAM, *supra* note 1, at 89 (commenting that some Federal Circuit judges think the written description requirement should only police inventors during the prosecution process); Holman, *supra* note 12, at 4 (explaining that the written description doctrine "traditionally functioned as a doctrine for policing against the late claiming of new matter" during patent prosecution); Lefstin, *supra* note 24, at 1153 (stating that the first articulation of the modern written description doctrine occurred in the priority-policing context during prosecution).

[73] The written description was originally used as a mechanism to police patents during prosecution, so it was a paradigm shift when litigants began using it as a defense in infringement litigation.

[74] 323 F.3d 956, 972 (Fed. Cir. 2002).

2. Current Doctrine

In the last twenty years, the written description requirement has become a powerful offensive strategy in litigation. Originally, the doctrine only monitored whether the claims matched the rest of patent application's disclosure. Now, the doctrine requires that an adequate written description convince a "person of ordinary skill in the art" that the patentee "possessed" her invention.[75] Seemingly straightforward, this standard requires that an expert of average knowledge in the field of the invention believe that the inventor actually understood her invention.[76]

Thus, the written description doctrine acts as a possession standard.[77] As the Federal Circuit illustrated in *University of Rochester v. G.D. Searle*, "use of the word 'automobile' would not have sufficed to describe a newly invented automobile; an inventor would need to describe what an automobile is . . . a chassis, an engine, seats, wheels on axles, etc."[78] And in *In re Ruschig*, the court analogized the doctrine to marking trees to create a path so that a person of ordinary skill could find her way through the woods of the invention.[79]

The Federal Circuit has briefly mentioned a policy basis for its doctrine, stating that the written description constrains patent scope by ensuring that inventors do not claim more than they actually invented.[80] This functionality relies on the assumption that, due to the unpredictability of claim interpretation, a patentee could claim more

---

[75] *Ariad II*, 598 F.3d 1336, 1351 (Fed. Cir. 2010); Univ. of Rochester v. G.D. Searle & Co. (*Univ. of Rochester I*), 358 F.3d 916, 923, 927–28 (Fed. Cir. 2004); Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559, 1566 (Fed. Cir. 1997); Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563 (Fed. Cir. 1991).

[76] *See Ariad II*, 598 F.3d at 1351; *Univ. of Rochester I*, 358 F.3d at 923; *Regents of the Univ. of Cal.*, 119 F.3d at 1566; *Vas-Cath Inc.*, 935 F.2d at 1563.

[77] *See, e.g.*, *Ariad II*, 598 F.3d at 1351; LizardTech, Inc. v. Earth Res. Mapping, Inc., 424 F.3d 1336, 1345 (Fed. Cir. 2005); *Vas-Cath Inc.*, 935 F.2d at 1563; *see also* Holbrook, *supra* note 28, at 162 (classifying the written description requirement as a possession standard and noting that PTO guidelines have also adopted the written description requirement as such). *Contra Univ. of Rochester I*, 358 F.3d at 926 (explaining that proving possession is not always sufficient to meet the written description requirement).

[78] *Univ. of Rochester I*, 358 F.3d at 923.

[79] The Court of Claims and Patent Appeals described it thus: "It is an old custom in the woods to mark trails by making blaze marks on the trees. It is no help finding a trail or in finding one's way through the woods where the trails have disappeared—or have not yet been made, which is more like the case here—to be confronted simply by a large number of unmarked trees. Appellants are pointing to trees. We are looking for blaze marks which single out particular trees. We see none." *In re* Ruschig, 379 F.2d 990, 994–95 (C.C.P.A. 1967).

[80] *See Ariad II*, 598 F.3d at 1353; *Univ. of Rochester I*, 358 F.3d at 920; *Vas-Cath Inc.*, 935 F.2d at 1561.

than she deserves.[81] Supporters of a heightened written description requirement largely argue that claims do not always convey what the patentee actually invented because patentees often draft their claims as broadly as possible, even if that breadth surpasses what they possessed.[82]

While there are benefits to a simple doctrine, the doctrine's simplicity provides little instruction in its application.[83] The Federal Circuit once rephrased the doctrine as requiring that the "inventor invented the claimed invention."[84] A large part of the problem is that the Federal Circuit's doctrine provides a *standard* but does not provide a *test* for determining if a patentee has met that standard: The standard requires that an inventor possess her invention, but how exactly does a patentee demonstrate that?[85]

There is little doubt that defining a uniform test is a difficult task. Since written description doctrine relies on a fact-specific inquiry,[86] different methods best allow different patents to satisfy the possession standard of the doctrine. Although the Federal Circuit has called the doctrine a "fairly uniform" standard,[87] several permutations emerged, making the doctrine much less uniform in recent years. Largely, this doctrinal variegation resulted from these factual differences as tech-

---

[81] This can occur either through the intentional expansion of the claims beyond what the patentee actually invented or by the unintentional use of language leading third parties to interpret the claims too broadly. *See, e.g.*, Douglas R. Nemec & Emily J. Zelenock, *Rethinking the Role of the Written Description Requirement in Claim Construction: Whatever Happened to "Possession Is Nine-Tenths of the Law?"*, 8 MINN. J. L. SCI. & TECH. 357, 360–61 (2007) (discussing problems that result from overly broad patent disclosures).

[82] *See, e.g.*, Robert P. Merges, *Software and Patent Scope: A Report from the Middle Innings*, 85 TEX. L. REV. 1627, 1652–54 (2007) (recounting a common way in which patentees overdraft their claims, described as "misappropriation by amendment"). Although the written description, once litigated, may reveal the overbreadth of the claims, the patent will be presumed valid until that litigation occurs. *See, e.g.*, *Ariad II*, 598 F.3d at 1354 (noting that clear and convincing evidence was required to invalidate Ariad's patent).

[83] *See* Holman, *supra* note 12, at 14–15 (highlighting that the Federal Circuit did not provide guidance for applying the doctrine when it revised the test in Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559 (Fed. Cir. 1997)).

[84] Lockwood v. Am. Airlines, Inc., 107 F.3d 1565, 1572 (Fed. Cir. 1997).

[85] *See supra* note 62 and accompanying text (explaining that the type of technology affects how possession is achieved).

[86] *See Ariad II*, 598 F.3d at 1351 ("[W]e have recognized that determining whether a patent complies with the written description requirement will necessarily vary depending on the context."); Capon v. Eshhar, 418 F.3d 1349, 1357 (Fed. Cir. 2005) ("The descriptive text needed to meet these requirements varies with the nature and scope of the invention at issue . . . ."); Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1562 (Fed. Cir. 1991) (noting the "fact-specificity" of the written description inquiry).

[87] *Vas-Cath Inc.*, 935 F.2d at 1562–63.

nology advanced and the written description doctrine evolved.[88] Most notably, the Federal Circuit has subjected gene and biotechnology patents to a specialized form of the written description doctrine.[89] The need for this permutation developed because gene patents often cover an entire *genus* of a certain type of DNA or molecular structure, making it nearly impossible for patentees to describe every single *species* encompassed by that genus.[90]

Rather than explaining what the written description doctrine is, it is in some ways easier to explain what it is not: It is not an *in haec verba* requirement, which would require the patentee to describe each and every detail of her invention.[91] A long-established and uncontested principle of the written description requirement is that inventors are not required to describe each and every feature of their inventions.[92] This principle follows logically from innovation policy

---

[88] For instance, *LizardTech, Inc. v. Earth Resource Mapping, Inc.* concerned a broad computer algorithm claim that encompassed numerous methods for performing a calculation called for a unique analysis. 424 F.3d 1336, 1339, 1342 (Fed. Cir. 2005). The court found that, while the claimed algorithm encompassed all variations of a certain "discrete wavelet transform," the patentee's written description only contemplated one unique instance of the discrete wavelet transform. *Id.* at 1337, 1342, 1344–45. The defendant in *LizardTech*, a competitor of the patentee, had used a similar *type* of algorithm but one which was technically distinct from the algorithm the patentee presented in the written description. *Id.* at 1346.

[89] In *Regents of the University of California v. Eli Lilly & Co*., the court determined that a written description for a gene patent must describe a "representative number of species" from the claimed genus to fulfill the possession standard. 119 F.3d 1559, 1569 (Fed. Cir. 1997). The Federal Circuit explained that the written descriptions of certain gene and chemical patents must prescribe what the invention *is* as opposed to what it *does*, asserting that the former ("identification") fulfills the written description requirement while the latter ("function") does not. *Id.* at 1568; *see* Holman, *supra* note 12, at 13–23 (differentiating the normal written description requirement from the "*Lilly* written description" requirement).

[90] *See Regents of the Univ. of Cal.*, 119 F.3d at 1568–69 (holding that the written description doctrine necessitates recital of a representative number of species but not every species in the genus). A genus is a category or class of things with a common feature while each species identifies a specific item in that category. Such a genus could refer to an actual genus of molecules or proteins (for example, the class of all molecules that inhibit a certain type of enzyme) or could refer to a genus or class of methods of accomplishing something (for example, the category of all brake pedals that use a certain sensor to slow a vehicle).

[91] The Latin translation of *in haec verba* is "in these words." An *in haec verba* requirement would require the patentee to describe in words each and every detail of her invention, no matter how small. *Ariad II*, 598 F.3d at 1352; Lockwood v. Am. Airlines, Inc., 107 F.3d 1565, 1571–72 (Fed. Cir. 1997).

[92] *See Ariad I*, 560 F.3d 1366, 1372 (Fed. Cir. 2009) (citing *Univ. of Rochester I*, 358 F.3d 916, 922–23 (Fed. Cir. 2004), and *Regents of the Univ. of Cal.*, 119 F.3d at 1566–67) (stating that disclosure "need not recite the claimed invention *in haec verba*"), *aff'd in part*, *rev'd in part en banc*, 598 F.3d 1336 (Fed. Cir. 2010); *see, e.g.*, *LizardTech, Inc.*, 424 F.3d at 1345 (holding that the patentee must only include enough specification to convince a person of skill in the art that the patentee possessed the invention); *Univ. of Rochester I*, 358 F.3d at 922–23 (affirming that *in haec verba* descriptions are not required to satisfy the

because the overwhelming transaction costs of such a meticulous requirement would outweigh any benefit it may offer.[93] It is important to note that this principle assumes, as a baseline, that the written description requirement has some limitation and is by no means intended to be a perfect tool for assessing an inventor's possession of the patented technology. An expectation of perfect description would hamper innovation, which is itself an imperfect endeavor where many things may remain unknown and may be difficult to convey to the public, particularly when the mode of communication is in written prose. While it is true that adequate disclosure makes innovation accessible to the public and future innovators, excessive disclosure discourages inventors from investing in innovation in the first place, which is contrary to the aims of innovation policy.

C. Ariad

1. The Opinion

Ariad reinforced the existing written description doctrine recounted in Part I.B but also expanded the reach of the doctrine: The Federal Circuit used the doctrine to invalidate claims based on material in the written description that was never formally claimed in the patent. Essentially, the Federal Circuit used the written description to supplant the claims of the patent. This led to a questionable judgment for the patent holder, Ariad, because the Federal Circuit ignored innovation policy and the overarching goal of encouraging inventors to pursue risky innovations, which is at the core of the written description requirement.[94] In doing so, the Federal Circuit committed a "cardinal sin" of patent law: reading the written description onto the claims, with the effect of *narrowing* the scope of the claims down to the content of the written description.[95] The court's choice arguably showed that the written description doctrine had deviated too far from its origins and the policies underlying patent law.

Ariad's invention followed the discovery that inhibiting a certain protein, NF-κB, prevented the symptoms of serious diseases, such as

written description requirement); *Vas-Cath Inc.*, 935 F.2d at 1563 (same); *see also* JANICE M. MUELLER, AN INTRODUCTION TO PATENT LAW 84–85 (1st ed. 2003) (stating that the written description must only convey that the inventor was in possession of the invention).

[93] *See supra* note 13 and accompanying text (excerpting Judge Rader's dissent in Univ. of Rochester v. G.D. Searle & Co., 375 F.3d 1303, 1313–14 (Fed. Cir. 2004), about unnecessary costs imposed by the written description requirement).

[94] Ariad might still have lost the lawsuit under a more appropriate innovation policy–based approach, discussed in Parts II–III, but at least then it would have been evaluated with patent policy in mind.

[95] *See infra* note 103 and accompanying text (describing the origin of the "cardinal sin" concept).

AIDS and cancer.[96] NF-kB, one of many "transcription factors," achieves this result because it affects specific gene sequences that stimulate those symptoms.[97] Ariad then patented its "recipe" for inhibiting NF-kB.[98] The problem was that Ariad's written description only disclosed three hypothetical classes of molecules that could perform the process of NF-kB inhibition.[99] Ariad argued that the molecules were not subject to the written description requirement because the claims only covered the *process* of inhibiting NF-kB, as opposed to the *products* used in the process, and thus, as a process patent, the written description only needed to disclose the process of inhibition.[100] After all, it would defeat the purpose of having process patents if an inventor practically had to invent the products used in the process to satisfy the written description requirement—if that were the case, inventors would only be able to apply for product-by-process patents in which both the process and the product must be described.[101] Nevertheless, the Federal Circuit invalidated the

---

[96] The district court described the process in greater detail: "When NF-kB is activated by various stimuli external to the cell, the complex dissociates and free NF-kB is released. This free NF-kB then travels into the cell nucleus and binds there to specific DNA sequences, causing the cell to produce proteins that are associated with many diseases, including cancer, AIDS, sepsis, and atherosclerosis. Inhibiting this process has enormous and wide-ranging therapeutic effects." Ariad Pharm., Inc. v. Eli Lilly & Co., 529 F. Supp. 2d 106, 112 (D. Mass. 2007), *aff'd in part*, *rev'd in part*, 598 F.3d 1336 (Fed. Cir. 2010).

[97] A transcription factor is a protein that can "affect[ ] gene expression," meaning that it can control the effects of particular genes on the body. *Id.* Some genes trigger reactions in cells that produce symptoms, and the relevant transcription factors can then be used to control whether those reactions are triggered. *See id.* at 112 & n.2 (explaining the processes of gene expression and transcription).

[98] *Id.* at 112–13. Ariad did not patent the ingredients for the recipe—the various operative molecules active in the process—although the claim technically covered the process as applied to any molecule. The actual claims at stake disclosed a rather specific process and were certainly not barebones. *See id.* at 114 n.9 (reciting asserted claim as "[a] method for inhibiting expression, in a eukaryotic cell, of a gene whose transcription is regulated by NF-kB, the method comprising *reducing NF-kB activity in the cell such that expression of said gene is inhibited*." (quoting U.S. Patent No. 6,410,516 (filed June 5, 1995)) (internal quotation marks omitted)). Regardless of whether one considers this a well-written claim, it was deemed a valid claim by the PTO.

[99] With the first class of molecules, Ariad named a naturally occurring molecule covered by the class; with the second class of molecules, Ariad described the actual chemical structure of an example molecule from that class; and with the third class, Ariad did not provide any description. *Ariad II*, 598 F.3d 1336, 1341, 1356–57 (Fed. Cir. 2010).

[100] *See id.* at 1354 (restating Ariad's claim that it was entitled to claim methods of NF-kB inhibition without describing specific molecules). One of the major questions is whether the products used to perform the process must be included in the written description to describe the process adequately.

[101] *See supra* notes 40–41 and accompanying text (describing the distinction between process patents and product patents). This can occur because an inventor may develop a new process but only know one way of achieving that process—that leaves room open for other inventors to develop different ways and tools for achieving that process. In *Ariad*,

asserted process claims, thereby disabling and effectively invalidating the patent. The court concluded that a solid understanding of the molecules used to inhibit NF-kB—the product—was critical to understanding the process and that, on paper, and within the four corners of the patent, there were "gaping holes" in the written description.[102] The gaping holes indicated to the court that Ariad's written description failed to demonstrate complete possession of the NF-kB inhibition process because it did not establish that Ariad had a complete understanding of the nature of the molecules.

2. *The Crux of the Written Description Problem*

Creating yet more uncertainty for patent litigants, *Ariad* reinforced the written description requirement as a general disclosure requirement and as a means of invalidating patents. In rejecting the opportunity to reevaluate or eliminate the doctrine, the Federal Circuit firmly edified it.

Yet, even more concerning, *Ariad* jeopardizes the validity of otherwise valid patents based on material *not claimed* in the patents. The Federal Circuit further confused the doctrine by committing one of the "cardinal sins" of patent law by restricting the scope of the claims to the content in the written description.[103] Thus, the Federal Circuit effectively treated the written description as an auxiliary claim—the hypothetical molecules were not actually claimed but were nevertheless used as a limitation on the patent.[104] In doing so, the Federal

---

this would happen if an inventor created an entirely different class of molecules (beyond the classes of molecules described by Ariad) that inhibited NF-kB in a superior manner. For example, Amazon's 1-Click patent claimed a process for completing online purchases but did not describe the algorithms used to code the process. *See* Method and System for Placing a Purchase Order via a Communications Network, U.S. Patent No. 5,960,411 (filed Sept. 12, 1997). This patent thereby left space for other inventors to patent specific algorithms to perform the process.

[102] *See Ariad I*, 560 F.3d 1366, 1376–77 (Fed. Cir. 2009) ("[T]he specification at best describes decoy molecule structures and hypothesizes with no accompanying description that they could be used to reduce NF-kB activity."), *aff'd in part*, *rev'd in part en banc*, 598 F.3d 1336 (Fed. Cir. 2010).

[103] *See* Phillips v. AWH Corp., 415 F.3d 1303, 1320 (Fed. Cir. 2005) ("[O]ne of the cardinal sins of patent law [is] reading a limitation from the written description into the claims . . . ." (quoting SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., 242 F.3d 1337, 1340 (Fed. Cir. 2001)) (internal quotation marks omitted)).

[104] Judge Rader noted that this "cardinal sin" had been committed because the court's written description doctrine conflicted with its claim construction doctrine. *See Ariad II*, 598 F.3d at 1365 (Rader, J., dissenting in part and concurring in part) ("In other words, this court's new written description doctrine *only has meaning if this court ignores its own claim construction rules*. This court essentially claims unfettered power to err twice—both in construing the claims so broad as to exceed the scope of the rest of the specification and then to invalidate those claims because it reads the specification as failing to 'support' this court's own broad conception of the claimed subject matter." (emphasis added)).

Circuit imbued the written description with power that the drafters of the patent statute never intended it to have.[105] The use of the written description by litigants to challenge otherwise valid claims represents the doctrine's evolution from a *policing* mechanism during prosecution into an *enforcement* mechanism during litigation.[106] Rather than a checkpoint or guardrail during prosecution, the written description has become the competitor's arrow and the inventor's Achilles' heel during litigation.[107] This evolution calls for a reconsideration of the

---

[105] *See* Holbrook, *supra* note 28, at 161–62 ("The Federal Circuit has expanded the written description beyond this traditional role in recent years, resulting in numerous criticisms of this change."). In many ways, *Ariad* also gives competitors an even greater upper hand during litigation by making it easier for defendants to win lawsuits. *See* Rabinowitz, *supra* note 22, at 141 ("[P]arties that attacked a patent on written description grounds succeeded more than forty percent of the time . . . ."). Furthermore, challenging a patent's written description can be a better litigation strategy for competitors than challenging a patent's novelty, obviousness, or utility, since those three requirements are more fundamental and difficult to attack and thus less likely to guarantee a win. *See* Ronald B. Coolley, *The Status of Obviousness and How To Assert It as a Defense*, 76 J. PAT. & TRADEMARK OFF. SOC'Y 625, 625, 630 (1994) (remarking that "obviousness is a difficult defense to prove and support on appeal" and "present[s] a challenge to accused infringers"); Jeffrey D. Sullivan & David Loretto, Symbol Technologies v. Lemelson*, Prosecution Laches, and the Still-Unmet Challenges of Junking "Junk Patents*," 33 AIPLA Q.J. 285, 303 (2005) (arguing that the clear and convincing evidence standard places a "heavy burden" on defendants contesting novelty and nonobviousness). *But see, e.g.*, KSR v. Teleflex, 550 U.S. 398, 422 (2007) (holding a patent invalid as obvious and approving a more flexible obviousness analysis); *see also In re* Winslow, 365 F.2d 1017, 1019–20 (C.C.P.A. 1966) (holding claims invalid as obvious and enunciating a fluid obviousness inquiry).

[106] *See supra* Part I.B (describing the evolution of the written description doctrine). *Compare* Holman, *supra* note 12, at 5–6 (describing the traditional function of written description as "a tool for policing against attempts by patent applicants to alter their patent claims during . . . prosecution"), *with* MERGES & DUFFY, *supra* note 33, at 54 (calling patent litigations "enforcement actions").

[107] The vast reach of the written description doctrine is illustrated by one particularly baffling misstep in its evolution: *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473 (Fed. Cir. 1998). Although decided before *Ariad*, *Gentry Gallery* occurred after the seminal decision in *Regents of the University of California*, which established the doctrine as a general disclosure requirement and set a new benchmark for the doctrine. *See supra* Part I.B.2 (explaining the current state of the written description doctrine). Under facts much different than the high-tech technology of the patent in *Ariad*, the Federal Circuit invalidated a product patent on sectional sofas simply because the patent's written description seemed to show that the patentee had only conceived of the invention with its sofa controls on a center console although the claims covered placements of the controls anywhere on the sofa. *Gentry Gallery*, 134 F.3d at 1474–75, 1479. Many commentators agreed that the patentee had contemplated and possessed the idea of the controls in places other than the center console—it is relatively apparent to the average person that the console could be placed in any number of places on the couch. *See* Merges, *supra* note 82, at 1654. But, for lack of care or some other reason, the drafter of the patent focused *only* on center placement of the console in the written description. *See Gentry Gallery*, 134 F.3d at 1479 (describing Gentry Gallery's limited disclosure). As a result, *Gentry Gallery* proved that no technology, no matter how low-tech, would be spared from the crosshairs of the written description doctrine. As mentioned above, *LizardTech, Inc.* also demonstrated the broad

purposes and policies served by the written description requirement, namely innovation policy.

II
Rethinking Innovation Policy

In the face of such doctrinal confusion, the Federal Circuit should have resorted back to the core of patent law: innovation policy.[108] It is within the wisdom of policy that practical and systematic considerations can turn theoretical principles into pragmatic solutions. The court should have recognized three conventional policy considerations that derive from the Constitution and undergird the written description: patent scope, public notice, and encouragement of disclosure. All three policy considerations reflect the goals of the written description requirement because they reflect the goals of disclosure: limiting the extent of patents to what the patentees actually invented (scope), making the public aware of the particular contours of those rights (notice), and making disclosure attractive to inventors (encouragement).[109] Due to the direct connection between disclosure and innovation, disclosure policy can actually be conceptualized as innovation policy.[110] The open question, then, is which way innovation policy should pull with regard to each of these considerations. Answering this question can lead to a more adept written description inquiry.[111]

A. Formulating an Innovation Principle: Enhanced Prospect Theory

To reinvent the written description doctrine, these conventional disclosure considerations must be understood in terms of innova-

reach of the written description by showing how a patent for a programming algorithm could fall victim to the requirement. *See supra* note 88 and accompanying text.

[108] While *Ariad* and the other precedential written description cases described in Part I.B may seem intuitively correct, intuition only goes so far when it is unsupported by the policies and aims of patent law. This is not to say that *Ariad* definitely would have been decided differently under the auspices of innovation policy; the point is that the Federal Circuit applied an inept doctrine, and, for that reason, there is a compelling possibility that the lawsuit would have turned out differently.

[109] See Part I.A for a discussion of the purposes and goals driving the patent system and patent disclosure.

[110] *See, e.g.*, Holbrook, *supra* note 28, at 125 (citing Integra Lifesciences I, Ltd. v. Merck KGaA, 331 F.3d 860, 873 (Fed. Cir. 2003)) (describing how disclosure leads to public knowledge, which allows innovators to build upon technology).

[111] *See infra* Part III (developing a new, innovation-based test to replace the current written description doctrine).

tion.[112] The most appropriate theoretical framework for disclosure à la innovation policy is Edmund Kitch's "prospect theory" of patents.[113] Prospect theory argues that inventors will only invest enough resources to produce patentable ideas if they are assured a commensurate reward. As Kitch explained, the patent system must be structured so that "the patent owner has an incentive to make investments to maximize the value of the patent without fear that the fruits of the investment will produce unpatentable information appropriable by competitors."[114] This, he argued, naturally led to the conclusion that patents needed sufficiently broad scope.[115] Even if inventors had yet to conduct enough research to fully exploit their inventions, Kitch still determined that they needed broad patents precisely so that they

---

[112] *See, e.g.*, Brief of Amicus Curiae Medtronic Inc. in Support of Eli Lilly & Co., *supra* note 14, at 13–14 (expressing the primary written description concern as inhibition of innovation).

[113] *See generally* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977). His theory is fitting as a normative basis for innovation policy because it is the most preeminent theory in the last fifty years to justify broad patent scope, and it has survived over thirty years of criticism. *See, e.g.*, John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 441 (2004) ("Kitch's prospect theory has become a standard part of the law-and-economics literature on patent law . . . ."); Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 132 (2004) ("Ed Kitch famously analogized patents to mining claims, suggesting that we should grant patents in advance of an invention, making a patent a right to 'prospect' a particular field for an invention."); Sichelman, *supra* note 28, at 374–75 ("The modern incarnation of these *ex post* theories of patent law began with Ed Kitch's landmark 1977 article, *The Nature and Function of the Patent System*, which introduced the 'prospect' theory."). Kitch's theory is also appropriate here because my theory, like his, pushes the boundaries of patent policy.

[114] Kitch, *supra* note 113, at 276. Some commentators have criticized Kitch's analysis, but many of those critics agree that his basic theory is sound. *See, e.g.*, Duffy, *supra* note 113, at 442–43 (stating that, despite valid criticism, the "social value of prospect features [is] evident"); Merges & Nelson, *supra* note 42, at 843 ("Like Kitch, then, we see the important question as how patent scope decisions influence the *development* of a technology . . . . However, contrary to what Kitch suggests, we do not *presume* that granting broad scope to an initial inventor induces more effective development and future invention.").

[115] *See* Kitch, *supra* note 113, at 267 (arguing that the relationship between the scope of patent claims and incentives to innovate shows that the prospect function is important to the patent system); *see also* Merges & Nelson, *supra* note 42, at 842 (explaining that prospect theory "necessarily implies" broad patents). *But see* Duffy, *supra* note 113, at 441 (noting that, while Kitch's theory has become "standard" in patent law, several critics have called Kitch's theory unrealistic and "'without foundation'" (quoting Roger L. Beck, *The Prospect Theory of the Patent System and Unproductive Competition*, 5 RES. L. & ECON. 193, 194 (1983))). Kitch's theory remains controversial, yet the controversy has not undermined the integrity and legitimacy of his theory. *See supra* note 114.

would have the market share guarantee necessary to invest in the commercialization of their patents for practical applications.[116]

To adapt prospect theory to the *Ariad* dilemma, I take an extra step and offer an "enhanced prospect theory," which offers a doctrinal solution by placing innovation at the forefront of the written description analysis as explained in Part III. This theory suggests that patentees should be entitled not only to broad patents but also to the "collateral fruit" of their patents that result from additional breadth found in the written description. Collateral fruits are embodiments or variations of a patented invention that could be construed to be within the permissible scope of the claims but could also be construed to exceed the claims; the written description often draws this dividing line between what is and what is not within the claims. Collateral fruit can then be organized along the lines of the two types of patent requirements (disclosure requirements and substantive requirements) and thus be divided into two categories: fruit that may exceed the claims solely because it is not disclosed in the written description (thereby failing the disclosure requirements) and fruit that may exceed the claims because it is not novel or nonobvious (thereby failing the substantive requirements). As will be explained below, the former fruit would still be patentable while the latter fruits would not. As in prospect theory, this collateral fruit gives patentees a firm guarantee that they will have the resources necessary to undertake the high costs of innovation and develop their innovations to fruition and commericalization. Profits collected from patents are generally proportionate to the scope of patents and so collateral fruit guarantees sufficient profit by guaranteeing sufficiently broad patent scope, thereby incentivizing innovation.[117]

The potential extent of collateral fruit awarded would vary due to the flexibility of patent claims and boundaries. Take a claim for a process that covers 100 different variations of performing the process—100 ways of curing a disease, 100 ways of manufacturing screws, 100 ways of coding an algorithm, or 100 ways of making cookies from the same recipe. Under the *in haec verba* doctrine, a patentee is not required to describe *every* variation in order to get patent rights over every variation. Nevertheless, a claim could be narrowed so that it

---

[116] *See* Kitch, *supra* note 113, at 267 (explaining that one of three factors guiding his theory was "the fact that many technologically important patents have been issued long before commercial exploitation became possible").

[117] *See* Colleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 301 & n.11 (2010) ("[P]atents are generally assumed to have an objective value, which can be estimated based on intrinsic qualities of a patent, such as the breadth of its claims . . . .").

does not cover every variation but only covers those variations that the patentee includes in her written description.[118] For instance, with genus claims in biotechnology, collateral fruit might include every species of that genus or only those species embodied in the written description. With process patents, "collateral processes" would only give the patent holder rights over those additional *processes* but not over the *ingredients* specific to those additional processes.[119] As another example, consider a patent claiming a process involving a microprocessor of *any* variation in speed, be it 10 MHz, 50 MHz, or 100 MHz, even though the written description only discloses the 10 MHz processor. Should the patentee be entitled only to the process using the 10 MHz processor, or should the patentee also be entitled to the collateral processes using the 50 MHz and 100 MHz processors? Although the process used for the various processors would be identical, one consideration is whether the inventor actually understands how to incorporate a 50 MHz or 100 MHz processor into the patented process if she did not disclose those in the written description.

Since awarding too much collateral fruit might produce overly broad patents, collateral fruit should certainly be granted with care. In *Ariad*, the collateral fruits in dispute were the unique variations of the process—the collateral processes—that utilized various classes of molecules to achieve the process of NF-κB inhibition. Under enhanced prospect theory, the inquiry would then become the following: Should the patentee have been limited to processes involving the three classes of molecules in its written description or should the patentee have been entitled to collateral processes covering *every* class of molecule that performed the claimed process? Arguably, Ariad could have been fairly entitled to the collateral processes covering the three classes of molecules named in the patent's written description.[120]

While the explanation and examples above describe the function of collateral fruit, patent law must still justify collateral fruit to war-

---

[118] *See supra* notes 91–93 and accompanying text (describing the *in haec verba* requirement).

[119] In terms of the cookie analogy, the question would be posed as the following: Do you grant the inventor of the cookie recipe rights over *every* variation of cookie made with that recipe, or do you restrict the inventor only to those cookie variations with which the inventor is familiar?

[120] *See infra* Part III.A (describing a hypothetical innovation test and how it would incorporate collateral fruit). This way, a middle ground would be found by awarding some—but not all—collateral fruit. Awarding *all* classes of molecules might make the patent overly broad and thereby stifle third-party innovation; but refusing to award any classes at all (as the Federal Circuit did in invalidating Ariad's key claims) would render the patent useless, thereby reducing the incentives to innovate in the first place. The precise scope of the collateral fruit to be awarded is explained in Part III by a test based on the principles of innovation policy.

rant its application. The basis for enhanced prospect theory is straightforward: Many patentees receive a slightly bigger slice of the public domain pie than they deserve. It is a widely held belief that the PTO issues patents of disputable quality and is by no means a perfect institution, with examiners frequently granting patents that are broader than intended.[121] This is demonstrated most definitively whenever a federal court invalidates a patent that the PTO previously ruled valid.[122] But, for all of those patents that would be invalidated by a federal court but are never litigated,[123] the patentees retain their extra slice. This might be one of the lesser-acknowledged incentives of the patent system: Most patents are never litigated and therefore have little risk of being invalidated and losing that extra slice.[124] Therefore,

---

[121] *See, e.g.*, Jay P. Kesan & Andres A. Gallo, *The Political Economy of the Patent System*, 87 N.C. L. REV. 1341, 1343 (2009) ("The major criticism leveled at the Patent Office is that the quality of the patents it issues is deficient."); Lemley, *supra* note 37, at 1495–96 ("The PTO has come under attack of late for failing to do a serious job of examining patents, thus allowing bad patents to slip through the system . . . . Much of the criticism of the PTO is well-founded . . . ."); Warren K. Mabey, Jr., *Deconstructing the Patent Application Backlog . . . A Story of Prolonged Pendency, PCT Pandemonium & Patent Pending Pirates*, 92 J. PAT. & TRADEMARK OFF. SOC'Y 208, 242 (2010) ("Examiners do and will continue to make some mistakes. It is an unavoidable and natural consequence of time and informational constraints."); Symposium, *Carrots and Sticks To Create a Better Patent System*, 17 BERKELEY TECH. L.J. 763, 765 (2002) ("It is widely suggested that the Patent Office issues patents that are either 'facially' invalid or broader than the actual innovation disclosed in the patent application."). Further proof of this is the "broadest reasonable interpretation" doctrine that requires the PTO to apply the broadest interpretation possible to patent claims. *See* Dawn-Marie Bey & Christopher A. Cotropia, *The Unreasonableness of the Patent Office's "Broadest Reasonable Interpretation" Standard*, 37 AIPLA Q.J. 285, 287 (2009) (explaining that courts have instructed the PTO to give claims the broadest interpretation).

[122] *See, e.g.*, Kesan & Gallo, *supra* note 121, at 1343 ("Many patents granted are later found invalid . . . ."); Lemley, *supra* note 37, at 1496, 1500 (stating that litigated patents that result in a final judgment are found invalid 46% of the time). Congress's decision to establish a formal system for the PTO to reevaluate patent validity post-issuance, known as reexamination, also shows that it is widely recognized that the PTO makes mistakes much more frequently than it should. *See* Mark D. Janis, *Rethinking Reexamination: Toward a Viable Administrative Revocation System for U.S. Patent Law*, 11 HARV. J.L. & TECH. 1, 22–23 (1997) (quoting Patlex Corp. v. Mossinghoff, 758 F.2d 594, 601 (Fed. Cir. 1985), *modified*, *reh'g denied*, 771 F.2d 480 (Fed. Cir. 1985)) (reviewing the legislative purpose of reexamination to determine the best way to correct PTO errors); *see also* Kesan & Gallo, *supra* note 121, at 1391 (noting that reexamination "increase[s] the quality of patents and the ability of the Patent Office to detect errors and, therefore, decrease[s] the number of bad patents before these patents are widely enforced").

[123] *See supra* notes 35–39 and accompanying text (discussing the presumption of validity attached to granted patents and the low level of patent litigation).

[124] This is why inventors draft their claims as broadly as possible, since they know that as long as they receive approval from the PTO, they will likely be entitled to those broad claims. Also, as opposed to the Securities and Exchange Commission or even the U.S. Postal Service, for instance, the PTO does not hunt down offenders—be they infringers or bad patents—because it has no statutory mandate to do so. *Compare* 35 U.S.C. § 2 (2006) (describing the duties and powers of the PTO), *with* Adam S. Zimmerman, *Distributing*

it behooves patent applicants to submit the broadest claims possible, even if that additional breadth is overly broad and un-"possessed." Therefore, it has become the norm that most patents retain their over-breadth for the duration of their term.

Based on this premise, the strongest normative justification for allowing collateral fruit identified in the written description is that those fruits *would still be patentable*, whereas other collateral fruit would not be.[125] Collateral fruit derived from the written description will not always be independently patentable, but, assuming that the eligible range of collateral fruit is within the bounds of the claims, they will be covered by the presumption of validity.[126] If collateral fruits are patentable, then giving them to a patentee does no additional harm to the public domain—they were ripe for picking. Patent theory requires fundamentally that an invention be novel, nonobvious, and have utility.[127] Collateral fruit failing the current written description test could still meet those requirements and qualify as patentable material, which suggests that there is no obvious harm done by

Justice, 86 N.Y.U. L. REV. 500, 504 (2011) (describing the enforcement powers of the Securities and Exchange Commission and the U.S. Postal Service). This is also true given the presumption of validity given to all patents granted by the PTO. 35 U.S.C. § 282.

[125] A second, weaker normative justification is that the collateral fruits doctrine reflects the status quo because it acknowledges the practical limitations of the patent system. In reality, evidence suggests that the patent office is permanently overburdened with the influx of patent applications and cannot possibly allow examiners to spend as much time on applications as would be necessary to produce accurate assessments. *See, e.g.*, Lemley, *supra* note 37, at 1500, 1508 (noting that examiners only spend eighteen hours per application but that thorough patent review would require closer to thirty-six hours). Therefore, broad patents are the norm rather than the exception. Another rationale for accepting the status quo is that only the most valuable patents are litigated, and the rest are most often worthless. *See* John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value of Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 3–4 (2009) (explaining that the most-litigated patents have the highest values); Lemley, *supra* note 37, at 1503 (observing that patent holders forfeit nearly two-thirds of patents because they fail to pay PTO maintenance fees—presumably, this would not happen if those patents were worth more than their "relatively low" maintenance fees). Therefore, if a non-litigated patent has collateral fruit, it is of little consequence since that patent is most likely worthless. Meanwhile, if a litigated patent has collateral fruit, it is typically a very valuable invention—with a very valuable contribution—and the patent system should reward inventors who take risks and patent valuable technologies despite lacking some understanding of the technology. If nothing else, this is more appealing than the alternative: the possibility that the invention will not be patented at all and society will never benefit from it.

[126] As long as the presumption of validity holds, then anything that is within the scope of the claims has the requisite novelty and nonobviousness to be independently patented. Thus, the only way that collateral fruit from the written description would not be independently patentable is if that collateral fruit exceeded the permissible bounds of the claims because it was not novel or nonobvious; but, in that case, such fruit would fall into the second category of collateral fruit.

[127] *See supra* note 34 and accompanying text (discussing these three fundamental requirements).

granting them to patentees.[128] As potentially patentable material, this fruit would still be ripe for cultivation into technology that could contribute to the public domain. But, following prospect theory, this fruit would only ripen into such a contribution if granted to patentees, which would incentivize patentees to commercialize the fruit into a public contribution.

Another way to understand this is to postulate that the collateral fruit of the written description doctrine would have been curable, in the sense that they could have been patented: Had a patentee known ahead of time that one of over ninety district courts around the country would find the written description deficient, it would have been able to expand the written description to a satisfactory degree to include that fruit. In *Ariad*, the use of those three classes of molecules in the claimed process were theoretically novel, nonobvious, and had utility under the presumption of validity; they were thus patentable material.[129] Had Ariad known what the Federal Circuit would decide, it very likely could have conducted the requisite research and expended the requisite costs to achieve an acceptable written description.[130] In this sense, the written description dilemma often condenses into a matter of research costs rather than a matter of inventive ability and possession.

Unlike collateral fruit from the written description, collateral fruit that fails any of the three fundamental substantive patent requirements is not patentable and, therefore, would undermine the integrity of the entire invention.[131] If a patentee knows ahead of time that her patent is obvious, not novel, or not useful, then the collateral material would be flatly unpatentable—essentially, the patentee could not have done anything to cure the deficiency aside from coming up

---

[128] This would be the case as long as the patent was not invalidated on the basis of novelty, nonobviousness, or utility due to the presumption of validity.

[129] This is true because the asserted claims were not invalidated on any of those three grounds and therefore the presumption of validity still holds for those requirements. *See generally Ariad II*, 598 F.3d 1336, 1354–58 (Fed. Cir. 2010) (refraining from any discussion of novelty, nonobviousness, or utility).

[130] In fact, Ariad had conducted further research, discovering the specific molecular structure of an inhibitor and describing the specific DNA sequence used to encode it. The problem was that it had disclosed the structure two years after filing its application, and, thus, the Federal Circuit disregarded this evidence. *Ariad I*, 560 F.3d at 1374; *see also* Brief for Plaintiffs-Appellees at 7–9, *Ariad I*, 560 F.3d 1366 (Fed. Cir. 2009) (No. 2008-1248). For a description of the disproportionate transaction costs and benefits associated with the heightened written description requirement, see *infra* notes 139–42 and accompanying text.

[131] *See supra* note 34 (discussing these three fundamental requirements). An example of this might be an extension of a patented process that is actually not novel or nonobvious. For instance, perhaps extending the claimed process in *Ariad* to another type of protein therapy would actually be obvious or resemble a technique in current use.

with a different invention. Such a problem with the substantive requirements is a matter of inventive ability rather than a matter of costs. In *Ariad*, the collateral fruits would not be curable if those particular classes of molecules had already been used in a similar way to treat something else (making the collateral processes obvious) or if the use of those particular classes of molecules had already been disclosed for use in the patented process in prior art (making the collateral processes not novel).[132] In this scenario, giving a patentee these unpatentable collateral fruits would harm the public domain.

While it might be argued that relaxing the written description requirement allows innovators to forgo the extra research and discovery necessary to meet a stricter requirement, the benefits of that extra research are likely to be minimal, and any modicum of benefit likely is outweighed by the increased transaction costs of a stricter requirement.[133] One way to understand this is by recognizing that it is better for the public domain to encourage innovations that are imperfectly, but adequately, described than to have no innovations at all.[134] Furthermore, the only parties harmed by collateral fruits from the written description would presumably be those who risk that a rival patent's claims will not be read as broadly as the written description allows. Patent law should be encouraging those parties to take a different risk: the risk of genuinely innovating.[135]

While a strict written description requirement may produce small, short-term gains in innovation, it does so at great cost. Awarding collateral fruit, in contrast, will incentivize long-term innovation by helping inventors avoid the additional costs associated with research and potential litigation.

---

[132] Since the claims were not invalidated based on nonobviousness or novelty grounds, we must assume that the claims were nonobvious and novel due to the presumption of validity. *See supra* note 35 and accompanying text.

[133] Such extra research is not of great value to the public, as will be shown in Part II.B.2, and innovators will be less likely to patent and disclose in the first place, as will be shown in Part II.B.3.

[134] For a cost-benefit analysis of the transaction costs of requiring additional disclosure and a discussion of the adverse effect of unregulated costs on innovation, see *infra* Part II.B.3.

[135] *See* FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY 3, 2-21 to 2-22 (2003) (explaining that some participants at the agency hearing urged that "design-around" activities could promote innovation by forcing competitors to build upon, rather than co-opt, competitors' patents).

B. Application of Enhanced Prospect Theory to Conventional Policy

In light of enhanced prospect theory and a preference for broad patent scope, the three policy considerations mentioned above (scope, notice, and encouragement) give rise to the following policy directives: presumption of broad patent scope, notice to the "interested public," and cultivation of the public domain. In relation to the written description requirement, these policy directives suggest that written descriptions should be interpreted as broadly as possible without impairing competitors' ability to innovate.

1. Presumption of Broad Patent Scope

Conventional policy only instructs that patent scope should not be construed too narrowly or too broadly, leaving a large gray area in between.[136] According to enhanced prospect theory, courts should err on the side of very broad interpretations of patent scope. To be sure, a broad interpretation would not mean construing the patent beyond its claims so that it has undue breadth. It would only mean that, within the permissible range of interpretations grounded in the claims, the broadest interpretation would be accepted.[137] The legitimacy of such a presumption can already be found in the practices of the PTO, which applies a "broadest reasonable interpretation" standard to patent claims during prosecution.[138]

Proponents of a heightened written description requirement often express concern that broad patents stifle innovation, largely due to the uncertainty they create about a patent's boundaries.[139] Sometimes this concern is couched in arguments about how broad patents increase the cost of innovation because additional research is needed to overcome that uncertainty.[140] At other times, these proponents

---

[136] *See, e.g.*, Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1752 (2009) (illustrating the possibility of interpreting claim elements broadly or narrowly).

[137] For instance, if a claim recites colored balls, the patent would not cover colored cubes, but it might be interpreted to cover balls of any color. *Cf.* Merges & Nelson, *supra* note 42, at 875 (explaining the need to balance between broad and narrow patent scope in terms of prospect theory). *Contra* Burk & Lemley, *supra* note 136, at 1790 (asserting that courts err on the side of narrower patents in the event of narrow and broad interpretations that are equally valid).

[138] *See generally* Bey & Cotropia, *supra* note 121.

[139] *See, e.g.*, Brief for the United States as Amicus Curiae on Rehearing En Banc in Support of Respondent at 24, *Ariad II*, 598 F.3d 1336 (Fed. Cir. 2010) (No. 02-CV-11280) [hereinafter Brief for the United States] (noting the difficulty of discerning the limits of patents and the limitations of improving on patented material as impediments to innovation).

[140] *See id.*

argue that broad patents, which encompass a larger pool of potential defendants, increase the risk of litigation and duly divert valuable resources from research projects into litigation.[141] Overarching both the concern about increased research costs and increased litigation costs is the threat of "patent thickets," whereby broad patents so congest a field that competitors are either forced to license broad patents or endure litigation.[142] Nonetheless, such arguments lack real thrust and do not take into account the fact that broad patents actually encourage innovation.

First, broader patents are more susceptible to invalidity arguments. The broader the patent, the more likely it will have "gaping holes" through which a court can poke with litigation.[143] Alternatively, competitors can poke through these holes with blocking or improvement patents, which potentially offer alternate avenues of action for competitors faced with broad patents.[144] In turn, litigation costs will be reduced if more competitors choose to apply for blocking and improvement patents rather than litigating. Furthermore, a relaxed written description inquiry can still be forceful and discerning. While it is readily admitted that Ariad's patent might still have been invalidated under a revised written description test, this admission actually demonstrates that a doctrine that embraces broad patents can still filter out the unduly broad chaff that would hinder innovation.

Second, patents have a limited term of exclusivity based on a logical policy rationale. The rationale is that while a patent monopoly indeed hinders innovation, competitors must eventually have access to the patented technology. Even if an improvement or blocking patent does not allow a competitor to invent around or through a patent, the competitor can simply wait until the patent term expires. After all, that is the scheme of the patent system: Denying competitors the

---

141 *See, e.g.*, Brief of Amici Curiae Google Inc.; Verizon Communications Inc.; Cisco Systems, Inc. at 12–14, *Ariad II*, 598 F.3d 1336 (No. 02-CV-11280) (arguing that overly broad claims must be cabined by "adequate disclosure" lest "[t]he staggering costs of litigating unclear patents divert resources from innovation—the objective of the patent laws—to wasteful transaction costs").

142 *See* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1614 (2003) (attributing some patent thickets to broad patents).

143 *See* Burk & Lemley, *supra* note 136, at 1762–63 ("Overclaiming may or may not help the patentee; the risk is that a claim that is too broad will be held invalid.").

144 *See supra* Part I.A.2 (discussing improvement and blocking patents). This agrees with the facts of *Ariad*. Eli Lilly never claimed that it would be unable to invent around Ariad's patent with an improvement patent or invent on top of the patent with a blocking patent. Judge Rader discussed the benefit of incentivizing competitors, like Eli Lilly, to seek such improvement patents. *Ariad II*, 598 F.3d at 1365–66 (arguing that blocking patents would benefit both patentees and competitors by encouraging improvement patents and, thereby, cross-licensing).

ability to practice and profit from new technology gives inventors an incentive to innovate in the first place.[145] This works both ways: A monopoly gives patentees incentive to innovate and, simultaneously, gives competitors incentive to develop new fields of technology, rather than infringe.

2. *Notice to the "Interested Public": The Lay Person and the Gene Patent*

Since patent rights affect all individuals, conventional policy requires that the general public be put on notice of patentees' rights.[146] Proponents of a heightened written description requirement argue that disclosure must be held to stricter standards if the notice function is to be served.[147] Specifically, they argue that broad patents would increase the costs of prosecution since broad patents provide less notice of rights and thus make it harder for other inventors to figure out what is outside the scope of those patents.[148] Yet innovation policy would urge that public notice through the written description requirement should be pragmatic and practical and, therefore, only require notice to the "interested public." Realistically, it usually does not happen that laypersons in the public try to research drugs whose creation required decades of research and billions of dollars.[149]

For practical purposes, members of the interested public should only include a patentee's competitors since they are the subsection of the public most likely to infringe or utilize the patent during or after its term. Thus, the interested public should have a comparable level of

---

[145] Thus, the patent system arguably accounts inherently for a reduction in innovation and competition. Further, in the case of *Ariad*, Eli Lilly and other competitors would not even have to wait the full patent term to use the process covered by Ariad's patent: Its patent was filed in 1995, so there were only five years remaining until the patent expired in 2015. U.S. Patent No. 6,410,516 (filed June 5, 1995).

[146] *See* Chiang, *supra* note 30, at 541 ("[I]t is frequently emphasized that the claims provide public notice of the limits of the patentee's monopoly. . . ."); Holbrook, *supra* note 28, at 128 (explaining that the enablement doctrine allows patents to be practiced without "undue experimentation" since adequate notice should provide enough information to prevent such burdensome use).

[147] *See, e.g.*, Brief for the United States, *supra* note 139, at 23–24 (noting that fair notice can be thwarted due to the impossibility of determining all potential compositions that "may share the recited function").

[148] *See, e.g.*, Brief of Amicus Curiae Medtronic Inc. in Support of Eli Lilly & Co., *supra* note 14, at 7–8 (emphasizing the cost increase caused by the unpredictability of ambiguously broad patents).

[149] "Laypersons" refers to members of the public that are not competitors of a patentee—a rough barometer would be whether the layperson shares a comparable level of knowledge with the patentee.

know-how to the patentee[150] and, as competitors, may even have been racing to the patent office against the patentee to stake a claim to the patented material. This reflects the facts in *Ariad*, since Eli Lilly was not only able to produce drugs that utilized the same process but also obtained two patents that exhibited NF-κB inhibition.[151]

This suggests that competitors who assert written description defenses by arguing that they were not on notice likely would *not* benefit from a more extensive written description themselves. Having knowledge comparable to a patentee's, a competitor has the ability to practice a patent and, at the same time, argue in court that the patent is invalid because of a deficient written description. What does it say about the patent if a competitor—claiming that the patentee has insufficiently described her invention, making it inaccessible to the public domain—has itself exploited the patent? For example, in Ariad's case, what does it say about Ariad's patent if the competitor has obtained patents involving the same level of technology? In fact, it seems logical that a competitor's use of the patented invention serves as evidence that the patentee has provided an adequate written description.[152]

3. Cultivation of the Public Domain: The "Quo" in Quid Pro Quo

Lastly, conventional policy requires that the patent system make it feasible for inventors to seek patents so that innovations can be transferred to the public domain.[153] But doctrine based on innovation policy would go further than that and have the patent system incentivize the cultivation of the public domain. "Cultivation of the public domain" means active contribution of novel and innovative ideas to the public. Again, the patent system is not a neutral arbiter and has specific goals in mind, one of which is to encourage inventors to file

---

150 If a competitor has been sued for infringement, this seems to show that the competitor at least had the requisite know-how, possession, and understanding of the patent to harness the invention.

151 It could be argued that this is not foolproof evidence that Ariad would have been able to commercialize its patent and that, more likely, Ariad's written description was simply broad enough to cover Eli Lilly's products. Even so, Ariad likely had very comparable resources at its disposal.

152 The facts of *Ariad* do not track as closely to this point. This would apply more to lawsuits where the infringer has produced the infringing product by intentionally practicing the patentee's patent. Nevertheless, the idea still has some traction in *Ariad*: If Eli Lilly had the know-how to practice Ariad's patent unintentionally, then it is plausible that it had the know-how to practice the patent intentionally.

153 *See* Holbrook, *supra* note 28, at 133 & n.51 (noting that a quid pro quo bargain "encourages the dissemination of information").

for patents[154] and thereby increase the wealth of knowledge in the public domain.

In order to encourage cultivation, the patent system has to moderate the transaction costs associated with obtaining patents.[155] If transaction costs are too high, inventors may not apply for patents unless they are granted greater rewards (for example, broader patents); in addition, the higher the transaction costs, the longer it will presumably take inventors to file an application at the patent office. If transaction costs are too low, then inventors will receive patents they do not deserve. In the case of the written description, making the requirement stricter increases the transaction costs of obtaining a patent since inventors will have to invest that much more money in conducting the extra research necessary to draft an extra adequate written description. The result is that inventors either will not apply for patents or will wait until they have conducted that extra research. Both results shirk innovation policy and put the patent system and the public at a disadvantage.

Nevertheless, proponents of a heightened written description requirement argue that the risk of overbroad patents poses more of a threat to innovation than increased transaction costs.[156] The problem for proponents is that a broad claim for an entire genus may even prevent a competitor from engaging in the research required to develop a product for an improvement or blocking patent.[157] In the case of a process patent, a competitor would have to license the process patent in order to research a product of the process that could turn into a blocking or improvement patent. In addition, some proponents argue that broad patents hinder innovation since broad patents blur the boundary of what is and what is not patentable,[158] thus making prosecution more costly and deterring innovation. These proponents note that would-be innovators must know what is and what is not fertile ground for new inventions—otherwise, fear of infringing patents may prevent would-be innovators from inventing. To the contrary, relaxing the written description requirement would not inhibit

---

154 See *supra* Part I.A for a discussion of the structure and goals of the patent system.

155 *See* Lemley, *supra* note 37, at 1498–99 (describing the many costs associated with prosecuting patents).

156 *See, e.g.*, Brief for the United States, *supra* note 139, at 16, 23–24 (arguing that precise claim construction is the paramount goal and remarking that low transaction costs often lead to overly broad claims).

157 *See id.* at 24 (arguing that granting broad claims will prevent others from seeking to innovate beyond the scope of the patent).

158 *See, e.g.*, Brief of Amicus Curiae RealNetworks, Inc. in Support of Eli Lilly & Co. at 14–15, *Ariad II*, 598 F.3d 1336 (Fed. Cir. 2010) (No. 02-CV-11280) ("A patent holder should know what he owns, and the public should know what he does not.").

innovation by allowing a single party to capture an entire field of innovation. This is partly due to the controls for broad patents discussed in Part II.B.1 but also partly due to research patterns. For instance, surveys of scientists working in the "transcription factor" field, as in *Ariad*, have shown that patents are not a significant deterrent to research and innovation.[159] Likewise, patent thickets and field capture are not as worrisome as some proponents may suggest because Ariad's patent was not the only patent covering NF-kB—in fact, it was one of nearly one hundred such patents.[160] The prevalence of these many other patents in the field shows two things: (1) that Ariad's patent was not so broad as to cover the entire field and prevent any of the nearly one hundred other patents from being sought, and (2) that, if there were so many patents already, there was likely even more room to innovate around Ariad's patent and the other patents in the field since the innovators behind some of those other patents undoubtedly had room to invent around patents already in the field.

There are two reasons why the transaction costs required to fulfill the written description requirement should be reduced. First, most patents are never litigated, so it does not make sense for inventors to invest significant labor into the written description. Second, even if a patent is litigated, litigation will likely turn on grounds other than a faulty written description.[161] Only a limited pool of cases turn on the written description requirement alone, which makes it unreasonable to force high transaction costs on something that may have little effect beyond prosecution.[162]

By imposing a heightened written description requirement, *Ariad* severely neglected patent policy and, consequently, the goals of innovation associated with the Constitution's Intellectual Property Clause. The claims were read more narrowly than necessary to satisfy the

---

[159] *See* John P. Walsh, Wesley M. Cohen & Charlene Cho, *Where Excludability Matters: Material Versus Intellectual Property in Academic Biomedical Research*, 36 RES. POL'Y 1184, 1189 & n.12 (2007) (concluding that "[t]echnology control rights, such as . . . patents covering needed research inputs (3%) were much less likely to be included" as a reason for abandoning research).

[160] *Id.* at 1198 (noting that ninety patents cover technologies related to NF-kB).

[161] This is partially because the written description was much more relevant in the past than it is today. *See* DURHAM, *supra* note 1, at 85–86 (noting that the written description requirement is a relic of eighteenth century patent law when such description was needed because claims did not yet exist); Holbrook, *supra* note 28, at 161–62 (calling written description a "historical vestige").

[162] *See supra* note 22 (discussing Holman's study of prominent, post-1997 written description cases); *see, e.g.*, *In re* Alton, 76 F.3d 1168, 1172 (Fed. Cir. 1996) (noting that compliance with the written description requirement must be determined on a case-by-case basis); *In re* DiLeone, 436 F.2d 1404, 1405 (C.C.P.A. 1971) (same).

goals of patent law and patent policy, and more extensive disclosure was required than necessary to educate those most likely to use or infringe the patent (like Eli Lilly). The combination of these two factors effectively increased the transaction costs of any future patents sought by Ariad. If the increased costs were to discourage Ariad from applying for patents or to delay when it applied for patents, these increased costs would prevent new innovation from entering the public domain as soon as possible, if at all. This happened because the Federal Circuit understandably restricted its inquiry to the four corners of the patent, which is the traditional way of performing the written description inquiry.[163] However, tradition is not always the best guide for developing new solutions to old problems arising in new contexts (like complex biotechnology patents), particularly when tradition is the root of those problems. For these reasons and others, the written description doctrine has been ripe for reform. Reform informed by innovation policy could lead to much-needed clarification of the doctrine and resolve the confusion of both patentees and their competitors.

III
A New Approach to an Old Problem

A. A Proposed Solution: A Hypothetical Innovation Test

Using this prospect theory–based framework, we can reconceptualize a written description doctrine that observes innovation policy. Thus, in order to foster scientific progress and innovation, while ameliorating fears about overly broad patents inhibiting innovation,[164] my proposed written description test poses the following question: Could a competitor "innovate around" the patent, read as broadly as possible, at the time of infringement? If the answer is in the affirmative, then the patent claims should be upheld, but, if in the negative, the claims should be narrowed until the question can be answered in the affirmative. Only under the latter scenario, when narrowing proves futile, should a claim be invalidated. Under such an inquiry, the Federal Circuit would need to look beyond the four corners of the patent since innovation depends not only on what is inside of a patent but also on what lies outside of and around it. After all, disclosure is the act of communicating that which is inside of the patent with that

[163] *See Ariad II*, 598 F.3d at 1351 ("Yet whatever the specific articulation, the test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.").

[164] Medtronic Inc. expressed these precise concerns in its amicus brief. *See* Brief of Amicus Curiae Medtronic Inc. in Support of Eli Lilly & Co., *supra* note 14, at 14.

which is outside of the patent, or in the public domain. By relying on what lies outside of the boundaries of the patent, as opposed to details about the invention found in the written description itself, this new test avoids the "cardinal sin" of reading the written description onto the claims. This test would be used during litigation, while the PTO could continue employing its current guidelines, which track the current doctrine, to police possession during prosecution.[165]

Assuming that the patent satisfies the enablement requirement, a competitor would be able to innovate around a patent if it could either (1) patent a completely different invention (for example, a different type of drug for the same disease) or (2) receive an improvement or blocking patent (for example, by improving upon the patented drug so much that the competitor deserves its own patent). A competitor would not be able to innovate around the patent if the competitor faced the following three conditions: (1) it would be infringing if it produced its product, (2) it could not invent something completely different because any alteration on the patented invention would be obvious or not novel, and (3) there was no opportunity for a blocking or improvement patent.

If the answer to the question is in the affirmative and the competitor could innovate around the patent, then patent law should not invalidate the asserted claims, but rather allow the patentee to claim the full range of collateral fruit, even in an *Ariad*-type scenario where the patentee would have rights over a very broad amount of technology. If the answer to the question is in the negative and the competitor could not innovate around the patent—no matter how great the competitor's ingenuity and resources—then the scope of the patent should be interpreted narrowly enough to restrict the patent's collateral fruits to the point where competitors have room to innovate. Only in extreme cases, where narrowing was ineffective, would invalidation be proper. Since none of the preceding steps of the test involve any consideration of the written description and do not use the written description to restrain the scope of the claims, the test does not read the written description onto the claims and therefore does not commit the "cardinal sin" of patent law.

There are three primary rationales for my "hypothetical innovation" test. First, lack of creativity or unwillingness to innovate is not an excuse for competitors to infringe and invalidate otherwise valid patents. Competitors do this as it is, but that does not mean that patent doctrines should support competitors in this behavior. Second,

---

[165] *See* MPEP, *supra* note 33, § 2163 (demonstrating PTO cognizance and use of case law surrounding the written description doctrine).

this test forces competitors to further the Article I, Section 8 value of "progress" of science by forging *past* the patented invention rather than stalling on it—in fact, the Federal Circuit encourages competitors to innovate around patents as a matter of patent policy.[166] Third, the enablement requirement typically captures the possession goals embodied in the current written description doctrine, allowing courts to continue monitoring patents for undue breadth.[167] It has often been observed that most cases that turn on the written description requirement could just as easily turn on the enablement requirement. As mentioned above, if a patentee cannot satisfy the written description requirement because she does not possess and understand her invention, the chances are slim that she will be able to teach a person of skill in the art to practice the invention.[168]

An illustration of this test is helpful in conceptualizing its application. Patent rights are often analogized to property rights because intellectual property, like property rights, are based on the right to exclude.[169] Thus, a patent can be analogized to a plot of land, and the claims to the boundaries of the property; the public domain can be seen as the unclaimed land outside of that plot; and the written description can be understood as making the boundary lines clearer and more discernible to the public. To take it a step further, the claims are more like the technical coordinates of the property boundary lines, which some members of the public may not be able to perceive without the aid of an expert. For example, a layperson may not be able to glean from the technical coordinates alone what the patentee owns, but a land surveyor would be able to do so. In that sense, the written description is like a fence that visually represents the technical coordinates of the claims demarcating the property and makes those coordinates discernible to the public.[170] The fence is necessary not only to ward away intentional infringers, but also to prevent unsus-

166 *See* Holbrook, *supra* note 28, at 131–33 (noting that the Federal Circuit has "lauded the use of the patent system to encourage 'design around' innovation, where a competitor alters the patented invention in a way so as to be outside the patent claims").

167 Judge Gajarsa noted that the enablement requirement was sufficient to prevent patents of undue breadth. *Ariad II*, 598 F.3d at 1361 (Gajarsa, J., concurring) ("Section 112, ¶ 1's enablement requirement is a more than adequate vehicle for invalidating claims that are broader than their disclosure.").

168 *See supra* notes 1–2 and accompanying text.

169 Numerous patent scholars have used similar analogies to illustrate their theories. *See, e.g.*, Merges & Nelson, *supra* note 42, at 845 ("The patents serve a different function: Analogous to the metes and bounds of a real property deed, they distinguish the inventor's intellectual property from the surrounding terrain."). Kitch, himself, used a famous mineral claim analogy to explain his theory. Kitch, *supra* note 113, at 271–75.

170 *Ariad II*, 598 F.3d at 1350 (describing written description as "drawing a fence around the outer limits of a purported genus").

pecting members of the public from accidentally trespassing on the patentee's property and "waking up" as an infringer.[171] This phrase refers to the possibility that, if patent boundaries are not clearly demarcated, an inventor could, in good faith, unintentionally practice patented technology and suddenly find herself liable for infringement despite her honest intentions.

In many ways, this test asks how much collateral fruit a patentee deserves within the permissible range of claim interpretation. Ideally, a court would award enough collateral fruit to incentivize the inventor, but not so much collateral fruit so that competitors are prevented from innovating. To award collateral fruit would mean to interpret the claims broadly enough to encompass the realm of inventions that constitute that fruit. Applied to *Ariad*, the court should have asked whether Eli Lilly and other pharmaceutical companies would be able to develop innovations related to NF-kB inhibition. Could competitors devise an improvement patent for a process of NF-kB inhibition far superior to Ariad's process? Or could competitors come up with a blocking patent by patenting the class of molecules best suited to Ariad's NF-kB therapy, such that everyone using Ariad's patent would be forced to use that class of molecules, including Ariad itself? Even if competitors would be locked out of treating those symptoms via innovation of NF-kB inhibition, there might very well be other mechanisms in the body that could be tweaked to inhibit those symptoms as well.[172]

For this reason, it is often helpful to translate problems in intellectual property to their cognates in real property. In *Ariad*, as depicted in Figure 1, the Federal Circuit essentially found that the technical coordinates did not match the visual fence surrounding Ariad's property: The claims covered all variations of the process involving any type of molecule while the written description limited the process to only those three classes of molecules. The court also

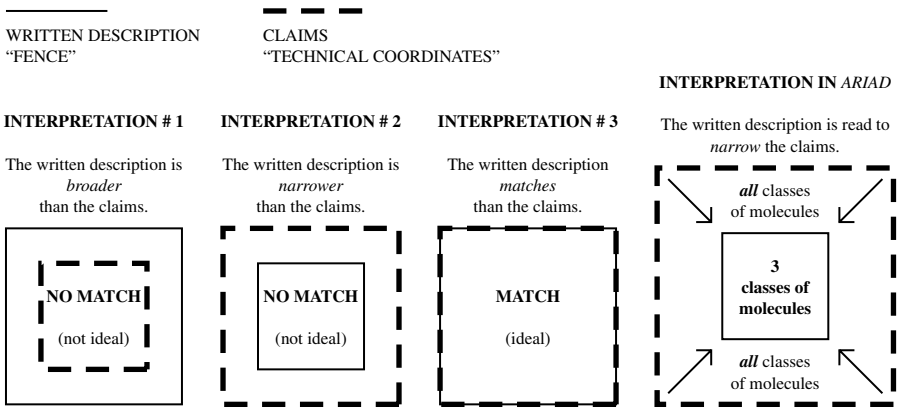
---

171 *See, e.g.*, Merges & Nelson, *supra* note 42, at 845 (analogizing claims to "metes and bounds" of real property); *cf.* Burk & Lemley, *supra* note 136, at 1747 (analogizing claims to fences and sign posts).

172 The body has thousands of transcription factors that interact with different gene sequences. As Ariad explained in its brief on appeal, while there exists a possibility that NF-kB is the only transcription factor able to treat these symptoms, there is at least a reasonable possibility that some other transcription factor might be able to achieve a very similar effect, particularly since "[m]ultiple transcription factors can regulate the same gene," such that symptoms caused by certain genes could be controlled by several means. Brief for Plaintiffs-Appellees, *supra* note 130, at 5. For instance, Ariad stated that there were "probably several thousand" transcription factors other than NF-kB that could have similar effects but that only "several hundred" had been discovered. *Id.* (internal citations omitted). Therefore, it would seem that competitors, like Eli Lilly, could find their own transcription factor and use that to innovate around Ariad's patent on NF-kB inhibition.

suggested that Ariad had been entitled to more property than it deserved.[173] The catch is that the PTO approved those coordinates for the property despite the placement of the fence.[174] The missing element in Ariad's written description—the exact description of the molecules used to inhibit NF-κB—represents the collateral fruit between the patent's claims and written description because the extent of the collateral fruit would depend on the written description. While the Federal Circuit's approach to Ariad's patent committed the "cardinal sin" by reading the written description to *restrict* the claims, collateral fruit allows the claims to be read *beyond* the four corners of the written description, when beneficial to innovation—there is no sin in that.

FIGURE 1

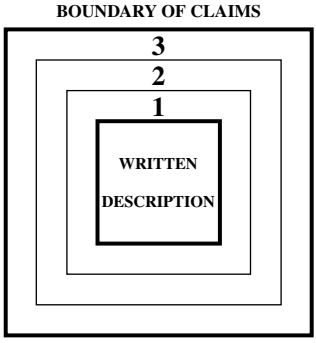


My test looks not at the property within the inventor's plot of land, but at the property outside of the plot (i.e., outside of the four corners of the patent). In the context of this plot and fence analogy, the test essentially asks whether the competitor could have claimed land around the patentee's plot. If there is enough unclaimed land—in other words, space for innovation—outside of the patentee's plot, then competitors should invest their resources in harvesting it rather than squatting on the plot and challenging the patentee's ownership of the collateral fruit between the visual fence and the plot's technical boundary. (Squatting would be depicted in Figure 2 by regions 1, 2, and 3—areas within a patent's claims but outside of the written description.) Thus, the test stipulates that either there is excess land beyond the patentee's plot (i.e., claims) and the claims should be

[173] *See generally Ariad II*, 598 F.3d at 1355–58.
[174] *Id.* at 1354. This is the analog for the basis of the presumption of validity.

valid, or there is no excess land and the patent's claims should be interpreted narrowly enough to give competitors land to cultivate. As shown in Figure 2, patentees could retain various degrees of the collateral fruit existing in the space between the written description and the claims and still allow competitors room to innovate. For instance, a court could restrict the claims represented by Figure 2 to Regions 1+2 (thereby allowing competitors room to innovate in Region 3) or even Region 1 (thereby allowing competitors to innovate in Regions 2+3). In the rare case that the written description *exceeds* the boundary of the claims (for example, that the written description is actually more vague and generalized than the claims), the claims would control and the written description would be read more narrowly to conform to the claim language.

FIGURE 2



REGION 1	REGION 1 + 2	REGION 1 + 2 + 3
Least Collateral Fruit In General If 100 variations, then only 10 variations. In *Ariad* Only 1 of the 3 classes of molecules in the written description.	**Moderate Collateral Fruit** In General If 100 variations, then 50 variations. In *Ariad* All 3 classes of molecules in the written description.	**Most Collateral Fruit** In General If 100 variations, then all 100 variations. In *Ariad* *Every* class of molecules.

B. Harmonization of the Hypothetical Innovation Test with Innovation Policy

The benefit of this test is that it reorients the center of gravity of the written description doctrine from "possession" to innovation policy.[175] This is necessary because possession provides no clear guidance for litigants[176] and is better evaluated during prosecution. As Judge Gajarsa commented in *Ariad*, "[t]he empirical evidence confirms my belief that written description serves little practical purpose

[175] *See* Holbrook, *supra* note 28, at 161–63 (arguing that written description should return to its traditional role in the priority context). Even proponents who supported Eli Lilly agree that innovation is the key to resolving the written description dilemma. *See, e.g.*, Brief of Hynix Semiconductor Inc. & Samsung Electronics Co., Ltd. as Amici Curiae in Support of Defendant-Appellant-Respondent and Reversal at 20–21, *Ariad II*, 598 F.3d 1336 (No. 02-CV-11280) (urging the court to adopt the interpretation of the written description best suited to promote innovation).

[176] *See Ariad II*, 598 F.3d at 1351 ("The term 'possession,' however, has never been very enlightening."); *supra* Part I.A.3 (discussing possession in patent law).

as an independent invalidity device and better serves the goals of the Patent Act when confined to the priority context [during patent prosecution]."[177] Since written description challenges during prosecution are about possession, it is in that context that a possession standard is most useful, while written description challenges during litigation are about innovation and demand a test highlighting such concerns.[178] Thus, possession is better judged during prosecution because that is when it is an issue of first impression. The focus of litigation should be determining infringement as opposed to re-prosecuting patents.

Duly reoriented, this test comports with the innovation policies at the core of patent doctrine. To begin, the test gives the patentee the largest scope possible by limiting scope only to the extent necessary to make room for competitors to innovate. Next, the test still requires the patentee to give reasonable disclosure to the interested public since patentees must still satisfy the enablement and claim-definiteness requirements, and patentees must still fulfill the possession standard of the written description requirement during prosecution. Moreover, the test encourages competitors to innovate and cultivate the public domain, rather than waste resources litigating patents.

C. Implementation

As noted, the test would be used during litigation, while the written description would still assess inventors' possession during prosecution.[179] Thus, the test does not replace the written description requirement; rather, it reformulates the *doctrine* in the litigation con-

---

177 *Ariad II*, 598 F.3d at 1361 (Gajarsa, J., concurring) (alteration in original).

178 The test would not eliminate the written description requirement but merely relegate it to its role during prosecution as a policing mechanism. *See supra* notes 71–72 and accompanying text (recounting the origins of the written description doctrine). Second, the enablement requirement would arguably encompass the possession inquiry during litigation anyway, as discussed in notes 167–68. *See, e.g.*, LizardTech, Inc. v. Earth Res. Mapping, Inc., 424 F.3d 1336, 1345 (Fed. Cir. 2005) ("Those two requirements usually rise and fall together."). Judge Gajarsa supported this position in his concurrence in *Ariad*. *Ariad II*, 598 F.3d at 1361 (Gajarsa, J., concurring) ("Section 112, ¶ 1's enablement requirement is a more than adequate vehicle for invalidating claims that are broader than their disclosure.").

179 The current doctrine would still be tracked through the PTO guidelines during prosecution to allow validity to depend on the written description for a time, thereby ensuring that inventors are still incentivized to provide enough material in their descriptions. Although the MPEP guidelines track case law, the transaction costs for drafting an adequate written description are lower at the PTO since, due to inefficiencies in the examination process, it is relatively easy for patentees to get a written description that would not pass muster in the courts approved by an examiner. *See* MPEP, *supra* note 33, § 2163.04 ("[A written] description as filed is *presumed to be adequate*, unless or until sufficient evidence or reasoning to the contrary has been presented by the examiner to rebut the presumption.") (emphasis added); *see also supra* notes 121–24 and accompanying text (explaining why the PTO is flawed institutionally).

text (as opposed to uprooting the *requirement* itself at the policing stage of patent prosecution). Implementation of this hypothetical innovation test is feasible and would track the analysis used elsewhere in patent law when assessing similarly abstract concepts.

In these abstract inquiries, the standard means of assessment is through an expert witness who can provide insight.[180] Reliance on hypothetical determinations of fact may seem dubious since it may appear difficult for expert witnesses to predict accurately whether a hypothetical competitor could invent around a patent. Nevertheless, this mode of inquiry is apt because patent litigation often comes down to such a "battle of the experts," despite the limited amount of certainty in such determinations.[181] Litigants could use the same method for the innovation test: They could put an expert on the stand to give testimony about how there is or is not room for competitors to innovate around the patent. After that, the judge or jury would decide whether the plaintiff had met its burden in proving that competitors could innovate around the patent.

In a typical written description case, a plaintiff would sue a defendant for infringing its patent and the defendant would attempt to invalidate the patent by showing that it did not satisfy the written description requirement. The plaintiff would have the initial burden of proving the existence of room to innovate around its patent, after which the defendant could rebut with testimony from its own experts. Therefore, there would be no significant additional costs beyond the costs of assessing the current written description doctrine or any of the other doctrines requiring an inquiry in the abstract (for example, the obviousness inquiry).[182] Some critics may think that this test potentially places too great of a burden on patentees by forcing them to divine a new invention. Notwithstanding, the test would not require patentees to conceive of *patentable* inventions that satisfy the general patentability requirements but would only ask that patentees outline

---

[180] *See generally* Edward G. Poplawski, *Selection and Use of Experts in Patent Cases*, 27 AIPLA Q.J. 1, 3 (1999) (discussing the selection, use, and prevalence of experts in patent litigation).

[181] *See generally id.*

[182] Other counterarguments may include concern about increases in the cost of maintaining a patent due to the cost of retaining experts. However, this concern should be placed in the context of other high-stakes patent suits, which cost, on average, four million dollars. AM. INTELLECTUAL PROP. LAW ASS'N, REPORT OF ECONOMIC SURVEY 22 (2003). The cost of experts is only a fraction of this. Even assuming that the cost of experts would be in the millions of dollars, a highly profitable pharmaceutical patent can recoup that cost in a matter of days if the patent is upheld in court. Ceci Connolly, *Coalition Seeks To Curb Drug Patent Extensions*, WASH. POST, Mar. 25, 2002, at A1 (noting that AstraZeneca, the pharmaceutical company holding the patent for Prilosec, "collect[ed] $5.6 million in unanticipated revenue every day Prilosec retain[ed] its monopoly").

the contours of such ideas and show that space for innovation exists around the boundaries of their patent. Cumulatively, this method reduces costs since the additional cost of an expert would only attach in the rare case when a patent is litigated, whereas the additional cost of a heightened written description requirement attaches to every patent, whether or not it is litigated.[183]

I propose that experts look to the following factors during the hypothetical innovation inquiry: (1) whether the research and patents in the field are so expansive as to preclude any novel ideas; (2) whether the state of the art and knowledge of persons having skill in the art are so advanced that any new ideas would be obvious; (3) whether other competitors have successfully patented inventions in the field; (4) the rate of progress (or stagnancy) of development in the field, which may indicate how fertile the field is for additional innovation; and (5) the time remaining in the patent term. The first and second factors indicate the potential for innovative cultivation in the field of technology; the third and fourth factors indicate the field's ability to accommodate broad patents; and the fifth factor assesses the importance of the patent's notice function.

Applied to the facts of *Ariad*, the hypothetical test would have required Ariad to present an expert witness explaining how there was room to innovate around Ariad's method of cell therapy. There is no guarantee that Ariad would have been able to meet this burden and win a favorable result, but there is at least a convincing possibility that it could have prevailed.[184] The expert witness might have described the current state of technology in the field, explaining that there was much room for further development of techniques and specific proteins used to treat the symptoms caused by NF-kB. He or she might have also detailed actual research taking place in these areas that presented opportunities for innovation or might have explained that a blocking patent could be granted for the specific composition of the active molecules. Eli Lilly then would have presented its own expert witness to explain why the field of technology surrounding NF-kB was at or close to a dead end. For instance, this expert might have explained how little had recently been invested into research or how

[183] *See supra* notes 155–60 and accompanying text (explaining why stricter requirements, such as a heightened written description requirement, result in higher transaction costs for patentees); *supra* notes 121–24 and accompanying text (explaining that many patents are never litigated and that written descriptions currently pass a lower hurdle with PTO examiners than they do with courts).

[184] For instance, if Ariad was actually hogging the field of innovation surrounding NF-kB inhibition, then it should still lose a lawsuit under the innovation test. This does not seem to be the case, however, since there were about ninety patents in the field. *See supra* note 182 and accompanying text.

attempts at innovation have failed. The court would then have decided whether Ariad's experts had met the burden of showing that there was room to innovate around its patent and, if so, how much collateral fruit Ariad should receive: one class of molecules, all three classes of molecules, or all classes of molecules (including those not described in Ariad's written description). As explained in Part II.A, a median solution—such as allowing the collateral fruit of the three classes of molecules—would likely ensure that the patent, as construed by the court, would not become overly broad or overly narrow.

Conclusion

The written description doctrine is in dire need of policy reform, and such reform must account for the requirement's tremendous influence on innovation. *Ariad* showed that the written description doctrine has continued to evolve and pose new problems in this age of rapid technological progress. From its origins as a policing mechanism during prosecution, the doctrine has matured into a formidable method of nullifying patents during litigation. Two core notions suggest that reformation of the written description doctrine is sensible and beneficial. The first notion is that possession is better evaluated during prosecution. The written description was originally a device used to police patents during prosecution,[185] and the enablement requirement effectively regulates possession during litigation.[186] Additionally, once a patent is granted by the PTO and given its "broadest reasonable interpretation," the patentee and its competitors conduct their business in reliance upon the assumption that the patentee possesses the broadest reasonable scope of its patent. Most important, however, is the notion that the written description doctrine and written description disputes revolve around innovation. Both the patentee's and its competitors' ability to innovate are impacted because the written description doctrine can determine whether a patentee will patent in the first instance and whether the patentee will retain its patent rights through litigation. Ultimately, these determinants will influence whether competitors innovate and what type of innovation competitors pursue.

The question we must ask ourselves is whether we want to reward an invention that "required years of hard work, great skill, and extraordinary creativity—so much so that the inventors first needed to discover, give names to, and describe previously unknown cellular

[185] *See supra* notes 71–72 and accompanying text (providing an overview of the origins of written description).

[186] *See supra* Part I.A.2.

components as a necessary predicate for their inventions."[187] These are the words that the Federal Circuit used to describe Ariad's efforts to develop its cell therapy process, and this description seems to embody innovation and constitutional progess. If so, such effort should be rewarded and encouraged by the written description doctrine.

Put another way, should we penalize those inventors that go to extra lengths to innovate in the most groundbreaking fields? Unless the Federal Circuit rewrites the written description doctrine in observance of innovation policy, some of the technologies most important to the public good—those on the cutting edge of their fields—will have a delayed entrance into society, if they are even able to enter at all under the increased costs and risks of a heightened written description requirement. To comprehend the troublesome implications, simply imagine a scenario similar to Ariad's, where the patented technology ameliorates the symptoms of cancer and AIDS; then imagine the predicament when only the patentee has the know-how to exploit its technology and allow the public to enjoy its benefits, but does not have the proper incentives to disclose that know-how.[188] A practical—and chilling—question will follow if courts continue to analyze the written description doctrine without observing its bearing on innovation: Having lost one groundbreaking patent to the written description doctrine, would Ariad and other patentees choose to innovate and risk losing another?

---

[187] *Ariad I*, 560 F.3d 1366, 1372 (Fed. Cir. 2009) (acknowledging that Eli Lilly's expert agreed that Ariad's invention was in an extremely unpredictable field), *aff'd in part*, *rev'd in part en banc*, 598 F.3d 1336 (Fed. Cir. 2010).

[188] It is a real and serious concern that research affecting the health of many will suffer delay due to patent disputes. *See, e.g.*, Fiona Murray & Scott Stern, *When Ideas Are Not Free: The Impact of Patents on Scientific Research*, *in* 7 INNOVATION POLICY AND THE ECONOMY 47–49 (Adam B. Jaffe et al. eds., 2007) (discussing the "extensive delay in AIDS research" caused by a two-year patent dispute over an AIDS blood test). Applied to the scenario in *Ariad*, although Eli Lilly had patented drugs that inadvertently achieved the same process as Ariad's drug, Eli Lilly had not recognized the benefit of NF-κB inhibition—only Ariad's drug directly harnessed the process and recognized the benefits of inhibiting NF-κB, and only Ariad had the know-how to fully utilize the process.