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Defining Patent Quality

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ARTICLES

DEFINING PATENT QUALITY

*Christi J. Guerrini**

Depending on whom you ask, the state of U.S. patent quality is either dismal or decent, in decline or on the upswing, in need of intervention or best left alone. Absent from the ongoing debate about the quality of U.S. patents, however, is much thoughtful discussion about what constitutes a patent's "quality" in the first place. What features of a patent make it "good" in quality, what features make it "bad" in quality, and whose opinion matters? Surprisingly, scholars and policymakers have shown little interest in these questions. Yet their answers are critical to the direction of the patent agenda because they dictate how to measure patent quality and, consequently, how to evaluate the extent of the so-called patent quality "crisis" as well as the effectiveness of quality reforms.

The broad aim of this Article is to draw attention to the definition of patent quality as an important subject of scholarly inquiry. Its more specific aim is to call for a return to first principles and begin the process of operationalizing the meaning of patent quality. It does so by analyzing the concept using a methodology applied in the business literature of quality management. The implications of this work include a fundamentally different approach to patent quality's meaning that is essentially the inverse of the conventional way of thinking about the concept. That is, instead of defining a good-quality patent as one that, at a minimum, satisfies the existing legal standards of patentability, the legal standards of patentability (among other things) should be adjusted and applied to reflect good patent quality. Following this new approach, I propose a formula for assessing patent quality and identify the most important variable in that formula: the quality "dimensions" along which patent quality can be said to rise and fall. Identifying these dimensions is the necessary first step in a process that ultimately aims to shift the focus of reform efforts from the limited goal of increasing the number of legally valid patents toward the more relevant goal of increasing the number of good-quality patents.

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INTRODUCTION

Depending on whom you ask, the state of U.S. patent quality is either dismal or decent, in decline or on the upswing, in need of intervention or best left alone.

On one side of the debate are those who believe that the universe of U.S. patents is populated by an unacceptably high and perhaps growing number of low-quality—or “bad”—patents.¹ Generally speaking, bad patents are

1. Ronald J. Mann & Marian Underweiser, *A New Look at Patent Quality: Relating Patent Prosecution to Validity*, 9 J. EMPIRICAL LEGAL STUD. 1, 1 (2012) (“No respected observer would deny the significance of the difficulties facing the patent system or that the central problem is the decline in the quality of patents.” (citation omitted)); R. Polk Wagner, *Understanding Patent Quality Mechanisms*, 157 U. PA. L. REV. 2135, 2144 (2009) (noting that “most academics likely believe that patent quality could (and should) be higher” and that those less familiar with the patent system are convinced that the pervasiveness of low-quality patents is a serious problem).

bad because they carve out of the public domain and deter others from practicing inventions that are in some way undeserving of patent protection. In addition, some bad patents are bad because they cause those working in related fields to unnecessarily restrict their operations or engage in expensive licensing transactions or lawsuits to protect themselves. A less tangible but equally worrisome consequence of bad patents is that they undermine the integrity of the patent system, including the institutions and professionals that sustain it.

Although the patent community has long been concerned with the dissemination of bad patents,² in the past several decades, activity around a so-called “quality crisis” has intensified.³ The legal academy, practitioners, and industry members have loudly complained about the quality of U.S. patents,⁴ and even those less familiar with the patent system appear convinced that low patent quality is a serious problem.⁵ Responding to these concerns, in the past decade, the U.S. Patent and Trademark Office (PTO) has identified patent quality as a pressing institutional issue and has launched a number of initiatives intended to improve it.⁶ And most

2. See, e.g., 1 ANN. REP. COMMISSIONER PATENTS 9 (1869) [hereinafter 1869 REPORT] (expressing concern with the seeming proliferation of patent practitioners who were “more solicitous about the number [of patents] than the quality of those which they obtain”); 1 ANN. REP. COMMISSIONER PATENTS 4 (1868) [hereinafter 1868 REPORT] (“I apprehend that much of [the] apparent [increase in patents] has arisen from the allowance of patents that never should have been granted.”).

3. See, e.g., Jay P. Kesan & Andres A. Gallo, *Why “Bad” Patents Survive in the Market and How Should We Change?—The Private and Social Costs of Patents*, 55 EMORY L.J. 61, 63 & n.2 (2006) (collecting articles criticizing the U.S. Patent and Trademark Office for issuing “so-called ‘bad’ or improvidently granted patents”); Beth Simone Noveck, “Peer to Patent”: *Collective Intelligence, Open Review, and Patent Reform*, 20 HARV. J.L. & TECH. 123, 123 (2006) (“There is a crisis of patent quality.”); John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. ILL. L. REV. 305, 321 (“The patent quality crisis is worthy of our attention.”); Aaron Homer, Comment, *Whatever It Is . . . You Can Get It on eBay . . . Unless You Want an Injunction—How the Supreme Court and Patent Reform Are Shifting Licensing Negotiations from the Conference Room to the Courtroom*, 49 S. TEX. L. REV. 235, 275 (2007) (“The assertion that the PTO is overwhelmed, under-funded, and issuing too many low quality patents has universal acceptance.”).

4. See *supra* notes 1, 3; see also Chris Mercer, Panel Contribution, in Sara-Jayne Adams, *Quality Is the Key to a Bright Patent Future*, INTELL. ASSET MGMT., Apr./May 2008, at 55, 63–64 (“[T]he quality of patents issued by the USPTO has declined”); Manny W. Schecter & Marian Underweiser, Panel Contribution, in Adams, *supra*, at 55, 65 (“IBM believes that patent quality has suffered in recent years”).

5. James Gleick, *Patently Absurd*, N.Y. TIMES, Mar. 12, 2000, § 6 (Magazine), at 44; Editorial, *Patently Absurd*, WALL ST. J., Mar. 1, 2006, at A14; Kevin Drum, *Chart of the Day: Patent Quality Declining*, MOTHER JONES (Sept. 21, 2011), <http://www.motherjones.com/kevin-drum/2011/09/chart-day-patent-quality-declining> (asserting that, on average, the quality of U.S. patents has become “noticeably worse over the past decade”); accord Wagner, *supra* note 1, at 2144 (“[A]s the patent system grows in importance—by both increasing in size and in visibility to the modern knowledge economy—the importance of this public perception will increase.”).

6. See, e.g., U.S. PATENT & TRADEMARK OFFICE, THE 21ST CENTURY STRATEGIC PLAN 5 (2003), available at http://www.uspto.gov/web/offices/com/strat21/stratplan_03feb2003.pdf (stating that patent quality is the PTO’s “highest priority” and is therefore emphasized in every component of its strategic plan); U.S. PATENT & TRADEMARK OFFICE, 2010–2015 STRATEGIC PLAN (2010), available at <http://www.uspto.gov/about/stratplan/>

recently, Congress passed the most sweeping patent legislation in at least half a century⁷ based in part on the promise that it will improve patent quality.⁸

Yet there is a vocal minority that rejects this pessimistic account. Largely relying on PTO data, this group contends that patent quality has stayed the same or even has improved in recent years.⁹ Finally, there is a third faction that agrees that the number of bad U.S. patents is excessive, but does not find this state of affairs particularly troubling given the low percentage of patents that are ever litigated or licensed.¹⁰

Notably absent from the ongoing debate about the quality of U.S. patents is much thoughtful discussion about what constitutes a patent's quality in the first place. What features of a patent make it "good" in quality, what features make it "bad" in quality, and whose opinion matters? Surprisingly, scholars and policymakers have shown little interest in these questions.

USPTO_2010-2015_Strategic_Plan.pdf (stating that a critical priority of the PTO is to improve the quality of issued patents); Notice of Roundtables and Request for Comments on Enhancement in the Quality of Patents and on United States Patent and Trademark Office Patent Quality Metrics, 75 Fed. Reg. 22,120 (Apr. 27, 2010) (announcing that the PTO will conduct two roundtables to obtain public input on patent quality improvement and measurement).

7. This legislation is the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011).

8. See 155 CONG. REC. S2,706 (daily ed. Mar. 3, 2009) (statement of Sen. Leahy) (asserting that the bill that would eventually become the Leahy-Smith America Invents Act would improve patent quality); David Kappos, *Using a Data-Driven Approach for Quality Improvements*, USPTO.GOV (Jan. 22, 2013), http://www.uspto.gov/blog/director/entry/using_a_data_driven_approach ("Improving patent quality was a key element in building bipartisan support for the America Invents Act . . .").

9. See, e.g., Brief for the Bos. Patent Law Ass'n As Amicus Curiae in Support of Genentech, Inc., on the Merits at 2-6, *MedImmune, Inc. v. Genentech Inc., et al.*, 549 U.S. 118 (2007) (No. 05-608), 2006 WL 2126862, at *2-6 (arguing that "there is no plague of bad patents" and that the PTO has become better at rigorously examining patent applications, resulting in improvements in the quality of issued patents); Jonathan Barney, Panel Contribution, in Adams, *supra* note 4, at 55 (opining that U.S. patent quality "is as high, if not higher, now than it was five years ago"); Patrick Doody, *The Patent System Is Not Broken*, INTELL. PROP. & TECH. L.J., Dec. 2006, at 10, 15 (discrediting claims that patent quality has decreased in recent years and asserting that the available evidence shows that patent quality "has stayed about the same, or actually increased, over the past 20 years"); Jon Dudas, Panel Contribution, in Adams, *supra* note 4, at 57 (asserting that the PTO's "objective measurements tells us that patents today are of higher quality than they were 10 or even five years ago"); James E. Malackowski & Jonathan A. Barney, *What Is Patent Quality? A Merchant Banc's Perspective*, 43 LES NOUVELLES 123, 125-27 (2008) (asserting that some of the statistical evidence the authors analyzed suggests that patent examination quality, and therefore patent quality, has either remained steady or has even improved over the past five years); Susan Walmsley Graf, Comment, *Improving Patent Quality Through Identification of Relevant Prior Art: Approaches To Increase Information Flow to the Patent Office*, 11 LEWIS & CLARK L. REV. 495, 500-01 (2000) (citing the PTO's internal quality assessment audits and data collected by the University of Houston Law Center on patent invalidity decisions as indicators that "patent quality may be increasing slightly").

10. See, e.g., Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1497 (2001) (claiming that because so few patents are ever asserted, it makes more economic sense for society to make detailed validity determinations in those few cases than to invest additional resources examining patents that will never be asserted).

The absence of work in this definitional space may mean one of three things. First, it may reflect that there already exists a consensus on patent quality's meaning. Admittedly, few seem to dispute that a good patent at least satisfies the legal standards of patentability. That is, a good patent, at a minimum, describes a new, useful, and nonobvious invention covering eligible subject matter in such full and definite terms that others can understand how to make and use it.¹¹ But a review of the literature reveals considerable diversity of opinions as to whether something more than legal validity is required for a patent to qualify as a good-quality one.¹² Far from there being a consensus on patent quality's meaning, the matter is controversial.¹³

Alternatively, the modest attention paid to patent quality's meaning may reflect an understanding that the choice of definition has no real-world significance. No one has yet established that the definitional choice is inconsequential, however, and so that seems a weak basis for declining to study it. In any event, the assumption is wrong; the choice of definition, in fact, has important normative implications. For one, it provides the basis for determining what "counts" as a good or bad patent. By establishing a metric for quality, the definition makes it possible to determine the extent of any so-called quality crisis and the effectiveness of policies aimed at containing it.¹⁴ It also provides a criterion for evaluating the hundreds of policies that have been proposed to improve the functioning of the patent system. If a proposed policy is sure to reduce patent quality, it should be rejected unless it is expected to produce substantial offsetting benefits. And a policy whose principal purpose is to enhance patent quality should be rejected if it is unlikely to actually achieve that purpose.

Third, the lack of interest in patent quality's meaning may reflect an assumption that developing a common definition of patent quality is an impossible task. If there ultimately is no "best" definitional choice, the analysis may not be worth the effort. Again, however, the analysis has not yet been performed and so concluding that it would be futile is premature. In any event, as described below, there are some elements of the definition on which consensus possibly can be achieved.¹⁵

The broad aim of this Article is to draw attention to the definition of patent quality as an important subject of scholarly inquiry. Its more specific aim is to call for a return to first principles and begin the process of

11. 35 U.S.C. §§ 101–103, 112(a)–(b) (2012).

12. See *infra* notes 27–35 and accompanying text.

13. See, e.g., Adams, *supra* note 4, at 55 ("Patent quality is an elusive term that seems to mean different things to different people."); Dennis Crouch, *What Can Patent Applicants Do To Improve Patent Quality?*, PATENTLYO (Jan. 15, 2013), <http://www.patentlyo.com/patent/2013/01/what-can-patent-applicants-do-to-improve-patent-quality.html> ("Patent 'quality' has many different meanings.")

14. Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051, 2067 (2007) ("[T]he extent of the problem [of patent quality], and its impact, is not well understood.")

15. Cf. *Frequently Asked Questions*, PAT. QUALITY INDEX, <https://www.law.upenn.edu/blogs/polk/pqi/faq.html> (last visited Apr. 26, 2014) (asserting that patent quality is not so subjective that it cannot meaningfully be quantified).

operationalizing the meaning of patent quality. In so doing, it hopes to bring clarity and give direction to the patent quality agenda.

Part I considers the preliminary question of whether examining the meaning of patent quality is a worthwhile endeavor. Concluding that it is, Part II looks to the business discipline of quality management for analytical guidance. Quality management studies the evaluation, measurement, and strategic improvement of the quality of business products and processes.¹⁶ Its scholars have described a multistep approach to constructing a meaningful definition of quality to support firms' strategic quality programs.¹⁷ This approach is based on identifying the quality "dimensions" that emerge from a consideration of the needs and preferences of stakeholders.

Part III applies this approach to the question of patent quality. In particular, it describes a formula for understanding patent quality. The next two sections identify the most important variable in that formula: the quality dimensions. First, Part IV describes the basic needs and preferences of four major stakeholders in patent quality. These stakeholders are the PTO, the courts, patentees, and the public.

Part V then describes five dimensions of quality that emerge from the stakeholder analysis. These dimensions are: (1) a patent's probable validity; (2) clarity of the patent; (3) faithfulness of the patent to the scope of the invention; (4) social utility of the patented invention; and (5) commercial success of the patented invention. The first three dimensions describe the patent document; the last two dimensions describe the patented invention. Although a patent is a distinct "thing" from its underlying invention, it may be impossible as a practical matter to separate the two for purposes of understanding patent quality because the patent is intended to "capture" the invention. This Article therefore embraces an expansive understanding of patent quality that takes into account attributes of both patents and the inventions they describe.

Part VI summarizes the implications of this work. Broadly, it demonstrates that the meaning of patent quality is far richer than most in the patent community recognize. Going forward, commentators and policymakers are urged to be more thoughtful—as well as transparent—about their definitional choices. This work also provides a common vocabulary to use during patent quality conversations that will help make those conversations more productive.

More specifically, this work calls on commentators and policymakers to adopt a fundamentally different approach to patent quality's meaning that is essentially the inverse of the conventional way of thinking about the concept. The conventional approach defines a good-quality patent as one that at a minimum satisfies the existing legal standards of patentability. The new approach puts "first things first" and asks what it means for a patent to be good quality without regard to the existing legal standards. It then calls

16. *See infra* note 56.

17. *See infra* Part II.B.

for a recalibration of the standards (among other things) to reflect the meaning of good patent quality that emerges from that analysis. Ultimately, following the new approach shifts the focus of reform efforts from the limited goal of increasing the number of legally valid patents toward the more relevant goal of increasing the number of good-quality patents.

I. WHY DEFINE PATENT QUALITY?

At the outset, it is important to resolve whether developing a meaning and theory of patent quality is a worthwhile endeavor. It may be that dissonance and ambiguity as to patent quality's definition is an unobjectionable condition—or even that it is the preferred one.¹⁸

This Part concludes that it is neither, given the placement of quality-improvement efforts at the top of the patent reform agenda. Surely, where an issue has achieved a place of such political prominence, it is fair, even advisable, to probe the basis for identifying the issue as a problem in the first place. Moreover, it is difficult to have productive conversations about patent quality when so many participating in the conversation do not define what they mean by that concept or, when they do, adopt vague or conflicting meanings. For at least these reasons, the meaning of patent quality merits a close look.

A. *Opinions on the Meaning of Patent Quality Are Diverse, Underdeveloped, and Ambiguous*

Although patent quality has been identified as a problem in the United States since the early years of the Patent Office,¹⁹ the meaning of the concept has so far escaped serious scrutiny. Since that time, many of those who have written on the state of patent quality have done so without explicitly defining the concept.²⁰ Instead, those commentators either have taken the meaning of the concept as a given—that is, they have assumed that the audience shares their understanding of the concept—or they have left it to the audience to discern their intended meaning from context. When that meaning can be discerned, commentators have rarely attempted to justify it.²¹ The assumption seems to be that no justification is necessary because the meaning of the concept is uncontroversial.

18. Cf. Gerald F. Smith, *The Meaning of Quality*, 4 TOTAL QUALITY MGMT. 235, 235 (1993) (“Academics often over-state the importance of defining one’s terms.”).

19. See *supra* note 2 and accompanying text.

20. See, e.g., Scott R. Boalick, *Patent Quality and the Dedication Rule*, 11 J. INTELL. PROP. L. 215, 267, 269 (2004) (referring to patent quality at various points in terms of certainty, validity, and breadth without explicitly defining it); David J. Kappos & Stuart Graham, *The Case for Standard Measures of Patent Quality*, MIT SLOAN MGMT. REV., Mar. 20, 2012, at 19, 19 (advocating for standard measures of patent quality without defining the concept).

21. See, e.g., James F. McDonough III, Comment, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189, 202 (2006) (defining, without further explanation, “quality patents” as “patents with well-defined property rights that are neither overinclusive nor underinclusive”).

If that were true, one would expect commentators to recite or suggest only one definition. An examination of the literature, however, reveals considerable definitional variability.²² To be sure, there seems to be a consensus that a good-quality patent is at least one that satisfies all of the statutory conditions of patentability. It is the duty of PTO examiners to evaluate whether a patent application complies with these conditions, and in deference to that evaluation, all issued patents are presumed valid.²³ The presumption can be overcome by a showing of clear and convincing evidence,²⁴ however, and those who challenge validity are in fact frequently successful.²⁵ Because invalid patents, by definition, never should have issued, there is a shared understanding that a good-quality patent is at least a legally valid one.²⁶ Implicit in that understanding, though, is the assumption that the validity standards have been—and even can be—calibrated and consistently applied to reflect good patent quality in the first place.

While there is general agreement that validity is relevant to quality, scholars, industry members, the PTO, and the public disagree on whether validity is the exclusive standard by which to judge patent quality. Many members of the patent community believe that it is.²⁷ But more than a few

22. Some of these definitions are summarized in DAN PRUD'HOMME, DULLING THE CUTTING-EDGE: HOW PATENT-RELATED POLICIES AND PRACTICES HAMPER INNOVATION IN CHINA 22–24 (2012), available at http://mpr.ub.uni-muenchen.de/47617/1/MPRA_paper_43299.pdf.

23. See 35 U.S.C. § 282(a) (2012).

24. See *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S. Ct. 2238, 2242–43 (2011) (affirming that a challenger must prove invalidity by clear and convincing evidence).

25. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 205 (1998) (finding an invalidity rate of 46 percent for written, final validity decisions by the federal district courts and the Federal Circuit from 1989 to 1996); Mann & Underweiser, *supra* note 1, at 8 (finding an invalidity rate of 60 percent for Federal Circuit decisions from 2003 to 2009, excluding cases in which validity decisions were vacated and remanded); Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 390 (2000) (finding an invalidity rate of 33 percent for combined judge and jury decisions for patent cases that went to trial between 1983 and 1999).

26. Nevertheless, the legal standards are not always equally emphasized when patent quality is being assessed. For example, those who believe software patents are “bad” are concerned that such patents protect algorithms that fall outside the scope of protected subject matter defined in 35 U.S.C. § 101 or are so ambiguous that, in violation of 35 U.S.C. § 112, it is impossible to understand the contours of the invention. See, e.g., Dennis Crouch, *Making Software Patents Transparent and Understandable: Begin by Determining Whether Software Is Patentable*, PATENTLYO (Oct. 9, 2012), <http://www.patentlyo.com/patent/2012/10/making-software-patents-transparent-and-understandable-begin-by-determining-whether-software-is-patentable.html>. By contrast, those who denounce patents on things like the crustless peanut butter and jelly sandwich are usually complaining that these inventions are either not new or are obvious in violation of 35 U.S.C. § 102 or § 103. See Mark Lemley et al., *What To Do About Bad Patents?*, REGULATION, Winter 2005–2006, at 10.

27. See, e.g., Christopher A. Cotropia, *Modernizing Patent Law's Inequitable Conduct Doctrine*, 24 BERKELEY TECH. L.J. 723, 748 (2009) (stating that patents that meet the validity requirements “are considered to be of good quality”); Ben McEnery, *Physicality and the Information Age: A Normative Perspective on the Patent Eligibility of Non-physical Methods*, 10 CHI.-KENT J. INTELL. PROP. 106, 150 (2010) (defining “[a] quality patent [as] one likely to meet the requirements of novelty, inventiveness and sufficiency of

appear to embrace a more complex view according to which a good-quality patent must possess additional characteristics. For example, some commentators view the concept of value as relevant to patent quality, while others are adamant that it is not.²⁸ Other commentators use value as a proxy for quality²⁹ or even use the terms interchangeably.³⁰

For the most part, the PTO has adopted a definition of patent quality that equates it with patent validity. The agency's quality metrics, for example, are focused on identifying issued patents that, upon further review, are invalid, as well as applications that bear markers of invalidity.³¹ Yet elsewhere the PTO has suggested that it has a higher standard for quality. For example, the PTO recently proposed rules—the stated purpose of which is to improve patent quality—that would require patent applicants to use standardized claim templates, provide glossaries of terms, and designate default dictionaries.³² Notably, each of these rules promotes clarity of claim terms well beyond what is required for a patent to be valid.

The range of opinions on the question of patent quality is on full display in a 2008 article in the professional journal *Intellectual Asset Management* that asked nineteen patent professionals around the world to define patent

specification, and thus not likely to be found invalid if challenged"); Lee Petherbridge, *Positive Examination*, 46 IDEA 173, 175 (2006) (defining "[q]uestionable, or low quality, patents" as those that fail to meet the standards for patentability); John R. Thomas, *The Responsibility of the Rulemaker: Comparative Approaches to Patent Administration Reform*, 17 BERKELEY TECH. L.J. 727, 730 (2002) ("Quality patents are, in short, valid patents.").

28. These opposing views are represented by Sivaramjani Thambisetty, who defines quality in terms of a patent's technological significance and commercial importance, Sivaramjani Thambisetty, *Patents As Credence Goods*, 27 OXFORD J. LEGAL STUD. 707, 709–10 (2007), and Polk Wagner, who writes that a patent's quality is distinct from and should not be confused with its value, Wagner, *supra* note 1, at 2138–39.

29. See, e.g., John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 997 (2003) (explaining that "patent quality and value are interwoven in inextricable ways" such that "value can probably be characterized as quality plus other factors").

30. See, e.g., *Patent Quality Improvement: Hearing Before the H. Subcomm. on Courts, the Internet & Intellectual Prop. of the H. Comm. on the Judiciary*, 108th Cong. 2 (2003) (statement of Rep. Howard Berman) ("The quality of a patent is synonymous with the value of that patent . . ."); Mark Liang, *Chinese Patent Quality: Running the Numbers and Possible Remedies*, 11 J. MARSHALL REV. INTELL. PROP. L. 478, 491 (2012) (referring to the quantification of patent quality in terms of "assessing the objective 'value' of a patent"); Malackowski & Barney, *supra* note 9, at 129 ("[P]atent quality from a merchant banc's perspective is . . . synonymous with value.").

31. U.S. PATENT & TRADEMARK OFFICE, ADOPTION OF METRICS FOR THE ENHANCEMENT OF PATENT QUALITY FISCAL YEAR 2011 (2010), available at http://www.uspto.gov/patents/init_events/qual_comp_metric.pdf. The first two metrics involve subjective determinations of individual applications and patents based on "clear error" as to the patent's validity; the third and fourth metrics involve subjective determinations of individual applications based on compliance with best practices; the fifth metric is a global, statistical representation of quality-related events in the prosecution of patent applications; and the sixth and seventh metrics measure subjective perceptions of examination quality. *Id.* at 4–14.

32. Request for Comments on Preparation of Patent Applications, 78 Fed. Reg. 2960 (Jan. 15, 2013).

quality. Some respondents equated quality solely with validity,³³ while others noted a place in the quality calculus for additional attributes.³⁴ For example, one respondent defined patent quality to “cover an invention that is meaningful; creates commercial advantage; has well-written claims, maximising the coverage; and has been filed and prosecuted correctly.”³⁵

The job of sorting out these diverse opinions is complicated by the fact that they typically are expressed in a conclusory fashion. One sentence, or a few, is all the textual space that typically is devoted to the definition.³⁶ Further, the attributes identified as relevant sometimes lend themselves to multiple interpretations, none of which is specified. For example, those who suggest that value is relevant to patent quality do not always specify whether they are referring to the value of the patent or the value of the invention it describes.³⁷ Yet these two values are distinct.³⁸

Adding yet another layer of ambiguity is the fact that one may have high quality standards for the patents that she owns but relatively low quality standards for patents owned by others, or vice versa. Those who offer definitions of patent quality do not often clarify the populations that are the intended definitional targets.³⁹ And it otherwise can be difficult to determine from context whether a proposed definition of patent quality is personal to the author and her business interests or is intended for broader application.

B. Clarity and Consensus on the Meaning of Patent Quality Promotes Sound Policymaking

The coarseness, ambiguity, and diversity of opinions on patent quality’s meaning create several challenges for policymakers. First, it is difficult to determine whether there exists a quality problem in need of remediation when those participating in the conversation understand patent quality to mean different things and do not use a common language to communicate their views. Again, this point is well illustrated in the 2008 article featuring

33. See, e.g., Schechter & Underweiser, *supra* note 4, at 65 (“Patent quality refers to how well a patent meets the legal criteria for patentability.”).

34. See, e.g., Lars Kellberg & Reza Green, Panel Contribution, *in* Adams, *supra* note 4, at 61 (“[A] quality patent is one that has claims of broad enough scope to provide a useful swath of exclusivity to the patent holder . . .”).

35. Stephen Potter, Panel Contribution, *in* Adams, *supra* note 4, at 64.

36. For example, a scholarly article devoted to identifying mechanisms that impact patent quality discusses the question of its meaning in six sentences. See Wagner, *supra* note 1, at 2138–39. Two of the six sentences set forth a positive definition; the remaining four sentences state that patent value is irrelevant to quality. *Id.* An exception to the summary nature of most definitions can be found in Graf, *supra* note 9, at 499–500 (describing three basic approaches to the definitional question that focus on validity, certainty, and value).

37. See, e.g., Potter, *supra* note 35, at 64 (defining a quality patent in terms of whether it “creates commercial advantage” without identifying whether that advantage is a result of the legal rights that attach to the patent, the patented invention, or both).

38. See *infra* Parts IV.C, V.D–E.

39. For instance, most of the patent professionals who contributed to the 2008 article in *Intellectual Asset Magazine* did not identify their intended definitional targets. See Adams, *supra* note 4.

the opinions of nineteen prominent patent professionals. Some respondents asserted that U.S. patent quality has declined in recent years, while others asserted that it has improved or stayed the same.⁴⁰

As that article suggests, some persons define bad quality narrowly so that the universe of bad-quality patents is much smaller than, and therefore not as troubling as, the universe of bad-quality patents constructed by those who define bad quality more expansively. The former group is less likely to view patent quality as an issue that merits intervention. The latter group may agree that intervention is warranted, but its members will likely have different ideas about the best way to proceed. Because they disagree on what quality means, they disagree on which policies should be developed and implemented for the purpose of improving quality. They also disagree on how to measure whether those policies, once implemented, are working and so should be continued or are failing and so should be canceled.

At bottom, the controversy surrounding the meaning of patent quality is a species of what is known as problem definition. Policy scholars describe problem definition as “the *strategic* representation of situations”; in essence, how the problem is defined dictates the extent of the problem and its solution.⁴¹ Many legal reforms have been shaped by strategic problem definition, including those related to punitive damages and class action suits.⁴² Patent law is also no stranger to issues of problem definition. Most recently, the debate over the problem of so-called patent “trolls” has turned in part on the definition of a troll, with expansive definitions suggesting that trolls do more social and economic harm than they do when more narrowly defined.⁴³

Whether the problem is patent trolls or patent quality, it is inefficient to spend resources developing and implementing solutions to a problem without clarity on what exactly is the problem. It is also less likely that the

40. Compare Mercer, *supra* note 4, at 63–64 (noting that quality has declined), and Schecter & Underweiser, *supra* note 4, at 65 (same), with Dudas, *supra* note 9 (stating that quality has improved), and Kellberg & Green, *supra* note 34 (noting that quality is approximately the same).

41. DEBORAH A. STONE, POLICY PARADOX AND POLITICAL REASON 106 (1988).

42. See, e.g., Stephen Daniels & Joanne Martin, *Punitive Damages, Change, and the Politics of Ideas: Defining Public Policy Problems*, 1998 WIS. L. REV. 71, 95 (addressing the politics of the alleged problem defined as the “‘explosion’ of punitive damage awards” (quoting S. 565, *The Product Liability Fairness Act of 1995: Hearing Before the Subcomm. on Consumer Affairs, Foreign Commerce, and Tourism of the S. Comm. on Commerce, Science, and Transp.*, 104th Cong. 415 (1995) (statement of Theodore B. Olson, attorney))); Nan S. Ellis, *The Class Action Fairness Act of 2005: The Story Behind the Statute*, 35 J. LEGIS. 76 (2009) (considering the impact of problem definition on the enactment of the Class Action Fairness Act of 2005).

43. See David L. Schwartz & Jay P. Kesan, *Analyzing the Role of Non-practicing Entities in the Patent System*, 99 CORNELL L. REV. 425, 440–41 (2014) (criticizing a study by James Bessen and Michael Meurer placing the direct costs of patent trolls—also known as nonpracticing entities (NPEs)—at \$29 billion on grounds that the study’s definition of an NPE is overbroad, noting that “[o]bviously, narrowing the definition of non-practicing entity would lower Bessen & Meurer’s \$29 billion figure”). See also generally John M. Golden, “Patent Trolls” and Patent Remedies, 85 TEX. L. REV. 2111, 2112 n.7 (2007) (“[A] widely accepted definition of a patent troll has yet to be devised.”).

solutions that are implemented will be effective. Today, there are hundreds of policy proposals on the patent reform table. Collectively, these proposals seek to change the legal rules, administrative procedures, institutional responsibilities, regulatory mechanisms, and behavioral norms that operate at virtually every level of the patent system. Individually, these proposals include:

- changes to the legal standards of patentability and their interpretation;⁴⁴
- changes to the examining capacity of the PTO and the competence standards of its examiners;⁴⁵
- changes to the procedures according to which applicants submit and the PTO evaluates patent applications;⁴⁶
- changes to the procedures according to which patents are challenged and enforced;⁴⁷
- changes to the regulations governing those who draft (or “prosecute”) patents;⁴⁸ and
- changes to the incentives that affect the behavior of patentees.⁴⁹

Each of these proposals is directed at improving the operation of the U.S. patent system, and many of them are directed at doing so, specifically and primarily, by improving patent quality. But there are insufficient resources

44. See, e.g., Tun-Jen Chiang, *A Cost-Benefit Approach to Patent Obviousness*, 82 ST. JOHN'S L. REV. 39, 64–72 (2008) (proposing a redefinition of the obviousness standard using economic principles).

45. See, e.g., Robert P. Merges, *As Many As Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent Reform*, 14 BERKELEY TECH. L.J. 577, 606–09 (1999) (arguing that the PTO should raise the salaries of senior examiners to induce them to stay and increase the training of junior examiners).

46. See, e.g., Request for Comments on Preparation of Patent Applications, 78 Fed. Reg. 2960 (Jan. 15, 2013) (seeking public comment on practices by patent applicants that will potentially improve patent quality, such as use of a standardized template for each claim and designation of a default dictionary); Jay P. Kesan, *Carrots and Sticks To Create a Better Patent System*, 17 BERKELEY TECH. L.J. 763, 784–86 (2002) (calling for mandatory technical methods of disclosure for software patents); Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 61–63 (2007) (arguing that the PTO should provide patentees the option to “gold-plate” their patents by subjecting them to a more vigorous examination at the PTO).

47. See, e.g., Kesan, *supra* note 46, at 776–83 (arguing for establishing a new preissuance opposition proceeding before the PTO); Lichtman & Lemley, *supra* note 46, at 59–61 (arguing that the presumption of validity that attaches to issued patents should be weakened).

48. See, e.g., Ralph D. Clifford, Thomas G. Field, Jr. & Jon R. Cavicchi, *A Statistical Analysis of the Patent Bar: Where Are the Software-Savvy Patent Attorneys?*, 11 N.C. J.L. & TECH. 223 (2010) (arguing that entry requirements to the patent bar should be expanded to include more computer scientists); Corey B. Blake, Note, *Ghost of the Past: Does the USPTO's Scientific and Technical Background Requirement Still Make Sense?*, 82 TEX. L. REV. 735, 757–63 (2004) (arguing for the elimination of the technical qualification requirement or, alternatively, the expansion of recognized disciplines).

49. See, e.g., Wagner, *supra* note 1, at 2165–72 (arguing for reforms that would increase applicants' incentives to file high-quality patents and decrease their incentives to file low-quality patents).

to adopt every promising policy that is proposed, and it would be irrational to do so given that each proposal presents a unique cost-benefit profile. In developing a strategy to optimize patent quality, it is necessary to choose among the policies on the reform table. What standards should govern that decision?

There are obviously many factors to consider when deciding whether to adopt or reject a particular reform, including its economic, political, and practical feasibility. When it comes to policies affecting the patent system, an additional factor that should be considered is impact on patent quality. That is because good patents are almost universally considered to be a crucial output of a properly functioning patent system.⁵⁰ And rightly or wrongly, there is widespread concern that the universe of U.S. patents includes an unacceptable number of bad patents.⁵¹ As summarized by one scholar, “There is perhaps no patent issue with a higher profile than patent quality.”⁵²

A proposed policy that is intended to improve the functioning of the patent system therefore should be rejected if it is sure to reduce patent quality, unless it provides substantial offsetting benefits. And a proposed policy whose principal purpose is to enhance patent quality should be rejected if it is unlikely to actually achieve that purpose. Where a policy satisfies these standards, then the decision whether to adopt or reject it should be determined in reference to other criteria.

Finally, the meaning of patent quality dictates how to evaluate the effectiveness of policies after their implementation. There is a maxim of business management that says, “[I]f you can’t measure it, you can’t manage it,” and so it is with quality.⁵³ If the number of bad patents is found to increase rather than decrease after a specific policy is implemented, this is an important fact to know in deciding whether to continue or cancel the reform. But the metric cannot be used without agreement at the outset as to what constitutes a bad patent.⁵⁴ In other words, we cannot count the number of good and bad patents until we know *what* counts as a good or bad patent. Moreover, that calculation will not accurately reflect a policy’s

50. See, e.g., Press Release, U.S. Patent & Trademark Office, USPTO Issues Examination Guidelines To Better Define the Scope of Patent Protection and Thereby Improve Patent Quality, Release 11-11 (Feb. 9, 2011), available at http://www.uspto.gov/news/pr/2011/11_11a.jsp (“Patent quality is essential to the proper functioning of the patent system.”).

51. See *supra* notes 1, 3–8 and accompanying text.

52. Wagner, *supra* note 1, at 2172; see also Adams, *supra* note 4, at 55 (“Ask anyone in the world of patents to name their top three issues and you can be sure that the importance of quality will be mentioned.”); Interview with Howard Shelanski, Director, FTC Bureau of Economics, ANTITRUST SOURCE, Dec. 2012, at 7 (answering, “Well, I think that anything that could improve patent quality is extremely important,” when asked whether any recent patent law changes were of particular interest to the FTC).

53. David A. Garvin, *Building a Learning Organization*, in HARVARD BUSINESS REVIEW ON KNOWLEDGE MANAGEMENT 70 (1998).

54. Cf. Carol A. Reeves & David A. Bednar, *Defining Quality: Alternatives and Implications*, 19 ACAD. MGMT. REV. 419, 419, 436–39 (1994) (explaining that difficulties defining quality in the business context had led to inconsistent and contradictory empirical results regarding the relationships between quality and market share, costs, and profits).

performance if there is a mismatch between the definition that is the basis for the metric and the definition that is the basis for the policy.

II. THE CONCEPTUAL FRAMEWORK: PRODUCT QUALITY

The concept of patent quality has a long history of loose interpretation lacking analytical rigor. If the meaning of that concept is to give useful direction to policymakers, a more systematic approach to understanding it is needed. The question this Article now turns to is: what should that approach look like?

For help with this question, I looked to the literature of quality management. Having emerged as a business discipline in its own right over the past sixty years,⁵⁵ quality management focuses on evaluating, measuring, and thinking strategically about the quality of products and services provided by firms.⁵⁶

Over time, many have attempted to define what quality means in the business world. The result has been a proliferation of definitions, none of which has proven fully satisfactory.⁵⁷ In the mid-1980s, however, management scholars began working to identify common themes in these competing definitions.⁵⁸ In the process, they developed a general approach to understanding quality's meaning in a commercial context that is widely cited in the management literature today.⁵⁹

The work of management scholars in this definitional space provides a helpful roadmap to those interested in defining patent quality. For one, their scholarship is mature, representing over thirty years of analysis—more if the presynthesis literature is included.⁶⁰ Given that management scholars have sought to answer the same conceptual question as the one addressed here, it makes sense to consult their work.⁶¹ Indeed, it would seem unwise *not* to do so. Accordingly, although the definitional approach described by management scholars is not the only methodology that can or perhaps even

55. See generally Kevin Dooley, *The Paradigms of Quality: Evolution and Revolution in the History of the Discipline*, 5 ADVANCES MGMT. ORG. QUALITY 2 (2000) (describing the history of quality management as a discipline).

56. S. THOMAS FOSTER, *MANAGING QUALITY: INTEGRATING THE SUPPLY CHAIN* 17–18 (5th ed. 2013).

57. David A. Garvin, *What Does "Product Quality" Really Mean?*, MIT SLOAN MGMT. REV., Fall 1984, at 25, 26; accord Reeves & Bednar, *supra* note 54, at 436–39 (describing the strengths and weaknesses of various proposed definitions).

58. See, e.g., Garvin, *supra* note 57, at 26–28; Reeves & Bednar, *supra* note 54, at 435–36.

59. See, e.g., JAMES R. EVANS & WILLIAM M. LINDSAY, *MANAGING FOR QUALITY AND PERFORMANCE EXCELLENCE* 44 n.6 (9th ed. 2012) (citing the definitional work of Garvin and another management scholar, Gerald Smith); FOSTER, *supra* note 56, at 3–5, 39–40 (describing the definitional work of management scholars David Garvin and Genichi Taguchi).

60. See generally Dooley, *supra* note 55.

61. Cf. Kenneth G. Dau-Schmidt, *Economics and Sociology: The Prospects for an Interdisciplinary Discourse on Law*, 1997 WIS. L. REV. 389, 405 (“[I]t is generally easier for scholars to make connections between their work and the work in other disciplines if the practitioners of the other disciplines are attempting to address the same substantive problems.”).

should be applied to the question of patent quality's meaning, it is a sound place to begin the analysis.

A. Conceptual Quality

That analysis begins with the understanding that quality is fundamentally a concept.⁶² Concepts can be distinguished according to their linguistic category, and the concept of quality falls under the category of a property attribute.⁶³ That is, quality refers to a characteristic of some object or entity, such as a thing, a state, or a process.⁶⁴

While some property attributes like weight and color are directly measurable, quality is not.⁶⁵ That is because quality is not a physical feature of a thing.⁶⁶ Rather, it is an abstract feature.⁶⁷ Assessing the quality of some thing may involve measuring its attributes—or “dimensions”—but those measurements serve only as a proxy for the thing's quality.⁶⁸

Particular attributes of a thing can be better or worse proxies for its quality. The measurements of those attributes therefore reflect the thing's quality only to the extent that the attributes are good proxies for quality. If they are bad proxies, their measurements are useless. This point underscores the need to take great care in identifying the quality dimensions that serve as the basis for judging a thing's quality.

Another important feature of conceptual quality is its indication of the relationship between a thing's quality dimensions and an evaluative standard or criterion. The standard may be an objective one reflecting the ideal prototype that people generally conceive for the thing.⁶⁹ Or the standard may be a subjective one based on the interests, needs, preferences, or values of individuals or groups who use or otherwise have an interest in the thing.⁷⁰

B. Product Quality

These two aspects of conceptual quality are captured in the following definition of commercial quality that appears in the management literature: “Quality is the goodness or excellence of any product, process, structure or other thing that an organization consists of or creates. It is assessed against accepted standards of merit for such things and against the interests/needs of producers, consumers and other stakeholders.”⁷¹ Although the definition covers both commercial products and processes, patents are more akin to

62. See Smith, *supra* note 18, at 236.

63. *Id.*

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

69. *Id.*

70. *Id.*

71. *Id.* at 241.

things than events and so the remainder of this Article will focus on the more relevant application of the definition to commercial products.

Consistent with the distinction between conceptual quality and quality dimensions, the first part of the definition equating quality with excellence is careful to describe the concept as transcendent in nature rather than by reference to specific characteristics.⁷² The second part clarifies that quality is a function of any objective standards that might exist for a thing and the subjective standards of stakeholders. Of course, it may be impossible to identify any truly objective quality standards for a product beyond what is already obvious, like freedom from defects that prevent the product from performing. That is because people have different needs and preferences with respect to the products they encounter that depend on their relationship to those products. In any event, because objective quality standards are, by definition, universally accepted, those standards necessarily will emerge in an analysis of subjective quality standards.⁷³ An attempt to identify relevant quality standards therefore may be described as a single inquiry into the common and unique standards of stakeholders.

Another way to understand the product-quality definition is to frame it as a three-step process.⁷⁴ First, identify the relevant stakeholders and their common and unique standards for the quality of a product as dictated by their individual interests and needs. Second, identify the dimensions of quality that emerge from the stakeholder analysis. A particular stakeholder's perspective might translate into one quality dimension or many, and the same quality dimension may or may not be preferred by multiple stakeholders. Third, measure the product's merit with respect to each dimension and consolidate those partial scores into a final judgment on quality.

Strategic quality management focuses on the first two steps and attempts to maximize the total quality score across an entire product category at the lowest marginal cost.⁷⁵ For any given product, each quality dimension helps define a minimum universe of desirable features of the product category. But it is not always possible or cost-effective for manufacturers to attempt to optimize quality along every dimension, and certainly not at the same time.⁷⁶

72. *But see* Garvin, *supra* note 57, at 25 (identifying the transcendent meaning of quality as one of several major approaches to the definition rather than, as Smith contends, the one true meaning of quality).

73. *See* David A. Garvin, *Competing on the Eight Dimensions of Quality*, HARV. BUS. REV., Nov.–Dec. 1987, at 101, 104 (explaining that some subjective preferences “are so universal that they have the force of an objective standard”).

74. *See* Smith, *supra* note 18, at 236.

75. *See* Garvin, *supra* note 57, at 33.

76. Garvin, *supra* note 73, at 108. In the 1980s, for example, Steinway & Sons focused on developing a reputation for high-quality, handmade pianos that are distinctive in sound and style, while Yamaha built a reputation for quality based on reliability and conformance to specifications. *See id.* The dimensions on which each company strategically chose to compete (at the expense of other dimensions) are called “quality niches.” *See id.* at 104; *see also* Garvin, *supra* note 57, at 33.

This is where the definitional work becomes especially important. By taking the time to identify a product's dimensions associated with quality, a firm can tailor its operations around exactly—and only—those functions and tasks that will maximize quality along the selected niches. As explained by a leading scholar in this area, firms that wish to compete in quality must “first develop a clear vocabulary with which to discuss quality as a *strategy*.”⁷⁷ It is only after breaking down the concept of quality into manageable parts that firms can develop a competitive plan for quality.⁷⁸

C. Application

Synthesizing the various definitions of product quality that have been offered over the years, management theorists have identified several perspectives on product quality that are associated with essentially three different stakeholder groups: manufacturers, consumers, and the public.

The manufacturing-oriented group is comprised of design engineers and operations managers.⁷⁹ Their perspective on quality is straightforward: a quality product is one that conforms to design and manufacturing specifications.⁸⁰ All products involve specifications for parts and materials, among other things, and these specifications are normally expressed in terms of an allowed range from a target or “center.”⁸¹ A product that deviates beyond this range is, according to the manufacturing-based approach, low in quality.⁸²

This perspective dominated the early modern quality management movement.⁸³ Over time, however, management scholars came to appreciate the limitations of a meaning of quality based solely on a manufacturing perspective. An S-Class Mercedes that conforms to all applicable standards is good quality according to manufacturing stakeholders, but so is—to no less a degree—a fully conforming Chevette.⁸⁴ That these two kinds of cars would receive equal quality ratings reveals a

77. Garvin, *supra* note 73, at 103.

78. *See id.*; cf. Kristie W. Seawright & Scott T. Young, *A Quality Definition Continuum*, 26 INTERFACES 107, 107 (1996) (explaining that effective quality management programs “require consensus or cross-functional goals that must be based on a shared understanding of quality definitions”).

79. *See* Garvin, *supra* note 57, at 27–28.

80. *Id.* at 28.

81. Garvin, *supra* note 73, at 105.

82. *See* Garvin, *supra* note 57, at 31.

83. *See* Reeves & Bednar, *supra* note 54, at 421–22 (explaining the early 1900s “American system of manufacturing” according to which the “key to quality was conformance to specifications”). The “zero-defects” theory of quality developed by Philip Crosby in the 1960s, for example, is consistent with this perspective. *See Zero Defects*, LOCKHEEDMARTIN.COM, <http://www.lockheedmartin.com/us/100years/stories/zero-defects.html> (last visited Apr. 26, 2014) (explaining the success of the “zero defects” program at Lockheed Martin during the 1960s).

84. Garvin, *supra* note 57, at 28.

major shortcoming of the manufacturing approach: a product that is perfectly “in spec” may still fail to satisfy user needs and preferences.⁸⁵

In appreciation of this shortcoming, in the mid-twentieth century, the end user emerged as the most important quality stakeholder in most industries.⁸⁶ The user-based approach to quality defines quality as “fitness for use” according to which higher-quality products are those that best satisfy user needs and preferences.⁸⁷ Of course, there are several problems with this approach, including the difficulty of aggregating idiosyncratic views in order to produce meaningful definitions of quality for designers and marketers.⁸⁸

Most recently, a third stakeholder in product quality has risen to prominence: the public. The social-loss approach to product quality defines it in terms of “the loss a product causes to society after being shipped, other than any losses caused by its intrinsic functions.”⁸⁹ Such losses result from variability in product functions as well as harmful side effects to bystanders, including uncompensated loss to others.⁹⁰ For example, a car that does not start in cold weather is low quality according to this approach because the owner suffers a financial loss in car repairs and the owner’s employer suffers a financial loss in reduced work performed by the tardy employee.⁹¹

The second step of the definitional process is to identify the quality dimensions that emerge from the stakeholder analysis. The manufacturing and user perspectives generate eight basic quality dimensions of commercial products: conformance to specifications; performance features; secondary features; reliability; durability; serviceability; perceived quality; and aesthetics.⁹² The social-loss approach generates two additional quality dimensions: variability in product function and side effects.⁹³ Together, these ten dimensions can be used to define the quality of a product, although they are not necessarily exclusive or mandatory in every case.⁹⁴

The third step is to measure a particular product’s performance along each of the relevant dimensions and to consolidate these partial scores into

85. *See id.*; Laura B. Forker, *Quality: American, Japanese, and Soviet Perspectives*, 5 *ACAD. MGMT. EXEC.* 63, 73 (1991).

86. Reeves & Bednar, *supra* note 54, at 423–27 (“The most pervasive definition of quality currently in use is the extent to which a product or service meets and/or exceeds a customer’s expectations.”).

87. *QUALITY CONTROL HANDBOOK*, at 2.2 (Joseph M. Juran et al. eds., 3d ed. 1974).

88. Garvin, *supra* note 57, at 27.

89. GENICHI TAGUCHI, *INTRODUCTION TO QUALITY ENGINEERING: DESIGNING QUALITY INTO PRODUCTS AND PROCESSES 1* (1986).

90. *Id.* at 2.

91. JIJU ANTONY & MIKE KAYE, *EXPERIMENTAL QUALITY: A STRATEGIC APPROACH TO ACHIEVE AND IMPROVE QUALITY 18* (2000).

92. Garvin, *supra* note 73, at 104–07; Garvin, *supra* note 57, at 29–32.

93. TAGUCHI, *supra* note 89, at 2.

94. Fewer or additional dimensions may be required, depending on the specific product category under consideration. For example, computer software may implicate two additional quality dimensions of integrity (the extent to which unauthorized access can be controlled) and portability (the ease of transfer between environments). *See* Garvin, *supra* note 73, at 108.

an overall judgment of the product's quality. While this last step must be performed to evaluate a particular product, only the first two steps are required to develop strategies for improving the quality of entire product categories.

III. THE CONCEPTUAL FRAMEWORK: PATENT QUALITY

This Part translates the management literature on defining product quality into a framework for defining patent quality. It begins by explaining why the insights of management theorists are particularly relevant to the patent context—and by identifying limits to the analogy. It then proposes a basic formula for assessing patent quality that can be used to identify efficient strategies for maximizing overall patent quality.

A. *From Product Quality to Patent Quality*

As described at the outset of Part II, the work of management scholars in defining product quality provides a helpful roadmap to those interested in defining patent quality. This is especially so given the similarities between manufacturing a commercial good and a patent that render the definitional work on product quality particularly relevant to the patent context. The typical process for manufacturing a good—also known as “realizing a product”—begins when a design engineer, usually in response to information about user needs and preferences, drafts specifications for a specific product.⁹⁵ The product is then manufactured in accordance with those specifications.⁹⁶ Afterwards, the product is subjected to quality-control procedures to ensure that its parts and operation fall within the accepted range of deviation.⁹⁷ If it does, the product is shipped for sale to end users. If it does not, the product may be destroyed or repaired, depending on the cost of the fix. Post-sale, a user may discover that, despite the best efforts of the manufacturer, the product suffers from a defect that renders it inoperable or otherwise worthless. When that occurs, the user may discard the product or ask the manufacturer or a third party to repair the defect.

The process for “manufacturing” a patent follows a similar path. That process begins when an inventor, typically through a patent attorney or agent, drafts an application for a patent that is intended to comply with the “specifications” set forth in the patent laws and the administrative rules that interpret them. The application includes two main parts: the specification and a set of claims.⁹⁸ The specification contains a detailed description (typically including drawings) of the invention and explains how it solves a particular problem.⁹⁹ The patent then concludes with a set of claims.¹⁰⁰

95. See CORRADO POLI, DESIGN FOR MANUFACTURING: A STRUCTURED APPROACH 3–6 (2001) (explaining the stages of product realization).

96. See *id.* at 6.

97. See *id.* at 7.

98. 35 U.S.C. § 112(b) (2012).

99. *Id.*

100. *Id.*

Each claim is a technical sentence that describes a unique invention, although all of the claims set forth in a patent relate to the same inventive concept.¹⁰¹ Because each claim of a patent is separately evaluated to determine its legal validity and infringement,¹⁰² it is probably more accurate to refer to “claim quality” than “patent quality.” Nevertheless, this Article follows the convention of using the term patent quality to refer generally to the quality of a patent’s claims.

After the inventor’s agent files the application, the PTO assigns one or more examiners to evaluate the application to determine whether it complies with the relevant legal requirements.¹⁰³ The examiner and agent then engage in what is typically a long process of refinement according to which the examiner usually rejects one or more claims for noncompliance.¹⁰⁴ When this occurs, the agent responds by trying to convince the examiner that the rejection is improper, by amending or canceling the rejected claims, or by appealing the rejection.¹⁰⁵ In the best-case scenario for the inventor, this refinement process ends when the examiner approves one or more claims and the PTO issues a patent setting forth the approved claims.¹⁰⁶ The patent owner (or her competitor) may later discover that the patent suffers from a defect that renders one or more of its claims legally invalid or commercially worthless. When this occurs, the owner may abandon the patent or attempt to cure the defect at the PTO or in court.¹⁰⁷

So described, each patent claim can be understood as a kind of product manufactured cooperatively by an inventor’s agent and the PTO that ultimately has passed a kind of quality assurance review conducted by the PTO. Indeed, of all the forms of intellectual property, the manufacturing analogy is the most applicable to patents. While copyrights and some

101. *See id.* (stating that the claims must describe what the inventor “regards as his invention”). For example, one patent claim may describe a new widget, and a second claim may describe a method of using the new widget.

102. *Amazon.com, Inc. v. Barnesandnoble.com, LLC*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) (“[I]nfringement and validity analyses must be performed on a claim-by-claim basis.”).

103. 35 U.S.C. § 131; 37 C.F.R. § 1.104(a)(1) (2013); MANUAL OF PATENT EXAMINING PROCEDURE chs. 700, 2100 (8th ed. 2012) (setting forth the procedures according to which the PTO evaluates patents for conformance with the legal standards of patentability).

104. *See* Dennis Crouch, *Likelihood of Office Action Rejections*, PATENTLYO (June 15, 2010), <http://www.patentlyo.com/patent/2010/06/likelihood-of-office-action-rejections.html> (finding that, based on an examination of 20,000 published patent applications, between 77 and 93 percent of applications across all PTO Technology Units were initially rejected and between 27 and 47 percent were finally rejected).

105. The examination process is described in chapter 700 of the MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 103. The appeals process is described in chapter 1200.

106. 35 U.S.C. §§ 131, 151.

107. A patent owner can affirmatively disclaim any part of her patent, or any part of its term, 37 C.F.R. § 1.321, or let the patent lapse by failing to pay maintenance fees, 35 U.S.C. § 41(b)(2). A patent owner can also attempt to cure defects by, among other things, seeking a reissue or advocating a construction of the patent that will avoid the defects. *See infra* notes 139, 244 and accompanying text.

trademark rights are automatic,¹⁰⁸ patents only issue following a rigorous and prolonged process of collaborative engineering and examination.

While there are notable similarities between products and patents, however, there are also notable differences. First, the identity of a product is typically self-contained. The identity of a widget, for example, is based on its attributes as a widget. The identity of a patent, however, is closely linked to the identity of the invention it describes. Indeed, the existential relationship between the two is so close that the patent is said to “capture” the invention.¹⁰⁹

Yet the patent has attributes—legal, economic, and social—distinct from the invention. The patent is therefore a different ontological “thing” than the invention.¹¹⁰ Consequently, the quality of a patent does not exactly correspond with the quality of the invention it describes. Still, it may be impossible as a practical matter to separate the two. That is because the nature of the invention—its subject matter, utility, and significance—will inevitably play a role in opinions on the quality of a patent describing the invention.¹¹¹

The second major difference between commercial products and patents stems from their different functions. Because a commercial product is a form of property, a variety of legal rights and obligations necessarily attach to it.¹¹² But to most observers, a product’s legal function will usually be secondary to its physical function: to do something. A patent claim also has a physical function of describing a particular invention, but to most observers, that function will usually be secondary to the patent’s legal

108. See 15 U.S.C. § 1125(a) (providing a federal cause of action for infringement of unregistered trademarks); 17 U.S.C. § 102(a) (recognizing copyright ownership without any filing or notice by the owner).

109. Daniel A. DeVito & Michael P. Dierks, *Exploring Anew the Attorney-Client Privilege and Work-Product Doctrine in Patent Litigation: The Pendulum Swings Again, This Time in Favor of Protection*, 22 AIPLA Q.J. 103, 129 (1994) (“In drafting the patent application, the scope of the legal right embodied in the invention is captured in writing.”); Greg H. Gardella & Emily A. Berger, *United States Reexamination Procedures: Recent Trends, Strategies and Impact on Patent Practice*, 8 J. MARSHALL REV. INTELL. PROP. L. 381, 406 (2009) (“A well-constructed patent claim that captures the invention more precisely and accurately will be more valuable because it is more likely to be found valid.”).

110. See Michael J. Madison, *Law As Design: Objects, Concepts, and Digital Things*, 56 CASE W. RES. L. REV. 381, 383 (2005) (“Traditionally, the notion of the ‘legal’ thing has been practically and conceptually distinct from the ‘real’ thing. In patent law, for example, there is the actual device that the inventor developed, and there is the legally distinct thing that the patentee owns, which the law knows as the patent claim.”).

111. Just as the visual appearance of a coffee cup may affect one’s opinion of a photograph of that cup, the features of an invention may affect one’s opinion of the patent claim describing the invention. For example, most observers will perceive a photograph of a white Styrofoam cup differently than a photograph of an ornate teacup. Similarly, the patent community typically perceives software and business method patents differently than, for instance, patents on mechanical inventions. See Lemley, *supra* note 10, at 1495 (“The criticism [allowing bad patents] is particularly strong in specific industries, notably software and Internet ‘business method’ patents.”).

112. See James Y. Stern, *Property’s Constitution*, 101 CALIF. L. REV. 277, 294 (2013) (explaining that, for each thing in existence, property laws inform who has authority to determine how it may be used).

function: to exclude others from doing something.¹¹³ Thus, the primary function of a hammer is to drive a nail, while the primary function of a patent on a hammer is to exclude others from making, using, and selling the hammer.

Third, most products are or can be mass-produced. This means that they exist in the world as multiple copies, and one's ownership of any particular product usually does not interfere with someone else's ownership of a copy of that product. Assuming sufficient supply and access, my ownership of one copy of a particular hammer does not preclude you from owning another copy of that hammer.

By contrast, patent claims are, by definition, unique.¹¹⁴ Each claim describes a thing or activity that, within certain parameters, has never before been disclosed.¹¹⁵ A claim is legally invalid, and therefore ceases to exist, if it is discovered to be an identical or substantially similar copy of a preexisting disclosure.¹¹⁶ In this way, the preexisting disclosure does not just frustrate one's ability to own a patent on it; the preexisting disclosure precludes such ownership altogether. If I own a patent disclosing a particular hammer, you cannot own a patent disclosing the same hammer. But I cannot patent the hammer if it was previously disclosed. In that case, the rights to make, use, and sell the hammer already are "owned" by the public.

These differences do not necessarily compel departing from the definitional approach described by management theorists. But they do suggest that the appropriate conception of patent quality is a broad one that takes into account both the features of patents and the inventions they describe. Part V returns to this point.

In addition, patents' prominent social identity suggests that when determining which stakeholder's views should take precedence in cases of conflict, greater weight should be placed on the needs and preferences of the public as opposed to manufacturers and owners. This conclusion is consistent with the fundamental goal of the patent system, which is a utilitarian one of promoting innovation for the benefit of the public.¹¹⁷ This goal is embodied in the Intellectual Property Clause of the U.S. Constitution, which empowers Congress to provide for a system of granting patents "[t]o promote the Progress of Science and useful Arts."¹¹⁸

113. See Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 546 n.5 (2012) (collecting articles criticizing the prominence of disclosure as a justification for the patent system).

114. See 35 U.S.C. § 102 (2012) (requiring patented inventions to be new).

115. See *id.*

116. See *id.*; *id.* § 103 (requiring patented inventions to be nonobvious).

117. See Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1597 (2003) ("[C]ourts and commentators widely agree that the basic purpose of patent law is utilitarian . . ."); Megan M. La Belle, *Patent Law As Public Law*, 20 GEO. MASON L. REV. 41, 50 (2012) ("[A]ny benefit that patents confer on individuals is secondary to the public's interest in our patent system."); Ted M. Sichelman, *Purging Patent Law of "Private Law" Remedies*, 92 TEX. L. REV. 517, 528 (2014) ("[T]here is nearly universal agreement that the patent system's primary goal is to promote innovation . . .").

118. U.S. CONST. art. I, § 8, cl. 8.

Interpreting the Intellectual Property Clause, the U.S. Supreme Court has consistently held that the primary purpose of the patent system is to benefit the public.¹¹⁹ In 1858, for example, the Court recognized that the “true policy and ends of the patent laws” are embodied in the Intellectual Property Clause: “the benefit to the public or community at large was . . . doubtless the primary object in granting and securing th[e patent] monopoly.”¹²⁰ In 1917, the Court emphasized that it had never modified its understanding “that the primary purpose of our patent laws is not the creation of private fortunes for the owners of patents but is ‘to promote the progress of science and useful arts.’”¹²¹ And in 1944, the Court succinctly stated, “It is the public interest which is dominant in the patent system.”¹²²

Nevertheless, the Court has consistently acknowledged that the patent laws are intended to promote private interests in addition to public ones.¹²³ The interests of other stakeholders are therefore still relevant to the calculus and are included in the analysis that follows.

B. *The Quality Calculus*

Turning to that calculus, as a preliminary matter, it is important to be precise about the relevant meaning of quality. As described in Part II, quality is transcendent in nature—a matter of goodness or excellence—and necessarily a function of objective and subjective standards. When speaking of the quality of patents, then, the meaning used here is the one that refers to “degree[s] of excellence,”¹²⁴ where what constitutes patent excellence depends on the views of stakeholders. In assessing a patent’s quality, or excellence, each stakeholder necessarily emphasizes certain attributes of the patent. These attributes—stated in management theory terms—are a patent’s quality dimensions.

As with a product’s quality, a patent’s quality can be understood in terms of a three-step process: first, identify the relevant stakeholders and their shared and unique needs and preferences; second, identify the quality dimensions that emerge from the stakeholder analysis; finally, measure a patent’s merit with respect to each dimension and consolidate those partial scores into a final judgment on quality. Ultimately, a particular patent’s

119. *Pennock v. Dialogue*, 27 U.S. (2 Pet.) 1, 18 (1829) (“[T]he main object [of the patent statute] was ‘to promote the progress of science and useful arts;’ . . .”).

120. *Kendall v. Winsor*, 62 U.S. (21 How.) 322, 328 (1858).

121. *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 511 (1917) (quoting U.S. CONST. art. I, § 8, cl. 8).

122. *Mercoid Corp. v. Mid-Continent Inv. Co.*, 320 U.S. 661, 665 (1944).

123. See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 731 (2002) (explaining that the patent laws attempt to maintain a balance between the interests of inventors and the public); Shubha Ghosh, *Patents and the Regulatory State: Rethinking the Patent Bargain Metaphor After Eldred*, 19 BERKELEY TECH. L.J. 1315, 1355 (2004) (explaining that under a utilitarian view, the patent system ideally attempts to balance all affected interests).

124. WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY 1858 (Philip Babcock Gove ed., 1993).

quality can be described as falling somewhere along a spectrum from lower to higher quality. A simple formula that captures this calculation is:

$$TQ = D_1 + D_2 \dots$$

where TQ is a patent's total quality score, D_1 is a score reflecting the patent's performance along dimension 1, D_2 is a score reflecting the patent's performance along dimension 2, and so forth.

A shortcoming of this formula is that it does not take into account each dimension's relative importance. To represent the relative importance of each quality dimension, a multiplier can be added to the formula as follows:

$$TQ = (M_1)(D_1) + (M_2)(D_2) \dots$$

where M_1 is a multiplier reflecting the relative importance of dimension 1, M_2 is a multiplier reflecting the relative importance of dimension 2, and so forth.

There are several aspects of this formula that merit further description. The first is the identity of each dimension. As with product dimensions, patent dimensions can be better or worse proxies for patent quality; the measurements of those dimensions reflect patent quality only to the extent that the dimensions are good proxies for quality. If they are bad proxies, their measurements are useless. The identities of the quality dimensions are therefore critical to the accuracy of any judgment on patent quality.

The second variable is the patent's performance along each dimension and its description. Performance can be qualitatively evaluated, but qualitative assessments cannot easily be compared or consolidated into a final judgment on quality. The functionality of such assessments will improve, however, if they are converted into numerical scores. Of course, the construction of a numerical score is itself subjective. Scores can be limited to whole numbers, or they can be presented as fractions or percentages. Scores that are excessively fragmented are not very practical; scores that are insufficiently fragmented are not very informative.

The third variable is the multiplier for each dimension. The multiplier reflects the dimension's relative weight in the eyes of stakeholders, and depending on the size of the multiplier, it can have a large influence on the total quality score.¹²⁵ But stakeholders will not necessarily agree on the

125. Consider the following hypothetical. In the baseline scenario (a), assume that the multiplier of one dimension is twice the multiplier of the second. If the patent performs at 50 percent along both dimensions, the total quality score is 1.50 out of a total possible score of 3.00:

$$(a) TQ = (1)(0.50) + (2)(0.50) = 1.50$$

But if the patent performs at 80 percent along only one dimension at a time, the total quality score increases to 2.10 in (b), where the patent performs better on the more important dimension. By comparison, in (c), it increases to only 1.80 where the patent performs better on the less important dimension.

$$(b) TQ = (1)(0.50) + (2)(0.80) = 2.10$$

$$(c) TQ = (1)(0.80) + (2)(0.50) = 1.80$$

In sum, the total quality score increases by 40 percent when the more important dimension is favored but only 20 percent when the less important dimension is favored. Increasing the

size of the multiplier to assign to a particular quality dimension. One stakeholder might view a dimension as critically important; another might view the same dimension as trivial or even inapplicable. In order to assign a multiplier to a particular quality dimension, then, it is necessary to consolidate stakeholder views on the importance of that dimension. Thus, the multiplier is actually the aggregate of individual stakeholder multipliers, as follows:

$$M_I = M_A + M_B \dots$$

where M_I is the aggregate multiplier applied to dimension 1, M_A is a multiplier reflecting the relative importance of dimension 1 to stakeholder A, M_B is a multiplier reflecting the relative importance of dimension 1 to stakeholder B, and so forth.

It is possible that stakeholders' views of dimension 1 will conflict, however, further complicating the calculation of M_I . One stakeholder might assign a positive multiplier to dimension 1, indicating its preference for the dimension, while a different stakeholder might disfavor the dimension and assign it a negative multiplier. In cases of conflict, it is necessary to decide whose views are controlling. As explained in Part III.A, given the prominent social identity and purpose of patents, the stakeholder whose views will usually be the most important in the context of patent quality is the public.

The fourth variable is the relationship between the quality dimensions. Some dimensions may function independently of one another so that performance along one dimension is unrelated to performance along another dimension. Other dimensions, however, may oppose each other so that performance along one dimension may be achieved only at the expense of another. Conversely, performance along one dimension may reinforce the same performance along another dimension: success begets success, and failure begets failure. Depending on the relationships that exist between dimensions, they also can influence the total quality score.¹²⁶

Understanding these four variables is not only critical to assessing the quality of individual patents; it is also critical to setting a policy agenda that

multiplier of one of the dimensions to ten times that of the second widens this gap by a factor of ten.

126. Consider the following hypothetical. In the baseline scenario (a), performance along each dimension is independent. Assume that the patent performs at 60 percent and 40 percent along dimensions D_1 and D_2 , respectively, and that the dimensions are equal in importance (allowing removal of the multiplier from the equation). The total quality score is 1.00 out of a possible score of 2.00.

$$(a) TQ = (0.60) + (0.40) = 1.00$$

Now assume in (b) that the better-than-average performance of the first dimension improves the performance of the second to 0.60. In that case, the total quality score increases 20 percent to 1.20.

$$(b) TQ = (0.60) + (0.60) = 1.20$$

But if the better-than-average performance of the first dimension decreases performance of the second to 0.20, as in (c), then the total quality score decreases 20 percent to 0.80.

$$(c) TQ = (0.60) + (0.20) = 0.80$$

The effect of these relationships on the total quality score will be magnified if multipliers are introduced into the equation.

will improve the quality of the universe of patents. As in business, in policymaking, it is simply not realistic, given scarce resources and other practical impediments, to attempt to maximize patent quality along every quality dimension. Even if that were possible, the marginal benefits of setting the bar so high would likely never be worth the costs. The more reasonable policy objective, rather, is to strive to maximize patent quality along those dimensions—the selected quality niches—that will achieve the largest gains at the least cost.

IV. STAKEHOLDERS IN PATENT QUALITY

While application of the formula described in the preceding section eventually will require description of all of its variables, the next two Parts focus on the most important of these variables: the relevant quality dimensions. An analysis of the formula's other variables would require far more space than this format allows. In any event, the other variables necessarily depend on the identities of the quality dimensions, and so it is appropriate that the analysis begin with them.

That analysis essentially tracks the first two steps of management theorists' three-step approach for understanding quality in a business context. This Part performs the first step of describing stakeholder interests. Specifically, it describes the basic needs and preferences of four major stakeholders in patent quality: the PTO, the courts, patentees, and the public.

Of course, any categorization of stakeholders is subjective, and some inevitably will disagree with the boundaries drawn here. For example, others might subtract categories from or add categories to this list, or they might describe these same categories with more or less granularity. In the end, however, lines must be drawn. The lines drawn here are based on my judgment that each of the identified group's interests in patent quality is both sufficiently important to merit description and sufficiently unique to merit its own category. The assumption is that the basic quality needs and preferences of each stakeholder are a direct function of these interests.

A. *The PTO*

The PTO is responsible for, among other things, examining patent applications and issuing patents that comply with the conditions of patentability.¹²⁷ The agency is therefore deeply interested in “manufacturing” patents consistent with its responsibilities. This is not only a matter of institutional integrity; it is also a matter of good public relations. The PTO has long been accused of doing a poor job of examining patents,¹²⁸ but the frequency and urgency of those complaints have intensified in recent years.¹²⁹

127. 35 U.S.C. § 2 (2012).

128. *See supra* note 2 and accompanying text.

129. *See supra* notes 1, 3–8 and accompanying text.

In addition, the PTO is interested in reducing its workload with respect to both patent applications and issued patents. It is frequently reported that the PTO is understaffed, overworked, and cannot keep pace with the demand for its services. The agency's performance statistics in recent years seem to bear this out. As an initial matter, the number of applications for patents has skyrocketed, reaching over 565,000 new applications in fiscal year 2012—more than three times the number filed twenty years earlier.¹³⁰ The increased filing activity, in turn, has created a significant backlog of pending applications. The PTO has made notable progress in reducing the number of pending applications by, among other things, expanding its examining corps.¹³¹ Nevertheless, the backlog of applications that have not reached final disposition remains high at over 1.15 million by the end of fiscal year 2012.¹³² The average length of pendency of a patent application to final disposition (defined as the application's issuance as a patent or abandonment by the applicant) also has increased over time.¹³³

An applicant can appeal an examiner's final rejection of a patent application to the Patent Trial and Appeal Board (PTAB), the agency's quasi-judicial body.¹³⁴ The number of ex parte appeals pending before the PTAB has grown exponentially to 26,570 at the end of fiscal year 2012, more than eight times the number pending only ten years earlier.¹³⁵ In

130. U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2012, at 176 tbl.2.

131. The PTO currently employs almost 8,000 patent examiners (excluding design patent examiners). *Data Visualization Center: February 2014 Patents Data, at a Glance*, USPTO.GOV, <http://www.uspto.gov/dashboards/patents/main.dashxml> (last visited Apr. 26, 2014). This represents an increase of over 2,000 examiners in a little over six years. See U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2007, at 13 (identifying 5,477 patent examiners at the end of fiscal year 2007).

132. U.S. PATENT & TRADEMARK OFFICE, *supra* note 130, at 177 tbl.3. Not only does the PTO face an enormous backlog of original patent applications, but it also faces a large backlog of requests for continued examination (RCE). An RCE is a request to continue the examination of a patent application after prosecution of the application has closed, as when an examiner issues a final rejection. See generally 37 C.F.R. § 1.114 (2013) (describing RCE practice before the PTO). In early 2014, over 80,000 RCE applications were awaiting initial action. See *Data Visualization Center: February 2014 Patents Data, at a Glance, supra* note 131.

133. The average pendency in fiscal year 2012 was 32.4 months. U.S. PATENT & TRADEMARK OFFICE, *supra* note 130, at 177 tbl.4. Ten years earlier, the average total pendency was twenty-four months. *Id.* at 16 fig.5. In early 2014, however, the PTO was reporting an average pendency of 28.1 months. *Data Visualization Center: February 2014 Patents Data, at a Glance, supra* note 131.

134. See 35 U.S.C. § 134(a) (2012). The PTAB is formerly known as the Board of Patent Appeals and Interferences (BPAI). See, e.g., Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 § 3(J)(1) (2011) (providing that the BPAI shall hereafter be known as the PTAB).

135. Compare *Fiscal Year 2002, Board of Patent Appeals & Interferences, Receipts and Dispositions by Groups, Ex Parte Appeals*, USPTO.GOV, <http://patents.uspto.gov/ip/boards/bpai/stats/receipts/fy2002.pdf> (last visited Apr. 26, 2014) (identifying 3,090 ex parte appeals pending at the end of FY 2002), with *Fiscal Year 2012, Patent Trial and Appeal Board, Receipts and Dispositions by Technology Centers, Ex Parte Appeals*, USPTO.GOV, http://www.uspto.gov/ip/boards/bpai/stats/receipts/fy2012_sep_e.pdf (last visited Apr. 26, 2014). The PTO is hiring more administrative judges to hear these cases. See Gene Quinn, *9 New Administrative Patent Judges Sworn in at the USPTO*, IP WATCHDOG (Mar. 2, 2012),

addition to hearing appeals of rejected applications, the PTAB also presides over third-party challenges to the validity of issued patents and patentee requests to reaffirm the validity of their issued patents.¹³⁶ Historically, these mechanisms have consisted of appeals of *ex parte* and *inter partes* reexamination decisions, where reexamination is a process through which anyone may request reopening examination of an issued patent on grounds that there exists a “substantial new question of patentability.”¹³⁷ Recently, the America Invents Act expanded the PTAB’s responsibilities to include presiding over still more kinds of proceedings.¹³⁸

In addition to reexamining patents, the PTO is responsible for correcting and modifying them. Among other things, it entertains requests to “reissue” already-issued patents in circumstances where the patent’s claims are too narrow or broad.¹³⁹ The number of reissue applications filed in 2012 was over 1,200, more than double the number filed twenty years earlier.¹⁴⁰ The average pendency of reissue applications has also grown significantly in recent years.¹⁴¹

In sum, the PTO’s most pressing quality concerns include issuing patents that are consistent with its institutional responsibilities and that will be a minimal burden to it following issuance.

B. The Courts

Importantly, the PTO shares responsibility for adjudicating patent challenges with the federal courts.¹⁴² Because the agency’s rulings are

<http://www.ipwatchdog.com/2012/03/02/9-new-administrative-patent-judges-sworn-in-at-the-uspto/id=22548/> (noting that nineteen new judges had been sworn in as of March 2012). Nevertheless, some remain skeptical that hiring more judges will sufficiently address the problem. See Dennis Crouch, *BPAI Appeals Cyclic Decision Making* PATENTLYJOBS (Feb. 15, 2012), <http://www.patentlyo.com/patent/2012/02/bpai-appeal-decisionmaking.html>.

136. See 35 U.S.C. § 6(b) (providing that the PTAB shall preside over appeals of *ex parte* reexamination decisions and conduct *inter partes* review and post-grant review proceedings).

137. *Id.* § 304 (*ex parte* reexamination); *id.* § 312(a) (Supp. IV 2010) (repealed by Leahy-Smith America Invents Act § 6(a), Pub. L. No. 112-29, 125 Stat. 284 (2011)) (*inter partes* reexamination). Although the PTO is no longer accepting requests to institute *inter partes* reexamination proceedings, the PTAB must still dispose of those appealed cases that remain pending.

138. These are post-grant review proceedings, *id.* §§ 321–329, *inter partes* review proceedings, *id.* §§ 311–319, and transitional post-grant review proceedings of business method patents, Leahy-Smith America Invents Act § 18.

139. See 35 U.S.C. § 251.

140. See U.S. PATENT & TRADEMARK OFFICE, *supra* note 130, at 176 tbl.2.

141. Dennis Crouch, *Reissue Patent Pendency*, PATENTLYO (Jan. 23, 2011), <http://www.patentlyo.com/patent/2011/01/reissue-patent-pendency.html> (finding that reissue application pendency had grown from a little over two years in 1990 to almost five years by 2010).

142. See 28 U.S.C. § 1338(a) (“The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents[and] plant variety protection . . .”). More precisely, one may challenge the validity of a patent concurrently in an administrative proceeding before the PTO and a judicial proceeding before a federal court. See 35 U.S.C. § 315 (establishing rules for the administration of an *inter partes* review proceeding and concurrently pending civil action involving the same patent); *id.* § 325 (establishing rules for the administration of a post-grant review proceeding and concurrently pending civil action involving the same patent); 37 C.F.R. §§ 1.565, 1.985 (2013) (requiring

appealable to federal court, however, the judiciary is the ultimate arbiter on patent disputes.¹⁴³ Given its important and unique relationship to the patent system, the judiciary is designated here as a distinct stakeholder, although there is admittedly overlap of some of those interests with the interests of the PTO and the public.

There is evidence that, like the PTO, the judiciary faces a patent-related workload that is growing. In the fifteen-year period between 1997 and 2011, the number of patent suits filed in the federal courts almost doubled, rising from 2,112 to 4,015.¹⁴⁴ As a result of new joinder rules that limit the ability of patent owners to join defendants, the number is growing ever faster.¹⁴⁵ Moreover, while the total number of lawsuits also increased during this same time period, patent cases represent a steadily increasing percentage of that total number. In 1997, patent cases represented a little less than 0.8 percent of all lawsuits; in 2011, they represented 1.4 percent.¹⁴⁶

Patent cases also represent a steadily increasing number of federal cases pending for three or more years. That number more than doubled in the fifteen-year period from 1997 to 2011, rising from 238 to 480.¹⁴⁷ Notably, the rate of long-pending patent cases kept rising despite significant fluctuations in the overall number of long-pending cases during that period. In particular, the rate of long-pending patent cases rose even during the

notification to the PTO of any concurrent litigation proceedings involving a patent at issue in a reexamination proceeding).

143. See 35 U.S.C. §§ 141(a), 145 (providing that a party dissatisfied with the PTAB's decision rejecting any patent claims in an original examination may appeal to the Federal Circuit or pursue a civil action against the PTO director in the Eastern District of Virginia); *id.* § 141(b)–(c) (providing that a party dissatisfied with the PTAB's decision in a reexamination, inter partes review, or post-grant review proceeding must appeal to the Federal Circuit).

144. See JUDICIAL BUSINESS OF THE U.S. COURTS 2011 tbl.C-2A (2011) (providing statistics for the years 2007 to 2011); JUDICIAL BUSINESS OF THE U.S. COURTS 2006 tbl.C-2A (2006) (providing statistics for the years 2002 to 2006); JUDICIAL BUSINESS OF THE U.S. COURTS 2001 tbl.C-2A (2001) (providing statistics for the years 1997 to 2001).

145. See *New Patent Cases Filed*, PATSTATS.ORG, <http://patstats.org/Patstats3.html> (last updated Jan. 15, 2014) (identifying the number of patent cases filed in calendar year 2012 as 5,778, and noting that the Leahy-Smith America Invents Act's new constraints on joinder (codified at 35 U.S.C. § 299(a)) are responsible for some but not all of the increase).

146. Compare JUDICIAL BUSINESS OF THE U.S. COURTS 1997 tbl.C-2A (1997) (showing that patent suits comprised 2,112 of 272,027 total civil cases commenced in 1997), with JUDICIAL BUSINESS OF THE U.S. COURTS 2011, *supra* note 144, tbl.C-2A (showing that patent suits comprised 4,015 of 289,252 total civil cases commenced in 2011).

147. See JUDICIAL BUSINESS OF THE U.S. COURTS 2011, *supra* note 144, tbl.C-12 (providing statistics for the year 2011); JUDICIAL BUSINESS OF THE U.S. COURTS 2010 tbl.S-11 (2010) (providing statistics for the years 2009 to 2010); JUDICIAL BUSINESS OF THE U.S. COURTS 2008 tbl.S-11 (2008) (providing statistics for the years 2007 to 2008); JUDICIAL BUSINESS OF THE U.S. COURTS 2006 tbl.S-11 (2006) (providing statistics for the years 2005 to 2006); JUDICIAL BUSINESS OF THE U.S. COURTS 2004 tbl.S-11 (2004) (providing statistics for the years 2003 to 2004); JUDICIAL BUSINESS OF THE U.S. COURTS 2002 tbl.S-11 (2002) (providing statistics for the years 2001 to 2002); JUDICIAL BUSINESS OF THE U.S. COURTS 2000 tbl.S-11 (2000) (providing statistics for the years 1999 to 2000); JUDICIAL BUSINESS OF THE U.S. COURTS 1998 tbl.S-11 (1998) (providing statistics for the years 1997 to 1998).

years 1999, 2006, 2007, and 2008, when the overall number of long-pending cases was at its lowest.¹⁴⁸

These trends are reason for judicial concern given that patent suits are considered to be among the most complex types of civil cases.¹⁴⁹ Patent suits often involve complicated technologies, some of which require expert assistance to explain to judges and juries.¹⁵⁰ They also require fluency in an elaborate web of international and domestic laws and regulations.¹⁵¹ The sheer number of these legal requirements and procedures has increased exponentially over time, making the work of understanding and applying them even more difficult.¹⁵²

Moreover, patent trials are typically preceded by minitrials called *Markman* hearings during which the courts interpret, or construe, the claims at issue.¹⁵³ The process of claim construction can be time-consuming, often requiring courts to consult many sources other than the patent document to determine claim meaning.¹⁵⁴ And the process can be further complicated

148. See *supra* note 147 (identifying statistical sources).

149. See, e.g., James Bessen & Michael J. Meurer, *Lessons for Patent Policy from Empirical Research on Patent Litigation*, 9 LEWIS & CLARK L. REV. 1, 2 (2005) (“Patent litigation has been called the sport of kings; it is complex, uncertain, and expensive.”); Jennifer K. Bush et al., *Six Patent Law Puzzlers*, 13 TEX. INTELL. PROP. L.J. 1, 2 (2004) (“To call patent law complex is to call the sky blue or the ocean vast and deep. Patent law’s complexity has long been acknowledged, and notwithstanding reform proposals aimed at simplification, it is likely to remain complex.”); Jennifer F. Miller, *Should Juries Hear Complex Patent Cases?*, 2004 DUKE L. & TECH. REV. 4, 29 (“Patent litigation involves some of the most complex legal theories and underlying factual issues of any type of litigation today.”).

150. Unlike PTAB judges, federal court judges are not required to have any technical expertise to hear patent cases. Compare 35 U.S.C. § 6(a) (2012) (requiring administrative patent judges to be “persons of competent legal knowledge and scientific ability”), with Peter Lee, *Patent Law and the Two Cultures*, 120 YALE L.J. 2, 10 & nn.30–32 (2010) (explaining that the number of scientifically trained district court judges is likely very low). Notably, although the judges of the Federal Circuit are often assumed to have technical training, only a handful of them hold scientific degrees. See Melissa F. Wasserman, *The Changing Guard of Patent Law: Chevron Deference for the PTO*, 54 WM. & MARY L. REV. 1959, 2010 (2013).

151. These include the Patent Act codified at 35 U.S.C. §§ 1–376, federal patent regulations codified at 37 C.F.R. §§ 1–501.9, the Patent Cooperation Treaty, June 19, 1970, 28 U.S.T. 7645, 1160 U.N.T.S. 231, available at <http://www.wipo.int/pct/en/texts/pdf/pct.pdf>, and the Agreement on Trade-Related Aspects of Intellectual Property Rights, April, 15 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, available at http://www.wto.org/english/docs_e/legal_e/27-trips.pdf.

152. One proxy for this expansion is the *Manual of Patent Examination and Procedure* (MPEP), which sets forth patent laws and rules and describes their interpretation and application for patent examiners. The original fifth edition of the MPEP, which was published in 1983, consisted of twenty-two chapters and was 595 pages long (excluding appendices). MANUAL OF PATENT EXAMINING PROCEDURE (5th ed. 1983), available at http://www.uspto.gov/web/offices/pac/mpep/old/mpep_E5R0.htm. The most recent eighth edition consists of twenty-seven chapters and is almost 2,300 pages long (excluding appendices). See MANUAL OF PATENT EXAMINING PROCEDURE, *supra* note 103.

153. These hearings are named after the U.S. Supreme Court’s opinion in *Markman v. Westview Instruments, Inc.* that claim construction is a matter of law for the courts alone to decide. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996).

154. Potential sources of claim meaning include dictionaries, reference materials, a patent’s prosecution history, reports of court-appointed technical advisors or special masters,

where the patent at issue concerns an obscure or rapidly developing technical field or where the claims at issue use idiosyncratic terms.¹⁵⁵ Perhaps reflecting each of these factors, patent cases have been described by one Federal Circuit judge as “among the longest, most time-consuming types of civil actions.”¹⁵⁶

Of course, patent lawsuits can drag out for reasons having more to do with the business objectives or combative nature of the litigants than with the quality of the patents at issue. Malpractice suits may therefore be a more reliable reflection of patent quality issues than patent lawsuits. Although public data on prosecution-based malpractice claims is sparse, there is some evidence that malpractice suits based on substantive drafting errors—for example, incorrect or incomplete descriptions of inventions—are on the rise.¹⁵⁷

For these reasons, the judiciary’s major quality interests include both reducing the number of patent-related disputes it is called upon to resolve and increasing the efficiency of its resolution of those disputes.

C. Patentees

Considering patent quality from the perspective of patentees shifts the inquiry from design and manufacturing concerns to the needs and preferences of users. The original owner of every patent is the inventor of what is described in the patent.¹⁵⁸ Patent rights are alienable, however, and inventors often assign them to other persons and entities.¹⁵⁹ Some

and fact and expert witness testimonies regarding, *inter alia*, the technology at issue and patent office procedure. See Peter S. Menell et al., *Patent Claim Construction: A Modern Synthesis and Structured Framework*, 25 BERKELEY TECH. L.J. 711, 800–06 (2010).

155. *Guidelines for Patent Claim Construction: Post-Philips—The Basics of a Markman Hearing*, 16 FED. CIRCUIT B.J. 13, 18, 26 (2006). However, courts are increasingly implementing measures intended to reduce the complexity of the claim construction process. See, e.g., N.D. CAL. PATENT L.R. 4-1(b), 4-3(c) (requiring the parties to identify the ten “most significant” terms to be construed by the court); N.D. ILL. LPR 4.1(b) (providing a default rule limiting the number of terms to be construed to ten). Nevertheless, a *Markman* hearing can easily last a week or longer. See, e.g., Rick McDermott, *Annual Intellectual Property Law Review Banquet Speech: Lessons Learned from Fifteen Years in the Trenches of Patent Litigation*, 14 MARQ. INTELL. PROP. L. REV. 471, 473 (2010) (describing a patent litigator’s experience with *Markman* hearings).

156. *Ohio Willow Wood Co. v. Thermo-Ply, Inc.*, 629 F.3d 1374, 1376 (Fed. Cir. 2011) (Moore, J., concurring). The burden of patent litigation on the courts has long been of interest to Judge Moore. See, e.g., Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 79 N.C. L. REV. 889, 933 (2001) (finding that although patent cases represented only 0.57 percent of the annual civil caseload in district courts between 1983 and 1999, they represented 9.4 percent of all civil cases requiring twenty or more days of trial).

157. See Christi J. Guerrini, *The Decline of the Patent Registration Exam*, 91 NEB. L. REV. 325, 372 nn.263–66 (2012).

158. *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1248 (Fed. Cir. 1993) (stating that the ownership of a patent initially vests in the named inventors of the invention described in the patent); see also *Isr. Bio-Engineering Project v. Amgen, Inc.*, 475 F.3d 1256, 1263 (Fed. Cir. 2007) (“It is a bedrock tenet of patent law that ‘an invention presumptively belongs to its creator.’” (quoting *Teets v. Chromalloy Gas Turbine Corp.*, 83 F.3d 403, 406 (Fed. Cir. 1996))).

159. 35 U.S.C. § 261 (2012) (providing that patents and applications can be assigned).

assignees will pay dearly for those rights if they wish to practice the patented invention or control the rights of others to do so.

While patents can be valuable to their owners because the inventions they protect are commercially successful, they also can have value as business assets independent of their underlying inventions. Because the economic value of a creation depends in part on the legal rights that attach to it, every patent has value by virtue of the rights of exclusion that its owner enjoys.¹⁶⁰ Patentees can monetize these rights by, among other things, constructing large portfolios that they can then license or use strategically for offensive or defensive purposes.¹⁶¹ Indeed, in some industries, competition within the patent space is fierce, with each participant stockpiling patents in what has been described as an escalating “intellectual-property arms race.”¹⁶² Patentees also can derive value from their patents by using them as deterrents to competitors and signals to consumers.¹⁶³

But an invalid patent is not enforceable. Although invalid patents can be used as a means to limit competition, charge supranormal prices, obtain licensing fees, and attract capital, one’s ability to engage in those activities will last only so long as the patents go unchallenged. Once challenged, an invalid patent may have negative value if unsuccessfully defended.¹⁶⁴ All things being equal, then, patentees prefer that their patents be enforceable.

160. See Malla Pollack, *What Is Congress Supposed To Promote?: Defining “Progress” in Article I, Section 8, Clause 8 of the United States Constitution, or Introducing the Progress Clause*, 80 NEB. L. REV. 754, 789 (2001). Admittedly, in some cases, that value may be negligible.

161. 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, 300, 326–32 (2010) (describing the various ways in which firms can use patents offensively and defensively).

162. Sam Gustin, *Patent Progress: What Apple and HTC’s Landmark Pact Means for the Patent Wars*, TIME (Nov. 12, 2012), <http://business.time.com/2012/11/12/patent-perestroika-what-apple-and-htcs-landmark-pact-means-for-the-patent-wars/>; see also *The Arms Race: Companies Are Preparing for the Intellectual-Property Battle*, ECONOMIST (SPECIAL REPORT), Oct. 22, 2005, at 6, 8 (interviewing industry insiders who describe how companies today are building up patent portfolios (“nukes pointing at each other”), demanding royalties, and enforcing patent rights in court because, as explained by one German software executive, “These are the rules of the game!”). Perhaps exemplifying this trend, in 2011, Apple and Google for the first time spent more on patent purchases and intellectual property litigation than they did on research and development. See Charles Duhigg & Steve Lohr, *The Patent, Used As a Sword*, N.Y. TIMES, Oct. 8, 2012, at A1.

163. Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 655–58 (2002) (explaining the communication function of patents as a means of credibly publicizing information to the marketplace).

164. In 2011, the cost of patent litigation was estimated to be \$5 million for a case worth more than \$25 million. See AM. INTELLECTUAL PROP. LAW ASS’N, REPORT OF THE ECONOMIC SURVEY 2011, at 35 (2011). These costs are between two and three times higher than those for other kinds of intellectual property litigation. See *id.* at 35–36 (reporting the median estimated cost of trade secret misappropriation, trademark, and copyright cases with more than \$25 million at risk as, respectively, \$2.5 million, \$1.5 million, and \$1.375 million); see also THOMAS E. WILLGING ET AL., FED. JUDICIAL CTR., DISCOVERY AND DISCLOSURE PRACTICE, PROBLEMS, AND PROPOSALS FOR CHANGE: A CASE-BASED NATIONAL SURVEY OF COUNSEL IN CLOSED FEDERAL CIVIL CASES 38–39 (1997) (finding, based on a nationwide survey of attorneys, that patent cases are among those civil cases having the highest discovery expenses).

Patentees also prefer that the rights of exclusion that attach to their patents be broad. Broad rights can be achieved in two ways. First, broad rights attach to “flexible” claims that can be interpreted in various ways to fit the circumstances.¹⁶⁵ In order for a claim to achieve maximum coverage of infringing activity, it must anticipate the technological changes that will occur during the time lag between the issuance of a patent and its interpretation in an adversarial proceeding.¹⁶⁶ This is accomplished by writing claims in vague terms that can bend in response to the patentee’s changing circumstances.¹⁶⁷

But broad rights can also attach to unambiguous claims when they are drafted such that their boundaries push up against, and arguably even exceed, what was actually invented.¹⁶⁸ Broadly drafted claims expand the scope of conduct that is deemed infringing, while narrowly drafted claims limit that scope and therefore the universe of potential infringers.¹⁶⁹

In sum, patentees’ most pressing quality interests are in patents that represent maximum value to them, where a patent’s value will usually be a function of the unique business circumstances of its owner and the nature of both the invention that the patent describes and the patent’s description of that invention.

D. The Public

As explained in Part III, the primary goal of the patent system is a utilitarian one of promoting invention for the benefit of the public.¹⁷⁰ Excluding patentees from this population, for any given patent, the public includes individuals who are metaphorically so far away from the patent that they are unlikely to ever be accused of infringing it, as well as competitors who are metaphorically close to the patent and either seek to practice the patented invention or avoid practicing (and being accused of infringing) it. The quality interests of these individuals are aligned, although in specific cases they will likely vary in intensity depending on one’s distance from a particular patent.

Ideally, each patent application would be evaluated to determine whether granting the applicant an exclusive right to limit access to potentially important innovations is worth it from a welfare perspective.¹⁷¹ That

165. Wagner, *supra* note 1, at 2148–51.

166. *See id.*

167. *See id.* at 2149. Patentees’ preference for vague claims that introduce uncertainty about claim scope and meaning is also discussed in R. Polk Wagner, *Reconsidering Estoppel: Patent Administration and the Failure of Festo*, 151 U. PA. L. REV. 159, 216 (2002).

168. Wagner, *supra* note 167, at 216.

169. *See* Stephen Yelderman, *Improving Patent Quality with Patent Incentives* 8–13 (Dec. 20, 2013) (unpublished manuscript), available at <http://ssrn.com/abstract=2147491> (explaining the trade-off between narrow and broad claims for validity and infringement analyses).

170. *See supra* notes 117–22 and accompanying text.

171. *See* Andres Sawicki, *Better Mistakes in Patent Law*, 39 FLA. ST. U. L. REV. 735, 741 (2012).

evaluation, however, would be prohibitively expensive.¹⁷² In its place, Congress has codified the standards of patentability to distinguish those applications that should issue as patents from those that should be rejected in a manner that is consistent with the goals of the patent system.¹⁷³

If the standards of patentability are properly calibrated to minimize costs and maximize benefits, then the public strongly prefers patents that satisfy those conditions. This assumes, however, that the standards themselves are correctly applied. Congress establishes the standards of patentability and the PTO and courts interpret and apply them to particular cases, in the process providing further definition to the standards. Even if the standards are properly calibrated, if they are incorrectly applied, some issued patents will presumably reflect an imbalance of costs and benefits.

That the conditions of patentability are properly calibrated and applied is important to the public for the additional reason that infringement of a patent is a strict liability offense.¹⁷⁴ This means that one may be liable for infringing a patent regardless of intent to infringe and regardless even of knowledge of the patent.¹⁷⁵ The public, which consists of potential infringers, must therefore avoid practicing the inventions protected by patents or else risk a charge of infringement. With respect to paradigmatic patented items like mechanical widgets, most people are metaphorically so far away from the invention that their legal duties with respect to it are irrelevant.¹⁷⁶ But patent law has expanded over the decades to include nonparadigmatic items, such as business methods and sports moves.¹⁷⁷ Given the generalized nature of many of these items, the class of persons likely to infringe includes a much larger subset of the population.¹⁷⁸ With respect especially to patents on nonparadigmatic items, it is important to the public that they are worth their compliance costs.¹⁷⁹

Moreover, it is important that all patents be understandable to interested persons so that they may decide whether or not to comply, and when they choose to comply, that they know how to do so. It is also generally easier to justify the costs of complying with patents that describe socially useful inventions.¹⁸⁰ Although some patents describe such inventions, there is no

172. *See id.*

173. *See id.* at 741–42.

174. *See, e.g., In re Seagate Tech., LLC*, 497 F.3d 1360, 1368 (Fed. Cir. 2007).

175. *See, e.g., Blair v. Westinghouse Elec. Corp.*, 291 F. Supp. 664, 670 (D.D.C. 1968) (“[A]n infringement may be entirely inadvertent and unintentional and without knowledge of the patent.”).

176. Clarisa Long, *Information Costs in Patent and Copyright*, 90 VA. L. REV. 465, 491 (2004).

177. *See id.* at 507, 536, 541.

178. *See id.* at 487–88.

179. *See id.* at 468 (explaining that nonowners, or “observers,” must “cognize and mentally process at least enough information to determine where the boundaries of protection lie so as to fulfill their legal duties of avoiding infringement”).

180. *See Michael Risch, A Surprisingly Useful Requirement*, 19 GEO. MASON L. REV. 57, 64 (2011) (“An invention’s usefulness indicates social welfare; when an invention is useless, society reaps no benefit.”).

requirement that they do so.¹⁸¹ Consequently, many inventors file patent applications before they can tell whether their inventions will satisfy any public need. This is good if the aim of the patent system is to encourage the prompt dissemination of ideas, but it is bad from the perspective of the public to the extent that it increases the number of patents with which the public must comply without providing offsetting welfare benefits.

The public also includes taxpayers who are interested in the efficient administration of the patent system. That is because the patent system relies in part on public funds for its operation and enforcement. The PTO is user-fee funded;¹⁸² its efficient operation is therefore of primary interest to patentees. The judicial system, however, is largely funded by the public.¹⁸³ The public therefore shares the concerns of the judiciary described in the preceding subsection.

For the public, however, these concerns are tempered by the potential social benefit of patent challenges. A ruling that a patent is invalid enhances social welfare because the ruling effectively returns information to the public domain that never should have been removed from it.¹⁸⁴ If patent challenges are more likely to involve valuable inventions, as some have suggested,¹⁸⁵ their social benefit might be substantial. It is one thing to improperly exclude information from the public domain that everyone agrees is trivial or worthless. It is another to improperly exclude information that others would benefit from using.

Of course, not every patent challenge concludes with an invalidity ruling.¹⁸⁶ Moreover, some patents are invalidated based on obscure references that never would have been located but for the efforts of adverse

181. See Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75, 78 (2005).

182. Melissa F. Wasserman, *The PTO's Asymmetric Incentives: Pressure To Expand Substantive Patent Law*, 72 OHIO ST. L.J. 379, 407 & n.107 (2011) (stating that “[t]he PTO is a self-funded agency that obtains its entire budget through user fees” and “the PTO[’s] budget is set to the amount of [its] projected revenue”).

183. Julia S. Gibbons, *How the Judiciary Gets Its Funding*, FED. LAW., Oct. 2009, at 30 (explaining the process by which the federal judiciary applies to Congress for its funding).

184. See Joseph Scott Miller, *Building a Better Bounty: Litigation-Stage Rewards for Defeating Patents*, 19 BERKELEY TECH. L.J. 667, 688 (2004) (“A court judgment that a patent claim is invalid is a public good.”).

185. To date, there are no empirical studies investigating a connection between valuable inventions and the litigation rates of patents covering such inventions, but an understanding that such a link exists seems reasonable. See, e.g., Bessen & Meurer, *supra* note 149, at 21 (“[V]aluable inventions are more likely to be litigated”); Stephen T. Schreiner & Patrick A. Doody, *Patent Continuation Applications: How the PTO's Proposed New Rules Undermine an Important Part of the U.S. Patent System with Hundreds of Years of History*, 88 J. PAT. & TRADEMARK OFF. SOC'Y 556, 561 n.21 (2006) (“[I]t is reasonable to expect that patents on significant inventions are more likely to be litigated.”). Valuable inventions are to be contrasted with valuable patents, whose litigation rates have been empirically studied. See generally John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435 (2004).

186. Although the number of patents that are invalidated during litigation is surprisingly high, approximately half of claims are still affirmed as valid when challenged in court. See *supra* note 25 and accompanying text.

parties.¹⁸⁷ It is difficult to say that invalidating an otherwise valid patent on the basis of a paper tucked away in a foreign library does the public a service that justifies its costs. In the end, it is uncertain whether patent challenges do more social harm than good and so are worth the public funds that subsidize some of them. Nevertheless, a consideration of these challenges' costs and benefits is at least useful for underscoring the significance to the public of their efficient and proper resolution.

In general, the public is powerfully interested in maintaining a balanced patent system that protects patented inventions—especially those that are socially useful—where doing so justifies the costs of compliance and monopoly and where affected bystanders can know what constitutes compliant conduct. Further, the public is interested in the efficient administration of the judicial system, especially with respect to both invalidating patents that never should have issued and upholding patents that merit protection.

V. DIMENSIONS OF PATENT QUALITY

The foregoing analysis of stakeholder preferences reveals certain features or dimensions related to patents that are relevant to the question of patent quality's meaning. Described in detail below, they are: (1) a patent's probable validity; (2) clarity of the patent; (3) faithfulness of the patent to the scope of the underlying invention; (4) social utility of the invention; and (5) commercial success of the invention.

The dimensions of probable validity, clarity, and faithfulness focus on the patent document, while the dimensions of social utility and commercial success focus on the invention described in the patent. In other words, patent quality is a function of both the patent as an informational document and legal instrument and its underlying invention as a thing that operates in the real world. Consistent with the discussion in Part III.A, both patent-based and invention-based dimensions are included in an understanding of patent quality as a result of the difficulty of disentangling the quality of an invention from the quality of a patent that is intended to capture the invention.

In describing each dimension, this Part summarizes each stakeholder's preference (or not) for that dimension. Beyond the earlier observation that the public interest generally should take precedence in cases of conflict,¹⁸⁸ however, it makes no attempt to weigh or balance competing interests. This Part also explains the relationships between specific dimensions where doing so is necessary to distinguish them. But it does not attempt to work out the many ways in which the dimensions positively and negatively reinforce one another. Again, the objective is to identify the dimensions on which these other variables depend, and in so doing, to lay the groundwork for further analysis.

187. See *In re Hall*, 781 F.2d 897, 899–900 (Fed. Cir. 1986) (holding that a single copy of a thesis indexed in one German library constituted invalidating prior art).

188. See *supra* Part III.A.

A. Probable Validity

The first quality dimension is legal validity, or a patent's conformance with the standards of patentability. In theory, valid patent claims embody the patent system's compromise between the benefits of increased innovation and its disclosure and the costs of monopoly and compliance. As explained by Federal Circuit Judge Pauline Newman, "The question of patent quality requires a threshold focus on the standard by which quality is measured, which in turn is determined by the purpose of a system of patents. . . . The quality of a patent is measured by how effectively it fulfills that purpose."¹⁸⁹ A patent's validity is therefore a good proxy for its quality where the conditions of patentability correctly distinguish patents that fulfill the purpose of the patent system.

This does not mean, however, that the legal standards are only relevant to patent quality where the standards are perfectly calibrated to make that distinction. As an initial matter, perfect calibration likely could never be achieved given the myriad influences on the interpretation and application of those standards in specific cases. In any event, it seems clear that, whatever the substance of the legal standards, stakeholders associate patents that meet those standards with good quality for the reason that they promote the efficient conduct of all who encounter them.

The PTO, for one, associates valid patent claims with good patent quality because issuing such claims is consistent with its institutional mission, and patentees prefer such claims because exclusionary rights attach to valid claims but not invalid ones. Moreover, the PTO, the courts, and the public prefer valid patents for the additional reason that rational persons accused of infringing them will not go to the expense of challenging their validity.¹⁹⁰ Accused infringers are less likely to pursue a challenge that they will surely lose than they are to quickly settle the case and spend any excess funds on research and development and other socially useful activities.¹⁹¹

Importantly, these behavioral predictions assume that a patent's validity can be observed. In reality, however, a patent's validity can never be certain. That is because a claim's presumption of validity can be challenged, and such challenges are in fact frequently successful.¹⁹² There are a number of rules that contribute to this outcome. For one, courts

189. Pauline Newman, Panel Contribution, *in Adams*, *supra* note 4, at 62.

190. *See supra* note 164 (describing the high costs of patent litigation).

191. On the other hand, rational owners of invalid claims will not press them in an adversarial proceeding but instead will attempt to license the claims at a cost that is lower than anticipated litigation expenses. *See* David L. Schwartz, *The Rise of Contingent Fee Representation in Patent Litigation*, 64 ALA. L. REV. 335, 370–71 (2012) (describing this well-known (and much-maligned) tactic of certain nonpracticing entities). Rational persons accused of infringing an invalid patent claim will accept this deal, albeit unhappily, because it makes economic sense to do so. *See* Lemley & Shapiro, *supra* note 181, at 88–89. In addition, there is a public good problem that discourages persons accused of infringing a patent claim from challenging it in court: rivals will benefit from a finding that the claim is invalid but will pay nothing to obtain that benefit. *See id.* at 88–90.

192. *See supra* note 25 and accompanying text.

determine validity from the perspective of the person having ordinary skill in the art (known as the PHOSITA), and unlike any real person, the PHOSITA is endowed with knowledge of all relevant technology, known as “prior art” references.¹⁹³ In practice, the determination of the relevant art in which the PHOSITA is deemed to have ordinary skill is relatively fluid and therefore subject to manipulation.¹⁹⁴ Moreover, the universe of prior art can be broadly construed to include publications that are known by only a few persons in the world.¹⁹⁵ Defendants have every incentive to unearth such references and argue for their inclusion in the universe of relevant prior art.¹⁹⁶ Further, new defendants are not collaterally estopped from attacking a patent claim’s validity,¹⁹⁷ and because historical information about the state of the art is continuously surfacing,¹⁹⁸ new defendants may be successful in invalidating claims where others had failed.

As a result of these rules, the validity of patent claims is never truly final.¹⁹⁹ It is therefore less accurate to refer to a claim as valid or invalid than it is to refer to a claim’s probability of being held valid or not if challenged.²⁰⁰

But is it even possible to calculate a particular claim’s probability of validity? Anecdotally, at least some members of the patent community assert that they can identify when a patent claim is particularly strong,²⁰¹ and scholars routinely assume that the validity of some claims is self-evident.²⁰² This commentary suggests that at least some claims are being

193. Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155, 1188 (2002).

194. *See id.* at 1189 (“[T]he parameters of the art are subject to fluctuation, and thus so is the size and depth of the library of references with which the PHOSITA is presumed to be familiar.”).

195. *See In re Hall*, 781 F.2d 897 (Fed. Cir. 1986).

196. At least some members of the patent bar believe that developing such proof is only a matter of time and resources. *Cf.* Schwartz, *supra* note 191, at 371 (quoting a plaintiffs’ lawyer’s explanation that “[t]he more a patent is litigated, it tends to decrease in value as people come up with better prior art or over-analyze the thing”).

197. This is the rule of nonmutual issue preclusion announced in *Blonder-Tongue Laboratories, Inc. v. University of Illinois Foundation*, 402 U.S. 313 (1971).

198. *See* Lichtman & Lemley, *supra* note 46, at 55 (explaining that objective evidence of validity issues like obviousness come to light over time).

199. Lemley & Shapiro, *supra* note 181, at 75 (asserting that a patent right is not a guarantee of a right of exclusion but rather is a legal right to try to exclude).

200. *Cf.* Graf, *supra* note 9, at 499–500 (noting that some commentators define patent quality not in terms of validity but rather in terms of *certainty* of validity).

201. *See, e.g.*, Russ Krajec, *Can Patent Quality Be Measured?*, ANYTHING UNDER THE SUN MADE BY MAN, <http://www.krajec.com/blog/can-patent-quality-be-measured> (last visited Apr. 26, 2014) (stating that most patent prosecutors claim that they know good patent quality when they see it and that some are “really good, and some not so good”). It is fair to assume, however, that such assessments are made without regard to invalidating “secret” prior art.

202. *See, e.g.*, Lichtman & Lemley, *supra* note 46, at 58 (asserting that a “clearly valid” patent does not much benefit from a validity presumption); Jonathan Masur, *Patent Inflation*, 121 YALE L.J. 470, 514 (2011) (explaining that “obviously” valid and invalid patents are usually settled before trial); Note, *Recovery in Patent Infringement Suits*, 60 COLUM. L. REV. 840, 856 (1960) (stating the desirability of deterring infringement of “obviously valid” patents).

identified as probably valid as a matter of course. Recently, empirical studies have sought to identify ways to validate these intuitive judgments.²⁰³ As more data is gathered and studies are performed, it may soon become possible to calculate a patent's probable validity with some degree of accuracy.²⁰⁴

B. Clarity

The second quality dimension is patent clarity. The correct interpretation of patents is a notoriously difficult task given, among other things, the inherent impossibility of words to describe things,²⁰⁵ the technical jargon and "patent-ese" that infuse patents,²⁰⁶ and the patentee's lexicographical right to invent new words and provide new definitions for existing words.²⁰⁷ And the task is made no easier by the lack of a stable analytic framework to guide judges in the claim construction process.²⁰⁸ Consequently, it is not uncommon for a court's construction of claim terms to be reversed when appealed to the Federal Circuit. One study found that 38 percent of district court cases appealed between 1996 and 2007 included at least one wrongly construed term.²⁰⁹

Although some of the problems associated with claim construction are unavoidable, a patent can do a better or worse job of describing its underlying invention. This *avoidable* ambiguity makes it difficult for readers of a patent to understand the invention and reliably predict whether the PTO, the courts, and third parties will take a similar view of the meaning of claim terms.

The patent statute includes a patentability condition known as the definiteness requirement that is intended to ensure a minimum level of clarity for all patents.²¹⁰ The definiteness requirement provides that claims must "particularly point[] out and distinctly claim[] the subject matter

203. One such study, for example, found that certain prosecution events and facial features of patents, including the degree of match between a patent's specification and its claims, are strongly correlated with validity rulings. See Mann & Underweiser, *supra* note 1, at 29–30.

204. These calculations, however, must necessarily include a discount for those legal rules that allow patents to be invalidated for unpredictable reasons, such as the unearthing of obscure prior art. See *In re Hall*, 781 F.2d 897, 898 (Fed. Cir. 1986).

205. See *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 397 (Ct. Cl. 1967) (stating that converting physical inventions to words "allows for unintended idea gaps which cannot be satisfactorily filled," because the invention is new and words do not yet exist to describe it).

206. Richard P. Beem, *The Abraham Lincoln School of Patent Litigation*, 19 PRAC. LITIGATOR, May 2008, at 59, 62 ("Do patents really need to be translated into plain English? . . . Perhaps no other practice has incurred the wrath of the courts so much as the use of complicated technical language, or 'patentese.'").

207. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

208. Lichtman & Lemley, *supra* note 46, at 57 (explaining that the interpretive rules under which patent claims are analyzed are "constantly in flux").

209. See David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 240 (2008).

210. 35 U.S.C. § 112(b) (2012).

which the inventor or a joint inventor regards as the invention.”²¹¹ A patent claim is sufficiently definite so long as it is capable of interpretation, even though the conclusion may be one over which reasonable persons disagree.²¹² It is only the “insolubly ambiguous” claim that will be held indefinite.²¹³ Applying these rules, claims are invalidated for indefiniteness in only the most egregious circumstances, such as where the meaning of a term depends entirely on a person’s subjective opinion.²¹⁴ Because the definiteness requirement sets a low bar, the dimension of clarity refers to clarity exceeding what is currently required by the definiteness standards of patentability.

Unlike the dimension of validity, the interests of stakeholders are not aligned on the dimension of clarity. While patentees do not prefer patents that are particularly explicit,²¹⁵ the PTO, the courts, and the public associate patent clarity with good quality because unambiguous patents are more easily construed than ambiguous ones. Unambiguous patents also promote a purpose of the patent system: to promote the disclosure of innovation.²¹⁶ A patent’s disclosure is incomplete and cannot induce further innovation where those in the relevant technical fields cannot understand it. Ambiguous patents also fail to inform others of their protected boundaries. As a result, third parties may invest in working within those boundaries, which is unlawful and also potentially wasteful, or decline to invest in working near but outside of those boundaries under the mistaken belief that the area is protected.²¹⁷ Further, those who may wish to practice the invention are unable to make informed decisions about whether to license or purchase it, file a declaratory judgment action seeking to invalidate it, or roll the dice with a lawsuit and infringe it. And those who wish to avoid

211. *Id.*

212. *Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1370–71 (Fed. Cir. 2004) (interpreting the term “surrender value protected investment credits,” which was not defined in the patent or in any industry publication, to be synonymous with “stable value protected investment credits,” even though the patent used the different terms in different ways that suggested they had different meanings, and ultimately holding the claim sufficiently definite (emphasis added)), *rev’d on other grounds sub nom.* *Bancorp Servs., L.L.C. v. Sun Life Assurance Co. of Can.*, 687 F.3d 1266 (Fed. Cir. 2012).

213. *Id.* Where the question of indefiniteness is a close one, it is resolved in favor of validity. *See id.* (citing *Exxon Research & Eng’g Co. v. United States*, 265 F.3d 1371, 1380 (2001)).

214. For instance, the Federal Circuit has invalidated for indefiniteness a claim using the term “aesthetically pleasing,” which the court viewed as “completely dependent on a person’s subjective opinion.” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1350 (Fed. Cir. 2005). Claims using terms such as “substantially” and “close to,” however, are routinely upheld as definite. *See Andrew Corp. v. Gabriel Elec., Inc.*, 847 F.2d 819, 821 (Fed. Cir. 1988).

215. *See supra* notes 165–67 and accompanying text.

216. *See Brenner v. Manson*, 383 U.S. 519, 533 (1966) (“It is true, of course, that one of the purposes of the patent system is to encourage dissemination of information concerning discoveries and inventions.”).

217. *See* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 278 (1977) (explaining that patents allow competitors to inform each other of their innovations, thus reducing duplicative investment in work already done).

practicing the invention cannot make informed decisions about how to work around it.²¹⁸

C. Faithfulness

Closely related to the dimension of clarity is faithfulness. The claims of a patent are analogous to the “metes and bounds” of a real property deed that “distinguish the inventor’s intellectual property from the surrounding terrain.”²¹⁹ In this way, the “claims establish a “conceptual perimeter around the invention.”²²⁰ This conceptual perimeter is known as claim scope.²²¹

A patent’s faithfulness refers to whether its claims completely and accurately describe—or are “faithful” to—the scope of the underlying invention. A faithful claim is congruent with the scope of its underlying invention. An unfaithful claim, on the other hand, captures something more, less, or different than what was actually invented. So described, the faithfulness dimension encompasses three problematic scenarios: overbroad scope, overnarrow scope, and otherwise inaccurate scope.

Claims that are overbroad assert rights to something more than what was actually invented. An example of overclaiming can be found in *In re Wright*,²²² which involved a claim on a vaccine on all pathogenic RNA viruses, where the only invention disclosed in the patent was a vaccine that conferred immunity in chickens against one type of RNA tumor virus.²²³ It is fundamental to American patent law that there is no patent protection for something that was not invented.²²⁴ This prohibition is reflected in multiple patent law doctrines, including the enablement and written description requirements of patentability. These requirements focus on a patent’s specification, which is considered relevant to claim scope as a result of the maxim that a PHOSITA is deemed to read claims in the context of the entire patent.²²⁵ The enablement doctrine requires that the specification describe “the manner and process of making and using” the disclosed

218. To work around a patent is to “achieve the technological benefits of the patent without duplicating the particular steps constituting it and thus without infringement.” WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 295 (2003).

219. Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 845 (1990).

220. Timothy Chen Saulsbury, *Pioneers Versus Improvers: Enabling Optimal Patent Claim Scope*, 16 MICH. TELECOMM. & TECH. L. REV. 439, 445 (2010).

221. *Id.*

222. 999 F.2d 1557 (Fed. Cir. 1993).

223. *Id.* at 1560–62.

224. U.S. CONST. art. I, § 8, cl. 8 (empowering Congress to grant patent rights to inventors); 35 U.S.C. § 101 (2012) (limiting the grant of patent rights to those who are inventors); Joshua D. Sarnoff, *Abolishing the Doctrine of Equivalents and Claiming the Future After Festo*, 19 BERKELEY TECH. L.J. 1157, 1178 (2004) (“It is fundamental to American patent law that patentees are not entitled to protection for what they either did not invent or did not disclose to the public.”).

225. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313–14 (Fed. Cir. 2005).

invention.²²⁶ The written description doctrine requires that the specification allow PHOSITAs to recognize that the inventor invented what is claimed.²²⁷

In practice, neither doctrine has managed to eliminate the problem of overbroad claims. The enablement doctrine has traditionally been limited to the so-called unpredictable arts—e.g., life sciences and chemicals.²²⁸ Meanwhile, the written description requirement has traditionally been limited to preventing late claiming of new matter.²²⁹ In any event, as explained by one scholar, both doctrines are “confusing and badly fractured.”²³⁰ As a result, traditional scope-limiting patent doctrines and practices are unable to reach every instance of overclaiming. Moreover, they only come into play when a claim is challenged.²³¹

While the problems of overbroad claims are well documented, those associated with underclaiming and otherwise inaccurate claiming generally receive less attention. But that was not always the case. Indeed, the practice of underclaiming and erroneous claiming by unscrupulous patent prosecutors was a source of intense public concern in the late 1800s and early 1900s.²³² And it was partly in response to the perceived proliferation of these kinds of patents that Congress and the PTO established a regulatory system—unique in all of administrative law—that restricts who may prosecute patents.²³³

Although this regulatory system helped curb the most egregious professional abuses, mistakes persist. An example of erroneous underclaiming²³⁴ is the case of *Immunocept, LLC v. Fulbright & Jaworski, LLP*,²³⁵ which involved an extra limitation in a claim that rendered it so narrow as to be practically worthless.²³⁶ Mistakes of otherwise inaccurate claiming also occur. An example is the case of *Chef America, Inc. v. Lamb-*

226. 35 U.S.C. § 112(a).

227. *Id.* (requiring a written description); *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (interpreting the statutory requirement).

228. *See* Bernard Chao, *The Infringement Continuum*, 35 CARDOZO L. REV. (forthcoming 2014).

229. *See id.* (manuscript at 19 n.83).

230. *Id.* (manuscript at 17).

231. *See* Lemley, *supra* note 10, at 1501 (estimating that roughly 2 percent of all patents are ever litigated, and less than two-tenths of 1 percent of all issued patents actually go to court).

232. *See* Guerrini, *supra* note 157, at 332–37 (2012) (describing the growing chorus of disapproval of prosecution practices that were believed to rob inventors of the full scope of the patent rights to which they were entitled); Kara W. Swanson, *The Emergence of the Professional Patent Practitioner*, 50 TECH. & CULTURE 519, 529–30 (2009) (same).

233. *See* Guerrini, *supra* note 157, at 331–38.

234. To be clear, the attribute of underbreadth described in this Article is limited to instances of unintentional underclaiming. It does not address instances of intentional underclaiming. *See* Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523, 556 (2010) (explaining that some patentees intentionally underclaim in order to dedicate subject matter to the public).

235. 504 F.3d 1281 (Fed. Cir. 2007).

236. Specifically, the claim at issue described the invention as “consisting of” certain elements, where “consisting of” in patent law means limited only to these elements, although the invention was not in fact limited to those elements. *See id.* at 1283.

Weston, Inc.,²³⁷ which involved a claim for producing a light and flaky crust.²³⁸ The claim mistakenly required heating the dough, rather than the oven, to a temperature of 400°F to 850°F, which would have caused the dough to burn to a crisp.²³⁹

Procedures exist to correct errors of underclaiming and inaccurate claiming. For one, patentees may broaden overnarrow claims during reissue proceedings at the PTO.²⁴⁰ However, broadening reissues must be sought within two years of the grant of the patent,²⁴¹ and reissued material is effective in some cases only as to causes of action arising after the reissuance date.²⁴² Minor drafting mistakes may be corrected via certificates of correction, but a correction certification also has a delayed effective date.²⁴³ Otherwise, the mismatch between claim scope and invention scope can be corrected through judicial claim construction.²⁴⁴ But the courts are not always so helpful when they interpret claims.²⁴⁵

As with the clarity dimension, stakeholder interests are not aligned on the faithfulness dimension. Overbroad claims expand the scope of conduct that is deemed infringing, and so long as they avoid invalidating prior art and otherwise go unchallenged, patentees associate them with good patent quality.²⁴⁶ But patentees disfavor overnarrow and otherwise inaccurate claims because the rights that attach to them are less than or different from those that would attach to the true invention. Meanwhile, the PTO, the courts, and the public disfavor all instances where claim scope does not match the true scope of the underlying invention claims. Aside from the likely invalidity of such claims, these stakeholders would prefer to reduce

237. 358 F.3d 1371 (Fed. Cir. 2004).

238. *Id.* at 1372.

239. *Id.* at 1373–74.

240. 35 U.S.C. §§ 251–252 (2012). The proceeding is also available to narrow the scope of a claim as a result of overclaiming. *See id.*

241. *Id.* § 251(d). As illustrated in the *Immunocept* case, some errors of underclaiming are not identified within this two-year period and so remain uncorrected. *Immunocept*, 504 F.3d at 1283 (explaining that the patent issued in 1996, but the drafting error was not discovered until 2002, long after the two-year window had closed).

242. 35 U.S.C. § 252 (providing that a reissued patent can be enforced against infringing activity that occurred from the time the original patent was issued only if the claims of the original and reissue patents are “substantially identical”). Moreover, persons who practice the reissued patent may have intervening rights that are a defense to patent infringement. *See id.* (codifying the defenses of absolute and equitable intervening rights).

243. 35 U.S.C. § 255 (providing that the corrected patent is effective only as to causes of action arising after the correction). For causes of action arising before that date, the patent must be considered without the benefit of the correction. *Novo Indus. v. Micro Molds Corp.*, 350 F.3d 1348, 1356 (Fed. Cir. 2003).

244. *See Menell et al.*, *supra* note 154, at 770–72 (describing courts’ authority to correct mistakes in patents through the claim construction process and providing examples).

245. *See, e.g.*, *Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1374–75 (Fed. Cir. 2004) (construing a claim for producing a light and flaky crust that required heating the dough “to a temperature in the range of about 400°F to 850°F” to refer to dough temperature rather than oven temperature even though that construction produced the nonsensical result that the dough would be burned to a crisp (emphasis omitted)).

246. *See generally* Yelderman, *supra* note 169.

the instances in which patentees call upon the PTO and courts to correct scope issues and adjudicate malpractice disputes.

Further, the public has agreed to give patentees rights of exclusion to exactly—and only—what was actually invented. Overbroad claims exclude the public from technological spaces in which they otherwise might freely be able to move. Overbroad claims also can have a chilling effect on those who would otherwise be inclined to investigate related forms of the invention that the patentee did not actually invent.²⁴⁷ Overnarrow and otherwise inaccurate claims, on the other hand, cheat the patentee of certain rights of exclusion to which she is entitled, which is demoralizing and may discourage her from innovating in the future or from disclosing her inventions to the public.

D. Social Utility

Moving from the patent document to its underlying invention, the fourth dimension is the social utility of the invention. There are two general sources of social utility: the nature of the invention and the technological progress represented by the invention. The nature of an invention can be such that its social utility is obvious; the discovery of a cure for a life-threatening disease that afflicts a large population, for example, is clearly beneficial to society. The social utility of other inventions, however, is more elusive; the patent on eyeglasses that attach to eyebrow piercings comes to mind.²⁴⁸

Distinct from the nature of an invention is the technological progress that it represents. “The patent system is a regime of technological evaluation”;²⁴⁹ that evaluation can and often does include a judgment that the invention described in a patent represents a revolutionary technological advance or, as is usually the case, a modest improvement over the existing technology.²⁵⁰ Such inventions are called, respectively, pioneers and improvements.²⁵¹ Frequently cited examples of pioneer inventions are the sewing machine invented by Elias Howe, Jr., the electrical telegraph invented by Samuel Morse, and the telephone invented by Alexander Graham Bell.²⁵²

There is a general consensus that pioneer inventions are crucial to the sort of technological advance that the patent system is designed to encourage. Because pioneer inventions have the most significant impact on society, “[t]hey are the inventions with which we are most familiar, and those we

247. Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 158 (2006).

248. U.S. Patent No. 6,557,994 B1 (filed July 18, 2002).

249. John R. Thomas, *The Question Concerning Patent Law and Pioneer Inventions*, 10 HIGH TECH. L.J. 35, 36 (1995).

250. *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 561–62 (1898) (defining a pioneer patent as one “covering a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what had gone before”).

251. Brian J. Love, *Interring the Pioneer Invention Doctrine*, 90 N.C. L. REV. 379, 393 (2012).

252. *Westinghouse*, 170 U.S. at 562.

care most about.”²⁵³ In other words, pioneer inventions have outsized social utility.

All patented inventions must have some utility in order to satisfy the utility standard of patentability,²⁵⁴ but the bar set by that standard is exceptionally low.²⁵⁵ All patented inventions must also be nonobvious, but the bar set by that standard also can be low and, according to some, is not consistently applied.²⁵⁶ A patented pioneer invention’s usefulness to society far exceeds what is required by law, and for this reason, the public associates it with good patent quality.²⁵⁷

While the PTO and courts may be neutral with respect to utility derived solely from the nature of an invention since that utility does not necessarily impact their functions, patentees associate patents on socially important inventions with good patent quality to the extent that they translate into money or power in the marketplace. With respect to utility derived from an invention’s technological progress, the opinions of these stakeholders may be stronger. With pioneer inventions, there is little to no prior art that must be avoided and so patents on them are typically broad in scope.²⁵⁸ Patentees therefore associate such patented inventions with good patent quality because they allow for greater operational freedom and competitive leverage than do typical improvement patents. Relatedly, the PTO and the courts may favor pioneer inventions because validity issues relating to patents on these inventions may take less time and resources to resolve, as there are fewer prior art references to consider.²⁵⁹ On the other hand,

253. Thomas, *supra* note 249, at 37.

254. 35 U.S.C. § 101 (2012) (requiring patented inventions to be “useful”).

255. That standard requires patented inventions to “operate as described and potentially provide some de minimis public benefit.” See Risch, *supra* note 180, at 58.

256. See, e.g., Gregory N. Mandel, *Another Missed Opportunity: The Supreme Court’s Failure To Define Nonobviousness or Combat Hindsight Bias in KSR v. Teleflex*, 12 LEWIS & CLARK L. REV. 323, 324 (2008) (explaining that obviousness decisions are “inconsistent and unpredictable”); Gregory R. Baden, Note, *Third-Party Assistance in Determining Obviousness*, 89 TEX. L. REV. 1203, 1213–14 (2011) (proposing a third-party obviousness specialist to bring greater consistency to the obviousness determination).

257. There is, however, some disagreement as to the proper scope of patent rights that should attach to pioneer inventions. Robert Merges and Richard Nelson have argued that in many industries, the efficiency gains from granting broad patent protection to pioneer inventions are likely outweighed by the loss of competition for improvements of those inventions. Merges & Nelson, *supra* note 219, at 843–44. The patent laws should therefore “attempt at the margin to favor a competitive environment for improvements.” *Id.* at 843. Other scholars have argued that expanding the scope of protection afforded to patents on pioneer inventions is appropriate given, among other things, the steep refinement costs and high risks associated with such inventions. See Love, *supra* note 251, at 405.

258. See *Augustine Med., Inc. v. Gaymar Indus.*, 181 F.3d 1291, 1301 (Fed. Cir. 1999) (“[P]ioneers acquire broader claims than non-pioneers who must craft narrow claims to evade the strictures of a crowded art field.”); Love, *supra* note 251, at 417 (explaining that pioneer inventions can be claimed using broad language, because they “open up new fields in which little or no prior art exists”).

259. Cf. Love, *supra* note 251, at 426–27 (explaining the claim that the PTO is unlikely to reject applications on pioneer invention claims on grounds of validity because there are so few prior art patents to consider).

because the field being described is entirely new, it may be more difficult to interpret such patents.²⁶⁰

E. Commercial Success

Inventions can have commercial value distinct from their social utility. For example, an invention that is selected as an industry standard may have a commercial value that far exceeds its technological achievement. In the setting of industry standards, there are usually alternatives from which to choose, although the technological differences between them may be insignificant.²⁶¹ Yet the selected solution will have much greater commercial value than the rejected solutions by virtue of its identification as the standard. And if that solution is patented, the patentee will be able to extract supranormal royalties from industry participants who seek to—indeed, must—use it.²⁶²

Conversely, a new orphan drug to treat a rare medical disease may be extraordinarily valuable to those affected by the disease. But by virtue of the small size of that population, such drugs will in many cases be unprofitable in the absence of government intervention.²⁶³ On the other end of the spectrum are inventions that have no market at all. The once-patented “beerbrella” to shade one’s cold beverage on a sunny day, for instance, is an oft-cited example of an invention having no commercial viability.²⁶⁴ Notably, the beerbrella may exemplify the rule rather than the exception; 50 percent or more of all patented inventions in the United States are likely never commercially exploited.²⁶⁵

There is currently no requirement in patent law that a patented invention be commercially significant. To the contrary, the patent system embraces the fact that some patented inventions will have no commercial value by, among other things, encouraging the early filing of patents before a market

260. See *id.* at 410–11 (explaining the PTO’s potential difficulty in understanding pioneer inventions due to the limitations of language in describing something that is entirely new).

261. Patrick J. Flinn, *Why FRAND Matters*, 25 INTELL. PROP. & TECH. L.J. 8, 9 (2013).

262. See *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 310 (3d Cir. 2007).

263. The Orphan Drug Act of 1983 incentivizes the development of orphan drugs. See Orphan Drug Act, Pub. L. No. 97-414, 96 Stat. 2049 (1983) (codified in scattered sections of 21, 26, 35, and 42 U.S.C.). Eligible drugs are those that treat any rare disease or condition that affects less than 200,000 persons in the United States or “for which there is no reasonable expectation that the cost of developing and making available in the United States a drug for such disease or condition will be recovered from sales in the United States of such drug.” 21 U.S.C. § 360bb(a)(2) (2012).

264. See, e.g., *Crazy Patents!*, FPO: IP RES. & COMMUNITIES, <http://www.freepatentsonline.com/crazy.html> (last visited Apr. 26, 2014) (citing the beerbrella patent, U.S. Patent No. 6,637,447 (filed Oct. 19, 2001), as an example of a “crazy” patent having minimal utility and no commercial viability). The invention has apparently never been commercialized even though the patent on it has long been expired. See *Patent Application Information Retrieval*, USPTO.GOV, <http://portal.uspto.gov/pair/PublicPair> (last visited Apr. 26, 2014) (select “Patent Number” under “Search for Application: Choose type of number;” then search “6,637,447”) (confirming that the patent expired due to nonpayment of maintenance fees).

265. Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 362–63 & nn.121–29 (2001).

for their inventions has been identified.²⁶⁶ To the extent that an invention is a commercial success because of the technological leap that it represents, stakeholders associate this dimension with good patent quality for the same reasons described in the preceding subsection. But it is unclear whether the PTO, courts, and society prefer commercially successful inventions that represent much more modest technological improvements, such as inventions described in some standards essential patents.

Patentees highly value patents on commercially successful inventions regardless of the magnitude of their contributions to society. All patent claims have value by virtue of the legal rights that attach to them, and that value can be exploited in various ways. But patents on inventions that create or enhance consumer demand or provide a supply-side benefit, such as reducing manufacturing costs, are that much more valuable to their owners and therefore likely to be associated with good patent quality because others will likely want to practice those inventions. Patentees can turn that demand into dollars by licensing or selling the patents, using them offensively to limit competition, or using them defensively to buy operational freedom.

VI. IMPLICATIONS

The foregoing sections operationalize the concept of patent quality by framing it in terms of dimensions valued by stakeholders. This Part summarizes the implications of that work. Broadly, it demonstrates that the meaning of patent quality is far richer than most in the patent community previously have recognized. Going forward, commentators and policymakers are urged to be more thoughtful—as well as transparent—about their definitional choices.

More specifically, this Article describes a fundamentally different approach to patent quality's meaning that is essentially the inverse of the conventional way of thinking about the concept. This new approach puts “first things first” and asks what it means for a patent to be good quality without regard to the existing standards of patentability. Describing this new approach is the first step toward constructing a metric for patent quality that ultimately can be used to determine the extent of the so-called quality crisis, evaluate the success or failure of quality reforms, and think strategically about ways to improve quality.

A. *Inverting the Conventional Approach*

This Article concludes that a comprehensive definition of patent quality takes into account five dimensions of patents and the inventions they describe. Recall the basic formula for total patent quality (TQ) described in Part III.B:

$$TQ = (M_1)(D_1) + (M_2)(D_2) \dots$$

266. See 35 U.S.C. § 102 (awarding U.S. patents to those who are first to publicly disclose their inventions).

Incorporating the five quality dimensions into the basic formula results in the following:

$$TQ = (M_V)(V) + (M_C)(C) + (M_F)(F) + (M_{SU})(SU) + (M_{CS})(CS)$$

where V refers to a patent's probable validity, C refers to the patent's clarity, F refers to the patent's faithfulness to its underlying invention, SU refers to the invention's social utility, and CS refers to the invention's commercial success. The multiplier reflecting each dimension's relative importance is indicated by a unique variable M .

This understanding of the meaning of patent quality is a result of a definitional approach that is essentially the inverse of how many in the patent community define patent quality, which is solely in terms of conformance with legal standards. A fundamental problem with the conventional approach is that it relies on circular reasoning: it concludes that a good patent is one that is legally valid because a legally valid patent is good quality. It does not consider the question of whether the legal standards of patentability are—or even can be—themselves calibrated and applied to reflect good patent quality in the first place.

As described in Part III.A, commercial product specifications can be analogized to the legal standards of patentability in that both dictate acceptable design parameters. As the business sector discovered some decades ago, a quality judgment based solely on conformance to specifications will not always be accurate. A product can perfectly conform to specs, yet it may still be bad quality if the specifications are poorly designed.²⁶⁷ For this reason, firms have invested heavily in calibrating their products' specifications to better achieve the desired quality outcomes.²⁶⁸

It is time for the way the patent community thinks about the relationship between patent quality and legal standards to similarly evolve. A definition of patent quality that is focused only on compliance with legal standards is limited and potentially irrelevant because it relies on the assumption that those standards are calibrated and being applied to reflect good patent quality. More than a few members of the patent community doubt that they are. Some have argued, for example, that the definiteness standard is not set where it should be,²⁶⁹ while others contend that the obviousness standard is inconsistently applied.²⁷⁰ That these are problems in the patent system is well known. That they are, fundamentally, patent quality problems is not yet fully appreciated.

267. See Forker, *supra* note 85, at 73 (explaining Taguchi's insight that if an original product design does not account for environmental, manufacturing, and consumer usage stresses, the finished product may not perform well or reliably).

268. See, e.g., FRANK R. KARDES ET AL., CONSUMER BEHAVIOR 12 (2011) (explaining that Proctor & Gamble spends millions to determine consumer needs and design products that respond to them).

269. See, e.g., FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 94–100 (2011) (criticizing the Federal Circuit's "insolubly ambiguous" standard for definiteness and urging its adoption of a more stringent standard in order to improve notice to the public).

270. See *supra* note 256 and accompanying text.

The approach followed here puts “first things first” and asks what it means for a patent to be good quality without regard to the substance of the validity standards. This allows for a deeper inquiry into the definition that is not artificially bounded by those standards. It also has the effect of redirecting the policy focus from a narrow one of increasing the number of probably valid patents to the more relevant one of increasing the number of good-quality patents.

For Congress, the PTO, and others interested in increasing U.S. patent quality, following this new approach will mean developing and implementing policy proposals *in addition to* those intended to increase a patent’s probability of being held valid if challenged. Proposals that increase patents’ probability of validity include giving patent applicants the option of “gold-plating” their patents by subjecting their applications to rigorous examination.²⁷¹ Applications that survive this heightened review process would be accorded a strong presumption of validity, meaning that courts would not be allowed to second-guess decisions based on prior art reviewed by the examiner or to consider new prior art that is redundant.²⁷²

Implementing this proposal would have the effect of increasing performance along the probable validity dimension since patents that carry a greater presumption of validity—by definition—are more likely to be held valid if challenged. But a validity-focused proposal is not alone sufficient to increase patent quality. After all, patent quality that is defined solely in terms of probable validity could be maximized simply by adopting a rule that a patent’s validity can never be challenged. Few, however, likely would agree that adopting such a rule would improve the quality of U.S. patents.

Efforts to increase patent quality should therefore contemplate maximizing patent performance along the other four quality dimensions. An obvious way to do so is by amending the standards of patentability. For instance, Congress might change the statutory language describing the definiteness standard to require greater clarity than is currently required.²⁷³ But it may be more efficient to increase patent performance along the clarity dimension through the manipulation of other policy levers. Alternative policy levers include, for example, requiring PTO examiners to record how the boundaries of patented property are refined during the process of examination,²⁷⁴ and requiring patent applicants to use standardized claim templates, provide glossaries of terms, and designate

271. See Lichtman & Lemley, *supra* note 46, at 61–62.

272. *Id.* at 62. Another policy proposal that increases patents’ probability of validity is giving deference to tribunals’ prior validity decisions. According to this proposal, if a claim is found valid in the context of litigation or an adversarial post-grant agency proceeding, tribunals who later find themselves in the position of assessing the validity of the same claim should place a heavy thumb on the scale in favor of validity. See *id.* at 63–65.

273. For example, the current statutory requirement that patent claims “particularly point[] out and distinctly claim[] the subject matter which the inventor or a joint inventor regards as the invention,” 35 U.S.C. § 112(b) (2012), might be amended to require patent claims to “unambiguously” point out and claim the invention.

274. See Petherbridge, *supra* note 27, at 189.

default dictionaries in their applications.²⁷⁵ This Article takes no position on the best way to optimize performance along the various quality dimensions. The point, rather, is that there are often ways to do so beyond recommending that Congress change the text of the standards or urging the courts to adopt a new interpretation of that text.

B. Pursuing Quality Strategically

The new definitional approach described here not only promotes informed policymaking, but it also promotes strategic policymaking. To maximize the effectiveness of any plans to improve patent quality, policymakers should follow the lead of business and adopt a strategic approach to quality improvement efforts. Depending on the circumstances, it may not be possible, necessary, or efficient to attempt to measure or optimize performance along every dimension. When this is the case, the rational reform strategy is to focus on improving performance along those quality dimensions that will result in the largest quality gains at the least cost.

Returning to the variables identified in Part III.B, one of the most efficient ways to maximize the impact of quality-improvement efforts is to focus on improving performance along dimensions having the largest multipliers. A second way is to focus on improving performance along dimensions that are positive reinforcers of other dimensions—preferably those having the largest multipliers.²⁷⁶ Conversely, an inefficient quality strategy is to focus on improving performance along dimensions having the smallest multipliers or that negatively reinforce other dimensions—especially those having large multipliers. To illustrate with a simple example, if the multiplier for the clarity dimension is significantly greater than the multiplier for the commercial success dimension, the efficient policy plan should focus on increasing the clarity of patents rather than ensuring the commercial success of the inventions they describe. And if improvement along the clarity dimension positively reinforces improvement along the commercial success dimension, there is even more reason to pursue this plan. Stated in management theory terms, efforts to improve patent quality as a whole should favor policies focused on improvement in the quality niche occupied by the clarity dimension over the quality niche occupied by the social utility dimension.

Admittedly, this analysis cannot be conducted without a clear understanding of the costs associated with pursuing quality along each dimension. But it is beyond the scope of this Article to attempt to quantify those costs. The aim here is to describe a systematic approach to the meaning of patent quality and to demonstrate that patent quality can and should be a strategic pursuit. It does not argue for or against any particular

275. Request for Comments on Preparation of Patent Applications, 78 Fed. Reg. 2960 (Jan. 15, 2013).

276. Garvin recognized the strategic importance of understanding these relationships with respect to product quality. Garvin, *supra* note 73, at 104 (explaining that “it is precisely this interplay” between quality dimensions that “makes strategic quality management possible”).

policy agenda. Going forward, however, it would be worthwhile to study the marginal costs and benefits of performing well along each quality dimension for the purpose of developing efficient strategies to increase overall patent quality.

CONCLUSION

This Article represents the first scholarly attempt to deconstruct the meaning of patent quality. It does so by using a methodology applied in the business literature of quality management. The implications of this work include a new appreciation for the multidimensional nature of the concept, a fundamental reorientation of policymaking efforts to focus on patent quality as defined by quality dimensions rather than validity standards, and a proposed formula for assessing patent quality that can be used to develop a strategic quality plan. Although several aspects of the analysis merit further study, including the costs of pursuing quality along each dimension, this Article lays the groundwork for that research, and in so doing, brings needed clarity and direction to the patent quality agenda.