

## VI. Synthesis and Analysis

As described, this paper aims to examine the role of patent quality in contributing to patent wars and generally increased litigation seen in recent years. As a baseline, Chapter II provided overview on legislative origins of the US patent system. Chapter III summarized major concerns brought up in a recent GAO audit of the USPTO; many of which are associated with patent quality. In Chapter IV, the *Apple vs. Samsung* smartphone litigation was reviewed and analyzed as a modern example of a patent war whereas Chapter V described the *Wright vs. Herring-Curtiss* patent war occurring almost one hundred years prior. These complementary perspectives have been provided to help illustrate the constant challenges with maintaining an effective patent system.

This chapter provides corresponding synthesis and analysis of these perspectives beginning with comparison of original intents with current practices of the U.S. patent system followed by a review of supplementary data to the GAO (2016) report. The aspect of utility of invention is then considered before comparison of the *Apple* and *Wright* patent wars. Finally, a list of primary challenges facing the US patent system is compiled based on this analysis.

### A. Drift from Historical Basis

As provided Chapter II, Framers of the U.S. Constitution and legislators from the first Congressional proceedings relied considerably on the example set by Britain for establishing a patent system. They aligned with the British precedent to set up an effective, low-cost registration-based patent system.<sup>118</sup> The requirements outlined in first Congress' H.R.10 emphasized utility and reliance on public feedback as a method of governing declared exclusive rights. Apart from the savings in cost, there was already recognition that any examination process presented a daunting, unfeasible task of research and evaluation.<sup>119</sup> Still, in 1836 the United States resorted

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118 Walterscheid, *supra*, at 37

119 *Id.* at 98

to an examination-based patent system due to loss of control over abusive and fraudulent filing activities. Circumstances had deteriorated to the point where applicants were copying already existing patents in order to obtain a formal letter grant for use in intimidating unwitting “infringers.” By 1835 license revenue from such fraud was estimated at approximately half a million dollars per year.<sup>120</sup>

But how had matters reached such a point? The answer appears to rest in the fact that the newly established U.S. was a vast geographical territory.<sup>121</sup> Given the limited communication and transport technology of the day, this would have made timely mass communication quite difficult. A first consequence is that much of the population was not aware of the dishonest practices surrounding patent issues until it was too late. More fundamentally, lack of effective mass communication disabled the “public notice” function intended by the Patent Act of 1793. The country was “an enormous place and publication of advertisements in Philadelphia ..New York and even Boston would not give adequate notice across the country of the existence of ..particular patent application.”<sup>122</sup> As such, one may consider that the registration procedure was never truly implemented under such circumstances.

Resultantly the Patent Act of 1836 introduced the examination-based system which formed the basis of the U.S. patent system of today. Establishment of the USPTO and growing needs for legal protection of technology have probably introduced more cost overhead than the Framers were able to imagine; perhaps even calling into question whether the patent system is still offering benefit to society.

In addition to introducing enormous cost, today’s examination-based patent system has also fallen short in maintaining the emphasis that early Congress placed on utility of invention. In the late 19<sup>th</sup> century much of the enthusiasm surrounding the patent system was derived from expectations that it would encourage development of machines with capabilities that would make up for the shortages in manpower relative to abundant land resources enjoyed by the new nation. Furthermore, American leadership had its sights on greater industrialization as a long term goal.<sup>123</sup>

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120 Kenneth W. Dobyns, *The Patent Office Pony: A History of the Early Patent Office* 97 (1997)

121 *Id.* at 43

122 Walterscheid, *supra*, at 98

123 Dobyns, *supra* at 43

Growing influence from industry and capacity limits for patent examination have worked to diminish patent quality and traditional notions of utility with it.

In sum, the modern patent system appears to have drifted far from the early vision for the U.S. patent system as described in the U.S. Constitution, H.R.10 and the Patent Act of 1793. The move from registration to examination has introduced burdens that were not part of the original “low-cost” British model for a patent system. Furthermore, reliance on public disclosure and discourse as a mechanism for governing patent recognition has been replaced by an overwhelmed examination process that introduces significant delays in publication with arguably no significant increase in legal certainty. Finally, subjective standards on utility have been lowered to allow too many weak patents. Recent improvements such as third party reviews and patent office review boards reflect some modest steps back towards a system of self-regulation but it is not clear whether these formalized methods are sufficient for addressing future challenges.

### B. Long-standing Patent Quality Concerns

The GAO (2016) report on the USPTO’s performance describes a disconcerting array of both fundamental and operational problems. Additionally troubling is that this report reflects a state of affairs representing at least the last forty years. Problems with patent quality and increased litigation are long-standing issues.

In their aptly titled book from 2008, “Patent Failure,” economic and legal authors James Bessen and Michael J. Meurer delve into an assessment of the U.S. patent system in relation to the tangible property ownership scheme after which it is modeled. They observe that the patent system is falling far short of this ideal model due to four reasons:<sup>124</sup>

- “fuzzy boundaries”: uncertainties with interpretation of claims language that is so complex that there is “no reliable way of determining patent boundaries short of litigation”

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124 James Bessen & Michael J. Meurer, Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk 10-11 (2008)

- “public access to boundary information”: delays and maneuvering “hide language for many years..” thus adding uncertainty and risk to R&D investment
- “scope of rights”: during litigation claims are often widened or narrowed beyond what was intended by patentee adding more uncertainty
- “patent flood”: current USPTO criteria such as non-obviousness and operational practices are not working well

The authors describe that these issues have led to a tripling in patent litigation over about a thirty-six year span (see Figure 4).<sup>125</sup> These points resemble the 2016 GAO report; which itself was initiated due to a doubling of patent litigation between 2007 and 2015.



Figure 4: U.S. Patent Lawsuits Filed in District Courts<sup>126</sup>

Bessen and Meurer focus on the term “patent notice” as a parameter measuring how well the patent system mimics land ownership. This parameter appears to embody both scope of property rights and awareness of those rights by society. In other words, they envision that patent rights be as clearly defined as a fenced area of land clearly marked with “do not enter” signs on all sides.

125 *Id.* at 17

126 *Id.* at 122 (taken from Administrative Office of the U.S. Courts; John L. Turner)

“..the genius of a property rights system is that it relies on .. judicial discretion as *little* as possible ... Without clear notice, no property system can work well and the result is excessive disputes... Indeed, Duffy (2000) writes, ‘The quality of an authoritative claim interpretation depends not on its fidelity to some abstract ideal of interpretation, but on its *predictability*.’”<sup>127</sup>

Whether an equivalency to the land ownership model can ever be truly realized remains a debate, but nonetheless it provides a target standard.

This paper takes the term “patent notice” to effectively mean the same thing as “patent quality.” Ironically, it comes down to interpretation of the language being used for these commonly used terms. Arguably higher patent quality would result in greater certainties regarding patent validity and scope, which in turn would provide the improved boundaries and patent notice that Bessen and Meurer seek.

Similar to GAO (2016), “Patent Failure” points out that software patent litigation has been a particularly problematic area whereas subject matters in chemical and pharmaceutical products have not exhibited such increases in litigation.<sup>128</sup> This correlates to the abstract nature of software claims which have tested the definition of patentable material in well-known cases such as *Bilski* and *Alice v Mayo*. Adjustments from case law have apparently not been enough to address the greater challenges posed by such abstraction.<sup>129</sup>

These same struggles of the patent system have been documented by other government research. For example, in June 2004 a Congressional subcommittee on Courts, the Internet and Intellectual Property held a hearing to obtain industry feedback on proposed patent opposition procedures designed to cut down on invalid patent grants. Guest speakers included distinguished IP professionals from high-profile corporations such as Google and Genentech.<sup>130</sup> During opening comments, state of Virginia representative Rick Boucher provided that although an “interference” re-examination was an option for challenging a patent any time after grant, it required new and compelling prior art to be introduced, as well as other strict formalities making the method effectively inactive.<sup>131</sup>

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127 *Id.* at 235

128 *Id.* at 21

129 *Id.* at 22

130 *Patent Quality Improvement: Hearing Before the Subcomm. on Courts, the Internet, and Intellectual Property*, 108<sup>th</sup> Cong. 39 (2004)

131 *Id.* at 3

During the hearing Mr. Karl Sun, Senior Patent Counsel for Google, Inc. provided a presentation where he highlighted many of the same concerns that would be mentioned eight years later in the GAO (2016) report. Amongst the issues raised were observations on how the USPTO incentivized patent examiners “according to a point or ‘count’ system that encourages patent issuance.” He stressed that changes to the system have to acknowledge the actual conditions facing the patent office:

“Reforms need to recognize and address the practical realities of the patent system, including the burgeoning rate of patent filings, an overworked and understaffed examining corps, and the ex parte process..”

Sun goes on to describe that increased third party challenges should be enabled and not restricted to narrowed patent office criteria such as novelty and non-obviousness.<sup>132</sup>

The realities alluded to by Sun and others are not limited to the United States. Worldwide, patent offices are facing challenges with high rates of patent invalidation. For example, in a recent paper examining legal certainty for patent holders in Europe, Professor Dr. Christoph Ann of Technische Universität München (TUM) provides there “is no disputing the fact that the success rates of nullity suits against German patents and for EP (European) patents valid in Germany are considerable” and that this trend “is not new, but has been more or less unchanged for more than at least 50 years.”<sup>133</sup> Ann cites a 2014 study which revealed that nullity actions on software and telecommunications patents “led to almost a rate of 60% total invalidations for the period 2010-2013. Approx. 30% of patents were partially invalidated. And only a good 10% were upheld.”<sup>134</sup> In Japan, the rate of patent invalidation by trial in 2006 was as high as 70%. Although this rate has been driven down by improved review processes, the average invalidation rate over the following nine years was approximately 40-50%.<sup>135</sup>

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132 *Id.* at 39

133 Christoph Ann, *Patent Invalidation and Legal Certainty - What Can Patent Holders Expect?* SSRN (July 5, 2016) 16, <https://ssrn.com/abstract=2804992> (accessed Aug 29, 2017)

134 *Id.* at 6

135 Atsushi Sato, *Japan Patent and Trademark Update*, TMI Associates, Issue 7 (July 2017), <https://www.tmi.gr.jp/wp-content/uploads/2017/07/jptu-vol.7.pdf> (accessed Sep 5, 2017)

Finally, in 2016 Notre Dame law school Professor Steve Yelderman expressed the benefits of “patent challenge” to competition law. Referring to the 2011 Leahy-Smith America Invents Act which introduced the new opposition proceedings he states:

“One theory that is specific to patent disputes is that they present an opportunity to mitigate the harms to competition imposed by individual patents. On most accounts, the purpose of having patent system is to reward invention through time-limited bequests of market power. According to this theory of the benefits of patent challenges, such cases can reduce or eliminate the patent holder's market power, stemming the harms to competition that might otherwise flow from an overbroad or invalid grant.”<sup>136</sup>

In effect, these additional administrative reviews provide “a golden opportunity to mitigate the costs of having a patent system.”<sup>137</sup> He also stresses that there is “public interest in free competition” that “is not necessarily represented by any of the parties to a particular dispute.”<sup>138</sup> Patent challenges therefore not only resolve specific mistakes but also lend to gained public confidence in the system that increases incentives for future inventors.<sup>139</sup>

### C. Unwritten Rule on Utility

Language regarding promotion of the “useful arts” originates with the U.S. Constitution and corresponds most directly with “helpful and value trades” given the context in which it was developed.<sup>140</sup> The term “useful arts” has been reiterated in subsequent patent legislation and has worked to shape the evolution of patent law ever since. In order to consider the implications intended by this requirement, especially relative to modern-day practices, it is helpful to obtain some additional historical perspective.

Beginning with H.R.10, section 3, petitions for patent are specified for “any new art, manufacture, engine, machine, invention or device.”<sup>141</sup> The majority of these terms are associated with objects that can benefit from

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136 Stephen Yelerman, *Do Patent Challenges Increase Competition?*, 83 4, The University of Chicago Law Review 1946 (2016)

137 *Id.* at 1952

138 *Id.* at 1953

139 *Id.*

140 Walterscheid, *supra* at 51

141 *Id.* at 435

performance improvements as demonstrated in the late 18<sup>th</sup> century. For example, “engine” suggests a powerplant used for running equipment or perhaps a transport device such as the steamboat being developed at the time. “Manufacture” referred to mass production such as that enabled by the cotton gin. These key words suggest a basis upon which quantification can be used as a tool to distinguish one idea from the next. For example, a machine such as Eli Whitney’s cotton gin was shown to double the yield of raw cotton production.<sup>142</sup> In this way it may be drawn that the Founders envisioned patents to represent inventions that similarly provide measurable improvement to the state of a trade or industry. “Progress of the useful arts was contemporaneously understood to mean promoting the development of manufacturing.”<sup>143</sup>

This directive to improve America’s position in manufacturing is reflected in a statement made by George Washington in 1790 during an address to Congress: “a free people ought not only to be armed,..their safety and interest require that they should promote such manufactories, as tend to render them independent from others for essential, particularly, for military supplies.”<sup>144</sup>

Although today’s U.S. patent code inherits the foundational language surrounding “usefulness” from early legislation, there has been surprisingly little elaboration on this requirement in the over two centuries since. Although entitled a “utility patent” there is no detailed description for a “utility” requirement. According to USPTO guidelines, a “utility patent is issued for the invention of a new and useful process, machine, manufacture, or composition of matter, or a new and useful improvement thereof.”<sup>145</sup> Guidelines for examining utility provide only that a “credible” and “specific” or “well-established” utility should be included in the specification of the patent application.<sup>146</sup> Per 35 U.S.C. section 112, the specification portion of a patent application requires only that the applicant provide a

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142 Joan Brodsky Schur, *Eli Whitney’s Patent for the Cotton Gin*, National Archives (2016), <https://www.archives.gov/education/lessons/cotton-gin-patent> (accessed Sep 5, 2017)

143 Walterscheid, *supra* at 146

144 Walterscheid, *supra* at 148

145 USPTO website, *Types of Patents*, <https://www.uspto.gov/web/offices/ac/ido/oei/p/taf/patdesc.htm> (accessed Sep 5, 2017)

146 USPTO website, *Synopsis of Application of Utility Guidelines with Examples*, <https://www.uspto.gov/ip/rules/proposed/utility-synopsis.jsp> (accessed Sep 5, 2017)



description of the invention “in such full, clear, concise, and exact terms as to enable any person skilled in the art” to “make and use the same.” Legal scholars point out that section 112, in addition section 100 of the patent code which defines patentable subject matter, provide a mechanism for ensuring some credible utility aspect to the filed invention.<sup>147</sup> Still, the limited treatment of utility in United States code and USPTO guidelines results in little practical barrier for applicants when it comes to this aspect of usefulness of invention.

Adding to this bearing is the relatively scarce U.S. case law on the matter of utility. Scholars point mainly to the renowned Joseph Story, Associate Supreme Court Justice and Dane Professor at Harvard Law School and his opinion from *Lowell v. Lewis*, (Court, D. Massachusetts, 1817 15 F.Cas. 1018) which “set forth the contours of the utility requirement which persist today.”<sup>148</sup> The defendant in this case tried arguing that the patent for a competing pump design was not valid because the plaintiff could not prove that his invention “is of general utility; so that in fact, ..it must supersede the pumps in common use.. and must be, for the public, a better pump...”<sup>149</sup> Judge Story flatly disagreed with this view, instead providing that the Patent Act of 1793 intended only to block any inventions that may be “frivolous or injurious to the well-being, good policy, or sound morals of society” and that the word “useful” is used in “contradistinction to mischievous or immoral.”<sup>150</sup> Judge Story emphasized that utility criteria should not impose any restrictions on the flow of incoming ideas because frivolous concepts would naturally and “silently sink into contempt and disregard.” Notably, this opinion was formed while the patent system was still in the “age of registration” established by the Patent Act of 1793.

Given the dramatic changes in technological and legal landscape since 1817, one should question how well Judge Story’s position aligns with modern circumstances. Patent Law Professor Martin J. Adelman provides:

“This sense of ‘practical’ or ‘beneficial’ utility is an all-or nothing proposition: Either the claimed invention possesses utility or it does not..does Justice Story’s assertion that no harm befalls the public if a patented invention pos-

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147 Martin J. Adelman, U.S. Patent Law class (lecture), Munich Intellectual Property Law Center (Apr. 2017)

148 Taken from Martin J. Adelman, MIPLC U.S. Patent Law Casebook 91 (4t ed. 2016)

149 Martin J. Adelman, MIPLC U.S. Patent Law Casebook 91 (4t ed. 2016)

150 *Id.*

esses limited utility remain correct? Doesn't the public suffer the burden of lengthened examination times when notoriously overworked patent examiners must allocate scarce resources towards the extended consideration of worthless technologies?"<sup>151</sup>

This paper contends that in light of the documented challenges facing the modern patent system, the answers to above questions are "no" and "yes" respectively.

#### D. Comparing *Apple* and *Wright* Cases

The stories behind the *Apple* and *Wright* patent wars have some interesting parallels as well differences which help expose long-standing challenges facing the patent system. The cases are compared here.

In terms of similarities, both cases were fueled at least in part by a deep-seated rivalry stemming from what was perceived as theft of personal property. The land ownership model appears to successfully take hold with respect to this human dimension. The Wrights and Steve Jobs both felt their inventions were stolen and were seemingly driven as much by a moral sense of justice as concern for material losses. How much of a role such emotion plays is difficult to ascertain but it seems likely that human factors only aggravate such volatile situations. One can at least draw the conclusion that it is in the interest of society to establish property systems that facilitate fair and expedient resolution in such disputes. Any violations in land usage such as trespassing would be dealt with swiftly by law enforcement and other government officials. The delays and uncertainties that the patent system presented in each case provided conditions where emotions could fester and hence contribute to protracted resource-consuming litigation.

Both cases also dealt with breakthrough products emerging as the world was on the cusp of disruptive technological change. In the 1900s the industrial revolution was well underway with inventions such as the light bulb and gasoline engines beginning to gain traction. There was already much research activity underway with aviation, most of which concentrated on balloon aircraft due to considerable difficulties with heavier-than-air flight.<sup>152</sup> In the case of smartphones, the emergence of the information age

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151 *Id.* at 92

152 Goldstone, *supra* at 7

was the disruptive technological backdrop. In both cases there was naturally a “burgeoning” of invention and business pursuit as industry players and innovators struggled to stake their claims for the future. Such circumstances present a stress-test to the patent system, which is tasked with “parceling” out property rights commensurate to achievement for each patent applicant. The increased volume of patent applications and dynamic nature of new technology make the already daunting task of examination all the more difficult during such periods.

Examining the differences between *Apple* and *Wright* can begin with consideration of the U.S. patent office in 1903 versus 2010. As mentioned, Wilbur Wright had a difficult time getting his patent granted due to apprehensions with revealing required data to the patent examiner. In line with early practices of the patent office, examiners routinely expected to see substantial supporting evidence of invention whether it be in the form of technical reports, testimonies, or working models. The Wrights’ reluctance to display their aircraft cast doubt on their claims; indicating the patent office at this time maintained a rigorous, albeit subjective, standard for utility on patent grants. This approach is contrasted with the practices already described by GAO (2016) where patents are granted too easily.

Therefore there are two extremes being represented in the contemporaneous patent office practices in each of these patent war cases. One can view the *Wright* scenario representing a period of “under-patenting” where the patent office may have disregarded legitimate concepts due to emphasis on supportive data on claims. In contrast, the modern era has provided an “over-patenting” environment where too many bad patents are passing examination due to criteria that are diminishing in the face of increased time and resource pressures placed on the patent office.

These differences in patent system practices correspondingly led to different approaches to litigation. The difficult standard on utility patents at the time of *Wright* had them rest all litigation on their ‘323 patent which described how to achieve aircraft equilibrium in fairly broad terms. Once their patent was granted, courts provide the wide interpretation of claims afforded by “principle” patent status. This is in contrast to the “arms race” approach used by large corporations such as Apple and Samsung facilitated by the patent system of today. Furthermore, the complexity and high degree of overlap occurring in high-congestion subject matters such as smartphone technology led Apple to successfully pursue a clustered “user experience” approach to legal protection that some argue represents spillover of patents into trade dress rights. Again, these are circumstances

that arguably have resulted from the patent quality challenges that have been exhaustively documented over the last several decades.

As a sidenote, both cases occurred outside the foundational registration-based system described in Chapter I. Both faced challenges with having patent examination proportionately allocate exclusive rights under these “under-patenting” and “over-patenting” conditions. Still, probably due to its proximity in history, the *Wright* case reflects a system that lies closer to original intentions described by the first sessions of U.S. Congress. The aforementioned strict regard for claims-supporting evidence exhibited by the patent office in 1903 appears to take greater measure at upholding the “new and useful” requirement as understood in the late 18<sup>th</sup> century.

In summary, the *Apple* and *Wright* cases illustrate that irrespective of historical placement, a primary challenge of any patent system is indeed the appropriate identification and bounding of patentee exclusive rights. With *Apple* one sees invention being effectively diced and diluted down into hundreds of patents many of which have no classic inventive substance; i.e., low patent quality. These high numbers inevitably result in complex entanglements with market competitors leading to patent war. On the other hand, with *Wright* one sees invention being reserved for only the most dramatic and substantial demonstrated achievement, effectively disregarding legitimate contributions made by other parties. This scenario can also be considered a display of low patent quality in that the disclosure was not properly bounded. Both scenarios led to patent war. As will be described in the next chapter, it is suggested that proper “tuning” of a patent system to avoid such extremes is likely unattainable with an examination-based system. Instead, the USPTO should consider a newly enabled implementation of the original patent registration framework depicted in H.R.10 and the Patent Act of 1793.

### E. Net Challenges

Despite overwhelming support for a federal patent system amongst the Founders there existed skeptics such as Thomas Jefferson who voiced “ambivalence concerning the merits and efficacy of the American patent

system” and apprehensions with the challenging task of “parceling” exclusive rights to inventors in a fair and consistent manner.<sup>153</sup>

The daunting challenges of patent examination were indeed recognized by government officials as early as 1790. After a brief attempt at instituting the process, there was a return to registration after a “dawning recognition by the members of the patent board, and particularly by Jefferson, that they simply had insufficient time to properly carry out the tasks assigned to them..”<sup>154</sup> The board was overwhelmed with applications, leading to “frustrating” delays for inventors. Unfortunately this scenario sounds all too familiar today.

As Jefferson took part in preparing the Patent Act of 1793 he built upon concepts introduced with H.R.10. The registration system would require applicants to file a notice in “every District Court of the United States” as well as “three times in some one Gazette of each of the said Districts.”<sup>155</sup> His concern over “trifling” invention submissions likely played a role in devising this procedure for public disclosure.<sup>156</sup> These activities indicate that the Founders were well acquainted with the challenges of proper examination in determining divisions in inventor exclusive rights.

This proper division of intellectual property has been shown to depend on patent quality because high quality patents establish legal certainty. By definition, high quality patents can survive opposition challenges and describe clear boundaries of ownership. The property model described by Bessen and Meurer reflects this conventional academic thought on the matter. What the recent GAO report and a host of other studies have shown however, is that consistent quality is not being achieved with today’s costly ex-parte application and examination procedure.

Adding more question to the tremendous expense of the examination process is the fact that the vast majority of issued patents are never even implemented. In a 2007 journal article discussing the “bad patent” problem, law professors Lichtman and Lemley provide:

“a..growing number of ‘patent trolls’ today (are)..using patents on obvious inventions quite literally to tax legitimate business activity..What to do? One tempting idea is to increase PTO funding, making possible more rigorous up-front screening..but the drawback is that most of the money would be wast-

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153 Walterscheid, *supra* at ix

154 *Id.* at 195

155 *Id.* at 202

156 *Id.* at 201

ed..most patents lie dormant after issuance..They are lottery tickets..Money spent perfecting these documents..is money thrown away.”<sup>157</sup>

Thus the drawbacks of full patent examination are two-fold: unrealistic expectations for completing thorough examination and massive amounts of wasted effort processing inconsequential “dormant” patents.

In summary, the net challenges facing today’s patent system can be reduced to two “classic” problems recognized over 200 years ago:

- *Subjective patent criteria*: definitions and standards for novelty, non-obviousness, utility, and enablement have varied throughout history due to changing landscape as well as limitations with language interpretation leading to inconsistent results and reduced legal certainty.
- *Unrealistic patent examination process*: determining patent validity in a closed examination-based process has always been an insurmountable and wasteful prospect. Only a fraction of patents are challenged. Examiners do not have time or resources to complete a proper examination anyway, and are actually incentivized to grant issues. This situation leads to delayed publications and weak patents which also undercuts legal certainty, inviting opportunity for more litigation that inhibits innovation.

Given these problems the question becomes: what other ways besides ex-parte examination can be used to achieve patent quality? As suggested, a modernized version of the Patent Act of 1793 offers at least one option.

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157 Lichtman and Lemley, *supra* at 48