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CALL FOR STANDARDIZATION IN PATENT CLAIM DRAFTING

Tao Zhang,[†] Daniel J. Sherwinter,[‡] & Dov Greenbaum[§]

The United States patent system has become a less favorable IP protection regime for inventors due to, among other factors, the widespread assertion of poor quality patents by patent assertion entities, a high percentage of invalidities by the USPTO PTAB under the new inter parties review system, and the resulting uncertainty in patent value and validity. Although a number of solutions have been suggested in the literature, only a truly transparent system will return the patent system to one that promotes invention and maintains U.S. leadership in innovation. Not only does the proposed tool described herein provide that transparency, it is also an effective tool in fighting patent trolls and raising the quality of patents. Employing artificial intelligence, natural language processing, and machine learning, the tool creates a patent system of standardized claim syntax and format and a patent system that promotes easy-to-understand, easy-to-parse and easy-to-assess patent claims.

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The views expressed herein are opinions of the authors and do not represent those of the authors' past or current employers.

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INTRODUCTION

The patent system has lost much of its luster as a mechanism for propelling innovation.[1] In particular, over the past few years, the U.S. patent system has become a significantly less favorable incentive pathway for inventors and innovators.[2] This is especially the case for disillusioned high-tech companies that have become frustrated with ever-expanding thickets of qualitatively poor patents[3] (particularly within the software space)[4] that are increasingly asserted by newly aggressive plaintiffs.[5]

Many of these plaintiffs are non-practicing entities ("NPEs"), arguably, a subset of patent assertion entities ("PAEs")—both colloquially known as trolls—who have forced new ground rules into the litigation game. According to at least one dataset, 20% of all patent litigation in 2017 was associated with plaintiffs that had acquired (i.e., not invented in-house, but rather purchased specifically to use offensively) the asserted patent.[6] Others have suggested that the numbers, while falling from prior years, may have been as high as 60%

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1.   *See* Mark A. Lemley, *Faith-Based Intellectual Property*, 62 UCLA L. REV. 1328 (2015).

2.   *See* Leonid Kravets, *Do Patents Really Matter to Startups?*, TECHCRUNCH (June 21, 2012), http://bit.do/Kravets_do-patents (noting that "[o]ne third of all funded companies have filed a patent application. 19% of all funded companies filed at least one patent application prior to receiving any funding [and] [s]ince 2005, the average start-up has become less likely to apply for patents than companies founded in the previous year."). *See also* Daniel Hoenig & Joachim Henkel, *Quality signals? The Role of Patents, Alliances, and Team Experience in Venture Capital Financing*, 44 RES. POL'Y, 1049 (2015) (Venture capital seems "to appreciate patents only in their productive functions as property rights, not as signals of technology quality."); Hanna Hottenrott, Bronwyn H. Hall & Dirk Czarnitzki, *Patents as Quality Signals? The Implications for Financing Constraints on R&D*, 25 ECON. INNOVATION & NEW TECH. 197, 217 (2016) ("[W]e find that the patent signaling effect does not seem to arise in larger firms and . . . that the effect on external financing tends to be driven by the mere presence of patents rather than observable ex post indicators of the value of those inventions.").

3.   *See* Ronald A. Cass, *Patent Litigants, Patent Quality, and Software: Lessons from the Smartphone Wars*, 16 MINN. J.L., SCI. & TECH. 1 (2015).

4.   *See generally* Arti K. Rai, *Improving (Software) Patent Quality Through the Administrative Process*, 51 HOUS. L. REV. 503 (2013); Colleen V. Chien, *Reforming Software Patents*, 50 HOUS. L. REV. 325 (2012) (Arguably, this could also be due to the reality that at the same time that patent thickets have been confounding freedom to operates assessments, the courts have been simultaneously confounding the ability to actually obtain new software patents.); *see also* Alice Corp. Pty. Ltd. v. CLS Bank Intern., 573 U.S. 189 (2014).

5.   Seemingly, the mutually-assured destruction that prevented large companies from suing other companies is no longer a strategy. *See, e.g.*, Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 34-35 (2005); Eli Dourado, *How Patent Privateers Have Eroded Mutually Assured Destruction in the Computer Industry*, THE ÜMLAUT (Oct. 2, 2013), http://bit.do/Dourado_patent-privateers.

6.   Shawn P. Miller et al., Introduction to the Stanford NPE Litigation Dataset, (Oct. 23, 2017) (unpublished manuscript).

in 2017.[7] Importantly, it is not just the number of patent cases, but also the way they are handled; NPEs are not hindered by the (former) reality that legal adversaries today may be business partners tomorrow, negating the need to play fair.[8]

What we can surmise is that, in many instances, NPEs have arguably asserted patents in irresponsible and often unpredictable ways that seem to serve only to shake down non-competitors.[9] This is in stark contrast to the litigation that occurred decades ago that aimed primarily to protect market share by preventing important and key innovations from being infringed by potential competitors.[10] Most of today's NPE plaintiffs do not have market share; they just assert their patent portfolios against any of the various stakeholders in the market. Notably, this phenomenon is now prevalent in other, non-U.S. jurisdictions as well.[11]

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7. Timothy Au, *U.S. Patent Litigation on Decline While PTAB Breaks Records and NPE Settlement Amounts Fall,* LEXOLOGY (Jan. 2, 2018), http://bit.do/Au_US-patent-litigation (perhaps reflecting changes in the law relating to venue).

8. Stefan Wagner, *Are 'Patent Thickets' Smothering Innovation?*, YALE INSIGHTS (Apr. 22, 2015), http://bit.do/Wagner_Patent-thickets. *See, e.g.*, John L. Turner, *Patent Thickets, Trolls and Unproductive Entrepreneurship* 5-6 (Sept. 2012) (unpublished manuscript) (on file with University of Georgia, Terry College of Business) (noting that "[a]mong non-NPE cases, the most highly represented technology class is Drugs & Medical, at about 26%. Among NPE lawsuits, however, less than 1% of lawsuits involve patents from this category. This suggests that the level of invention in this industry is below the level needed to induce widespread troll behavior. On the other hand, more than 77% of NPE cases involve Computers & Communications patents, compared to about 22% in non-NPE cases. Here, troll behavior appears to be flourishing."). *But cf.* Robin Feldman, Tom Ewing, & Sara Jeruss, *The AIA 500 Expanded: The Effects Of Patent Monetization Entities*, 17 UCLA J.L. & TECH. 110-11 (2013) ("The study can tell us that there is a lot of patent litigation being filed by monetizers, that the amount has increased rapidly over the last five years, and that it appears to be continuing to increase. The study cannot identify the reasons for the increase in monetization, determine whether the level of litigation by patent monetizers is problematic, and if so, identify the solutions to that problem.").

9. David L. Schwartz & Jay P. Kesan, *Analyzing the Role of Non-Practicing Entities in the Patent System*, 99 CORNELL L. REV. 425, 455 (2013) ("The bigger picture, and the better question, is whether the lawsuits are being brought because the defendants are infringers of a valid patent or whether the defendants are merely easy targets for a nuisance law-suit."). *See also* Eon-Net LP v. Flagstar Bancorp, 653 F.3d 1314, 1326-27 (9th Cir. 2011) (In particular, the district court found that Eon-Net's case against Flagstar had 'indicia of extortion' because it was part of Eon-Net's history of filing nearly identical patent infringement complaints against a plethora of diverse defendants, where Eon-Net followed each filing with a demand for a quick settlement at a price far lower than the cost to defend the litigation. The record supports the district court's finding that Eon-Net acted in bad faith by exploiting the high cost to defend complex litigation to extract a nuisance value settlement from Flagstar.").

10. *See, e.g.*, Edward Lee, *Patent Trolls: Moral Panics, Motions in Limine, and Patent Reform*, 19 STAN. TECH. L. REV. 113 (2015) (detailing both academic supporters and opponents of NPEs).

11. *The Rise of Non-Practicing Entity (NPE) Cases Outside the United States*, DARTS-IP http://bit.do/Darts-ip_Rise-NPE; Michael Platzöder, *NPE Patent Litigation in Germany: Recent Trends and Strategies,* LEXOLOGY, (Oct. 12, 2016) (noting that while "[t]raditionally, patent litigation initiated by non-practising entities (NPE) has focused predominantly on the U.S.

These assertions lead to, among other externalities, uncertainty in patent value, an erosion of protectable patent rights, a cheapening (not in actual dollars, but in its relevance) of the patent litigation process, and growing impediments to research and entrepreneurial efforts due to actual or threatened excessive lawsuits and their resulting high litigation costs.[12] As a result, there is mounting sentiment among those various stakeholders at greatest risk of falling prey to NPEs that the patent system has failed inventors, and now hinders innovation.[13] Many companies, especially cash-strapped startups, are appreciably cutting back, or even foregoing, patenting altogether (seeing them as primarily a negative tool), or looking to operate in areas where patent enforcement is weak and the threat of speculative litigation by NPEs is less.[14]

Again, this is not how things once were: patents are intended to promote innovation. Optimally, a patent should provide a limited monopoly to an innovator as a quid pro quo for disclosing their innovations to the public.[15] In an effort to balance further follow-on innovation and the innovation associated with the patent itself, patent systems were designed to cabin the scope of that limited monopoly (i.e., the extent of the collective patent rights) to the specific claims within the patents; everything else however was fair game. Like the aforementioned destructive NPE litigation, this bargain between patent owners and the public has become less helpful in promoting innovation or protecting legitimate monopolies. Patents have evolved such that their now often-opaque claim language is explicitly designed to, and successfully used to, exceed this quid pro quo by allowing patentees to *post facto* grab more than they actually disclosed.[16] This is a reality that is especially exploited by NPEs.

market," there is now a shift to other markets due to changes in the U.S. patent system.).

12.   Catherine E. Tucker et al., *The Effect of Patent Litigation and Patent Assertion Entities on Entrepreneurial Activity*, 45 RES. POL'Y, 218, 231 (2016); Seokbeom Kwon & Kazuyuki Motohashi, *Effect of Non-Practicing Entities on Innovation Society and Policy: An Agent Based Model and Simulation*, IAM DISCUSSION PAPER SERIES #033 ("Our result concludes that the negative effects of NPEs are likely to outweigh their potential benefits.").

13.   Turner, *supra* note 8; *Time to Fix Patents*, ECONOMIST (Aug. 8, 2015), http://bit.do/TimetoFixPatents.

14.   Yongwook Paik & Feng Zhu, *The Impact of Patent Wars on Firm Strategy: Evidence from the Global Smartphone Industry*, 27 ORG. SCI. 1397, 1399 (2016).

15.   *See* Jacob Adam Schroeder, *Written Description: Protecting the Quid Pro Quo Since 1793*, 21 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 63 (2010).

16.   *See, e.g.*, Eon-Net LP v. Flagstar Bancorp, 653 F.3d 1314 (Fed. Cir. 2011) (where the plaintiffs claimed their patent read on essentially all e-commerce). *See also id.* at 1325 ("Moreover, Eon-Net's failure to engage the claim construction process in good faith was only one of many instances of misconduct detailed by the district court. The district court also found that Medina displayed a "lack of regard for the judicial system" and that Eon-Net and Medina had

NPEs exploit some particular characteristics of the modern patent. To wit: patent claims are, by common convention, inherently terse collections of words.[17] Arguably, patent claims are one of the most complex and difficult to interpret collections of words in the legal canon.[18] Which words are chosen to describe an invention, how those words are combined to form patent claims, and how those words are eventually defined (e.g., in context of a litigation and other judicial proceedings) will ultimately determine if a competitor's product infringes the granted patent or not.[19] Thus, part of the operating risk calculus of any firm that has good patent counsel will depend on the uncertainty surrounding how future legal arbitrators will define both its and its competitors' patents.

As such, the value of a patent is inextricably tied to its semantics. Given their inherent uncertainty, semantic ambiguities are especially valuable in the patent space where they can be leveraged to expand the scope of the patent monopoly beyond what might have been originally appreciated by the inventor, or to circumvent new developments in patent law.[20]

Stepping back, we are not equating talented patent wordsmiths with the bad actors associated with NPEs. This opaqueness is not necessarily nefarious, but rather a necessity of doing business, as changes in patent law are retroactive without grandfathering in already allowed patents. With both legal and technological innovations hanging as swords of Damocles above each patent, patent drafters have to be creative. Patents must be prosecuted today to be robust in light of unknowable statutory, regulatory, judicial, and technological changes tomorrow. Arguably, to not do so could be construed as malpractice.

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a "cavalier attitude" towards the "patent litigation process as a whole.").

17. Scripps Clinic & Research Found. v. Genentech, Inc., 927 F.2d 1565, 1580 (Fed. Cir. 1991).

18. Simon Mille & Leo Wanner, *Making Text Resources Accessible to the Reader: The Case of Patent Claims*, INT'L LANGUAGE RESOURCES & EVALUATION CONF. PROC. 1393, 1393 (2008).

19. *See, e.g.*, Shawn P. Miller, *"Fuzzy" Software Patent Boundaries and High Claim Construction Reversal Rates*, 17 STAN. TECH. L. REV. 809, 811 (2014) (citing JAMES BESSEN ET AL., PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 141 (2008)) (Noting that "owners and producers cannot be certain of the legal scope of any patent until the Federal Circuit has spoken.").

20. For example, via the doctrine of equivalents. *See, e.g.*, Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605 (1950); Warner-Jenkinson Co. v. Hilton Davis Chem. Co*.,* 520 U.S. 17, 36 (1997); Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 234 F.3d 558, 619 (Fed. Cir. 2000) ("A primary justification for the [doctrine of equivalents] is to accommodate after-arising technology. Without the [doctrine of equivalents]**,** any claim drafted in current technological terms could be easily circumvented after the advent of an advance in technology."); *see also* Timothy R. Holbrook, *Equivalency and Patent Law's Possession Paradox*, 23 HARV. J.L. & TECH. 1, 36-37 (2009) (outlining the fairness justifications for the doctrine of equivalents).

However, these realities also make novelty point identification, prior art searches, and patent comparison difficult or even unfeasible—and these factors are exploited by less-than-good actors.

For example, though the purpose of patent claims is to define the scope of an innovation, patent claims are typically written in a manner that is rife with obfuscation, full of subtle attempts to exploit or avoid legal precedent and future legal and technological uncertainty. Further confounding the system is the reality that most patents are drafted in highly inconsistent forms depending on the drafters, their clients, and myriad other factors, knowable and unknowable.

Professor Duffy highlights an ironic example as to how the current system dramatically fails to limit the negative externalities of these ambiguities. This is due to the nature of the courts to generally accept those ambiguities in patent claims.[21] Notably, the general acceptance of these ambiguities within the patent system and by its gatekeepers—the courts (further ironically, itself the result of inherently ambiguous legislation)[22]—are arguably a failure of the characteristic notice function[23] of patents.

But it gets worse: bad patent actors bask in those ambiguities[24] and in the imprecise terminology of many patents that lacks reasonable certainty to exploit those ambiguities beyond what normative patent law had accepted. These bad actors use those ambiguities to extract rents from any innovator that can be caught in their dragnets, taxing

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21.   John F. Duffy, *Counterproductive Notice in Literalistic versus Peripheral Claiming*, 96 B.U. L. REV. 1197, 1199 ("Spending vast resources to find a supposedly precise and correct interpretation of claims, only to have that interpretation lead to the invalidation of the claims, is not merely wasteful but also counterproductive. If there is a justification for spending millions of dollars during years of litigation to find the correct interpretation of a patent claim, that justification must be that such litigation might lead, in the future, to better and more certain notice of property rights") (describing the protracted and circuitous litigation in Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898 (Fed. Cir. 2004), and Liebel-Flarsheim Co. v. Medrad, Inc., 481 F.3d 1371 (Fed. Cir. 2007)).

22.   Ariad Pharmaceuticals, Inc. v. Eli Lilly & Co., 598 F.3d 1336, 1360 (Fed. Cir. 2010) (Gajarsa, J., concurring) ("In my judgment, the text of § 112, ¶ 1 is a model of legislative ambiguity. The interpretation of the statute, therefore, is one over which reasonable people can disagree, and indeed, reasonable people have so disagreed for the better part of a decade.").

23.   Graham v. John Deere Co., 383 U.S. 1, 9 (1966); Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 731 (2002) ("A patent holder should know what he owns, and the public should know what he does not.").

24.   Although some have argued that the nature of language inherently also creates ambiguities, without the intention of bad actors. *See, e.g.*, Amir H. Khoury, *The "Unlimitless": On How to Remedy the Inadequacies of a Language-Based System for Patent Claims*, 24 TEX. INTELL. PROP. L.J. 103, 129 (2016).

innovation. This is especially the case in the area of software,[25] where definiteness[26] is sorely lacking and NPEs are active.[27]

The concern of ambiguities and all of its repercussions is not novel; it is a longstanding issue within patent law.[28] The United States Patent Office explicitly tied the reforming of claim language to the improvement of patent quality,[29] itself a nebulous quantity.[30]

All this handwringing regarding the legitimate and illegitimate use of ambiguities notwithstanding, it is our contention that good patent actors generally abhor using such ambiguities and the realities those ambiguities have created, even with all of their associated legitimate benefits. Rather, innovative companies and investors would prefer, or at least benefit greatly from, the legal clarity of better-defined patent rights arising from better-defined claim language—i.e., rights that are stronger and more certain, even if potentially narrower in scope.[31]

To this end, we believe that a vibrant and transparent patent system, e.g., where all parties and stakeholders each share the same understanding of the scope of each patent, and its exacting metes and bounds, will return the patent system to one that promotes innovation, maintains United States leadership in technological developments, and advances world–changing technologies.[32] This is particularly true in

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25.   Arti K. Rai, *Improving (Software) Patent Quality Through the Administrative Process*, 51 HOUS. L. REV. 503, 505 (2013).

26.   35 U.S.C. § 112(b) (2013).

27.   *See* Sona Karakashian, *A Software Patent War: The Effects of Patent Trolls on Startup Companies, Innovation, and Entrepreneurship*, 11 HASTINGS BUS. L.J. 119, 155 (2015).

28.   Merrill v. Yeomans, 94 U.S. 568, 573 (1876) ("The genius of the inventor . . . should not be restrained by vague and indefinite descriptions of claims in existing patents from the salutary and necessary right of improving on that which has already been invented.").

29.   MPEP § 2173 (9th ed. Rev. 8, Jan. 2018) ("Optimizing patent quality by providing clear notice to the public of the boundaries of the inventive subject matter protected by a patent grant fosters innovation and competitiveness. Accordingly, providing high quality patents is one of the agency's guiding principles. The Office recognizes that issuing patents with clear and definite claim language is a key component to enhancing the quality of patents and raising confidence in the patent process."); *see United States Patent & Trademark Office 2010-2015 Strategic Plan*, USPTO (2010), http://bit.do/USPTO_2010-2015-Strategic.

30.   Christi J. Guerrini, *Defining Patent Quality*, 82 FORDHAM L. REV. 3091, 3096 (2014). *See, e.g.*, James E. Malackowski & Jonathan A. Barney, *What is Patent Quality? A Merchant Banc's Perspective*, 43 LES NOUVELLES 123, 124-28 (2008)

31.   *See, e.g.*, Soonwoo Hong, *IP and Business: Quality Patents: Claiming what Counts*, WIPO MAG. (Feb. 2006), http://bit.do/Hong_IP-Business.

32.   Matthew Herper, *New Patent Law Would Trash Disease Cures*, FORBES (March 24, 2015), http://bit.do/Herper_New-Patent-Law ("Weakening patent laws will decimate long-term investment in cures for diseases such as Alzheimer's, Parkinson's, and Huntington's, as well as funding for new therapies to treat autism and breast, colon, lymphoma and prostate cancer . . . Let us be clear: investments in the biotech industry are based entirely on patents. Without strong patents, we cannot raise money to find cures for disease."). *See also* David Kline, *Do Patents Really Promote Innovation?*, MICHELSON INST. FOR INTELL. PROP. (Apr. 24, 2017),

today's increasingly globalized economy, where information is readily available at one's fingertips regardless of those fingertips' current location.

We further believe that with a better patent system, inventors will be motivated by the classical limited patent monopoly awarded to innovators, when their efforts are adequately rewarded via an enforceable monopolistic patent, even when that patent scope is limited. Moreover, with a transparent patent system, those inventors who may not have been previously motivated to patent may now find use in patenting. Especially because a transparent patent system, with well-defined terms, will eventually be a cheaper and more accessible patent system for all stakeholders, at all levels of prosecution, litigation, and licensing processes.

Why change the patent system? Maybe we should let it crumble under its own bloated weight? Patents, when used properly and effectively, can provide critical motivation and security to inventors, and validation to their corresponding investors by creating protectable, robust intellectual property rights. Consequently, proper patent protection enables both innovation and essential third-party investment.[33]

In sum, one of the main concerns voiced by stakeholders relates to the opacity of patents and the scope of the claims: patents are valid and potentially encompass their broadest possible scope, until they are found to be invalid, and parties are often unwilling to settle patent disputes until the courts construe the scope of their claims.[34] Moreover, the scope of that presumed valid patent is effectively indeterminable until the patent is litigated, an admittedly increasingly rare occurrence.[35] And even when litigated, there is a more than 50% chance

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http://bit.do/Kline_Do-Patents (citing the economists "Arrow (1962), Griliches (1963), Schmookler (1966), Kitch (1977), Reinganum (1981), Klemperer (1990), Romer (1990), Giulbert and Shapiro (1990), Grossman and Helpman (1991), Scotchmer (1999), and Gallini (2002)"). *But cf. The Experts: Does the Patent System Encourage Innovation?*, WALL ST. J. (May 16, 2013), http://bit.do/WSJ_The-experts; Alberto Galasso & Mark Schankerman, *Do Patents Help or Hinder Innovation?*, WORLD ECON. F. (May 14, 2013), http://bit.do/Galasso_Do-patents-help.

33.   *But cf.* James Bessen & Michael J. Meurer, *Do Patents Stimulate R&D Investment and Promote Growth?*, PATENTLY-O (Mar. 13, 2018), http://bit.do/Bessen_Do-patents-stimulate ("The evidence certainly is consistent with the notion that patents encourage American pharmaceutical R&D. But otherwise, it is hard to find evidence suggesting patents are a major factor spurring R&D investment, that patents contribute to economic growth, or even that the patent system is a source of great wealth to important inventors and innovators (outside of a few industries like pharmaceuticals)").

34.   Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1745 (2009).

35.   LEX MACHINA, *Lex Machina Q4 2016 Litigation Update* (Jan. 12, 2017), http://bit.do/LexMachina_2016 ("Overall litigation in 2016 has declined by a moderate 22% from

that the appellate court will modify the district court decision.[36] Thus, patent ambiguities that are there by design nevertheless prevent the adequate assessment of a patent value and hinder the ability to predict the outcome of patent litigation.

The proposed changes herein are non-trivial; interpreting claims and cabining claim scope is a multi-factor problem. In this paper, we discuss some of the factors driving poor patent quality resulting from ambiguities and propose a solution—our Patents with Applied Standardized Structure (PASS) approach—and some considerations for promoting adoption of the proposed PASS approach.

I.   POOR PATENT QUALITY RESULTS FROM DIFFICULTIES
          REGARDING CLAIM INTERPRETATION

Poor patent quality is a central concern for many stakeholders.[37] Simply, poor patents result in patents that should not have been granted in their current form. These types of patents are often an unappreciated cost in innovation ecosystems, and at best, they might only create unnecessary costs associated with licensing or threat of litigation. At worst, they force companies to pivot or to stop innovation in that space entirely.

Moreover, patent quality is an issue even when the patent is deserved. Poorly drafted patents can be hard to parse by competitors or are too broad or too narrow to optimally protect those innovations that objectively deserve to be patented, creating costly confusion and uncertainty amongst all relevant stakeholders.

All of the many actors in the patent pathway—from the inventors, to their managers, to the patent attorneys, to the patent examiners, to the relevant arbitrators—share the blame for the current state of affairs.[38] Their combined actions have made it nearly unachievable for competing innovators, investors, patent litigation juries, and others to accurately construe claim terms and ultimately their scope. As a result

2015").

36.   Chris Barry, Ronen Arad, Landan Ansell, Meredith CarTier & HyeYun Lee, *PWC 2016 Patent Litigation Study*, PRICEWATERHOUSECOOPERS (May 2016), http://bit.do/PWC_2016-patent.

37.   Michelle K. Lee, Remarks at the Patent Quality Conference Keynote at the USPTO (Dec. 13, 2016), http://bit.do/USPTO_Remarks-Lee. *See also* Peter S. Menell, *A Method for Reforming the Patent System*, 13 MICH. TELECOMM. & TECH. L. REV. 487, 506 (2007); Julie E. Cohen, *Reverse Engineering and the Rise of Electronic Vigilantism: Intellectual Property Implications of "Lock-Out" Programs*, 68 S. CAL. L. REV. 1091, 1177–80 (1995).

38.   *See, e.g.*, Bruce Berman, *Patent Quality—is a "Shared Responsibility," Says IBM; It Does Not Represent Invention Quality or IP Value,* IP CLOSEUP (Mar. 26, 2015), http://bit.do/Berman_Patent-quality.

of the current system, a significant percentage of patents likely should not have been granted and should not be enforceable.

We believe in the patent system and the underlying premise that an idea that is both novel and nonobvious ought to be patentable, and its royalty rents are justified as a promoter of innovation. However, when a large number of poor-quality patents are granted (partially because the situation described above often makes novelty point identification, prior art searches, and patent comparison difficult or even unfeasible at times), the quid pro quo balance of the patent system is disrupted. Such patents fail to provide desirable public disclosure, and instead tend to add to the aforementioned undesirable thickets and rents for innovators. Any demands by patent holders for royalty payment based on such poor-quality patents are not only unfair, but, according to the accepted calculus of the patent system of one limited monopoly per patent, actually inhibit innovation.

Demanding higher quality patents may not necessarily reduce the number of patent applications or reduce the burden on overworked examiners. It will, however, likely shrink the number of final allowable patents. Higher quality patents are not just simply per se patentable, they arguably have a determinable and definable scope. Those qualities are also valuable to the system at large.

To reiterate: this is an important goal. The inherent difficulty (particularly, *a priori*) in determining the quality of any particular patent, and the assumption that many of those patents are of low quality, can effectively cast a shadow over the quality of all patents, thereby eroding the value of all patent rights and the ability of all patents to provide incentives to real innovation.

Innovators can better avoid costs associated with pursuing protection for innovations that would read on prior art and/or would infringe extant patent rights, and examiners can devote more of their limited time to innovations with a higher likelihood of patentability if the patenting process was more standardized and the scope of patents more predictable. Accordingly, one or more mechanisms for standardizing patent claim drafting would help address many of the root causes of poor patent quality.

Notably, optimizing patent claims through our proposed PASS system is not only of relevance to competitors within related fields—by making it easier to assess relevant patents in their fields—but it is also useful in the context of the global patent examination process. Giving examiners a better understanding of the scope of a patent application enables a more reliable determination of whether a particular innovation already exists within the prior art, which would

increase examination quality and reduce examination time and costs for all parties.

II.   THE PROPOSED PASS SOLUTION – STANDARDIZED CLAIM FORMAT CONSISTING OF PRE-POPULATED KEY TERMS LINKED BY CONNECTORS

We propose a two-tiered system for U.S. patent applications. The First Tier would comprise the majority of drafted claims and would require the implementation of standardized terminologies, as described herein. These Tier-One patents would have an optimized claim language with the express goal of clarity over opacity. The second tier of patents would be a much smaller cohort (hopefully mostly legacy claim sets) that for one reason or another are not yet standardized. Tier Two patents would be incentivized to switch to the standardization of Tier One patents but may not necessarily be wholly standardized. For example, Tier One patents can receive discounts on official fees, prioritized examination, an automated first Office Action, and/or other benefits. In the alternative, new Tier Two patents would have to pay additional fees to avoid the proposed system. An evaluation of such benefits would be the focus of future study.

More specifically, in Tier One patents, each claim would be built from a closed group of pre-defined elements where each element is defined by one or more key terms semantically linked by connectors. This idea of clearly defining claim terms is not entirely novel, Professor Hal Wegner suggests that patents were intended to include a section devoted to this need.[39] Moreover, patentees are clearly within their rights to set their own definitions for terms the Federal Circuit has expressly allowed the patentee "to act as its own lexicographer [. . . if they] clearly set forth a definition of the disputed claim term' other than its plain and ordinary meaning."[40]

Granted, it is non-trivial to optimally build claims from an open set of terms, all the more so from a limited set of terms. To this end, key terms and their relevant connectors could be suggested to the drafter by a machine learning algorithm that creates the claims based on the description in the patent itself; this would be an iterative process. As the description is modified, the claims would as well. Machines are

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39.   Letter from Harold C. Wegner to Hon. Michelle K. Lee, Under Secretary of Commerce, USPTO 43 (June 3, 2015), http://bit.do/Wegner_Limelight, (blaming the USPTO for failing to teach new practitioners how to adequately draft patents: "[i]n fact, passing the examination requires *zero* practical patent drafting skills").

40.   Thorner v. Sony Comput. Entm't Am. LLC, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

already capable of complex natural language processing,[41] and moving to the actual drafting of a claim is not a significant technical leap.[42] Alternatively, claim drafters may also select terms from an extensive but pre-populated pull-down menu (in a software program, or otherwise metaphorical). In either case, the drafter would be incentivized/forced to select from terms with well-(pre)defined meaning. Each term would be associated with a clear and concise glossary that lays out the metes and bounds of that term.

Patents are rarely truly totally novel (in the popular meaning of the word) and it is likely that most drafters would be able to optimally describe their invention from this closed set of terms. Still, when necessary, patent drafters would be able to petition the USPTO to allow additional terms, provided that they also provide a glossary for their new or revised terminologies. A streamlined process would allow the USPTO to quickly allow or deny the addition of a term to the closed set of terms for each art. Once allowed, the new term would become part of the lexicon, allowing other drafters to also use the term, when necessary.

The process of introducing new terms into the closed set need not necessarily be via the USPTO itself. Other members of the patent bar could be given the chance to weigh in and comment on new proposed terms, perhaps even incentivized through the gamification of the process.[43] Consider the popular Waze traffic application wherein traffic notices provided by one user can be accepted or discarded by other users within the network. Seniority within the system would result in weighting of the acceptance or discarding of terms, with more senior participants carrying more weight. Like the Waze app, the inputs from other users would not come with any remuneration for added activity within the system. In the alternative, these peer gatekeepers could be rewarded with discounts in the patenting process.

This effort is actually not too difficult to implement: many professional patent drafters already employ a relatively closed set of terms for each art, and a relatively consistent style in drafting their

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41.   *See, e.g.*, Tom Young et al., *Recent Trends in Deep Learning Based Natural Language Processing*, COMPUTATIONAL INTELLIGENCE MAG. (2018).

42.   *See, e.g.*, Linda Andersson et al., *The Portability of Three Types of Text Mining Techniques Into the Patent Text Genre*, *in* CURRENT CHALLENGES IN PATENT INFORMATION RETRIEVAL 241 (Mihai Lupu et al. ed., 2d ed. 2017); Akihiro Shinmori et al., *Patent Claim Processing for Readability: Structure Analysis and Term Explanation*, *in* 2003 ACL WORKSHOP ON PAT. CORPUS PROCESSING PROC. 56; Yuen-Hsien Tseng et al., *Text Mining Techniques for Patent Analysis*, 43 INFO. PROCESSING & MGMT. 1216 (2007).

43.   Jesús Eduardo et al., *Gamification: An Effective Mechanism to Promote Civic Engagement and Generate Trust?*, *in* 8 INT'L CONF. ON THEORY & PRAC. ELECTRONIC GOVERNANCE PROC. 514 (2014).

patents. Accordingly, for many, adoption of the proposed Tier One standardized claiming would entrench, and even further refine, their current practices while at the same time constraining only a minority of peers at the tail-end by limiting the use of extraneous and less clearly defined terms.

There are many advantages of such a standardized claim structure for these Tier One patents, with pre-defined key terms connected by pre-defined connectors, including the following:

    a) It prompts patent attorneys to streamline claim drafting and focus on the novelty points, while also mitigating obfuscation;

    b) It enforces more disciplined selection of claim terms and consistent usage of those terms throughout the claims, specification, and drawings;

    c) It enables easy prior art searching by the inventor or patent drafter so that they can avoid wasting time on an idea not worth pursuing;

    d) It simplifies the patent examination process and thus assists patent examiners to go through more cases with high quality results;

    e) It simplifies claim construction, allowing putative infringers to have a better idea of the scope and nature of the claim;

    f) It simplifies the drafting process to allow for the even the iconic garage inventor to draft their own claims without the need of professional counsel; and

    g) Patent drafters can propose their own broadest reasonable interpretation.[44]

III.   DETAILED DESCRIPTION – STRUCTURED PATENT CLAIM DRAFTING UNDER PASS AND ASSOCIATED EXAMPLES

Even complicated claims can be simplified to key elements. As an example, a simplified claim structure should look like the following, with the key terms underlined and the prepositions or connectors in parenthesis:

CLAIM 1:
    (preposition0.1 or connector0.1) <u>method</u>, <u>comprising</u>:
        <u>term1.1</u> (connector1.1) <u>term1.2</u> (connector 1.2) <u>term1.3</u>;

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44.   *See* 37 C.F.R. § 42.100(b) ("A claim in an unexpired patent that will not expire before a final written decision is issued shall be given its broadest reasonable construction in light of the specification of the patent in which it appears.").

term2.1 (connector2.1) term2.2 (connector 2.2)
term2.3; and

term3.1 (connector3.1) (connector 3.2) term3.2
(connector 3.3) term3.3.

When a claim is distilled down to the above bare-bone structure, it becomes more transparent for patent drafters to figure out which step is truly the novelty step, and it becomes extremely easy to perform prior art searches. Of course, patent drafters may still prefer to include additional adjectives, adverbs, or other modifiers to further refine each term. These adjectives would have to be defined by the patentee as part of the submission.

A.   Example #1: A Method Claim

We'll use an actual patent example, U.S. Patent 7,126,588, "Multiple mode display apparatus," to illustrate our proposal. Claim 1 reads as follows (with the key terms underlined and the prepositions or connectors in parenthesis as illustrated above):

Claim 1:
(A) method comprising:
opening (a) first housing attached (with) (a) display device having (a) first display area (and) (a) second display area;
uncovering (the) second display area (to) activate (the) second display area;
closing (the) first housing over (the) display device (to) cover (the) second display area (and) place (the) display device (in) (a) first mode of reduced power consumption, wherein (the) first display area is visible (and) is active; (and)
closing (a) second housing over (the) display device (to) cover (the) first display area (and) (to) place (the) display device in (a) second mode of reduced power consumption.

Using the Patent Deconstruction approach described in an IP book, Mining Ideas for Diamonds, authored by Tao Zhang & Jingui Fang,[45] one can obtain a visual schematic for Claim 1 as shown in Figure 1. In MINING IDEAS FOR DIAMONDS, typically square boxes represent objects or nouns, elliptical shapes for actions, and single lined arrows point from subjects to objects or simply connect the two through

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45.   TAO ZHANG & JINGUI FANG, MINING IDEAS FOR DIAMONDS –COMPARING CHINA AND U.S. IP PRACTICES FROM IDEA SELECTION TO PATENT MONETIZATION 174 (2016).

certain connectors, while double-lined arrows are main elements of Claim 1. In Figure 1 for this article, for the purpose of clarity, we use each color to represent each main element of the claim. For example, we use thin, single-lined arrows to represent the first main element of Claim 1, double-lined arrows for the second main element, triple-lined arrows for the third main element, and thick, single-lined arrows for the last main element.

Figure 1. Schematic representation of Claim 1 in its original unaltered written form.

Furthermore, following the steps detailed by Tao Zhang et al., one can remove boxes or shapes that appear redundant or unnecessarily narrows to simply the claim structure to the most relevant key elements. This way, the claim becomes more generic and thus can be more easily compared with other claims. Specifically, we use the following conversion relationships i) through iv), where "=>" means "to be replaced by":

    i)   display device => display
    ii) uncovering the 2nd display area to activate the 2nd display area => uncovering to activate the 2nd area
    iii) closing the 1st housing over the display device to cover the 2nd display area and place the display device in a 1st mode of reduced power consumption wherein the 1st

display area is visible and is active => closing the 1st housing over the 2nd area to cause the 1st mode

iv) closing a 2nd housing over the display device to cover the 1st display area and to place the display device in a 2nd mode of reduced power consumption => closing a 2nd housing over the 1st area to cause the 2nd mode.
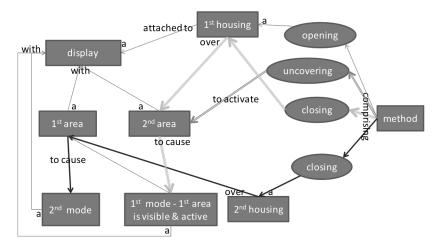

Figure 2. Schematics of the bare-bone structure of an exemplary patent Claim 1.

After performing such simplification, one should be able to arrive at the following bare-bone simple structure for Claim 1:

Claim 1:
(A) <u>method</u>, <u>comprising</u>:
<u>opening</u> (a) <u>1st housing</u> (attached to) (a) <u>display</u> (with) (a) <u>1st area</u>, (a) <u>2nd area</u>, (a) <u>1st mode</u> (wherein) (the) <u>1st area is visible and active</u>, (and) (a) <u>2nd mode</u>;
<u>uncovering</u> (to activate) (the) <u>2nd area</u>;
<u>closing</u> (the) <u>1st housing</u> (over) (the) <u>2nd area</u> (to cause) (the) <u>1st mode</u>; (and)
<u>closing</u> (a) <u>2nd housing</u> (over) (the) <u>1st area</u> (to cause) (the) <u>2nd mode</u>.

Such simplified bare-bone claim structure can be represented by the claim schematics depicted in Figure 2. With a detailed studying of such schematics, one can easily find out whether there are additional ways to further simplify the claim, and whether there are any missing

elements or mistakes in claim structure. From such clear schematics, one can easily compare claims and determine which step(s) are the novel portions, and which part(s) overlap with pre-existing prior art (i.e., documents, patent applications, or product features). In addition, it becomes easier to determine whether subsequent products infringe the claimed inventions.

On the other hand, if patent drafters prefer to write a more complicated claim structure, they can easily expand each box in Figure 2 and change the simplified bare-bone Claim 1 to a more complex original Claim 1 by using the reverse conversion relationships defined in the above bullet points i) through iv).

To further illustrate that such claim structure works for various types of patents, we will deep dive into a few additional examples. Besides the process claim for a software invention in the above, we'll also look at an apparatus claim, a hardware invention, and a pharmaceutical invention.

B.   Example #2: An Apparatus Claim

For simplicity, we will use the same patent discussed above, U.S. Patent 7,126,588, "Multiple mode display apparatus," and look at its Claim 12 as an example.

Claim 12:

(An) <u>apparatus</u> <u>comprising</u>:

(a) <u>first housing</u> (having) (a) <u>first edge</u>, (the) <u>first housing comprising</u> (a) <u>display device</u> (having) (a) <u>first display area</u> (and) (a) <u>second display area</u>;

(a) <u>second housing</u> (pivotally attached with) (said) <u>first housing</u> (proximate) (said) <u>first edge</u> (in) (a) <u>first closed position</u> (substantially coplanar with) (the) <u>first housing</u> (wherein) (the) <u>second display area</u> (is placed in) (a) <u>mode of reduced power consumption</u> (and) (is) <u>visually</u> (obscured by) (the) <u>second housing</u> (but) (the) <u>first display area</u> (is) <u>visible</u> (and) (is) <u>activated to display output</u>, (the) <u>second housing</u> (pivotally displaceable) (to) (a) <u>first open position</u> (wherein) (the) <u>first display area</u> (and) (the) <u>second display area</u> (are) <u>both visible</u> (and) (are) <u>both activated</u> (to) <u>display output</u>; (and)

(a) <u>third housing</u> (pivotally attached) (with) (said) <u>second housing</u> (displaceable to) (a) <u>second closed position</u> (substantially coplanar with) (the) <u>first housing</u> (wherein) (the) <u>first display area</u> (and) (the) <u>second display area</u> (are) <u>both covered</u> (and) (are) <u>both deactivated</u> (to) <u>display output</u>, (the) <u>third housing</u> (displaceable to) (a) <u>second open</u>

position (wherein) <u>at least</u> (the) <u>first display area</u> (is) <u>visible</u> (and) (is) <u>activated</u> (to) <u>display output</u>.

Using the principles discussed above, one can easily simplify this Claim 12 to a bare-bone structure, which makes comparison to prior arts and determination of infringement extremely straightforward. We'll leave such a task to readers as a follow up exercise.

C. Example #3: A Hardware Claim

Next, we will take a look at a hardware invention with a very early priority date, Claim 1 of U.S. Patent 4,327,459, "Combined steam and vacuum cleaner," as an example.

Claim 1: <u>(A) portable steam cleaning machine</u> <u>comprising</u>, (in combination),
(an) <u>electrolytic generator</u> (for) <u>generating steam</u>, (said) <u>generator consisting</u> (of)

(a pair of) <u>spaced carbon rods</u>,

(a) <u>sealed receptacle</u> (for) <u>containing</u> (said) <u>carbon rods</u>, (said) <u>receptacle</u> (having) (an) <u>inlet port</u> (and) (an) <u>outlet port</u>,

(a) <u>positive displacement pump</u> (having) (an) <u>inlet port</u> (and) (an) <u>outlet port</u>,

(a) <u>tank</u> (for) <u>holding</u> (a) <u>liquid solution</u>, <u>tubular means</u> (for) <u>interconnecting</u> (said) <u>tank</u> (and) (said) <u>inlet port</u> (of) (said) <u>pump</u>,

<u>tubular means</u> (for) <u>interconnecting</u> (said) <u>outlet port</u> (of) (said) <u>pump</u> (and) (said) <u>inlet port</u> (of) (said) <u>receptacle</u>,

<u>tubular nozzle means</u> (including) <u>tubular means</u> (having) (one) <u>end</u> (connected to) (said) <u>outlet port</u> (of) (said) <u>receptacle</u>, (and)

<u>electrical means</u> (for) <u>simultaneously energizing</u> (said) <u>carbon rods</u> (and) (said) <u>pump</u>, (whereby) <u>liquid</u> (from) (said) <u>tank</u> (is) <u>fed</u> (by) (said) <u>pump</u> (into) (said) <u>receptacle</u> (to) <u>contact</u> <u>both</u> (of) (said) <u>carbon rods</u> (and) <u>close</u> (an) <u>electrical circuit</u> (for) (said) <u>electrolytic generator</u> (for) <u>producing</u> <u>substantially</u> <u>instant steam</u> (to be) <u>discharged</u> (from) (said) <u>nozzle means</u> (upon) (a) <u>surface</u> (to be) <u>cleaned</u>.

D. Example #4: A Software Claim

Next, we will take a look at a software invention with an early priority date, Claim 1 of U.S. Patent 5,566,134, "Digital computer algorithm for processing sonar signals," as an example.

Claim 1: (A) <u>method</u> (in) <u>which</u> (one or more) <u>input spectra</u> (in) <u>digital form</u>, <u>which</u> (are) <u>formed</u> (from) <u>associated time-segments</u> (of) (a) <u>voltage-vs.-time representation of a real-time signal</u>, (are) <u>analyzed</u> (for) <u>persistent signal content</u> (and) (are) <u>converted</u> (to) <u>digital data that</u> (are) <u>representative</u> (of) (such) <u>persistent signal content</u> (for) <u>display</u> (upon) (a) <u>display system</u>, (the) <u>method</u> <u>comprising</u> (the) <u>steps</u> (of):

    A. <u>performing</u> <u>frequency analysis</u> (on) <u>each one</u> (of) <u>a series</u> (of) <u>time segments</u> (of) (a) <u>voltage-vs.-time representation of a real-time signal</u> (to) <u>produce</u>, (a) <u>digital power spectrum</u> (for) <u>generating a series</u> (of) <u>digital power spectra</u> (corresponding to) (the) <u>series</u> (of) <u>time-segments</u>;

    B. <u>generating</u> (a) <u>preliminary estimate</u> (of) <u>regular spectral features</u> (possibly due to signals) (by) <u>integrating</u> <u>successive ones</u> (of) (said) <u>digital power spectra</u>, (as) <u>they</u> (are) <u>available</u> (after) (said) <u>frequency analysis</u>, (into) (an) <u>integrated ALI (Automatic-Line-Integrator) buffer</u> (in) (a) <u>digital computer</u> <u>using</u> (an) <u>ALI algorithm</u> (of) (a) <u>stored program</u>;

    C. <u>assigning</u> <u>ABTs (Automatic-Band-Trackers)</u> (in) (said) <u>digital computer</u> (to) <u>detect</u>, <u>follow</u> (in) <u>frequency</u> (and) <u>enhance</u> (any) <u>lines</u> (or) <u>line-sets</u> <u>present</u> (in) (one or more) (of) (said) <u>digital power spectra</u>, <u>in response</u> (to) (an) <u>operator-request</u> (or) (to) <u>internal control</u>;

    D. <u>combining</u> (the) <u>enhanced lines</u> (or) <u>line-sets</u> (from) (said) <u>ABTs</u> (and) <u>other sources</u>;

    E. <u>displaying</u> (said) <u>combined enhanced lines</u> (or) <u>line-sets</u> (in) (an) <u>appropriate visual display</u>.

    E.   Example #5: A Pharmaceutical Claim

    Next, we will take a look at a pharmaceutical invention which is still active and thus more representative of modern claim drafting styles, Claim 1 of U.S. Patent 7,790,677, "Insulin production methods and pro-insulin constructs," as an example.

Claim 1: (A) <u>composition</u> <u>comprising</u> (a) <u>peptide</u> <u>comprising</u>:
    <u>B chain</u> (–)
<u>RREAEALQVGQVELGGGPGAGSLQPLALEGSLQAR</u> (<u>SEQ ID NO</u>: <u>32</u>)(–)
    <u>A chain</u>,
    (wherein) (said) <u>A chain</u> (and) (said) <u>B chain</u> (are) <u>native human insulin chains</u>.

As can be seen from the above five examples, which cover various type of technology and complexity of claims, all or nearly all can be represented using the structure described at the beginning of Section III.

IV.   USING ARTIFICIAL INTELLIGENCE TO ASSIST
        STANDARDIZATION OF CLAIM STRUCTURE

The count of the present library of granted patents already numbers close to ten million as of the time of this writing. While it might be straightforward to retroactively change all patents within the library, changing the scope of those patent claims without the knowledge or permission of the patentee would not be binding. Nevertheless, a shadow dataset of patents can be created for reference. Thus, natural language process algorithms can be applied to the entirety of the patent database to parse each of the already granted claim into its main elements, where each element consists of words or terms and prepositions or connectors. Patents can be automatically or manually classified, for example, into group art units, U.S. patent classifications (UPC), international patent classifications (IPC), and/or other suitable classification schemes. This classification can help to improve contextual processing of terms and help to build a glossary for future use in technologies and groups of related patents.

A. Application After Issuance

Recent rapid advancements in artificial intelligence ("AI") can facilitate and simplify the retroactive application of the PASS approach described herein to the vast library of patents. The massive patent library could be used as a massive training set for developing, refining, and validating the machine learning algorithms on which PASS will be built. Patentees could also be incentivized to convert their current patent applications to the PASS system. Granted that few patents would be able to go through the conversion under current law,[46] a new proceeding could be developed to simplify the process and allow for a greater number of such amendments.[47]

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46.   *See* Jennifer R. Turchyn, *Improving Patent Quality Through Post-Grant Claim Amendments: A Comparison of European Opposition Proceedings and U.S. Post-Grant Proceedings*, 114 MICH. L. REV. 1497 (2016).

47.   With only prospective applying amendments and few options for non-narrowing amendments, the current process is far from simple. 35 U.S.C. § 251 (2012).

B. *Application During Drafting*

As described above, optimally, PASS could also be applied during the drafting process (e.g., in real time). We envision that patent drafters would be able to draft patents within a software application (e.g., a cloud-based application or a word processing program plug-in) that runs PASS modules, such as a PASS parser, PASS debugger, and PASS compiler. During the drafting process, AI algorithms can be used to aid in the selection of USPTO pre-approved key terms and connectors based on the patentees notes or the already drafted specifications. For example, the software would suggest likely subsequent connector and word combinations or provide lists of alternative terms. Algorithms can also be used to validate proposed claims and/or elements as they are written, based on the text of the patent itself, as well as the entirety of the known patent library. For example, drafted claims or claim elements could be automatically checked for consistency with other claims and the specifications, validated against prior art, and checked for support within the figures and detailed description. Much of this technology is already available for drafters, however, the use of consistent terminology would make such efforts more robust.

C. *Application During Prosecution*

Another application of PASS could occur during the examination (prosecution) process. The consistency and structure provided by PASS can facilitate use of patent office AI algorithms to quickly and automatically check applications for issues such as antecedent basis, clarity, written description support, indefiniteness, etc. Further, the PASS structure can improve the ability of algorithms to assess novelty and potentially even non-obviousness. For example, the nearly ten million patents, vast library of computer-accessible human knowledge, libraries of prosecution and litigation histories, and other sources of data can provide training datasets, from which machine learning algorithms can quickly flag likely issues and provide relevant citations and support that could be followed up by a lean corps of human examiners.

Of course, given candor requirements, using an AI will dramatically increase the likelihood that the patentee will have to disclose art that the examiner might never have become aware. Instead, a patentee might prefer to use an alternative blackbox third-party service that provides suggested terms without providing concomitant information to the patentee about prior art, thus sidestepping away from any duty-of-candor issues before the patent office and providing only

guidance as to what terms might be problematic, not why those terms are problematic. However, the patent office would have access to similar technologies so the likelihood that the patentee might come across a reference that the examiner would not is not likely.

V.   PROS AND CONS OF A PASS STANDARDIZED CLAIM
            STRUCTURE – FOR EXAMINERS, PATENT DRAFTER, AND
            INVENTORS

There are many benefits to a standardized claim structure. It enables easy comparison of patent claims regardless of the source, i.e., the patent drafter. It facilitates comparison of patents with vast areas of prior art literature, including those in foreign languages. It also enables drafters to quickly see relationships between various patents within a family and to easily distinguish new patents from older family members or other sources in the prior art.

Examiners will be able to easily and accurately search for relevant prior art, which will help decrease pendency and increase patent quality. In addition, some of the examination process can be further streamlined using AI, and thus further shortening the patent process.

Competitors will be able to easily work out freedom to operate analyses, thereby avoiding time consuming and costly litigation. And, all stakeholders will be able to determine whether the threats of NPEs are reasonable or beyond the scope of the presented claims and ignorable—effectively confounding the business practices of most trolls.

Patent drafters may worry that such standardization may make their jobs obsolete. Instead, such standardization enables patent drafters to focus on the most creative portion of patent drafting— figuring out invention novelty points, and thus make their jobs even more valued than before.

VI.   HOW TO ENABLE BROAD ADOPTION OF STANDARDIZED
            CLAIM STRUCTURE?

We believe that change must start at the USPTO. The USPTO can set up incentive programs, such as those similar to the glossary initiative,[48] where patent applications using the aforementioned standardized claim structure can get fast tracked without paying additional fees, or only need to pay a reduced examination fees (since

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48. Glossary Pilot Program, 79 Fed. Reg. 17137 (Mar. 27, 2014). *See also Glossary Initiative*, USPTO (Apr. 3, 2016), http://bit.do/USPTO_Glossary. Notably, the initiative had to be extended as it had failed to receive even 200 applications by its first deadline. *See Welcome to the Patent Quality Summit*, USPTO (Mar. 25, 2015), http://bit.do/USPTO_Patent-quality-summit.

efficiency will be higher), or both. Additionally, regulatory change is necessary if we were to allow for a readily accessible *post-facto* rephrasing of all granted patent claims.

Inventors and patent drafters might worry that prior art is too easy to find using such standardized claim structure and thus reduce their chance of obtaining a granted patent. To address this concern, we recommend the United States adopts aspects of the China Utility Model patent.

As discussed in the book MINING IDEAS FOR DIAMONDS,[49] a Chinese utility model allows for a two-tiered patent system. Moreover, the evaluation report of patent ("ERP") that accompanies the utility model can be used in litigation cases. ERPs are relatively easy to obtain and easy to defend. This is because only one or two pieces of prior art, which must be references from the same art of technology field, can be used to attack the inventiveness or otherwise invalidate a utility model patent application.[50]

As a reward for such clarity, perhaps prior art should also be similar to the Chinese utility model's ERP, and generally be confined to a smaller number of references from the same technology field. This may force inventors to file more patent applications to protect their inventions due to the narrower-yet-clearer claim structure and may later result in lower number of invalidated patents and reduce both patent examination and patent drafting costs. Overall, it will be a good outcome for the entire patent industry.

CONCLUSION

The U.S. patent system suffers from a number of ills, many of them associated with the continued concerns associated with NPEs, PAEs, or other entities exhibiting trolling behavior. In the past, these bad actors have upended the patent system to a degree that is heretofore unprecedented, resulting in a cheapening of the entire system, an inhibition of innovation, and a number of changes to the patent system driven solely by removing the threat of trolls.

None of these attempted changes have been very successful in relieving the threat of trolls for all stakeholders. Not only has this continued to cost many of the industries that rely on the patent system (surprisingly, not the biotechnology industry)[51] but it has also forced

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49.   ZHANG & FANG, *supra* note 45, at 28-31.

50.   *Id.* at 28.

51.   Dov Greenbaum, *Patent Sharing in Biotechnology*, *in* PATENT PLEDGES: GLOBAL PERSPECTIVES ON PATENT LAW'S PRIVATE ORDERING FRONTIER 56 (Jorge L. Contreras & Meredith Jacob, eds., 2017).

many stakeholders to look elsewhere to protect their innovation (e.g., through the use of trade secret).

We propose a new tool to fight trolls and otherwise raise the quality of patents, a central issue of the current USPTO. By employing AI, NLP, and machine learning to create standardized claim terms, syntax, and format, we can create an easy to use system that promotes easy-to-understand, easy-to-parse, and easy-to-assess patent claims. Standardization is an important if not central concept in all emerging technologies; why not enforce it in the regime that protects those technologies as well?