

THE COMPLICATED RELATIONSHIP OF PATENT EXAMINATION AND INVALIDATION

GREG REILLY*

The conventional view is that the Patent Office examines patent applications before issuance to assure compliance with the statutory criteria of patentability. Ex post invalidation in district court litigation or Patent Office cancellation proceedings then reviews the Patent Office's work to correct errors that result from the Patent Office's shortcomings, bias, or "rational ignorance" that limits resources spent on examination because of the irrelevance of most patents. Scholars, the Federal Circuit, and the Supreme Court have all endorsed this conventional view. However, it is wrong—or at least overly simplistic. The American patent system is only partially a system of ex ante patent examination. In other respects, it functions as a registration system where significant aspects of patentability determinations are left entirely to ex post patent invalidation in litigation and administrative proceedings. Even if the Patent Office was allocated greater resources and its examiners performed their assigned tasks perfectly, full evaluation of patentability would be impossible due to structural features of examination that exclude certain categories of prior art, prevent evaluation of the full extent of the patent owner's exclusive rights, and allow only a snapshot evaluation of a patentability question that changes over time. Given that parts of the patentability evaluation are structurally impossible in examination, the role of ex post invalidation is more nuanced than traditionally described. In some instances, it performs a review function to correct errors in the Patent Office's examination. In other instances, however, it serves an examination function to provide a first-instance evaluation of the aspects of

* Assistant Professor of Law, *Chicago-Kent College of Law*. Thanks to Kevin Collins, Dmitry Karshedt, Ed Lee, Mark Lemley, Saurabh Vishnubhakat, and participants at the *Washington University Faculty Workshop*, the 2019 Intellectual Property Scholars Conference at *DePaul University College of Law*, the 2019 Patent Conference at the *University of Kansas School of Law*, and the *Chicago-Kent College of Law Early Stage Faculty Workshop* for helpful discussions and comments on this and earlier versions.

patentability which are structurally unsuited for ex ante examination. Yet, the design of the patent system does not reflect the structural limits of examination or varied roles of ex post invalidation. A proper understanding of patent examination and invalidation sheds light on current debates over the presumption of validity, administrative patent cancellation, and the role of ex ante examination.

TABLE OF CONTENTS

Introduction	1097
I. The Conventional Account of Patent Examination and Invalidation.....	1104
A. The Basics of Patent Examination and Invalidation	1105
B. The Conventional View of Patent Examination.....	1108
1. Assumed role of patent examination	1108
2. The conventional criticisms of patent examination.....	1110
C. The Conventional View of Ex Post Patent Invalidation	1112
II. The Reality of Patent Examination	1116
A. The Structural Barriers to Complete Patent Examination.....	1117
1. Examiners as database searchers, not investigators	1117
2. The lack of a motivated adversary in examination.....	1118
a. Ex parte examination and information gathering	1119
b. Ex parte examination and information processing.....	1122
3. The confidentiality of patent examination.....	1123
4. The language limitations of examination.....	1124
5. The lack of referents for claim scope in examination.....	1125
6. The snapshot nature of patent examination	1126
B. Examination of Only Some Categories of Prior Art.....	1129
1. The nonexamination of unpublished patent applications.....	1131
2. The nonexamination of activities prior art	1131

3.	The practical nonexamination of informal publications	1133
4.	The questionable examination of foreign language prior art	1136
C.	Examination of Only Partial Claim Scope.....	1137
D.	Examination of Only Current Patentability Doctrines.....	1139
III.	The Reality of Ex Post Patent Invalidation.....	1140
A.	Ex Post Invalidation as Examination	1141
1.	Ex post invalidation and unexamined categories of prior art	1142
2.	Ex post invalidation and unexamined claim scope	1144
3.	Ex post invalidation and changed patentability doctrines	1146
B.	Ex Post Invalidation as Review	1149
IV.	Taking the Realities of Patent Examination and Ex Post Invalidation Seriously.....	1152
A.	Rethinking Examination: Inevitable Ignorance and the Patent Examination Funnel.....	1153
B.	The Presumption of Validity and the Different Jobs of Examination and Invalidation.....	1157
C.	Rethinking the Design of Patent Office Cancellation Proceedings	1159
	Conclusion.....	1161

INTRODUCTION

In the United States patent system, three distinct institutions evaluate whether a claimed invention meets the statutory criteria of patentability and therefore warrants patent protection: patent examiners in ex ante examination in the United States Patent and Trademark Office (Patent Office), federal district courts in litigation, and the Patent Trial and Appeal Board (PTAB) in Patent Office post-issuance cancellation proceedings. Scholars and other commentators vigorously debate the appropriate roles and relative performance of these institutions in evaluating patentability.¹ Yet, they share a

1. See, e.g., Roger Allan Ford, *The Patent Spiral*, 164 U. PA. L. REV. 827, 835–41 (2016) (describing debates regarding patent examination); F. Scott Kieff, *The Case for*

common assumption that each performs the exact same task, with the debate focused on how to apportion responsibility in a way that optimizes the efficiency and accuracy of the patentability evaluation.²

According to conventional wisdom, the Patent Office is tasked with examining patent applications, evaluating all of the relevant prior art (i.e., existing knowledge in the field), and issuing a patent if and only if the claimed invention satisfies all of the statutory criteria of patentability.³ Under this criteria, the claimed invention must be new, sufficiently different from what existed, useful, adequately described and delineated in the patent document, and the type of subject matter for which patent protection is granted.⁴ The Patent Office is widely criticized for the quality of this ex ante patent examination, supposedly issuing a large number of patents that fail the statutory criteria of patentability.⁵ Commentators blame this poor performance on the inherent error rate in any human endeavor, patent examiners' shortcomings, the Patent Office's biases, and/or the Patent Office's limited time and resources.⁶

Traditionally, federal courts in litigation were responsible for invalidating issued patents that failed the statutory criteria of patentability.⁷ However, courts too were seen as inadequate at policing and invalidating issued patents.⁸ Congress responded by passing the American Invents Act of 2011 (AIA),⁹ which significantly expanded and strengthened the Patent Office proceedings for reconsidering, and where appropriate, invalidating issued patents.¹⁰ The conventional

Preferring Patent-Validity Litigation Over Second-Window Review and Gold-Plated Patents: When One Size Doesn't Fit All, How Could Two Do the Trick?, 157 U. PA. L. REV. 1937, 1951 (2009) (advocating for greater role for litigation and lesser role for examination and post-issuance review in policing patentability); Megan M. La Belle, *Public Enforcement of Patent Law*, 96 B.U. L. REV. 1865, 1884–95 (2016) (explaining debate over patent litigation and post-issuance proceedings).

2. See *infra* Part I.

3. See *infra* Section I.B.1.

4. 35 U.S.C. § 131 (2012); see also 35 U.S.C. §§ 101–03, 112 (stating that novelty and a nonobvious subject matter are conditions for patentability).

5. See Roger Allan Ford, *Patent Invalidity Versus NonInfringement*, 99 CORNELL L. REV. 71, 87–88 (2013).

6. See *infra* Section I.B.2.

7. See *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1353 (2018).

8. Rochelle Cooper Dreyfuss, *Giving the Federal Circuit a Run for Its Money: Challenging Patents in the PTAB*, 91 NOTRE DAME L. REV. 235, 237–40 (2015).

9. Leahy-Smith America Invents Act, 35 U.S.C. § 1 (2012).

10. *Regents of the Univ. of Minn. v. LSI Corp.*, 926 F.3d 1327, 1332–35 (Fed. Cir. 2019).

description of the role of ex post patent invalidation, whether in district court litigation or Patent Office post-issuance proceedings, is to review the Patent Office's work to correct any mistakes and errors it made in examination.¹¹ Ex post invalidation thus supposedly eliminates patents that never should have been issued because they failed the statutory criteria of patentability at the time of examination.¹² On this view, any issued patent that fails the statutory criteria of patentability is evidence of a Patent Office error, and the frequency of ex post invalidations is proof of the Patent Office's shortcomings.¹³

Scholars,¹⁴ the Federal Circuit,¹⁵ the Supreme Court,¹⁶ and even the Patent Office¹⁷ have adopted this conventional wisdom of the functions and relationship of ex ante patent examination and ex post invalidation. Yet, it is wrong—or at least overly simplistic.

Ex ante examination is not institutionally structured to provide a complete evaluation of the statutory criteria of patentability and, at best, can provide only a partial evaluation. A patent examiner sitting at a desk and searching online libraries and databases (or even the Patent Office's physical library) is not capable of identifying significant portions of the wide swath of information (prior art) that can render a claimed invention unpatentable as anticipated (i.e., not new) or obvious (i.e., not sufficiently different). Prior art includes sources of information that are not physically documented or would not appear in libraries or databases—actual uses and sales of the claimed invention, Ph.D. dissertations catalogued in a single library anywhere in the world, product manuals and brochures, conference or trade show presentations, etc. Ex ante examination lacks the inquisitorial powers, such as hiring investigators, deposing witnesses, compelling

11. See *infra* Section I.C.

12. See *infra* Section I.C.

13. See *infra* Section I.C.

14. See, e.g., *infra* Sections I.B–C and scholars cited therein.

15. See *Regents of the Univ. of Minn.*, 926 F.3d at 1331–34 (describing the purpose of Patent Office post-issuance proceedings as correcting defects in original examination resulting from Patent Office's shortcomings).

16. See *Oil States Energy Servs., LLC v. Greene's Energy Grp., LLC*, 138 S. Ct. 1365, 1370 (2018) (“Congress has created administrative processes that authorize the PTO to reconsider and cancel patent claims that were wrongly issued.”); *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 96 (2011) (expressing an invalidity defense in litigation as an effort by the defendant “to prove that the patent never should have issued in the first place”).

17. See *Celgene Corp. v. Peter*, 931 F.3d 1342, 1358 (Fed. Cir. 2019) (describing the Patent Office's argument on appeal that a PTAB finding of unpatentability is evidence that the patent was erroneously issued in the first place).

document production, etc., or the adversarial process, which involves a motivated opponent willing to conduct this investigation, necessary to identify this information.¹⁸

There are additional, less obvious ways in which ex ante examination is structurally incapable of providing a complete patentability evaluation. The confidentiality of the patent examination process, at least for its first eighteen months, limits the examiner's ability to search unsecure sources of information, including the internet, and renders nearly useless the limited means for third parties to submit information in examination.¹⁹ In addition, examiners often lack the foreign language skills necessary to determine whether a foreign patent or publication, which qualify as prior art, is even potentially relevant and warrants translation.²⁰ Because patent examination occurs in the early stage of the claimed invention's development and lacks a motivated adversary, the examiner's only point of reference is the disclosure in the patent document itself and the applicant's arguments, making it difficult for the examiner to appreciate the full scope of the claimed invention and complete relevance of even identified prior art references.²¹

The structural realities that prevent a full patentability evaluation in examination are not just examples of the Patent Office's widely recognized resource constraints or what Mark Lemley has called the Patent Office's "rational ignorance"—the idea that expending more resources on ex ante examination would be wasteful because a large percentage of patents are never litigated, licensed, or otherwise used.²² Addressing the structural realities that make a full patentability evaluation impossible in examination would require fundamental changes to the very nature of patent examination.²³ Discussions of Patent Office resource constraints and rational ignorance focus not on major structural changes to examination but instead on increasing Patent Office funding and examiner time allocations, with the focal point being whether enough additional examiners should be hired to

18. See *infra* Sections II.A.1–2.

19. See *infra* Section II.A.3.

20. See *infra* Section II.A.4.

21. See *infra* Sections II.A.2, II.A.5.

22. Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1497 n.6 (2001).

23. Cf. *id.* at 1511 (noting that most would consider a proposal that to “minimize the risk of error we should conduct the equivalent of a full trial on validity (say, one thousand hours of examination) before granting a patent” as ludicrous and unworkable).

double examiner time per application.²⁴ Increasing the money and time allotted to examination might have a marginal impact on some of the examination shortcomings identified above; for example, it may slightly help with the translation issue or the examiner's ability to appreciate the full scope of the invention. But significantly addressing these issues would require drastic reforms to core structural features of ex ante examination.

Moreover, even with unlimited resources and significant structural changes, ex ante examination still could provide only a partial evaluation of patentability along a temporal dimension. Ex ante examination evaluates patentability at one point in time—before the patent is issued—but whether a claimed invention satisfies the statutory criteria of patentability can change over the patent's nearly two-decade life. Jason Rantanen has recognized the malleability of patent claims—that their imprecision and the tools of patent law can be used to narrow or expand the scope of the claimed invention over time.²⁵ When this malleability is used to expand claim scope, the claim may become invalid in light of the prior art or disclosure in the specification, even if it was patentable under a narrow understanding of the claimed invention at issuance.²⁶ Moreover, the statutory criteria of patentability can and do change over time as courts alter their interpretations of the broad, open-ended statutory provisions, and these changes are applied retroactively to previously issued patents.²⁷ A claimed invention that was patentable based on the statutory criteria at the time of issuance can become invalid if the statutory criteria are made more demanding over time.²⁸ As a result, the conventional assumption that ex post invalidation necessarily shows that the patent never should have issued is mistaken.

Given these realities of patent examination, the function of ex post invalidation in litigation or Patent Office post-issuance proceedings is more complex and nuanced than commonly portrayed. At times, ex post invalidation does perform a review function of correcting errors

24. See Michael D. Frakes & Melissa F. Wasserman, *Irrational Ignorance at the Patent Office*, 72 VAND. L. REV. 975, 1017–21 (2019) (opining that the Patent Office simply needs to boost its operating budget to accommodate the increased number of personnel required); Lemley, *supra* note 22, at 1508–09 (defining the resource constraints and rational ignorance issue as being about “how many of the bad patents that currently issue can be smoked out merely by adding a few more hours to an examiner’s evaluation”).

25. Jason Rantanen, *The Malleability of Patent Rights*, 2015 MICH. ST. L. REV. 895, 899, 941–42.

26. See *infra* Sections II.A.6, II.C.

27. See *infra* Section II.A.6.

28. See *infra* Section II.D.

made in examination. These errors could be true examiner mistakes—a claimed invention that was unpatentable at the time of examination and could have and should have been caught by the examiner despite structural limitations and resource constraints. Or these errors could be inevitable errors resulting from the limited time and money expended on ex ante examination, i.e., the Patent Office’s rational ignorance—a claimed invention that was unpatentable at the time of examination and could have been caught, despite the structural limits of examination, with enough time and resources. Ex post invalidation most clearly performs this review and error-correction function when it is based on the prior art most structurally suited for examination: U.S. patents, formal publications, or other prior art at issue in examination.²⁹

At other times, ex post invalidation performs an examination function of providing the first-instance evaluation of those aspects of the patentability determination not structurally suited for ex ante examination. It provides an initial examination of those categories of prior art not accessible in ex ante examination, such as unpublished applications, real-world activities, and informal publications. It also supplies an initial examination of the full claim scope not recognizable in examination, either because of the examiner’s limited points of reference or because of post-issuance stretching of claim scope. This full claim scope can require additional consideration of the patentability requirements of novelty and nonobviousness but is particularly likely to implicate the disclosure requirements of enablement and written description, which serve to prevent overbroad claims. Finally, ex post invalidation can provide supplemental examination to account for judicial developments that have retroactively made the statutory criteria of patentability more restrictive over time. The explosion of invalidations after the Supreme Court strengthened the requirements for patent-eligible subject matter under section 101 of the Patent Act³⁰ is a compelling, recent example of this function.³¹

Scholars have recognized pieces of these realities of patent examination and invalidation (though often in passing or while focused on other issues)—for example, that some prior art is essentially inaccessible in patent examination;³² that increased examination time and resources will

29. See *infra* Section III.B.

30. 35 U.S.C. § 101 (2012).

31. See *infra* Section III.A.

32. See Lemley, *supra* note 22, at 1500 (“[M]uch of the most relevant prior art isn’t easy to find—it consists of sales or uses by third parties that don’t show up in any

have no impact on patents that are invalid in light of this inaccessible prior art;³³ that patent claims can be expanded over time in a way that makes them more likely to be invalid;³⁴ and that patentable claimed inventions can become invalid due to changes in the statutory criteria of patentability.³⁵ This Article builds on this work and puts together these pieces, revealing a complete picture of the function and relationship of patent examination and invalidation that is more varied, complex, and nuanced than the conventional wisdom.

The design of the patent system reflects a formalistic model whereby the Patent Office provides a comprehensive evaluation of patentability and the ex post invalidation serves to review this work and correct any errors made. Recognizing the complicated relationship of ex ante Patent Office examination and ex post patent invalidation requires reconsideration of the design of, and debates about, patent examination, patent litigation, and Patent Office post-issuance proceedings.

First, the structural limits of ex ante examination would seem, initially, to support proposals to expend little on ex ante examination and perhaps even abolish it altogether. Yet, new empirical data by Michael Frakes and Melissa Wasserman challenges Lemley's "rational ignorance" theory and suggests that greater investment in examination would have a positive effect.³⁶ Despite the structural limitations that make it an ineffective substantive screen of patentability, the partial examination that occurs ex ante in the Patent Office may be important because it serves as a funnel of claim scope that narrows the patent

searchable database . . ."); Robert P. Merges, *As Many as Six Impossible Patents before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 589, 599–600 (1999); Michael Risch, *The Failure of Public Notice in Patent Prosecution*, 21 HARV. J.L. & TECH. 179, 196 (2007).

33. See Kieff, *supra* note 1, at 1948 ("[N]o realistically available amount of time, training, and access to commercial databases will help an examiner at her desk obtain an obscure student thesis on the bookshelf of a foreign library or a specific laboratory notebook corroborating the work of an individual researcher."); Stephen Yelder, *Prior Art in the District Court*, 95 NOTRE DAME L. REV. 837, 880 (assuming that "no plausible reform to examination practice would have precluded the issuance" of patents later invalidated based on nontraditional publications or activity prior art).

34. See Jason Rantanen, *How Malleability Matters*, 6 IP THEORY 1, 23–27 (2016) (arguing that patent challenges can use the malleability of patent claims to expand their scope and make them more likely to be invalid).

35. See La Belle, *supra* note 1, at 1883 ("[A]s the legal standards for patentability change—as many have in recent years—inventions that were once subject to a valid patent are no longer worthy of protection.").

36. See *infra* Section IV.A.

owner's exclusive rights, thereby mitigating the harm caused by the presence of an unwarranted patent.³⁷

Second, the realities of patent examination and invalidation are further evidence for those who challenge the presumption of validity and heightened burden of proof required to invalidate a patent in litigation, which is premised on the presumption that an expert administrative agency correctly did its job. While many have questioned whether the assumption of correctness is warranted given the Patent Office's documented shortcomings, this Article questions whether examination and invalidation even perform the same job in the first place.³⁸

Third, more than nine months after issuance, Patent Office post-issuance proceedings only allow anticipation and obviousness challenges based on patents and printed publications. The realities of examination and invalidation suggest that this design omits situations in which a second round of Patent Office review might be most warranted—when invalidity is based on activity prior art least amenable to *ex ante* examination or is based on the disclosure requirements of enablement and written description most likely to police claim expansion.³⁹

The Article proceeds in four parts. Part I describes the conventional view of the functions and relationship of *ex ante* examination and *ex post* invalidation. Part II details the realities of patent examination, while Part III lays out the varied functions that *ex post* invalidation performs. Part IV analyzes the implications of recognizing the varied, complex, and nuanced functions and relationship of *ex ante* examination and *ex post* invalidation.

I. THE CONVENTIONAL ACCOUNT OF PATENT EXAMINATION AND INVALIDATION

Ex ante patent examination and *ex post* invalidation typically are seen as performing identical functions—applying the statutory criteria of patentability to determine whether patent protection is warranted.⁴⁰ Specifically, patent examination is seen as performing this function in the first instance and *ex post* invalidation is seen as reviewing the Patent Office's work to correct any errors. After first providing background on patent examination and invalidation, this Part lays out the conventional view of each.

37. See *infra* Section IV.A.

38. See *infra* Section IV.B.

39. See *infra* Section IV.C.

40. Frakes & Wasserman, *supra* note 24, at 987.

A. *The Basics of Patent Examination and Invalidation*

The act of invention gives no enforceable rights against competitors.⁴¹ The inventor must petition the government to grant it exclusive rights in the form of a patent.⁴² Specifically, the inventor must file a patent application with the Patent Office.⁴³ Since 1836, the Patent Office has substantively examined patent applications before issuing them.⁴⁴ “A patent examiner with expertise in the relevant field reviews an applicant’s patent claims, considers the prior art [i.e., the existing knowledge in the field], and determines whether each claim meets the applicable patent law requirements.”⁴⁵

The applicant must satisfy several statutory criteria of patentability to obtain patent protection. The claimed invention must be the type of technological advancement for which patent protection is granted (“patent eligible subject matter”) and must have a real-world, practical function (“utility”) under section 101 of the Patent Act; must be an actual invention that did not previously exist under section 102 (“novelty” or “anticipation”); and must be sufficiently different from what did exist to warrant patent protection under section 103 (“obviousness”).⁴⁶ Pursuant to section 112 of the Patent Act, the patent application also must adequately teach a skilled person in the field how to make and use the invention (“enablement”); must demonstrate that the inventor actually possessed the invention (“written description”); and must claim the invention with adequate precision (“definiteness”).⁴⁷

The existing knowledge, or “prior art” in patent parlance, that can render a patent anticipated under section 102 or obvious under

41. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 9 (1966).

42. *See Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 149 (1989) (“[T]he federal patent scheme creates a limited opportunity to obtain a property right in an idea.”).

43. 35 U.S.C. § 111 (2012); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2136 (2016).

44. Michael J. Burstein, *Rules for Patents*, 52 WM. & MARY L. REV. 1747, 1755, 1761 (2011).

45. *Cuozzo Speed Techs.*, 136 S. Ct. at 2136–37.

46. 35 U.S.C. §§ 101–03.

47. § 112(a)–(b). A patent application must also disclose the best way the inventor knows to implement the invention, but this is rarely a hurdle to patentability because it is difficult to police in patent examination and not a ground for invalidity in litigation. *Id.*; *see also* § 282(b)(3)(A) (declaring that even when a patent application fails to include the best mode, it is not a reason for a claim of a patent to be cancelled, invalidated, or unenforceable); Lee Petherbridge & Jason Rantanen, *In Memoriam Best Mode*, 64 STAN. L. REV. ONLINE 125, 126–27 (2012) (noting that elimination of best mode as a defense in litigation “effectively eliminated the best mode requirement from patent law”).

section 103 includes anything that “was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention” *anywhere in the world*, as well as that which was described in another previously filed United States patent application provided that application subsequently issues or is published.⁴⁸

Because a patent application is presumed patentable, the Patent Office must issue a patent unless it can establish that the application fails one of the statutory criteria of patentability.⁴⁹ If an examiner rejects an application, the applicant can either explain why the patent claims actually do satisfy the statutory criteria or amend the claims to bring them within the statutory criteria.⁵⁰ Ultimately, the Patent Office is required to issue the patent “if on such examination it appears that the applicant is entitled to a patent under the law.”⁵¹

However, *ex ante* patent examination has never been conclusive in the American patent system.⁵² Most commonly, issued patents are subject to invalidity challenges as affirmative defenses and/or counterclaims in federal court litigation brought against those accused of violating, or infringing, the patent’s exclusive rights or, less commonly, in federal court declaratory judgment actions brought by accused infringers.⁵³ A patent claim is invalid, and therefore cancelled, if it fails any of the same statutory criteria of patentability considered during patent examination.⁵⁴ But an issued patent is presumed valid in litigation, with the burden on the challenger to prove it invalid by clear and convincing evidence.⁵⁵

In 1980, Congress created *ex parte* reexamination, allowing issued patents to be challenged and potentially cancelled within the Patent Office itself.⁵⁶ *Ex parte* reexamination remains available today and allows the Patent Office to reconsider the novelty or nonobviousness

48. 35 U.S.C. § 102(a)(1)–(2); *see also* § 103 (incorporating section 102’s definition of prior art). The America Invents Act of 2011 altered the statutory definition of prior art. Most relevant for present purposes, it expanded nonpaper prior art to include activities anywhere in the world. *Compare* 35 U.S.C. § 102 (2012), *with* 35 U.S.C. § 102 (2006) (pre-AIA).

49. Sean B. Seymore, *The Presumption of Patentability*, 97 MINN. L. REV. 990, 995 (2013).

50. 35 U.S.C. § 132(a) (2012).

51. § 131.

52. Christopher Beauchamp, *Repealing Patents*, 72 VAND. L. REV. 647, 662–63 (2019).

53. La Belle, *supra* note 1, at 1884–85.

54. 35 U.S.C. § 282(b)(2)–(3). The only exception is the best mode requirement. § 282(b)(3).

55. § 282(a); *Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 95 (2011).

56. *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2137 (2016).

of a patent based only on printed prior art (e.g., prior patents, publications, etc.).⁵⁷ Ex parte reexamination proceeds similarly to initial patent examination, involving just the patentee and the patent examiner and with amendments to claims liberally allowed to overcome findings of unpatentability.⁵⁸

The America Invents Act of 2011⁵⁹ (AIA) substantially overhauled and expanded Patent Office post-issuance proceedings. First, it created inter partes review, which allows any party to challenge an issued patent for anticipation or nonobviousness based on printed prior art from nine months after the patent issues through the life of the patent.⁶⁰ Second, the AIA created post grant review, which allows any party to challenge a patent on any statutory criteria of patentability within nine months of issuance.⁶¹ Third, the AIA created a temporary covered business method patent review program lasting until 2020 that allows a party accused of patent infringement to file a challenge in the Patent Office on any statutory criteria of patentability but only if the patent covers a nontechnological “method or corresponding apparatus for performing data processing or other operations used in the practice, administration, or management of a financial product or service.”⁶²

The new AIA proceedings are adversarial proceedings involving both the patentee and requester that include limited discovery, an oral hearing, and some other features more reminiscent of litigation than traditional examination or reexamination.⁶³ The proceedings also are resolved by three administrative patent judges of the newly created Patent Trial and Appeal Board (PTAB), rather than a patent examiner.⁶⁴

57. See U.S. DEP'T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE § 2209 (9th ed. rev. 08.2017, last rev. Jan. 2018) [hereinafter MPEP], <https://www.uspto.gov/web/offices/pac/mpep> [<https://perma.cc/532J-3VBZ>] (summarizing reexamination).

58. 35 U.S.C. § 307; MPEP, *supra* note 57, § 2209. From 1999 to 2012, Congress also provided inter partes reexamination that allowed some participation by the requestor. 35 U.S.C. §§ 314(b), 315(b) (2006) (pre-AIA); MPEP, *supra* note 57, § 2609.

59. Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011).

60. Sarah Tran, *Patent Powers*, 25 HARV. J.L. & TECH. 609, 633–35 (2012).

61. *Id.* at 631–32.

62. *Id.* at 636–37 (quoting Leahy-Smith America Invents Act, sec. 18(d)(1), 125 Stat. at 331).

63. *Id.* at 633–34, 636–37; Melissa F. Wasserman, *The Changing Guard of Patent Law: Chevron Deference for the PTO*, 54 WM. & MARY L. REV. 1959, 1981–83 (2013).

64. Tran, *supra* note 60, at 633, 636; Wasserman, *supra* note 63, at 1983.

B. *The Conventional View of Patent Examination*

1. *Assumed role of patent examination*

As typically described, American “patent law follows an examination model.”⁶⁵ In this examination model, inventors have no exclusive rights in their invention until the Patent Office has reviewed the claimed invention described in the patent application, found it warranting patent protection, and granted the patent.⁶⁶ Specifically, the inventor must convince the patent examiner that it is entitled to patent protection because it satisfies the statutory criteria of patentability.⁶⁷

This examination model is seen as a “substantive screen” that weeds out those inventions that fail the statutory criteria of patentability and ensures that *only* those inventions meeting *all* of the statutory criteria of patentability receive patent protection.⁶⁸ The Patent Office itself notes that “[t]he public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability.”⁶⁹ Under the substantive screen view of examination, no patent failing the statutory criteria of patentability “ought ever be issued.”⁷⁰ Thus, “[w]hen examiners perform this task correctly, all is well; inventors are precisely the people who are supposed to enjoy the benefits of a patent monopoly.”⁷¹ The Federal Circuit has emphasized the importance of this traditional role, noting that “our patent system depends primarily on the [Patent Office’s] care in screening out invalid patents during prosecution.”⁷²

This examinational model is justified on the grounds “that, as a society, we do not want to bear the costs of a significant number of

65. Ford, *supra* note 1, at 833.

66. *Id.* at 833–34.

67. Christopher A. Cotropia, *Modernizing Patent Law’s Inequitable Conduct Doctrine*, 24 BERKELEY TECH. L.J. 723, 748 (2009) (“The patent system assumes that only those patent applications that describe and claim a patentable advance are granted the power to exclude.”); Ford, *supra* note 1, at 833; Megan M. La Belle, *Patent Law as Public Law*, 20 GEO. MASON L. REV. 41, 55 (2012).

68. Ford, *supra* note 1, at 835–36; Merges, *supra* note 32, at 592; *see also* La Belle, *supra* note 67, at 43 (describing examination as “ensur[ing] that the invention satisfies all the requirements of patentability”).

69. 37 C.F.R. § 1.56(a) (2019).

70. Merges, *supra* note 32, at 592.

71. Ford, *supra* note 1, at 842–43.

72. *Prima Tek II, L.L.C. v. Polypap, S.A.R.L.*, 412 F.3d 1284, 1287 (Fed. Cir. 2005).

invalid patents.”⁷³ Examination is described as ensuring that only those who contributed something valuable to society receive the benefits of exclusive rights to inventions.⁷⁴ It also is seen as promoting notice and reducing risk in investing in new inventions “since a patent that has made it through examination is more likely to survive in court.”⁷⁵ Scholars also posit that patent examination improves the information value of patents by policing the statutory criteria to ensure that the invention is fully and adequately disclosed.⁷⁶

The examination model is seen as a unique feature of the patent system, both historically and as compared to other forms of intellectual property.⁷⁷ Robert Merges explained that “historically the current system of a professional corps of patent examiners grew out of our disastrous experience with a patent registration system run amuck.”⁷⁸ Under this registration system, which existed from 1793 to 1836, the Patent Office issued patents as long as the proper documentation was completed without *ex ante* examination.⁷⁹ Evaluation of the statutory criteria of patentability only occurred *ex post* in federal court, either through an invalidity defense in infringement litigation or in a separate revocation action initiated within three years of patent issuance.⁸⁰ The Patent Act of 1836⁸¹ abolished this registration system in favor of the current system of pre-issuance examination by expert patent examiners.⁸² Reflecting conventional wisdom, Merges described the system adopted in 1836 as the American patent system’s conclusive rejection of a patent registration system because “the high [social] cost of registering invalid patents was not worth whatever benefits were provided by this low ‘entry barrier’ to inventors.”⁸³ The examination model is also viewed as distinguishing patent law from other areas of

73. Merges, *supra* note 32, at 593.

74. Ford, *supra* note 1, at 835–36.

75. *Id.* at 836.

76. *Id.* at 836–37.

77. *Id.* at 829, 834–35.

78. Merges, *supra* note 32, at 593.

79. Robert Merges, *The Hamiltonian Origins of the U.S. Patent System, and Why They Matter Today*, 104 IOWA L. REV. 2559, 2568 (2019). From 1790 to 1793, the American patent system used pre-issuance examination to ensure that the invention was both novel and useful, but this was conducted by high-ranking government officials and proved too burdensome. See La Belle, *supra* note 1, at 1881.

80. Beauchamp, *supra* note 52, at 665–66; Merges, *supra* note 79, at 2568.

81. Patent Act of 1836, ch. 357, 5 Stat. 117 (1836).

82. La Belle, *supra* note 1, at 1881–82.

83. Merges, *supra* note 32, at 594–95.

intellectual property, which either do not require an *ex ante* proceeding for exclusive rights to vest or, if they do, require only registration and not substantive examination.⁸⁴

2. *The conventional criticisms of patent examination*

Scholars widely recognize that the patent examinational model does not live up to its theorized ideal. The scholarly near-consensus is that “the [United States Patent and Trademark Office (USPTO or PTO)] does a poor job of examining patents, allowing significant numbers of invalid patents to issue.”⁸⁵ In response, scholars have proposed a variety of “examination-based reforms” that seek “to improve the manner in which the USPTO takes in patent applications and turns out issued patents.”⁸⁶

One set of proposals attributes the Patent Office’s examination problems, at least in part, to the incentives and biases of the Office as a whole, and examiners individually, including: the Patent Office’s explicitly customer-service approach to applicants; Patent Office procedures that make it nearly impossible to finally reject a patent application; appellate review of patent denials but not grants; the Patent Office’s budgetary dependence on post-issuance fees, rather than examination fees; the additional work required for an examiner to explain a denial not required for a grant; and a skewed examiner compensation system that rewards examiners for grants.⁸⁷ Commentators call for reforms that would eliminate, reduce, or counter these incentives and biases.⁸⁸

Most commonly, the Patent Office’s examination problems are attributed to the resource constraints faced by the Patent Office—finite resources, a high volume of patent applications, and difficulty hiring a

84. Lemley, *supra* note 22, at 1526 (noting that patent law is unique in requiring “government examination and approval as a prerequisite to filing a lawsuit”); *see also* Ford, *supra* note 1, at 834–35.

85. Jonathan Masur, *Patent Inflation*, 121 YALE L.J. 470, 477 (2011); *see also, e.g.*, Ford, *supra* note 5, at 87–88; Frakes & Wasserman, *supra* note 24, at 977–78; F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 57 (2003); Lemley, *supra* note 22, at 1495–96; Jonathan Masur, *Costly Screens and Patent Examination*, 2 J. LEGAL ANALYSIS 687, 687 (2010); Stephen Yelderman, *Improving Patent Quality with Applicant Incentives*, 28 HARV. J.L. & TECH. 77, 78 (2014).

86. Yelderman, *supra* note 85, at 78.

87. *See* Ford, *supra* note 1, at 837–39; Masur, *supra* note 85, at 687, 692–95; Melissa F. Wasserman, *The PTO’s Asymmetric Incentives: Pressure to Expand Substantive Patent Law*, 72 OHIO ST. L.J. 379, 417–20 (2011).

88. *See, e.g.*, Yelderman, *supra* note 85, at 83–84 (noting these proposals).

large number of high-quality examiners.⁸⁹ Examiners thus only have approximately twenty hours per application for all of the tasks of examination: reviewing the application, conducting a prior art search, comparing the prior art to the claimed invention, drafting one or more office actions, responding to the applicant's arguments, evaluating any amendments, and potentially holding an interview with the applicant's attorney.⁹⁰ Even patent examiners acknowledge this amount of time is insufficient for a quality examination.⁹¹ Insufficient examination time is likely to generate patent grants for claimed inventions that fail the statutory criteria of patentability because the presumption of patentability means that the patent issues unless the examiner, within the time allotted, can establish and explain its unpatentability.⁹²

Given the effects of Patent Office resource constraints on examination quality, a common patent reform proposal is to increase funding to allow the Patent Office to increase its workforce and spend more time examining each application, particularly searching for prior art.⁹³ Mark Lemley and others have questioned the wisdom of doing so, since the increased resources would be wasted for the vast majority of patents that are never litigated or otherwise used.⁹⁴ Relying on data, estimates, and assumptions on the costs of patent prosecution, the costs of litigation, the number of patents litigated or otherwise used, and the effect of doubling examiner time on these numbers, Lemley concluded that "the PTO does [not] do a very detailed job of examining patents, but we probably

89. *Saint Regis Mohawk Tribe v. Mylan Pharms. Inc.*, 896 F.3d 1322, 1331–32 (Fed. Cir. 2018) (Dyk, J., concurring) ("Resource constraints in the initial examination period inevitably result in erroneously granted patents.").

90. Frakes & Wasserman, *supra* note 24, at 4 (eighteen hours). Compare *Regents of the Univ. of Minn. v. LSI Corp.*, 926 F.3d 1327, 1332 (Fed. Cir. 2019) (twenty-two hours), with Masur, *supra* note 85, at 687 (eighteen hours). The actual time allotted per application varies with the technology classification of the invention and experience level of the examiner. See Frakes & Wasserman, *supra* note 24, at 982–83.

91. See *Regents of the Univ. of Minn.*, 926 F.3d at 1332 (disclosing data showing that 70% of patent examiners find the time allotted per patent application insufficient).

92. Frakes & Wasserman, *supra* note 24, at 982.

93. See Lemley, *supra* note 22, at 1508–09 (summarizing proposals); Masur, *supra* note 85, at 698 (summarizing proposals). Alternatively, some have suggested outsourcing some of the Patent Office's work, particularly prior art searching, to third parties, whether the applicant, competitors, or independent search companies. Ford, *supra* note 1, at 864–65 (summarizing proposals).

94. See Lemley, *supra* note 22, at 1511 (outlining how money spent on improvements would likely be wasted as 95% of patents will either never be used or subject to litigation).

don't want it to. It is 'rationally ignorant' of the objective validity of patents, in economics lingo, because it is too costly for the PTO to discover those facts."⁹⁵ Some scholars have gone further than Lemley, suggesting moving more towards a registration system because any significant level of ex ante patent examination may not be cost-justified.⁹⁶

Recently, however, Michael Frakes and Melissa Wasserman utilized newly available data and sophisticated economic analysis in place of some of Lemley's estimates and assumptions to conclude that "the savings in future litigation costs and prosecution expenses associated with giving examiners additional time per application outweighs the costs of increasing examiner time allocations."⁹⁷ To them, "society would be better off investing more resources into the [Patent Office examination] to improve patent quality than relying on ex-post litigation to weed out invalid patents."⁹⁸ They thus disagreed with Lemley that the Patent Office was rationally ignorant, instead concluding that "the present degree of ignorance—that is, the limited ability of examiners to unearth prior art and hence reject patent applications that fail to meet the patentability standards—is *irrational*. In other words, the current level of resources the Patent Office extends to review patent applications is insufficient."⁹⁹

C. *The Conventional View of Ex Post Patent Invalidation*

Ex post patent invalidation is typically described as performing the exact same task as ex ante patent examination—determining whether a claimed invention satisfies the statutory criteria of patentability.¹⁰⁰ Formally, this is true, as section 282 of the Patent Act explicitly defines one of the "defenses in any action involving the validity or infringement of a patent" as "[i]nvalidity of the patent or any claim in suit" with cross-reference to the portions of the Patent Act defining the

95. Lemley, *supra* note 22, at 1497.

96. See Kieff, *supra* note 85, at 58–59 (advocating for a "soft-look" examination by the Patent Office, if any examination); see also Masur, *supra* note 85, at 692 (summarizing additional proposals).

97. Frakes & Wasserman, *supra* note 24, at 980.

98. *Id.* at 981.

99. *Id.* at 1021.

100. See *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 97 (2011) ("[T]he same factual questions underlying the PTO's original examination of a patent application will also bear on an invalidity defense in an infringement action."); see also La Belle, *supra* note 67, at 52 (describing an ex post invalidity determination as "an objective inquiry into whether the patentability requirements were actually satisfied as the PTO concluded").

statutory conditions of patentability for patent issuance.¹⁰¹ Similarly, the Patent Act defines the scope of Patent Office post grant review by cross-referencing the grounds for invalidity that can be raised in litigation under section 282 (which themselves cross-reference the examination provisions).¹⁰² And it defines the scope of inter partes review by cross-referencing the statutory provisions that establish the novelty and nonobviousness requirements for patent issuance, sections 102 and 103, though subsequently limited to “prior art consisting of patents or printed publications.”¹⁰³

The typical justification for the seemingly duplicative efforts of patent examination and ex post invalidation is that the Patent Office errs in applying the statutory criteria of patentability in examination and mistakenly issues patents that should have been denied.¹⁰⁴ These unwarranted patents impose significant social costs.¹⁰⁵ Thus, the purpose of ex post invalidation is seen as reviewing the work of the Patent Office in evaluating the statutory criteria of patentability and correcting errors made by the Patent Office in issuing patents for unpatentable claimed inventions.¹⁰⁶ Megan La Belle described the basic question of invalidity in litigation as whether “the PTO, *a governmental agency*, ma[d]e a mistake when it issued the patent[.]”¹⁰⁷ Likewise, Saurabh Vishnubhakat explained that “[a]ll three types of [Patent Office cancellation] proceedings are concerned essentially with the same problem—correcting patent examination errors.”¹⁰⁸

101. 35 U.S.C. § 282(b)(2) (2012).

102. § 321(b) (defining the scope of post grant review).

103. § 311(b).

104. Ford, *supra* note 5, at 92–93 (describing invalidation in litigation as serving to address the problem of Patent Office issuance of invalid patents); La Belle, *supra* note 1, at 1883 (explaining that one of the reasons that “the ability to police patents post-issuance remains important” is because “the PTO sometimes makes mistakes and grants bad patents”).

105. *See* Merges, *supra* note 32, at 592 (recounting various social costs that arise from invalid patents).

106. *See* Wasserman, *supra* note 87, at 405 (describing invalidation in infringement litigation as “judicial review” of Patent Office decisions in examination).

107. La Belle, *supra* note 67, at 52.

108. Saurabh Vishnubhakat, *When Can the Patent Office Intervene in its Own Cases?*, 73 N.Y.U. ANN. SURV. AM. L. 201, 211 (2018).

And the rate of ex post invalidation is often used as evidence of the failures of ex ante examination.¹⁰⁹

Thus, an ex post finding of invalidity is typically seen as “prov[ing] that the patent never should have issued in the first place,” but for a mistake by the Patent Office, because it failed the statutory criteria of patentability at the time of issuance.¹¹⁰ An issued patent is entitled to a presumption of validity in litigation, with the burden on the challenger to prove invalidity by clear and convincing evidence.¹¹¹ The traditional justification for the presumption of validity, and clear and convincing burden, is “the presumption of administrative correctness of actions of the agency charged with examination of patentability.”¹¹² On this view, the purpose of ex post invalidation is to review and correct Patent Office errors, but, in doing so, generalist courts and juries should presume that the expert examiners in the Patent Office did not commit an error, absent strong evidence to the contrary.¹¹³ Conversely, those who complain about the Patent Office’s examinational shortcomings, or support its rational ignorance, suggest abolishing the heightened burden of proof because the presumption that the Patent

109. See Colleen Chien, *Comparative Patent Quality*, 50 ARIZ. ST. L.J. 71, 72–73 (2018) (relying on high court and PTAB invalidation rates as evidence for “[t]he perception that the USPTO makes many mistakes”); Ford, *supra* note 5, at 87–88 (relying on the fact that “nearly half of all litigated patents that make it to a final judgment are invalidated by the courts” as evidence that “patent examiners do not do their job particularly well” and that “the PTO issu[es] many invalid patents”); Ford, *supra* note 1, at 837–38 (relying on fact that “nearly half of litigated patents that make it to a final judgment are invalidated” as “evidence shows clearly that examiners grant many invalid patents”); Yelderman, *supra* note 85, at 82 (using the fact that “roughly half of litigated patents are found to contain one or more invalid claims” as evidence that “the USPTO makes mistakes” in examination).

110. *Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 96–97 (2011).

111. See 35 U.S.C. § 282(a) (2012) (outlining the presumption of validity); *accord i4i*, 564 U.S. at 97.

112. *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1569 (Fed. Cir. 1996); see also *i4i*, 564 U.S. at 97 (quoting Federal Circuit precedent adopting this rationale).

113. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007) (describing “the rationale underlying the presumption” of validity as “that the PTO, in its expertise, has approved the claim”); Ford, *supra* note 5, at 103 (“Since such [examination] decisions are made only after extensive examination by expert patent examiners, the story goes, they are likely to be correct and are therefore entitled to some deference.”).

Office did its job correctly in applying the statutory criteria of patentability is unwarranted.¹¹⁴

The recent expansion in Patent Office post-issuance proceedings also results from the conventional view that ex post invalidation serves to correct Patent Office errors or mistakes resulting from the Patent Office's flaws, biases, resource constraints, and rational ignorance. Commentators long proposed post-issuance Patent Office review and cancellation of patents to allow greater participation by competitors and others with valuable information relating to patentability and to allow the Patent Office to efficiently apportion its resources to those patents that had post-issuance relevance.¹¹⁵ Congress adopted these proposals in the AIA.¹¹⁶ In response to the effectiveness of the new procedures at invalidating issued patents and the large number of patents invalidated, some have questioned the propriety of one arm of the Patent Office examining and issuing patents only to subsequently have another arm review and cancel them, assuming (again) that these are duplicative proceedings addressing the same question.¹¹⁷

The conventional account of the relationship between ex ante patent examination and ex post invalidation, whether in litigation or Patent Office cancellation proceedings, has three basic premises. First, ex ante examination and ex post invalidation perform the exact same function of evaluating claimed inventions for compliance with the statutory criteria of patentability and are therefore interchangeable

114. Ford, *supra* note 5, at 103–04; Lemley, *supra* note 22, at 1528–29 (arguing for the paring back of the presumption of validity).

115. See *Regents of the Univ. of Minn. v. LSI Corp.*, 926 F.3d 1327, 1333–37 (Fed. Cir. 2019) (describing history of perceived need for Patent Office post-issuance cancellation proceedings to address resource constraints and mistakes of initial examination); Ford, *supra* note 5, at 91–93 (summarizing this view); Merges, *supra* note 32, at 610–15.

116. *Regents of the Univ. of Minn.*, 926 F.3d at 1335 (explaining the new procedures adopted within the AIA).

117. See, e.g., ALDEN ABBOTT ET AL., REGULATORY TRANSPARENCY PROJECT, CRIPPLING THE INNOVATION ECONOMY: REGULATORY OVERREACH AT THE PATENT OFFICE 1, 21, 22 (2017), <https://regproject.org/wp-content/uploads/RTP-Intellectual-Property-Working-Group-Paper.pdf> [<https://perma.cc/9F7H-R9HQ>] (“Rather than fixing problems with the patent examining corps, Congress created a second group of people within the same agency to undo their work. Now there is a large patent examination staff to issue patents and a separate PTAB staff to destroy those patents. What an odd, and inefficient, system.”).

substitutes for each other.¹¹⁸ Second, the ex post invalidation of a patent demonstrates that the patent failed the statutory criteria of patentability at the time of issuance and therefore the Patent Office erred in granting it.¹¹⁹ Third, designing ex ante examination and ex post invalidation represents a financial trade-off between investing more in ex ante examination, making ex post invalidation less necessary, or investing less in ex ante examination, making ex post invalidation more necessary.¹²⁰

II. THE REALITY OF PATENT EXAMINATION

Patent examination is structured to provide, at best, only a partial evaluation of whether a claimed invention satisfies the statutory criteria of patentability. This is not simply an acknowledgement that there is an inevitable risk of error in any human endeavor, especially one as complex, information-intensive, and dependent on imprecise language as patent examination.¹²¹ Nor is it merely a recapitulation of the well-recognized incentives, biases, resource constraints, and potential rational ignorance of examination.¹²²

Rather, the very nature of patent examination prevents a complete patentability evaluation, even if examiners performed their assigned tasks perfectly. The core structure of patent examination prevents examiners from accessing some categories of prior art necessary to fully evaluate patentability, identifying and examining the full scope of the claimed rights, and determining whether the claimed invention will remain patentable over the full life of the patent rights. Better

118. See, e.g., Frakes & Wasserman, *supra* note 24, at 987 (“Patent examiners, the adjudicatory board at the Patent Office, and the federal courts are all tasked with applying the patentability standards and assessing the validity of inventions seeking patent protection.”).

119. See, e.g., Microsoft Corp. v. i4i Ltd. P’ship, 564 U.S. 91, 96 (2011); La Belle, *supra* note 67, at 52.

120. See, e.g., Frakes & Wasserman, *supra* note 24, at 981 (“This Article seeks to provide a take on the classic regulatory question: Should society increase the resources of the Patent Office to weed out bad patents, or should society instead reserve a larger residual role for the courts to invalidate improvidently granted patents?”); Lemley, *supra* note 22, at 1497 (“Because so few patents are ever asserted against a competitor, it is much cheaper for society to make detailed validity determinations in those few cases than to invest additional resources examining patents that will never be heard from again.”).

121. R. Polk Wagner, *Understanding Patent-Quality Mechanisms*, 157 U. PA. L. REV. 2135, 2146 (2009) (“[E]ven under the best of circumstances, one would expect a nontrivial number of invalid patents to slip through the system and a number of patentable inventions to be inappropriately rejected.”).

122. See *supra* Section I.B.2.

resources and incentives would have a marginal impact, at most, on these shortcomings of patent examination. A complete evaluation of patentability in examination, if even possible, would require fundamental changes to the very nature and concept of ex ante patent examination.

A. *The Structural Barriers to Complete Patent Examination*

Even with greater time and resources allocated to patent examination, examiners would still face several obstacles in carrying out their tasks. These obstacles result from the structure of examination as an ex ante, nonadversarial, noninquisitorial, and confidential proceeding.

1. *Examiners as database searchers, not investigators*

Information gathering in patent examination is a document-focused, desk-constrained, and database-driven process. After reading the patent application to understand the invention, the examiner is instructed to “search[] the prior art as disclosed in patents and other published documents.”¹²³ The examiner conducts this search for documents by searching databases from his or her desk at the Patent Office in Arlington, Virginia (or a regional office or, increasingly, the examiner’s home).¹²⁴

Specifically, the examiner searches databases containing the full text of United States patents and pending patent applications, as well as abstracts of foreign patent applications.¹²⁵ The examiner also is instructed to search databases that might contain relevant nonpatent documents, though such searches are often outsourced to search specialists in the Patent Office’s Scientific and Technical Information Center (STIC). STIC maintains a (largely electronic) library of nonpatent literature that includes over 78,000 journals and 359,000 books in full text, though also including some conferences, standards, and dissertations.¹²⁶ STIC staff can also search commercial databases and subscription resources, which can “provide access to non-patent literature that is typically not available on the [i]nternet.”¹²⁷

123. MPEP, *supra* note 57, § 904 (emphasis added).

124. Kieff, *supra* note 1, at 1948 (demonstrating that examiners conduct prior art searches in databases from their desks).

125. MPEP, *supra* note 57, § 904.02.

126. *Id.* § 901.06(a)(IV)(B); *Electronic Non-Patent Literature Available at the USPTO*, U.S. PAT. & TRADEMARK OFF. (Sept. 14, 2016), <https://www.uspto.gov/learning-and-resources/support-centers/scientific-and-technical-information-center-stic/electronic> [<https://perma.cc/B2SV-RD4D>].

127. MPEP, *supra* note 57, § 901.06(a)(IV)(B).

The Patent Office lacks the “inquisitorial powers” necessary to “compel the disclosure of pertinent facts” not found in the type of formal documents collected and maintained in formal databases.¹²⁸ The examiner can impose a requirement for information (or interrogatories or requested stipulations) on the patent applicant, seeking, for example, information about any prior art search conducted by the applicant, relevant nonpatent literature in the applicant’s possession, and real-world uses of the claimed invention before the filing of the patent application.¹²⁹ However, if information is not found in a formal, searchable database and is not in the applicant’s possession, the examiner has no way to find the information. The examiner cannot issue subpoenas or send document requests to third parties, conduct depositions of relevant witnesses, hire investigators, or the like.

Thus, examination is noninvestigatory, with the examiners’ task primarily to search for relevant documents in the available formal databases. Overcoming this limitation would require a fundamental shift of examination towards an investigatory model, not merely more time and resources.

2. *The lack of a motivated adversary in examination*

Patent examination is an ex parte, nonadversarial process between just the patent examiner and the applicant without a third party that actively opposes patent issuance.¹³⁰ Statutory and regulatory provisions expressly prohibit the participation of third parties in examination.¹³¹ The ex parte nature of patent examination is both a further obstacle

128. John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. ILL. L. REV. 305, 314. An impractical and rarely used procedure for the public before publication or an office action to initiate an evaluation of patentability based on activity prior art was abolished in 2012. See U.S. DEP’T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE § 720 (8th ed., Aug. 2012 rev.), <https://www.uspto.gov/web/offices/pac/mpep/old/e8r9/mpep-0700.pdf> [<https://perma.cc/FUK6-GBAQ>].

129. 37 C.F.R. § 1.105 (2018); see also MPEP, *supra* note 57, § 704.10–14.

130. Wasserman, *supra* note 63, at 2014 (describing the patent examination process).

131. See MPEP, *supra* note 57, § 1901.07 (highlighting prohibition on further participation by third parties who file pre-publication protests against a patent application); MPEP, *supra* note 57, § 1134.01(II)(B)(3) (emphasizing that post-publication prior art submission procedures “should not be interpreted as permitting a third party to participate in the prosecution of an application”).

to information gathering in examination and undermines the ability to accurately process the information that is available.

a. Ex parte examination and information gathering

Ex parte examination exacerbates the structural limits on information gathering discussed above. Examination lacks a motivated adversary that could offset the examiner's lack of investigatory and inquisitorial powers by, for example, conducting an investigation to find and provide relevant information not found in formal databases or the applicant's possession.¹³² Examination relies on two mechanisms to offset the informational gap caused by its nonadversarial nature, but neither is particularly effective.

First, examination imposes a duty of disclosure on patent applicants. Applicants have little inherent incentive to provide information to aid the Patent Office's examination because more information equates with more prior art that could render the application unpatentable.¹³³ However, Patent Office regulations impose a duty on the patent applicant and its attorney to disclose information that "establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim" or refutes an applicant's argument about patentability.¹³⁴ Still, applicants have no duty to search for prior art and need only disclose information already in their possession.¹³⁵ The costs of prior art searching and the potential consequences of failing to disclose relevant prior art that applicants find—unenforceability of their patent through an inequitable conduct finding in litigation—discourage most patent applicants from undertaking a prior art search.¹³⁶ Unsurprisingly, many patent applications have "a minimal number of submitted references" from the applicant.¹³⁷

Those applicant disclosures that do occur do little to remedy the structural shortcomings of examination. Presumably, applicants drafted their claims to maximize claim scope while avoiding the known

132. See Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 54 (2007) ("Adversarial processes tend to produce good evaluative information.").

133. Cotropia, *supra* note 67, at 751–52 (characterizing the strategic reasons for applicants to avoid providing patent quality information).

134. 37 C.F.R. § 1.56(a)–(b).

135. Thomas, *supra* note 128, at 314.

136. Cotropia, *supra* note 67, at 751–52; Thomas, *supra* note 128, at 314–15.

137. Thomas, *supra* note 128, at 314.

prior art.¹³⁸ Moreover, applicants who disclose prior art tend to submit an overwhelming amount,¹³⁹ probably due to some combination of the difficulty evaluating the materiality of information, the threat of inequitable conduct from nondisclosure, and the strategic incentive to hide important prior art amongst lots of trivial references.¹⁴⁰ Separating the useful from the useless disclosed information is nearly impossible.¹⁴¹ And empirical evidence suggests that applicants even “withhold between 21% and 33% of relevant citations known to them,” as evidenced by prior art found and used by examiners that had been cited in prior patents issued to the same applicant.¹⁴²

Perhaps for all of these reasons, only 2% of prior art references disclosed by applicants are used in unpatentability rejections, with 87% of prior art used to reject claimed inventions coming from the examiner and only 13% coming from applicant disclosures.¹⁴³ To some extent, this could be attributable to resource constraints, since examiners with more time could more carefully sift through the material disclosed by the applicant. But the self-interested way in which applicants approach their duty of disclosure—submitting virtually nothing, trying to overwhelm the examiner, and/or withholding key relevant documents—reflects the inherent shortcomings of a nonadversarial process.

Second, although there historically was no public involvement in examination whatsoever,¹⁴⁴ two limited opportunities now exist for third parties to submit information, though they may not participate any further. First, a third party may submit a protest against a pending patent application but is statutorily barred from doing so after the

138. See Deepak Hegde & Bhaven N. Sampat, *Examiner Citations, Applicant Citations, and the Private Value of Patents*, 105 ECON. LETTERS 287, 289 (2009).

139. Thomas, *supra* note 128, at 314–15 (stating that providing an overwhelming number of references may be an attempt to overload examiners facing time constraints).

140. Cotropia, *supra* note 67, at 767–69, 777–78 (discussing the various incentives for both overcompliance and undercompliance); Thomas, *supra* note 128, at 315.

141. See Thomas, *supra* note 128, at 314–15 (blaming the inability to sort through all the disclosed information on the Patent Office’s tight employee schedules).

142. Ryan Lampe, *Strategic Citation*, 94 REV. ECON. & STATISTICS 320, 320 (2012); see also Bhaven N. Sampat, *When Do Applicants Search for Prior Art*, 53 J.L. & ECON. 399, 401 (2010) (“Applicants routinely fail to identify even their own previous patents . . .”).

143. Christopher A. Cotropia, Mark A. Lemley & Bhaven Sampat, *Do Applicant Patent Citations Matter?*, 42 RES. POL’Y 844, 847 (2013); see also *id.* at 851 (suggesting resource constraints and/or cognitive biases are the most likely explanations).

144. Wagner, *supra* note 121, at 2161 (examining the traditionally secretiveness of patent prosecution).

patent application publishes (usually eighteen months after filing).¹⁴⁵ The protest can be “based on any facts or information adverse to patentability,” including prior art patents, patent applications, nonpatent literature, and evidence of real-world activities related to the patentability of the invention.¹⁴⁶ It also must include a concise statement of the relevance of the information submitted, which can include arguments against patentability.¹⁴⁷ Second, after publication, a means still exists for third parties to submit prior art for consideration in examination, though this action is more limited than prepublication oppositions.¹⁴⁸ Post-publication third-party submissions are limited to prior art patents, patent applications, and printed publications and exclude nondocumentary evidence.¹⁴⁹ They also permit concise statements as to the relevance of the documents submitted but prohibit arguments related to patentability.¹⁵⁰

Although these third-party participation procedures seem like promising ways to address the nonadversarial nature of examination, they “are rarely used.”¹⁵¹ The confidentiality of patent examination severely limits their effectiveness, as discussed further below.¹⁵² Moreover, given the sheer volume of patenting activity and the difficulty in ascertaining claim scope, competitors in many industries do not have incentives to even monitor each other’s patent applications,¹⁵³ much less submit prior art.¹⁵⁴ And in some cases, a competitor may not even exist at the time of examination because the patent application relates to a new technology for which a market has not yet developed.¹⁵⁵

Even when aware of applications, competitors may not find a prior art search or submission cost-justified, given uncertainty in claim scope

145. 35 U.S.C. § 122(c) (2012) (establishing appropriate protest procedures); 37 C.F.R. § 1.291 (2018) (outlining specific protest requirements).

146. MPEP, *supra* note 57, § 1901.02.

147. 37 C.F.R. § 1.291(c)(2) (identifying a concise explanation of relevance as a protest requirement); MPEP, *supra* note 57, § 1134.

148. 35 U.S.C. § 122(e) (listing procedures for third party inquiries).

149. *Id.* (describing preissuance submission by third parties); MPEP, *supra* note 57, § 1134.

150. MPEP, *supra* note 57, § 1134.01(II)(B)(2).

151. Cotropia, *supra* note 67, at 732 & n.39.

152. *See infra* Section II.A.3.

153. *See* Christina Mulligan & Timothy B. Lee, *Scaling the Patent System*, 68 N.Y.U. ANN. SURV. AM. L. 289, 302, 307 (2012).

154. Lichtman & Lemley, *supra* note 132, at 55.

155. *Id.*

and the relevance of the application to their business.¹⁵⁶ This is particularly true given that a third party's participation in examination ends with the submission of prior art, and there is no opportunity to provide the further arguments, explanations, and response to the applicant's arguments that might be necessary to establish unpatentability and prevent patent issuance.¹⁵⁷ And competitors who are aware of the patent application and have their own prior art readily at hand have incentives to withhold it for their private use if the patent is asserted against them, rather than identifying themselves as a target for litigation¹⁵⁸ or creating a public good that benefits other competitors by preventing the patent from issuing.¹⁵⁹

b. Ex parte examination and information processing

The nonadversarial nature of patent examination also hinders the processing of that information which is available in examination. The patent applicant is highly motivated to obtain patent issuance, whereas the patent examiner is neutral and without any particular incentive to reject a patent application. Thus, “[p]atent examination is in many ways steered by the patent applicant.”¹⁶⁰ The patent applicant's incentive is “to reframe the issue, rebut the evidence, and otherwise put its own spin on the information” in a way that favors patentability.¹⁶¹ Without an opposing party arguing for the opposite result or providing an alternative view of the evidence and issues, examiners must identify weaknesses and counterarguments themselves.¹⁶² “[N]o matter how good the examiner, no examiner will ever know as much or be as motivated as a true market rival.”¹⁶³

Thus, without a motivated adversary to push back, applicants “will take advantage of [any] wiggle room in the conceptual space between a prior art reference and the claims of a patent” to avoid unpatentability.¹⁶⁴ Left

156. *See id.* (noting the burden of monitoring and participating in examination, especially in industries where commercial products could potentially implicate a large number of patents).

157. MPEP, *supra* note 57, §§ 1134(V), 1901.07.

158. Lichtman & Lemley, *supra* note 132, at 55.

159. Cotropia, *supra* note 67, at 752–53; Thomas, *supra* note 128, at 333.

160. Joseph Farrell & Robert P. Merges, *Incentives to Challenge and Defend Patents: Why Litigation Won't Reliably Fix Patent Office Errors and Why Administrative Patent Review Might Help*, 19 BERKELEY TECH. L.J. 943, 965 (2004).

161. *Id.*

162. Lichtman & Lemley, *supra* note 132, at 54.

163. *Id.* at 54–55.

164. Farrell & Merges, *supra* note 160, at 966.

with only the examiner's own limited understanding of the prior art and claimed invention¹⁶⁵ and "the patentee's characterization and spin,"¹⁶⁶ the ex parte structure of patent examination makes it difficult for the examiner to fully appreciate the significance for patentability of even those prior art references that it can plausibly search and identify, regardless of resources or time allotted.¹⁶⁷

3. *The confidentiality of patent examination*

By statute, patent applications are confidential and patent examination is a secretive process until the patent application publishes, typically eighteen months after filing.¹⁶⁸ This confidentiality hinders patent examination in at least three distinct ways.

First, because unpublished patent applications are confidential, they are not available as prior art references during examination of other patent applications.¹⁶⁹ Patent examiners have access to unpublished patent applications but cannot use them as prior art until they are published or issued.¹⁷⁰ Yet, a U.S. patent application that later publishes or issues is prior art from the date it is filed, even if not publicly available at that time.¹⁷¹ The patentability of a claimed invention therefore can change based on what happens in prosecution with another patent. If Patents A and B cover the same claimed invention and Patent A was filed before Patent B's filing date but not yet published or issued, Patent B would be patentable at the time it was filed and would stay patentable, and even issue, unless Patent A was published or issued. But as soon as Patent A is published or issued, Patent B would suddenly become unpatentable because it was anticipated by Patent A. Thus, the Patent Office cannot rely on unpublished patent applications even though those applications are prior art for anticipation and obviousness purposes as soon as they are published.

Second, the confidentiality of patent examination severely undermines the effectiveness of the third-party prior art submission procedures. Since protests are prohibited once the patent application

165. See Lichtman & Lemley, *supra* note 132, at 53.

166. Farrell & Merges, *supra* note 160, at 966.

167. See Lichtman & Lemley, *supra* note 132, at 54 (lamenting the lack of a "competitive dynamic" and "[a]dversarial processes" in examination that produces "good evaluative information").

168. 35 U.S.C. § 122 (2012).

169. MPEP, *supra* note 57, § 901.03.

170. Yelderman, *supra* note 33, at 865–66 & n.113.

171. 35 U.S.C. § 102(a)(2).

is published and becomes publicly available,¹⁷² protests depend on the happenstance that a third party has somehow obtained independent knowledge of the confidential patent application. And, practically, post-publication third-party prior art submissions must occur within a short window between when the application becomes public after eighteen months and a statutorily imposed deadline of the later between six months after publication and the examiner's first rejection of the application.¹⁷³ This short, six-month timeframe resulting from the pre-publication secrecy of patent examination exacerbates the difficulties and disincentives for competitors in submitting prior art.¹⁷⁴

Finally, "[t]he [i]nternet is an Office-approved search tool" and could help identify information not collected in formal databases.¹⁷⁵ However, the internet's effectiveness as a means of gathering information is severely undermined by the confidentiality of examination. Because "[t]he [i]nternet is generally a public forum and most communications made over the [i]nternet are neither confidential nor secure," patent examiners are prohibited from conducting internet searches that "could disclose proprietary information directed to a specific application which has not been published" and limited to internet searches while the application is unpublished for "the general state of the art and formulated in such a way that protects the confidential proprietary intellectual property."¹⁷⁶ This confidentiality restriction makes the internet an ineffective information source, at least during the early part of examination when the examiner is typically gathering information.¹⁷⁷

4. *The language limitations of examination*

Patent examination occurs in English. But the relevant information (i.e., prior art) for patent examination can come from anywhere in the world and therefore be in any language.¹⁷⁸ The Patent Office's STIC offers oral, machine, and written translation services for "foreign document sources that may be possible references for applications

172. § 122(c).

173. § 122(e).

174. *See supra* Section II.A.2.a.

175. MPEP, *supra* note 57, § 904.02(c).

176. *Id.*

177. *See id.* § 904 (noting that "[f]ollowing the first Office action, the examiner need not ordinarily make a second search of the prior art").

178. *See* 35 U.S.C. § 102(a)(1).

being examined.”¹⁷⁹ But these translation services have limits. Oral translations are limited to the major European languages and Japanese, while written translations are limited to those materials “being considered for citation or already cited in applications.”¹⁸⁰

More generally, the disconnect between the language breadth of prior art and the language abilities of the examining corps makes the translation issue somewhat circular. Translations are available for “possible references” and material “being considered for citation,”¹⁸¹ but, often, examiners will be unable to know whether a foreign-language document is a possible reference or should be considered for citation because they cannot understand the disclosure of that document.

5. *The lack of referents for claim scope in examination*

Patent rights are defined by the scope of the claims, not the technical disclosure of the invention in the specification.¹⁸² “Frequently, a claim includes within its breadth or scope one or more variant embodiments that are not disclosed in the application, but which would anticipate [or render obvious] the claimed invention if found in a reference.”¹⁸³ The Patent Office instructs its examiners to identify the full potential scope of the claim beyond merely the specification’s description of the invention.¹⁸⁴ In fact, claims in examination are supposed to be given their broadest reasonable interpretation consistent with the rest of the patent to ensure that the Patent Office has considered and found patentable the full potential breadth that the claim could later be given.¹⁸⁵

But discerning the full potential scope of the claim is nearly impossible in examination. Examiners have some specialized training in the general field of the invention but only a limited understanding of the specific invention at issue,¹⁸⁶ which (in theory) should be new and sufficiently different than what previously existed. Applicants typically encourage a narrow understanding of claim scope in examination to increase the chances of patentability,¹⁸⁷ and *ex parte* examination lacks a motivated

179. MPEP, *supra* note 57, § 901.06(a)(IV)(D).

180. *Id.* § 901.05(d).

181. *Id.* § 901.06(a)(IV)(D).

182. See *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

183. MPEP, *supra* note 57, § 904.01(a).

184. *Id.*

185. Dawn-Marie Bey & Christopher A. Cotropia, *The Unreasonableness of the Patent Office’s “Broadest Reasonable Interpretation” Standard*, 37 AIPLA Q.J. 285, 291 (2009).

186. See Cotropia, *supra* note 67, at 754–55.

187. Wagner, *supra* note 121, at 2149–50.

adversary to counter the narrow understanding advanced by the applicant and push the boundaries of the claimed invention.¹⁸⁸

With the disclosure of the specification as the only point of reference and “without a particular ‘targeted’ good or service in hand” to offer another and broader potential understanding, the examiner naturally will read the claim in light of the disclosed embodiments and struggle to recognize other implementations that might still fall within the claim scope.¹⁸⁹ Notably, the Patent Office does not provide any particular guidance to examiners on how to discern the broadest reasonable interpretation.¹⁹⁰ Examination thus inevitably focuses on the patentability of the scope of the invention disclosed in the specification, even though the patent’s exclusive rights extend beyond the scope of the disclosed embodiments to the full scope of the claim language. For example, if the claim recites a “binding” connecting two pieces and all of the examples in the specification and prior art relate to snaps, screws, bolts, and other such devices, the examiner will tend to understand the “binding” as referring to a piece of hardware that serves as a fastener and have trouble recognizing that it could include adhesive substances like glue.

6. *The snapshot nature of patent examination*

Examination is only capable of providing a partial evaluation of patentability from a temporal perspective. Contrary to the conventional wisdom that patentability is static and a claimed invention either always satisfied the statutory criteria or never did,¹⁹¹ the patentability of a claimed invention can change over a patent’s two-decade life. Thus, a claimed invention patentable at issuance may subsequently become unpatentable.

Most obviously, a claimed invention may be properly found patentable by the Patent Office in examination but subsequently become unpatentable because the statutory criteria of patentability changed. Although patent law is a statutory field, the statutory criteria

188. See Cotropia, *supra* note 67, at 732 (describing the nonadversarial nature of examination).

189. Wagner, *supra* note 121, at 2147; see also Janet Freilich, *The Uninformed Topography of Patent Scope*, 19 STAN. TECH. L. REV. 150, 167–72, 187–88 (2015) (explaining that the only information available to reliably determine claim scope in ex ante examination is the disclosure in the specification and the prior art).

190. See Bey & Cotropia, *supra* note 185, at 309–10 (explaining that Patent Office guidance reflects only general claim construction applicable to litigation without explaining how to use these tools to identify the broadest reasonable interpretation).

191. See *supra* Section I.B.

of patentability are written in broad, open-ended terms and developed primarily through case-by-case judicial decisions.¹⁹² Thus, “[p]atent law . . . is not fixed in place. It is continually in flux, occasionally because of changes enacted by Congress, but more frequently because of judicial changes to the common law of patents.”¹⁹³ Although patent law always has been subject to change,¹⁹⁴ the changes have been particularly frequent and pronounced in the twenty-first century.¹⁹⁵ Importantly, judicial changes to the statutory criteria of patentability are applied retroactively to previously issued patents.¹⁹⁶

“[A]s the legal standards for patentability change—as many have in recent years—inventions that were once subject to a valid patent are no longer worthy of protection.”¹⁹⁷ Patent examination can only provide a snapshot evaluation of the patentability of a claimed invention as the statutory conditions of patentability exist at the time of examination; it offers no insight into the patentability of the invention in light of subsequent changes to the statutory conditions.

Perhaps less obviously, the claimed invention itself can change over time. Patents are often assumed in popular conception and even in patent law doctrine and theory to provide exclusive rights to a distinct, concrete invention, often thought of in physical terms.¹⁹⁸ This assumed concrete, even physical, patented invention necessarily remains constant over time.¹⁹⁹ Thus, patent rights are typically assumed to be “fixed at the moment the patent issues” and to remain “unchanging”

192. Craig Allen Nard, *Legal Forms and the Common Law of Patents*, 90 B.U. L. REV. 51, 53 (2010).

193. Jonathan S. Masur & Adam K. Mortara, *Patents, Property, and Prospectivity*, 71 STAN. L. REV. 963, 971 (2019); see also David L. Schwartz, *Retroactivity at the Federal Circuit*, 89 IND. L.J. 1547, 1548 (2014) (noting that the Federal Circuit frequently makes rulings “that substantially alter the value of previously issued patents”).

194. Nard, *supra* note 192, at 55.

195. See Masur & Mortara, *supra* note 193, at 971–72 (contending that many Supreme Court and Federal Circuit cases since 2005 “have revised the law in significant ways”).

196. *Id.* at 995–97; see also Schwartz, *supra* note 193, at 1548–49.

197. La Belle, *supra* note 1, at 1883.

198. See Rantanen, *supra* note 25, at 902 (describing the idea of “[t]he invention as a thing, a *rem*” as a historical foundation of the patent system and patent statutes); *id.* at 903 (describing the typical understanding of a patent as covering a “stationary construct; it is the very thing that the patent holder is allowed to stop others from using”); *id.* at 919–20 (describing the conventional “assumption that patent rights are rights over a discrete unit of technology”).

199. *Id.* at 900–06.

and “immutable” over the life of the patent.²⁰⁰ Yet, bedrock patent law holds that the claim language, not the inventor’s physical embodiment of the invention, defines the inventor’s exclusive rights.²⁰¹ The claimed invention is whatever is encompassed within the claim language,²⁰² and “the invention itself has no substantive existence other than as a shorthand for the subject matter that a patentee can claim.”²⁰³

Defining the patented invention based on the claim language allows it to change over time. As recognized by Jason Rantanen, “patent rights are malleable [T]heir scope and strength can be altered by actors interacting with those rights even after the government has issued that right.”²⁰⁴ In theory, patent claims are a fence demarcating and providing notice of the patent owner’s exclusive rights, but, in reality, they lack the clarity, certainty, and objectivity of a fence.²⁰⁵ Applicants face a notoriously difficult task in translating an invention that exists in the inventor’s mind into words that define the full scope of the invention but nothing more.²⁰⁶ They also have an incentive to use broad, vague, and ambiguous language to maintain flexibility in light of unknown prior art and future market and technological developments.²⁰⁷ Nor, as previously noted, is claim scope constrained by the description or embodiments in the patent document.²⁰⁸ Because the scope of the claimed invention can stretch and contract over time, Patent Office examination only provides a snapshot evaluation of the patentability of the claimed invention as it exists at one point in time.²⁰⁹

Perhaps this is just a variation of the lack of referents problem, with the examiner lacking the referents to envision the outer limits to which

200. *Id.*

201. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005); *see also* Freilich, *supra* note 189, at 156 (“[P]atent grants typically extend somewhat beyond the physical invention created by the patentee.”).

202. Oskar Liivak, *Rescuing the Invention from the Cult of the Claim*, 42 SETON HALL L. REV. 1, 8–10 (2012).

203. *Id.* at 7.

204. Rantanen, *supra* note 25, at 919.

205. Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1747–49 (2009).

206. *Autogiro Co. of Am. v. United States*, 384 F.2d 391, 396–97 (Ct. Cl. 1967).

207. *See* Rantanen, *supra* note 25, at 941; Risch, *supra* note 32, at 188; Wagner, *supra* note 121, at 2149; Yelderman, *supra* note 85, at 97–102.

208. *See supra* Section II.B.

209. Although the broadest reasonable interpretation standard used in examination should force the Patent Office to consider the full potential claim scope, its effectiveness is doubtful. *See supra* Section II.B.

claim scope can be stretched over the life of the patent. However, it is probably better seen as a distinct, but overlapping issue. Even if the examiner had sufficient referents to perfectly understand the claim at the time of examination, the scope can still expand in the future in a way that the examiner could not predict in examination. New technology might be developed that is different from that which existed at examination but arguably falls within the claim scope²¹⁰—for example, the invention of Velcro after the issuance of a claim to a “binding” between two pieces. Or the patentee might attempt to alter the claim meaning from how it would have been understood in examination to cover a competitor’s product. For example, assume a claim referred to a “fastener” between two pieces and a perfect understanding of the claim in examination would have covered all hardware devices capable of connecting two pieces, but not adhesive substances like glue. If a competitor introduces a product using an adhesive substance rather than a hardware piece, the patent owner has a strong incentive to attempt to reimagine the meaning of “fastener” to cover adhesive substances. While there is no guarantee that the patent owner will be able to do so, the vague language of claims, flexible tools of claim construction, and uncertainty in the rules of claim construction make it a realistic possibility.²¹¹

B. Examination of Only Some Categories of Prior Art

The Patent Office insists that patent examination is most effective when “the Office is aware of and evaluates the teachings of all information material to patentability.”²¹² In reality, patent examination evaluates only some types of the wide swath of information that qualifies as prior art. Scholars have recognized, at least in passing, that patent examiners face information shortages,²¹³ with particular

210. See Freilich, *supra* note 189, at 156 (“[T]here is no basis in current knowledge to predict the scope of the claimed invention, because parts of the claimed invention do not yet exist.”).

211. See Rantanen, *supra* note 25, at 928–42.

212. 37 C.F.R. § 1.56(a) (2018).

213. See, e.g., Cotropia, *supra* note 67, at 749–50 (“[T]he [Patent Office] does not have access to adequate information to correctly determine whether a claimed invention is novel and nonobvious.”); Lichtman & Lemley, *supra* note 132, at 46 (“Information is a second significant impediment to PTO review.”); Wagner, *supra* note 121, at 2139 (“The patent-prosecution process is fraught with serious information problems . . .”).

difficulty finding prior art other than U.S. patents.²¹⁴ Anecdotal evidence indicates that patent examination is overwhelmingly focused on U.S. patent prior art.²¹⁵ Empirical evidence seems to bear this out. U.S. patents comprise 63.5% of all prior art cited in examination by either the applicant or examiner, with nonpatent publications comprising 22% and foreign patents comprising 14%.²¹⁶ The prior art used in rejecting patent applications is even more heavily skewed towards U.S. patents.²¹⁷ Indeed, only 3.6% of prior art cited by the examiner is nonpatent publications and less than 15% of granted patents had any nonpatent literature cited by the examiner.²¹⁸

Scholars typically blame this U.S. patent-centric focus on the well-recognized time and resource constraints of examination.²¹⁹ This is undoubtedly part of the explanation—searching U.S. patents is generally quicker and easier than finding other types of prior art.²²⁰ Aside from sheer volume, prior art U.S. patents are comparatively easy to identify since they are written in English, classified by technology area, and contained in a single, centralized, and text-searchable

214. See, e.g., Cotropia, *supra* note 67, at 753–54 (describing patent examiners as limited to “search[ing] world-wide patent databases and some technical article databases”); Ford, *supra* note 1, at 838–39 (noting that patent examiners “have limited ability to search nonpatent prior art”); Rantanen, *supra* note 25, at 911–12 (describing “searches for nonpatent prior art” as being “more challenging” for patent examiners).

215. See Thomas, *supra* note 128, at 318 (“Persistent commentary also reports that the Patent Office has increasingly relied upon previously issued patents as prior art. Newly granted patents stress the citation of prior art patents, with diminished reference to such secondary literature as texts and journal articles.”).

216. Cotropia et al., *supra* note 143, at 846–48.

217. *Id.* at 846–47 (finding that examiner-cited prior art is the primary basis for rejections and is heavily skewed towards U.S. patents).

218. Chien, *supra* note 109, at 118.

219. See, e.g., Ford, *supra* note 1, at 853–54 (describing examination searches as “necessarily more cursory” than in litigation because “examiners have far less time”); Ryan Lampe, *Strategic Citation*, 94 REV. ECON. & STATISTICS 320, 320 (2012) (concluding that “patent examiners are too resource constrained to conduct thorough searches”); Sampat, *supra* note 142, at 399 (noting that “resource-constrained examiners face difficulties in identifying relevant prior arts”); Thomas, *supra* note 128, at 318 (“Tight examiner schedules appear to be the chief cause of this circumscribed searching strategy.”); Wagner, *supra* note 121, at 2139 (attributing the “serious information problems” in patent examination to “an over-taxed administrative agency”).

220. See Thomas, *supra* note 128, at 318 (“In comparison to much of the secondary literature, patents are readily accessible, conveniently classified and printed in a common format. Identification of a promising secondary reference, and full comprehension of its contents, often prove to be more difficult tasks.”).

database.²²¹ More time and resources could give examiners a greater opportunity to search and find other categories of prior art, such as formal publications. Studies have shown that European patent examiners, who have much more time than American counterparts, cite nonpatent publications at much higher rates.²²²

Even with greater time and resources, however, the structural limitations of examination would still prevent effective examination of significant categories of prior art. Put differently, even with optimal time and resources, examination is only structured to be able to provide systematic, comprehensive, and effective examination of the patentability of a claimed invention against certain types of prior art, specifically, U.S. patents, formal publications, and maybe foreign patents. Unpublished patent applications, real-world activities, and informal publications cannot effectively be evaluated *ex ante* in examination and appear in examination, if at all, by happenstance.

1. *The nonexamination of unpublished patent applications*

Most clearly, the pre-publication confidentiality of patent examination means that other unpublished patent applications cannot affect the patentability of a claimed invention during examinations, even though such unpublished applications can render the claimed invention unpatentable as anticipated or obvious as soon as they are published or issued.²²³

2. *The nonexamination of activities prior art*

Examiners generally cannot find information unless it is documentary evidence capable of being searched via databases from their desk.²²⁴ Yet, prior art extends beyond that which has been formally documented to include real-world activities, in particular, sales and uses of the invention.²²⁵ Even a single sale of the claimed invention can constitute invalidating prior art, whether done by the inventor or third parties.²²⁶ Moreover, sale prior art is invalidating if there is a commercial offer for sale of an invention that is ready for patenting, regardless of whether the

221. Yelderman, *supra* note 33, at 865.

222. *See* Chien, *supra* note 109, at 117–18 (finding that approximately 20% of European examiner citations are to nonpatent publications).

223. *See supra* Section II.A.3; MPEP, *supra* note 57, § 901.03.

224. *See supra* Section II.A.1.

225. *See* Thomas, *supra* note 128, at 313 (“Other permissible sources of prior art, such as sales offers or knowledge, need not have been formally documented at all.”).

226. *See* CHISUM ON PATENTS § 6.02[6] (summarizing cases for sales).

sale makes the invention available to the public.²²⁷ Thus, the claimed invention need not be for-sale to the general public or end users, but rather can be the subject of a single sale among businesses in the supply chain.²²⁸ And even “secret sales” that are not publicized or are subject to confidentiality obligations among the parties qualify as invalidating prior art.²²⁹ Likewise, “[i]t is clear from the pertinent Supreme Court decisions that very little use and very little publicity are required to constitute a public use.”²³⁰ A single use of the invention for its intended purpose by someone with no limitation, restriction, or obligation of secrecy to the inventor constitutes public use prior art.²³¹ The use is a public use if the invention was used in its natural and intended way, even if the public generally could not see the invention in operation, for example, because the invention was hidden within a larger product or was commercially exploited in a factory not open to the public.²³²

These prior art activities—prior uses and sales of the invention—are essentially not a part of patent examination.²³³ Sales and public uses typically are not formally documented in the type of publicly accessible publications or databases that a noninvestigatory examiner can find via database searching.²³⁴ These activities generally occur in the commercial sector, not the scientific research community, and the commercial sector does not share the scientific community’s emphasis on disclosure and dissemination of information.²³⁵ For example, “[i]nternal developments at a competitor firm can manifest themselves in a number of types of prior art” that “no amount of pre-filing search could have turned up.”²³⁶ Even when a documentary trail exists for prior art uses or sales—sales

227. *Helsinn Healthcare S.A. v. Teva Pharm. USA, Inc.*, 139 S. Ct. 628, 633 (2019).

228. *See id.* at 628 (sale from manufacturer to U.S. marketing and distribution partner constituted invalidating prior sale); *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 60–69 (1998) (sale from manufacturer of component part to manufacturer of end consumer product found to be invalidating prior sale).

229. *Helsinn*, 139 S. Ct. at 633.

230. CHISUM ON PATENTS, *supra* note 226, § 6.02[5].

231. *Id.*

232. *See id.* § 6.02[5][a]–[b] (summarizing cases).

233. *See Risch*, *supra* note 32, at 196 (“[E]xaminers limit their searches to printed publications only.”).

234. *See Cotropia et al.*, *supra* note 143, at 845 (noting that “prior sales and public uses do not show up in publications, and are accordingly unlikely to be found by patent examiners”); Lemley, *supra* note 22, at 1500.

235. *See Thomas*, *supra* note 128, at 319 (making this point in the context of business method patents).

236. *Merges*, *supra* note 32, at 599.

brochures, order forms, press releases, newspaper accounts, or the like—it may not appear in the formal databases searched by the examiner. The confidentiality of patent examination further limits the examiner’s ability to find any documentary trail that might be on the internet.²³⁷

Reflecting these structural shortcomings, the Patent Office does not even instruct examiners to search for prior uses and sales in the prior art it instructs examiners to search.²³⁸ Activity prior art (i.e., sales and uses) can only be submitted by third parties via the exceedingly rare pre-publication protests, not post-publication submission procedures.²³⁹ Thus, activity prior art will only be a part of an examination if it is submitted by the applicant,²⁴⁰ an unlikely possibility for reasons discussed above. Thus, activity prior art is functionally not a part of ex ante patent examination in the Patent Office. Unsurprisingly, researchers exclude activities when studying the prior art used in patent examination.²⁴¹

3. *The practical nonexamination of informal publications*

Prior art includes nonpatent publications like books, scientific journals, and other formal publications likely to appear in searchable databases.²⁴² But it extends beyond such formal documents to include any paper or electronic document that is sufficiently accessible to those interested in the field, with a focus on dissemination and public accessibility.²⁴³ Trade publications, conference papers, sales catalogs, nonconfidential government and industry reports, product manuals, grant proposals and applications, and conference “poster” presentations can be printed publications.²⁴⁴ “[A] single cataloged thesis in one university library” counts as a printed publication, provided it is indexed by subject matter.²⁴⁵ Printed publications also can come from the internet, including online

237. See *supra* Section II.A.3.

238. See MPEP, *supra* note 57, § 904.02 (instructing examiners to search “three reference sources . . . domestic patents (including patent application publications), foreign patent documents, and nonpatent literature (NPL)”).

239. See *supra* Section II.A.2.a.

240. See Cotropia et al., *supra* note 143, at 845 (suggesting that prior sales and public uses are “more likely to be in the possession of applicants”).

241. See *id.* at 846 n.3 (excluding “applicant information outside of references, like prior sales, public uses, etc.”).

242. See CHISUM ON PATENTS, *supra* note 226, § 3.04[2] (discussing what sources may constitute “prior art”).

243. *In re* Klopfenstein, 380 F.3d 1345, 1348 (Fed. Cir. 2004); MPEP, *supra* note 57, § 2128.

244. See CHISUM ON PATENTS, *supra* note 226, § 3.04[2] (summarizing cases).

245. *In re* Hall, 781 F.2d 897, 899–900 (Fed. Cir. 1986).

databases, web pages, discussion groups, and social media posts.²⁴⁶ The Federal Circuit even has suggested that a public billboard on display for months “most surely” would be a printed publication.²⁴⁷ A document can be a printed publication even if not widely distributed or distributed at all.²⁴⁸ Nor does a document even have to be viewed by anyone, provided it was sufficiently publicly accessible that a person interested in the field could have come across it.²⁴⁹ And, again, these obscure printed publications can come from anywhere in the world.²⁵⁰

Unlike unpublished applications and activities, patent examiners are officially instructed to search and rely on nonpatent printed publications.²⁵¹ Yet, commentators have widely recognized that examiners encounter substantial problems searching nonpatent literature²⁵² and rarely rely on nonpatent literature of any type, much less informal publications not collected in databases.²⁵³

Traditional publications, like books and journals, seem suitable for examiner search during patent examination. They are publicly available in the type of libraries and databases to which examiners have access, are frequently catalogued by topic, and can be text-searchable. Traditional publications may be more difficult to search and find than U.S. patents because they do not follow the established classification system and are often not in the same centralized database.²⁵⁴ Yet, with enough time and resources, examiners seem capable of finding relevant traditional publications. Thus, the absence of traditional

246. MPEP, *supra* note 57, § 2128(II) (A).

247. *Klopfenstein*, 380 F.3d at 1348.

248. *See id.* at 1349–52 (noting that a conference paper with six distributed copies and an oral presentation to 500 people qualified as a printed publication and finding a poster presentation displayed for a total of three days at another conference, without any distribution of copies, qualified as a printed publication).

249. *Id.* at 1350.

250. *See* Thomas, *supra* note 128, at 313 (“Every book, journal article, leaflet, and student thesis published anywhere in the world in any language potentially serves as prior art.”).

251. MPEP, *supra* note 57, § 904.02.

252. *See infra* notes 256–58 and accompanying text.

253. *See* Chien, *supra* note 109, at 117–18 (providing data that less than 15% of all U.S. patent grants have any nonpatent literature cited by the examiner and nonpatent literature comprises less than 5% of all prior art cited by examiners for granted U.S. patents).

254. *See* Rantanen, *supra* note 25, at 911–12 (noting examiners difficulty searching for nonpatent prior art).

publications in examination seems best attributable to Patent Office resource constraints and rational ignorance.²⁵⁵

The conclusion is different for nontraditional publications. Most of the wide swath of documents other than traditional books and journals that qualify as printed publications are not catalogued and kept in libraries or centralized databases that are capable of being found by an examiners searching from their computers.²⁵⁶ Some of these documents might be discoverable via internet searching, but, again, the confidentiality of pre-publication examination limits the examiner's ability to conduct effective searches. And the Patent Office lacks the inquisitorial powers—the ability to hire investigators, to subpoena witnesses, to take depositions, to make document requests, etc.—needed to find these nontraditional publications, such as a PhD thesis in a single library, sales brochures, academic conference poster presentations, trade show flyers, and the like.²⁵⁷ Nor is there a motivated adversary, with the tools of litigation discovery and the incentive to invest in finding such documents, to supplement the examiner's shortcomings.

Patent examination, even with greater time and resources, is simply not structured to find nontraditional publications. The discovery of these documents would be pure happenstance, perhaps because the applicant knew of the document and disclosed it,²⁵⁸ the examiner accidentally stumbled across it, or it was one of the exceedingly rare occasions where third-party prior art submission procedures were used. However, the Patent

255. See Chien, *supra* note 109, at 120, 122 (suggesting that greater use of nonpatent literature by European patent examiners is due to their greater time for examination).

256. See Cotropia, *supra* note 67, at 753–54 (“Patent examiners . . . do not have ready access to all technical literature, such as specialized industry publications or dissertations . . .”); Yelderman, *supra* note 33, at 865 (noting that “[l]ibraries, after all, do not typically maintain collections of product manuals, brochures, and catalogs”); *id.* at 865 n.103 (noting that obtaining some documents like product manuals requires purchasing a larger product).

257. See Kieff, *supra* note 1, at 1948 (“[N]o realistically available amount of time, training, and access to commercial databases will help an examiner at her desk obtain an obscure student thesis on the bookshelf of a foreign library or a specific laboratory notebook corroborating the work of an individual researcher.”); Yelderman, *supra* note 33, at 880 (“[N]othing short of imaginary reform to the PTO would suddenly permit examiners to travel to the trade shows, conferences, or far-flung locales where activities and nontraditional publications might be found.”).

258. See Colleen V. Chien, *Rigorous Policy Pilots the USPTO Could Try*, 104 IOWA L. REV. ONLINE 1, 12 (2019) (showing that applicants cite nonpatent literature much more frequently than examiners rely on it in cases where the patent is later invalidated in inter partes review).

Office does not, and structurally cannot, systematically evaluate the patentability of applications against nontraditional publications.

4. *The questionable examination of foreign language prior art*

Prior art includes foreign patents issued from the over one million patent applications filed each year in the over 150 patent offices across the world.²⁵⁹ It also includes formal and informal publications from anywhere in the world. These sources of prior art share similarities to their American counterparts, though with some additional complications. Foreign patents are not as easy to search as American patents because they are not in a single database, and countries vary greatly on the ease of searching their patents.²⁶⁰ Foreign formal publications are probably somewhat less likely than American formal publications to appear in examiner databases. And foreign informal publications involve all of the structural problems faced by American informal publications and are probably even less likely to come to the attention of the examiner by chance.

More significantly, foreign prior art implicates an additional structural limitation of examination—the disconnect between English-language examination and the global scope of prior art. Devoting more time and resources to examination could make translations more freely available. However, widely available translation services still depend on the examiner's being able to identify the relevance of a prior art source. Examiners may sometimes have the language ability to do so or be able to identify relevance from figures, diagrams, and the like. And in some well-identified and narrow fields, the mere fact of publication in a particular source or identification as part of a particular technology classification may be a sufficient indicator of relevance. Often, however, the examiner's recognition of the relevance of a foreign language publication will just be a matter of happenstance. Thus, while foreign language prior art can be the subject of *ex ante* patent examination, the structure of patent examination makes a systematic and comprehensive examination of

259. See *The PCT Now Has 153 Contracting States*, WORLD INTEL. PROP. ORG., https://www.wipo.int/pct/en/pct_contracting_states.html [<https://perma.cc/FE4Y-MDDC>] (identifying 153 signatories to the Patent Cooperation Treaty for patent filing and examination); see also WORLD INTELLECTUAL PROP. ORG., WORLD INTELLECTUAL PROPERTY INDICATORS 2017 29 (2017), https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2017-chapter2.pdf [<https://perma.cc/JB8C-7RX2>] (noting that more than three million patent applications were filed worldwide in 2016).

260. Yelderman, *supra* note 33, at 873–74.

foreign language prior art impossible, even if more resources and time were dedicated to examination.

C. Examination of Only Partial Claim Scope

Ex ante examination also is structurally limited to evaluating the patentability of only a portion of the patent applicant's claimed rights. The result is that patent owners' exclusive rights will often reach into space that the Patent Office has not reviewed or determined meets the statutory criteria of patentability.

First, examination is not suited to discerning the outer limits of the claim scope, even as those limits existed at the time of examination, because of the lack of referents beyond the embodiments disclosed in the specification and the lack of a motivated adversary to mitigate the effects of the examiner's restricted imagination and the applicant's incentive to push a narrow understanding of the claim.²⁶¹ The examiner's inability to evaluate the full claim scope undermines examination of the prior art requirements of anticipation and obviousness. The broader the claim scope, the more prior art that is implicated and the more likely that the claimed invention will be found anticipated or obvious. Because ex ante examination is ill-suited for discerning the full claim scope, it is only capable of determining that a subset of the claimed rights is patentable over the prior art. And this determination is an unreliable proxy for the patentability of the outer limits of claim scope (undiscernible in examination) over the prior art.

The inability to identify the full claim scope in examination is not just a problem for the prior art-based patentability requirements but also the disclosure requirements of enablement and written description.²⁶² Enablement and written description seek to ensure that the patent owner's claimed rights are commensurate with the technological contribution disclosed in the specification. The narrower the claim scope, the more likely the technological disclosure in the specification will be found to satisfy the enablement and written description requirements. Examiners' inability to appreciate the full claim scope in examination will cause them to find the claimed invention enabled and adequately described even where the full claim scope extends beyond the technological disclosure. Indeed, the

261. See *supra* Sections II.A.2, II.A.5.

262. Similar issues probably exist for the indefiniteness doctrine, which requires that the full claim scope be reasonably clear to a skilled person in the field. If the examiner cannot appreciate the full claim scope, the examiner will be unable to determine whether it would be reasonably clear to a skilled person.

fact that the examiner will often understand claim scope based on the embodiments disclosed in the specification, its only real point of reference, will tend to prevent the examiner from recognizing any conceptual gap between the patent claims and the technological disclosure that gives rise to an enablement or written description problem.

Second, the malleability of patent claims further complicates the ability of the examiner to evaluate patentability of the full set of claimed rights conveyed by the patent. The malleability of patent claims could be two-directional²⁶³—with claims either expanded or narrowed—but tends to be used to broaden claim scope over time.²⁶⁴ Post-issuance, the technology and market will have developed in a way that brings new points of references—competitor’s products and advances—against which claim scope must be evaluated.²⁶⁵ These new points of reference expand the perspective of a decision maker about the claim language and provide examples of ways to understand the claim language that go beyond the disclosure in the specification.²⁶⁶ This tends to result in a broader understanding of the claimed invention.

Moreover, post-issuance, the patent owner’s incentive generally is to try to expand claim scope to bring more products, including market and technological developments unforeseen at issuance, within its exclusive control,²⁶⁷ increasing the value of the patent.²⁶⁸ This expanded scope comes, in theory, with an increased risk of invalidity²⁶⁹ but the presumption of validity, as well as the cost and risk required to

263. Rantanen, *supra* note 25, at 949.

264. See Wagner, *supra* note 121, at 2149 (noting that patent owners exploit weaknesses in claiming to obtain a patent based on a narrow understanding “and later assert that same patent in a way that broadens the scope of coverage”).

265. See Freilich, *supra* note 189, at 153 (noting that determining patent scope is “an attempt to predict the shape of downstream innovation”); see also Wagner, *supra* note 121, at 2147–48.

266. See Freilich, *supra* note 189, at 164 (noting that “[o]ver the years of the patent’s life, competitors may develop inventions falling into the scope of the patent that were not imagined by the patentee during prosecution of the patent” and can only be accounted for in ex post adjudication).

267. See Wagner, *supra* note 121, at 2148 (noting the difficulty for patent drafters in predicting the future of the technology and market).

268. See Freilich, *supra* note 189, at 153 (describing broad claim scope as “a windfall to the patent owner”); see also Rantanen, *supra* note 34, at 12 (concluding that due to claim malleability “only a portion of the enforced scope of patent rights may reflect the inventor’s actual contribution”).

269. Rantanen, *supra* note 25, at 943.

invalidate a patent, mitigate this risk.²⁷⁰ Traditionally, the accused infringer had a countervailing incentive to exploit the malleability of claims to try to shrink the claim's scope and escape infringement.²⁷¹ This was especially likely since accused infringers tended to prefer noninfringement defenses (which benefit from narrower scope) to invalidity defenses (which benefit from broader scope).²⁷² However, the recently expanded Patent Office cancellation proceedings only consider invalidity, not infringement, and are efficient and effective ways to invalidate a patent and thereby end an infringement suit.²⁷³ As a result, accused infringers may now have incentives to use the malleability of patent claims to expand their scope and make them more vulnerable in these proceedings.²⁷⁴

In sum, the malleability of patent claims means that the claim scope that defines the claimed invention can change over time and, for various reasons, is likely to expand over time.²⁷⁵ Once again, the narrower claimed invention in examination is more likely than the subsequently expanded claimed invention *ex post* to meet the statutory criteria of patentability, both the prior art requirements of anticipation and nonobviousness and the disclosure requirements of enablement, written description, and claim definiteness. Contrary to conventional wisdom, then, the Patent Office may have properly issued a patent as the claimed invention was then understood even though the patent is later invalidated based on an expanded understanding of the claimed invention.

D. Examination of Only Current Patentability Doctrines

Finally, *ex ante* patent examination is only capable of evaluating the patentability of a claimed invention under the law as it exists at the time of examination. Post-issuance judicial changes could lower the bar of patentability and make it easier for a claimed invention to satisfy

270. See La Belle, *supra* note 1, at 1884–86 (describing the costs and risks involved in seeking to invalidate a patent); Wagner, *supra* note 121, at 2150 (defining the “presumption of validity”).

271. Rantanen, *supra* note 34, at 14.

272. Ford, *supra* note 5, at 102–03, 114–15.

273. Rantanen, *supra* note 34, at 15, 17, 19.

274. *Id.* at 23–24.

275. It is admittedly challenging to distinguish situations where the examiner did not appreciate the full claim scope as it existed at the time of issuance and situations in which the malleability of claims was used to expand claim scope *ex post*.

the statutory criteria²⁷⁶ or raise the bar and make it harder for a claimed invention to satisfy the statutory criteria. However, this century's changes to the patentability criteria have generally raised the bar of patentability²⁷⁷—making it easier to establish that a claimed invention is unpatentable as obvious,²⁷⁸ indefinite,²⁷⁹ and, most significantly, patent ineligible subject matter.²⁸⁰

Thus, an issued patent that was patentable and properly issued based on the statutory criteria of patentability at the time of issuance could become unpatentable and therefore invalid because of retroactive judicial adjustments that make one or more statutory criteria of patentability more demanding.²⁸¹ A finding of patentability in examination and finding of invalidity *ex post* may be fully consistent and both correct if the statutory criteria of patentability changed in the intervening years.

III. THE REALITY OF EX POST PATENT INVALIDATION

The realities of patent examination discussed in Part II undermine the conventional wisdom that *ex post* invalidation performs the exact same task as examination, functions solely to correct errors or mistakes made by the Patent Office in issuing patents, and demonstrates that the patent should not have been issued in the first place.²⁸² To be sure, sometimes *ex post* invalidation serves this conventionally assumed review and correction function. However, scholars incorrectly assume that *ex post* invalidation in and of itself is evidence of examiner error in issuing the patent or, relatedly, that any issued patent that presently fails the statutory criteria of patentability reflects an examiner error.²⁸³ The structural barriers that prevent a complete evaluation of patentability in Patent Office examinations are absent or mitigated during *ex post* invalidation in litigation or Patent Office post-issuance

276. See, e.g., Merges, *supra* note 32, at 587–88 (describing how 1990s court decisions suddenly made business methods patent eligible when they were thought to be ineligible in the 1980s).

277. Mark A. Lemley, *The Surprising Resilience of the Patent System*, 95 TEX. L. REV. 1, 10–11 (2016).

278. See, e.g., *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007).

279. See, e.g., *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898 (2014).

280. See, e.g., *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208 (2014); *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576 (2013); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012).

281. La Belle, *supra* note 1, at 1883.

282. See *supra* Section I.C.

283. See *supra* Section I.C.

proceedings. Thus, ex post invalidation can serve, in effect, as the first opportunity to evaluate the aspects of the patentability determination not amenable to the structure of ex ante patent examination or the aspects of the patentability determination that have changed since examination.

To be fair, there are not necessarily sharp boundaries between the functions of ex post invalidation, nor can any particular ex post invalidity decision definitively be classified as falling into one category or another. The goal is not to oversimplify ex post invalidation as readily dividable into these categories but the exact opposite—to show that ex post invalidation is more nuanced, complex, and varied than the simplistic conventional wisdom.

A. *Ex Post Invalidation as Examination*

The basis for ex post invalidation provides a means for identifying, with some degree of certainty, when ex post invalidation is serving to provide an initial examination of patentability, rather than to review and correct the Patent Office's work. And empirical data, particularly Professor Stephen Yelderman's recent studies of the types of prior art used to invalidate patents in litigation and Patent Office proceedings,²⁸⁴ indicates that nearly half of all invalidations in litigation, though much less in Patent Office post-issuance proceedings, seem to perform an examination, not review and correction, function.²⁸⁵ These numbers are only a floor, not a ceiling, on ex post invalidation's examination function, since other circumstances where this occurs are harder to identify.

Selection effects are undoubtedly at play, as the data is based on a small number of cases litigated to final judgment that resulted in invalidation. Litigants may be more likely to choose grounds of invalidation that function as initial examination, rather than review and correction, perhaps exactly because they believe it easier to convince the decision maker to invalidate the patent when the matter was not before the Patent Office or suited for its determination. Additionally, litigants may be more likely to pursue to final judgment or achieve a judgment of invalidation in such cases, again because the decision maker is more amenable to such arguments or, alternatively, because there is greater uncertainty about the outcome. However,

284. Stephen Yelderman, *Prior Art in Inter Partes Review*, 104 IOWA L. REV. 2705, 2728 (2019); Yelderman, *supra* note 33.

285. See Yelderman, *supra* note 33, at 886 (noting that even if the examiner did the best search possible and fully appreciated all of the prior art found, examination would only preclude 52–55% of district court invalidations); see also *infra* Section III.A.1.

because the present question is the role that ex post invalidation functionally performs in actual litigation, these selection effects do not undermine the resulting conclusions.

1. *Ex post invalidation and unexamined categories of prior art*

Some circumstances where ex post invalidation performs an initial examination function, rather than a review and correction function, are readily identifiable because they are based on one of the categories of prior art not amenable to ex ante examination.

Most obviously, invalidation based on a patent application that was unpublished, and therefore uncitable, during examination necessarily serves as an initial evaluation of patentability against that prior art.²⁸⁶ Yelderman's data shows that 7–16% of anticipation findings and 18–35% of obviousness findings in litigation and 26–38% of invalidations in inter partes review relied on U.S. patents that were secret when the invalidated patent application was filed.²⁸⁷ Not all of these invalidations reflect an initial examination function, however, because many of these applications were published and therefore became citable, after the invalidated application was filed but before it was issued.²⁸⁸ Yet to be effectively useable in examination, the prior art applications would have had to have been published by the time the examiner was actually conducting prior art searches or making the patentability determinations.

Invalidation based on activity prior art—sales and uses of the claimed invention—is the next clearest example of an examination function. Rarely, this prior art is accessible in examination, such as when it was disclosed by the applicant or has a prominent documentary trail.²⁸⁹ But given the near-impossibility of the examiner's finding and considering this type of prior art in ex ante examination, even with greater time and resources,²⁹⁰ invalidation based on activity prior art is best classified as performing an initial examination function, rather than serving to review and correct the Patent Office's work. Ex post invalidations frequently function to provide an initial evaluation of

286. See Yelderman, *supra* note 33, at 866 n.121 (noting that due to unpublished patent applications a patent may be valid when granted “but later become invalid as a result of subsequent events in the life of a different pending application”).

287. *Id.* at 868; Yelderman, *supra* note 284, at 2729.

288. See Yelderman, *supra* note 284, at 2728 n.92 (noting that 98% of the invalidating patents in inter partes review that were unpublished at the time of filing had become published by the time of issuance).

289. See *supra* Section II.A.2.

290. See *supra* Section II.A.2.

patentability against activities prior art, with over half of all anticipation findings and 29% of all obviousness findings in litigation relying, at least in part, on prior art activities.²⁹¹ The vast majority of these invalidating activities were not cited in examination,²⁹² further confirming that the invalidation was not serving a review and correction function.

Similarly, greater time and resources might allow the examiner to find and rely on marginally more nontraditional and informal publications, such as those which happen to be disclosed by the applicant, to exist in a searchable database, or are able to be found through examiner internet searching. But this would be pure happenstance. In litigation, nontraditional publications are not typically found via a better traditional prior art search of the type that the Patent Office might be able to conduct with greater resources. Rather, this type of prior art is generally found because of the greater participation or the inquisitorial and investigational powers that exist in litigation.²⁹³ Perhaps they are produced in response to discovery requests because one employee of a party happens to have a copy on file. Perhaps a party employee, witness, or expert happens to remember such a document and mentions it in an interview or deposition. Or perhaps a party engaged in very high stakes litigation hired professional investigators.

Ex post invalidation serves as the first realistic chance to evaluate patentability of a claimed invention against nontraditional publications. Yelderman's data suggests this is a noticeable, though not overwhelming, function of ex post invalidation. In litigation, 5.4% of anticipation findings and 14% of obviousness findings relied on nontraditional publications.²⁹⁴ In Patent Office inter partes review, 17% of all invalidations relied on a nontraditional printed publication.²⁹⁵

291. Yelderman, *supra* note 33, at 860–61. Activity prior art is excluded from inter partes review. *Id.* at 860 n.101.

292. *Id.* at 882, 884. Nor would strengthening the duty of disclosure be of much help, since only 27% of the activities that anticipated and 13% of the activities used for obviousness were those of the patent applicant. *Id.* at 872.

293. *Cf.* Lichtman & Lemley, *supra* note 132, at 58 (“A patent can be held invalid because someone uncovers ‘secret’ prior art—art that was not public at the time of invention, but that is nevertheless admissible in court under one of several special exceptions.”).

294. Yelderman, *supra* note 33, at 863–65 (dividing nontraditional publications into separate categories for “catalog/manual/brochure” and “other” publications).

295. Yelderman, *supra* note 284, at 2725–26.

And, again, most of these invalidating nontraditional publications were not cited in examination.²⁹⁶

In total, 45–48% of all prior art invalidations in litigation, though only 12% of invalidations in inter partes review, relied on activity or nontraditional publication prior art not cited in examination.²⁹⁷ For all of the reasons explained, these invalidations can be said, with a fair degree of confidence, to be performing as an initial patentability evaluation, rather than reviewing and correcting the work performed by the Patent Office. As large as these numbers are, at least in the litigation context, they understate how often ex post invalidation is serving as examination, not review and correction. At least some of the significant number of invalidations based on U.S. patents not published at the time of filing serve an examination function. Likewise, some of the approximately 10% of anticipation findings and 20% of obviousness findings that rely on foreign patents²⁹⁸ probably involve foreign language patents not suitable for discovery ex ante given the language and translation limitations in examination. And even invalidations based on U.S. patents or traditional publications most readily available in examination may reflect structural limitations that prevent a full appreciation of claim scope in examination or changes in the statutory criteria of patentability, as discussed in the following sections.

2. *Ex post invalidation and unexamined claim scope*

Even some invalidations based on U.S. patents and traditional publications may actually function as an initial patentability evaluation for some of the claim's full breadth because the ex ante timing of examination and lack of a motivated adversary made it impossible for the examiner to recognize the full scope of the claim or because the claim scope was stretched ex post. Identifying when ex post invalidation functions as examination of claim scope not amenable to evaluation in examination is difficult. Examiners do not normally explicitly identify their understanding of claim scope during

296. Yelderman, *supra* note 33, at 883.

297. *Id.* at 886 (explaining that reliance only 52–55% of invalidations in the district courts rely only on patents, traditional publications, and cited references); Yelderman, *supra* note 284, at 2733.

298. See Yelderman, *supra* note 284, at 2729 (showing similar patterns for inter partes review); Yelderman, *supra* note 33, at 873.

examination.²⁹⁹ Examiners' comparison of the claimed invention to the prior art in claim rejections can offer some implicit insight but is unlikely to reveal an examiner's full understanding of the claim.³⁰⁰ The claim construction process in litigation expressly identifies claim scope³⁰¹ but without a comparable point of reference, it is difficult to say whether this claim scope is broader than the understanding in examination.

Invalidations based on enablement or written description are probably the most likely to reflect structural shortcomings that make examination of the full claim scope impossible in examination. Because these doctrines function to tie claim scope to the patent owner's technical contribution, as described in the specification, invalidation on these grounds indicates that the patent owner has claimed too broadly.³⁰² Because these doctrines thus are most likely to address an ex post broadening of claim scope,³⁰³ ex post invalidations on these grounds could indicate such a broadening occurred.

Of course, sometimes invalidations for enablement or written description may function to review and correct the Patent Office's work because the examiner could have and should have recognized the claim's overbreadth in examination, or at least could have with more time and resources. However, there are reasons to think such situations will be infrequent. Absent the structural barriers discussed in Part II, enablement and written description would seem fairly well-suited for examination. They depend only on the patent document and background knowledge available to the technically trained patent examiner,³⁰⁴ not requiring the costly, time-intensive, and complicated searching that the prior art doctrines do. They also are technologically, but not legally, intensive doctrines³⁰⁵ and therefore well-suited for

299. See Wagner, *supra* note 121, at 2150 (noting that examination "virtually never provides a detailed analysis of claim language").

300. See Timothy R. Holbrook, *The Patent Trial and Appeal Board's Evolving Impact on Claim Construction*, 24 TEX. INTELL. PROP. L.J. 301, 302 (2016) ("[E]xamination tended to emphasize explicit claim construction less, focusing more on the give and take between the examiner and the applicant.").

301. See *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008) (describing claim construction as defining all claim terms in dispute).

302. Timothy R. Holbrook, *The Written Description Gap*, 45 LOY. U. CHI. L.J. 345, 347–48 (2013).

303. Oskar Liivak, *Overclaiming Is Criminal*, 49 ARIZ. ST. L.J. 1417, 1426 (2018).

304. See *supra* Section III.A.1.

305. See *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351–52 (Fed. Cir. 2011) (en banc) (written description); MPEP, *supra* note 57, § 2164 (enablement).

technologically, but not legally, trained examiners. Thus, absent the structural barriers to complete examination, examiners would seem less likely to err on the enablement and written description doctrines than the prior art doctrines. For that reason, many, though not all, enablement and written description invalidations likely reflect the structural limitations of examination, particularly the inability to appreciate the full claim scope and the lack of a motivated adversary.

Thus, invalidations based on enablement and written description will often be another example when *ex post* invalidation serves an initial examination function, rather than to review and correct the Patent Office's work. These doctrines are responsible for an additional 6.6% of invalidations in litigation,³⁰⁶ though are not an available basis for invalidation in *inter partes* review.

3. *Ex post* invalidation and changed patentability doctrines

Contrary to the conventional wisdom that invalidation shows that the patent “never should have issued in the first place,”³⁰⁷ the patent may have been patentable and properly issued based on the statutory criteria as it then existed but subsequently become unpatentable because of later changes to the criteria. When this occurs, invalidation functions as a form of supplemental examination to account for these changes that could not be accounted for in initial examination.³⁰⁸ The data suggests that this supplemental examination function is a major part of what *ex post* invalidation does, at least in recent years.

Some situations where *ex post* invalidation serves a supplemental examination function to account for changed governing law are easy to identify. Before a series of Federal Circuit and Supreme Court cases beginning in the late 2000s, the threshold for patent-eligible subject matter was easily satisfied.³⁰⁹ Of a sample of 138 patents invalidated in litigation in a late 1990s empirical study, only one was invalidated on the grounds of patent-eligible subject matter.³¹⁰ In another study of all district court cases filed in 2008 and 2009, there were only twenty-six

306. Yelderman, *supra* note 33, at 854.

307. *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 96 (2011).

308. See Dreyfuss, *supra* note 8, at 256 (“Given the fundamental nature of these changes to patent law, it is not surprising that the PTAB would institute review and then invalidate many claims issued, reexamined, or litigated before these cases were handed down.”).

309. See Paul R. Gugliuzza, *Quick Decisions in Patent Cases*, 106 GEO. L.J. 619, 621 (2018) (referring to section 101 of the Patent Act as an afterthought until recently).

310. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 208 (1998).

decisions (not even invalidations) on patent-eligible subject matter.³¹¹ By contrast, for anticipation, obviousness, and indefiniteness, there were over one hundred decisions per doctrine.³¹²

But since the late 2000s, the patent-eligible subject matter requirement has become much harder to satisfy, due to a series of Supreme Court decisions that have raised the bar for patent-eligible subject matter.³¹³ Thus, invalidation of a patent issued before the late 2000s on subject matter grounds almost certainly functions as supplemental examination to apply a much more demanding patent-eligibility test than existed at the time of issuance. In fact, Congress created one new Patent Office cancellation proceeding, covered business method review, specifically to “allow[] parties to challenge the validity of business method patents that, under then-current law, were presumed valid when issued but, under the intervening court decisions, are no longer valid.”³¹⁴ Although Rantanen suggests that covered business method review ensures that “[p]atents that *never should have issued* are being weeded out,”³¹⁵ the patents were properly issued under existing law and became unpatentable only due to subsequent court decisions.

Patent-ineligible subject matter under section 101 was the most common grounds for ex post invalidation in litigation, accounting for a full one-third of invalidations in Yelderman’s 2011 to 2017 study.³¹⁶ Section 101 invalidations began to rise in 2012,³¹⁷ the same year the Supreme Court adopted a more demanding test for the doctrine in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*³¹⁸ Section 101 invalidations then experienced a significant jump—by about 100 per year—in 2014,³¹⁹ when the Supreme Court confirmed and expanded its stronger section 101 test in *Alice Corp. v. CLS Bank International*.³²⁰ Perhaps a few of these invalidations involved patents that were

311. John R. Allison et al., *Understanding the Realities of Modern Patent Litigation*, 92 TEX. L. REV. 1769, 1782 (2014).

312. *Id.*

313. See Dreyfuss, *supra* note 8, at 256.

314. Rantanen, *supra* note 34, at 22.

315. *Id.* (emphasis added).

316. See Yelderman, *supra* note 33, at 854.

317. *Id.* at 888 (showing steady rise from only a few section 101 invalidations to nearly 60 per year from 2012–2014).

318. 566 U.S. 66 (2012).

319. Yelderman, *supra* note 33, at 888.

320. 573 U.S. 208 (2014).

examined and issued after adoption of the stronger section 101 requirements or the rare patents that would have failed section 101 even without the change in law. However, for most, if not all, of the ex post invalidations on section 101 grounds functioned as supplemental examinations, with the claimed inventions patent-eligible under the doctrine as it existed when issued and only becoming ineligible due to the Supreme Court's changes to the section 101 test.

Similarly, the claim indefiniteness doctrine was traditionally seen as "toothless."³²¹ But in the late 2000s and early 2010s, the Federal Circuit began enforcing the indefiniteness requirement more stringently for software-related claims, which reflect a significant portion of litigated and invalidated patents.³²² Then, in 2014, the Supreme Court adopted a stricter indefiniteness standard for all patent claims.³²³ Indefiniteness was the second most common ground for invalidity in Yelderman's study of litigation, responsible for 23% of invalidations in litigation.³²⁴ Given that invalidations for indefiniteness rose over Yelderman's sample and spiked after 2014,³²⁵ this may be another example of ex post invalidation functioning as supplemental examination to enforce changes to the statutory criteria of patentability made first by the Federal Circuit and then by the Supreme Court.³²⁶

Identifying other examples where ex post invalidation is performing a supplemental examination function is not always as easy. In 2007, the Supreme Court significantly raised the bar for when claimed inventions are patentable as nonobvious.³²⁷ However, because obviousness was always a common basis for invalidity,³²⁸ it is hard to distinguish pre-2007 patents that became obvious only because the Supreme Court raised the legal standard from pre-2007 patents that would have been invalid as obvious even without this intervening change in law.

321. John R. Allison & Lisa Larrimore Ouellette, *How Courts Adjudicate Patent Definiteness and Disclosure*, 65 DUKE L.J. 609, 625 (2016).

322. Allison et al., *supra* note 312, at 1782–83.

323. Allison & Ouellette, *supra* note 321, at 619–20 (citing *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014)).

324. Yelderman, *supra* note 33, at 854.

325. *Id.* at 888.

326. A reason for caution in this conclusion is that the Patent Office adopted a stricter standard for indefiniteness than that used in litigation in 2008, one that was essentially the same as the standard ultimately adopted by the Supreme Court in 2014. See Greg Reilly, *Decoupling Patent Law*, 97 B.U. L. REV. 551, 574 (2017).

327. See Dreyfuss, *supra* note 8, at 255–56.

328. Allison & Lemley, *supra* note 310, at 208.

B. Ex Post Invalidation as Review

Although ex post invalidation often serves as an initial evaluation of those aspects of the patentability determination not suited for ex ante examination in the Patent Office, it does also serve its traditionally assumed function of reviewing and correcting the Patent Office's performance in ex ante examination. Ex post invalidation does so for those parts of the patentability determination that are functionally part of ex ante examination within the structural realities of the patent system. Thus, the Patent Office only makes an "error" in examination when it performs this role inadequately or incorrectly, i.e., when an examiner approves an unpatentable claimed invention that could have been rejected within the structural confines of examination. Sometimes, examiners truly err in their evaluation of patentability, issuing a patent that *could have and should have* been rejected within both the structure of examination and the time and resources allocated to examination. In such circumstances, ex post invalidation performs a review and error-correction function well known in the legal system, one similar to that of appellate courts' reviewing and correcting errors by lower courts.

Other times, the error in examination reflects not the examiner's shortcomings but rather institutional shortcomings in the time and resources allocated to examination. In such circumstances, a patent is issued on a claimed invention that failed the statutory criteria of patentability and *should have been rejected* in examination but *could not be rejected* because of insufficient time and resources for examination.³²⁹ In these circumstances, ex post invalidation performs a somewhat less familiar review and error-correction function, though one recognized by Professor Lemley's "rational ignorance" theory. The system invests limited resources in the initial examination and tolerates a high error rate because so few patents ever become relevant, and therefore the costs of wrongfully issued patents are arguably less than the cost of improving examination.³³⁰ The system then invests much greater resources in the review stage of ex post invalidation to correct the inevitable errors resulting from the limited investment made in examination.³³¹ Importantly, these greater resources are targeted at

329. See Merges, *supra* note 32, at 598 (noting that "a certain number of invalid patents . . . that cannot be cost-effectively eliminated at the examination stage" will be issued).

330. Lemley, *supra* note 22, at 1500–11.

331. *Id.*

correcting errors made in examination and providing a detailed evaluation of patentability only for the few patents that prove to be relevant, rather than wasting resources avoiding errors on the large number of patents that will never matter.³³²

The idea that ex post invalidation serves to correct examination errors assumes that the ex post invalidation is an accurate outcome, i.e., that the claimed invention failed the statutory criteria of patentability at the time of invalidation. Of course, it is possible that the ex post invalidation was itself erroneous and the claimed invention satisfied the statutory criteria of patentability. This possibility is more than hypothetical in litigation with lay judges and juries and arguments that often tell simplistic stories of “good” and “bad” actors, rather than focusing clearly on the statutory criteria as applied to the technological merits.³³³ Yet, there is no definitive and objective means of determining whether a particular patent was or was not patentable other than examination and ex post invalidation outcomes.³³⁴ As recognized by other scholars, the greater time, resources, and information available in ex post invalidity proceedings should tend to lead to accurate outcomes.³³⁵

When, then, does ex post invalidation perform its traditionally assumed review and error-correction function? Invalidation based on prior art that was before the examiner is probably the best example. For prior art actually considered by the examiner, patent issuance seems best attributable to either a true error or insufficient time for the examiner to accurately process the information considered.³³⁶ For prior art that was part of the examination record but not considered by the examiner, such as that submitted by the applicant, patent issuance seems best attributable to insufficient time for the examiner to review all of the prior art. Invalidation based on uncited U.S. patents is probably the next most likely situation in which ex post invalidation performs a review and error-correction function. This prior art is the type best suited for search and discovery in ex ante examination.³³⁷

332. *Id.* at 1497.

333. See Gregory Dolin, *Dubious Patent Reform*, 56 B.C. L. REV. 881, 897–98 (2015).

334. *Id.* at 897–98.

335. See Lemley, *supra* note 22, at 1513–14; *cf.* Rantanen, *supra* note 25, at 911–12. *But see* Farrell & Merges, *supra* note 160, at 948 (concluding “that litigation is an unreliable tool for assessing patent validity” because it under-invalidates patents).

336. *Cf.* Yelderman, *supra* note 33, at 879 (noting that in “cases in which the examiner knew about the relevant prior art and failed to appreciate its significance. . . . all she would need to do is better understand the prior art already in front of her”).

337. See *supra* Section I.A.1.

When a patent is invalid based on this type of prior art, the most likely explanation for its issuance is either that the examiner inadequately performed the prior art search or had insufficient time to conduct a thorough search of this readily available prior art.³³⁸ Invalidation based on uncited formal publications and readily accessible foreign patents—such as those written in or translated into English from prominent foreign patent jurisdictions³³⁹—likewise would seem to indicate inadequate performance of the examiner’s search responsibilities or inadequate time in which to carry out these responsibilities. This conclusion is somewhat less strong because the structural constraints of examination make formal publications and foreign patents less accessible to examiners than U.S. patents.

Once again, Yelderman’s data on prior art used to invalidate patents in litigation and inter partes review sheds light on how often ex post invalidation performs a review and error-correction function. In litigation, 45–46% of anticipation findings and 59–65% of obviousness findings relied only on prior art that was cited in examination or was a patent (from anywhere in the world) or traditional publication.³⁴⁰ And 37% of obviousness invalidations relied only on cited prior art or U.S. patents.³⁴¹ Similarly, 51% of invalidations in inter partes review relied only on prior art cited in examination or U.S. patents or patent applications, while 74% relied only on this prior art or traditional publications like books and journal articles.³⁴²

These numbers reflect only a ceiling on how often ex post invalidation functions to review and correct the Patent Office’s work in examination. It would be incorrect to assume that all of these invalidations serve this function, as Yelderman sometimes seems to do.³⁴³ Some of these invalidations may reflect structural shortcomings of examination: the lack of an adversary to challenge the applicant’s characterization of the claimed invention and prior art, the lack of referents to appreciate the full claim scope, post-issuance stretching of

338. See *supra* Section III.A.1.

339. Yelderman, *supra* note 33, at 883–85.

340. *Id.* at 883–86.

341. *Id.* at 886.

342. Yelderman, *supra* note 284, at 2733.

343. Yelderman, *supra* note 33, at 883, 885–86 (arguing that a perfect search and appreciation of all patents and traditional publications globally would only preclude “45–46% of district court anticipation events” and “somewhere between 59% and 65% of district court obviousness events”).

claim scope by the patent owner, or the language limitations of examination for foreign patents and publications. And some of these invalidations likely function as supplemental examination to reconsider patentability in light of strengthened patentability standards. For example, Yelderman's data includes patents invalidated in litigation between 2011 and 2017³⁴⁴ and in inter partes review in a one-year study period between 2017 to 2018.³⁴⁵ At least some of the patents invalidated as obvious, particularly those in litigation, likely would have been examined prior to 2007 and therefore may have been affected by the stronger obviousness standard adopted by the Supreme Court in 2007.³⁴⁶

IV. TAKING THE REALITIES OF PATENT EXAMINATION AND EX POST INVALIDATION SERIOUSLY

The descriptive account in Parts II and III demonstrates that, contrary to conventional wisdom, the American patent system operates with only a partial system of ex ante patent examination. The Patent Office provides an evaluation of patentability at one point in time for part of the patent owner's exclusive rights and against only some categories of prior art. As a result, ex post invalidation sometimes functions to review and correct the Patent Office's work, as commonly thought, but other times functions to provide a first instance examination of some aspects of the patentability determination.

There is nothing inherently wrong with this division of labor within the patent system. Apportioning responsibility for initial patent examination based on the comparative information-gathering and processing abilities of the Patent Office ex ante, courts in litigation, and the Patent Office in post-issuance proceedings would be a perfectly reasonable, and likely efficient, design choice for the patent system. Whether the current ad hoc distribution discussed in Parts II and III is optimal or whether the distribution should be altered in some way by addressing the structural limits of examination discussed in Part II is left for other work.

For present purposes, the more limited takeaway is that the design of the patent system does not reflect the functional divide of examination and dual role of invalidation but rather a formalist view

344. *Id.* at 851.

345. Yelderman, *supra* note 284, at 2708.

346. *See* Dreyfuss, *supra* note 8, at 257 (noting that both PTAB and district court invalidations tend to be concentrated in the fields most affected by recent Supreme Court changes to patent law, including *KSR*).

that Patent Office examination offers a complete evaluation of patentability while invalidation serves to review and correct the Patent Office's work. The following sections detail how the complicated realities of examination and invalidation require rethinking the role and design of ex ante examination, invalidation in district court litigation, and Patent Office post-issuance proceedings.

A. *Rethinking Examination: Inevitable Ignorance and the Patent Examination Funnel*

Patent examination's purpose is typically described as a "substantive screen" that seeks to issue only worthy patents and deny unworthy patents.³⁴⁷ Examination and issuance is therefore used as evidence of the patentability of the claimed invention and as a proxy for entitlement to patent protection. The presumption of validity and heightened burden of proof for invalidity in litigation, discussed in the next section, are one such example. Likewise, investors and others treat patent issuance as evidence of the quality of the claimed invention, given the supposed expertise of the examiner as to the claimed invention's novelty and nonobviousness.³⁴⁸ Others find it inconsistent for the Patent Office's examination arm to find the statutory criteria of patentability met and grant the patent only to have the Patent Office's PTAB part later find one or more of those criteria unsatisfied and invalidate the patent.³⁴⁹

However, patent examination and issuance are weak evidence and unreliable proxies for patentability and entitlement to patent protection because of the structural limits and incomplete examination detailed in Part II. To some extent, this is a reminder of Mark Lemley and Carl Shapiro's important recognition that a patent is a probabilistic right, in part because even after patent issuance, "considerable uncertainty will continue to exist about its validity and scope."³⁵⁰ But the traditional description of patents as probabilistic rights treats examination as

347. Ford, *supra* note 1, at 835.

348. See Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1306 (2009) (noting this view but also the contrary view that "the Patent Office's pronouncements are not very meaningful").

349. See, e.g., ABBOTT ET AL., *supra* note 117, at 4, 32.

350. Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75, 85 (2005).

probative, not dispositive, of patentability.³⁵¹ The structural limits of Part II show that patents are not merely probabilistic rights where examination and issuance are probative, but not dispositive, evidence of entitlement to patent protection. Rather, issued patents are, in some respects, putative rights that reflect a claim to exclusivity that only has been partially vetted.

The structural limits of examination would seem to provide further support for Lemley's rational ignorance theory that "the PTO doesn't do a very detailed job of examining patents, but we probably don't want it to."³⁵² In fact, this Article goes further than Lemley. Lemley and his critics share the premise that *ex ante* examination and *ex post* invalidation are interchangeable, such that the only relevant question is the most efficient allocation of responsibility between the two for this shared task.³⁵³ In doing so, they overlook or minimize the structural limits discussed in Part II that make a complete evaluation of patentability impossible, regardless of the time and money invested, without fundamental changes to the core features of examination. The issue is not merely deciding whether the Patent Office is rationally or irrationally ignorant. In significant respects, the Patent Office is *inevitably ignorant*. At the very least, the Patent Office's inevitable ignorance should be recognized, for example, by formally limiting examination to U.S. patents and perhaps formal publications and foreign patents. And perhaps examination should be formally recognized as evaluating only claim scope commensurate with the embodiments in the disclosure—the exact opposite of the formal broadest reasonable interpretation standard that currently applies but that is functionally impossible for examiners to execute. If a patent owner wants to assert a broader claim scope later, the facts of examination and issuance should be of no relevance.

The Patent Office's inevitable ignorance and structural ineffectiveness as a substantive screen of patentability, regardless of resources, would seem to support proposals to abolish *ex ante* examination in favor of a

351. See Rantanen, *supra* note 25, at 912 (noting "that a patent claim, when it issues, may or may not actually be valid" because "[n]o one seriously contends that the patent office gets it right all the time").

352. Lemley, *supra* note 22, at 1497.

353. Compare Frakes & Wasserman, *supra* note 24, at 980 ("Should we increase the resources at the Patent Office in an effort to increase the quality of issued patents, or should we forego those marginal investments and reserve a larger residual role for the courts?"), with Lemley, *supra* note 22, at 1531 ("For the PTO to gather all the information it needs to make real validity decisions would take an enormous investment of time and resources. Those decisions can be made much more efficiently in litigation . . .").

registration system that leaves substantive evaluation of patentability to ex post invalidation proceedings.³⁵⁴ Yet, in their data-intensive challenge to Lemley's rational ignorance theory, Michael Frakes and Melissa Wasserman provide data indicating that patent examination is doing something useful.³⁵⁵ Using the different allocations of time per application given to junior and more senior patent examiners, they found that the longer the examiner had to examine an application, the less likely the application was to result in a patent involved in litigation or PTAB proceedings.³⁵⁶ Specifically, they found that doubling examination time would result in a 44% decrease in expected litigation and a 72% decrease in PTAB challenges.³⁵⁷ They speculated that "[t]his may be due to the fact that the expansion in examination time leads to the issuance of fewer patents overall and fewer invalid patents in particular."³⁵⁸ They concluded that the Patent Office could be an effective substantive screen of invalidity if allotted more resources.³⁵⁹

This data is in tension with the Patent Office's (partial) inevitable ignorance detailed in this Article, as well as Yelderman's data confirming that greater examination is unlikely to prevent a significant percentage of prior art invalidations in litigation and the PTAB. Yelderman acknowledges this tension and resolves it by noting that Frakes and Wasserman are focused on case filings, whereas he is focused on findings of invalidity.³⁶⁰ He suggests that while increased examination time may eliminate patents that would be asserted in litigation but resolved in early stages, it does not eliminate the type of patents that would make it all the way to a finding of invalidity.³⁶¹

An alternative way to reconcile the Patent Office's inevitable ignorance and both Frakes and Wasserman's and Yelderman's data is

354. See *supra* Section I.B.2 (noting such arguments). Jonathan Masur suggested that patent examination functions as a costly screen that weeds out low-value patents that are not worth the cost of examination, though he acknowledges that this function could be performed by simply raising Patent Office fees rather than requiring substantive examination. Masur, *Costly Screens*, *supra* note 85, at 688–92.

355. Frakes & Wasserman, *supra* note 24, at 981 (“[W]e thus conclude the opposite of Lemley: society would be better off investing more resources into the Agency to improve patent quality than relying upon ex post litigation to weed out invalid patents.”).

356. *Id.* at 984, 998.

357. *Id.* at 999, 1007.

358. *Id.* at 999.

359. *Id.* at 1020, 1023.

360. Yelderman, *supra* note 33, at 877–78.

361. Yelderman, *supra* note 33, at 887.

that the primary function of examination is not to effectively screen out unpatentable claimed inventions but rather to narrow the scope of the claimed invention. Applicants draft their own claims and tend to draft them as vaguely and/or broadly as possible.³⁶² To overcome examiner rejections in examination, applicants often amend their claims to narrow their scope.³⁶³ This narrowed claimed invention may still be unpatentable, but the structural barriers to a complete evaluation may prevent the examiner from recognizing its unpatentability. This would account for both the Patent Office's inevitable ignorance and Yelderman's data. At the same time, the narrowed claim scope means that the patent owner has less exclusive control and is therefore less able to assert infringement,³⁶⁴ which would account for the decreased case filings Frakes and Wasserman predict from increased examination.

Thus, examination might be beneficial *not* because the process of application, prior art search, rejection, amendment, and ultimate grant functions as an effective substantive screen of patentability. Rather, examination may be beneficial because this process, even with the narrow U.S. patent focus and lack of referents for claim scope, functions as an effective funnel that narrows the broad opening claims of the applicant to a more limited claim scope. The more limited claim scope gives the patent owner less power over the market and subsequent developments. Even if this narrower patent is still unpatentable, its narrow claim scope makes it less significant, minimizing the costs imposed by invalid patents.

The concept of examination as a claim scope funnel is just a hypothesis that needs more exploration and data, but it is one that is consistent with both Yelderman's and Frakes and Wasserman's data. Frakes and Wasserman make passing reference to the possibility that narrower claim scope resulting from more vigorous examination may help explain the reduction in case filings.³⁶⁵ And other scholars have noted the claim narrowing function of examination, though often in

362. Liivak, *supra* note 303, at 1428–31; Risch, *supra* note 32, at 188.

363. Mark A. Lemley & Bhaven Sampat, *Is the Patent Office a Rubber Stamp?*, 58 EMORY L.J. 181, 202 (2008) (“[I]n a significant majority of cases, the prosecution process requires the applicant to amend her claims, presumably to make them narrower.”).

364. Yelderman, *supra* note 85, at 100 (“The broader the claim, the greater the infringement value . . .”).

365. Frakes & Wasserman, *supra* note 24, at 995 & n.77, 999 & n.85.

passing or as a subsidiary function to screening for patentability.³⁶⁶ To the extent the primary benefit of examination is claim scope narrowing, rather than patentability evaluation, reforms and additional resource allocations should focus on this narrowing function. Such reforms could include providing more explicit interpretation of claim scope in examination or enhancing the written description and enablement doctrines that are intended to keep claim scope commensurate to the technological contribution.

B. The Presumption of Validity and the Different Jobs of Examination and Invalidation

An issued patent is presumed valid in litigation, with the burden on the challenger to establish invalidity by clear and convincing evidence.³⁶⁷ This heightened burden is traditionally justified by the presumption that the expert Patent Office, tasked with evaluating the patentability of a claimed invention in examination, has done its job correctly.³⁶⁸ Scholars have relentlessly attacked this heightened burden,³⁶⁹ focusing on how the Patent Office's well-recognized resource constraints give little reason to presume its patentability determinations are correct.³⁷⁰

The recognition that ex post invalidation functions not just to correct examiner errors, or even to supplement the Patent Office's constrained resources, but also to serve as an initial evaluation of patentability in some circumstances, or a supplemental evaluation of patentability in light of changed circumstances, provides further ammunition for those challenging the presumption of validity.

366. See, e.g., Mark A. Lemley & Bhaven Sampat, *Examining Patent Examination*, 2010 STAN. TECH. L. REV. 2, 4–5 (“[E]ven though the PTO ultimately grants patents on a large majority of the applications it receives, it may still be serving an important gatekeeper function by requiring applicants to narrow their claims.”); Lemley & Sampat, *supra* note 363, at 202 (“Requiring an applicant to narrow a patent provides a useful social function akin to weeding out bad patents.”); Masur, *Costly Screens*, *supra* note 85, at 696 (“Even patents that are improvidently granted may be substantially narrowed in the course of examination, as examiners cancel or restrict the least tenable claims.”).

367. *Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 97 (2011).

368. *Id.*; Cotropia et al., *supra* note 143, at 845.

369. See Cotropia et al., *supra* note 143, at 845 (summarizing literature).

370. See Lemley & Sampat, *supra* note 363, at 186 (noting that proposals “to eliminate the clear and convincing evidence presumption as unwarranted . . . are based on the assumption that the PTO is not doing a good job of weeding out bad patent applications”).

Likewise, it suggests that proposals to apply the heightened burden of proof in PTAB proceedings³⁷¹ are misguided.

However, this Article offers a new perspective that differs from the typical attacks on the heightened presumption of validity. Rather than focusing on whether the presumption of correct job performance is warranted, Parts II and III indicate that the presumption of validity is based on a false premise—that the “job” of the Patent Office is the same as that of courts in litigation, such that courts should defer to performance of this job by the experts in the Patent Office when reviewing that performance. The job of the Patent Office in *ex ante* examination only partially overlaps with the job of courts in litigation. Courts often must also conduct initial patentability evaluations in light of prior art not structurally suited to examination, consider the full scope of patent claims not recognized in examination, and/or conduct a supplemental patentability evaluation in light of changed circumstances. Given that these tasks were not performed in examination and courts are conducting these tasks in the first instance, there is no reason to defer to the Patent Office.

This different perspective on the presumption of validity has important consequences for at least one policy proposal to improve patent examination—to grant the heightened presumption of validity only if applicants opt into (and pay for) a more searching examination,³⁷² a proposal endorsed by then-candidate Barack Obama in 2007.³⁷³ These proposals for “gold-plated” patents are premised on the assumption that the only things preventing the Patent Office from conducting an examination that would warrant a presumption of correctness are time and resource constraints.³⁷⁴ But greater time and resources in examination do not fully justify a heightened burden of

371. See SENATOR CHRIS COONS, THE STRONGER PATENTS ACT OF 2019 SECTION-BY-SECTION ANALYSIS (2019), [https://www.coons.senate.gov/imo/media/doc/STRONGER%20Patents%20section-by-section%20\(2019-07-10\).pdf](https://www.coons.senate.gov/imo/media/doc/STRONGER%20Patents%20section-by-section%20(2019-07-10).pdf) [<https://perma.cc/YX6Y-S9PM>].

372. See, e.g., Mark Lemley et al., *What to Do About Bad Patents?*, REGULATION, Winter 2005–2006, at 10, 12–13; Lichtman & Lemley, *supra* note 132, at 50; Wagner, *supra* note 121, at 2162, 2164.

373. Dennis Crouch, *Barack Obama's Patent Reform Initiatives*, PATENTLYO (Nov. 14, 2007), <https://patentlyo.com/patent/2007/11/barak-obamas-pa.html> [<https://perma.cc/5JNL-YXLZ>].

374. See Lemley et al., *supra* note 372, at 12 (contending that “applicants should be allowed to ‘gold-plate’ their patents by paying for the kind of searching review that would merit a presumption of validity”).

proof in litigation, given that the Patent Office in examination is performing only part of the job performed by courts in litigation.

Thus, the more complex and nuanced picture of examination and invalidation offered in this Article suggests that the heightened burden of proof for invalidity in litigation is unwarranted. Or, less boldly, it should be scaled back to reflect the tasks actually performed in examination by applying, for example, only to prior art considered in examination³⁷⁵ and/or U.S. patents. Alternatively, fully retaining the heightened burden of proof requires a new theoretical justification, such as the reliance interests that patent owners develop based on the issued patent.³⁷⁶

C. *Rethinking the Design of Patent Office Cancellation Proceedings*

Patent office post-issuance proceedings are typically described as performing the same task as *ex ante* examination, thereby serving to review and correct errors in initial examination. For example, in rejecting Article III and Seventh Amendment challenges to these proceedings, the Supreme Court relied, in part, on the fact that Patent Office examination was undoubtedly constitutional and “[i]nter partes review involves the same basic matter as the grant of a patent” and “considers the same statutory requirements that the PTO considered when granting the patent,” with the key difference being the timing of the two procedures.³⁷⁷ Likewise, in rejecting the applicability of state sovereign immunity, the Federal Circuit relied on the fact that Patent Office cancellation proceedings “are designed to allow the USPTO to harness third parties for the agency to evaluate whether a prior grant of a public franchise was wrong”³⁷⁸ On first glance, this Article would seem to suggest that the Court’s rationale is wrong (even if the results may have been right) since examination and invalidation only partially overlap, and invalidation only partially serves to review the Patent Office’s work in examination.

However, the actual design of the Patent Office post-issuance offers some support for the Court’s rationale. These proceedings’ design is better suited for *ex post* invalidation’s review and correction function than its initial examination function. Other than the short, nine-

375. See Cotropia et al., *supra* note 143, at 845, 852 (discussing possibility of limiting presumption of validity to prior art considered in examination).

376. Greg Reilly, *The PTAB’s Problem*, 27 TEX. INTELL. PROP. L.J. 31, 31, 33, 50 (2019).

377. Oil States Energy Servs., LLC v. Greene’s Energy Grp., LLC, 138 S. Ct. 1365, 1374 (2018).

378. Regents of the Univ. of Minn. v. LSI Corp., 926 F.3d 1327, 1339 (Fed. Cir. 2019).

month post-issuance window of post-grant review, a patent can only be challenged in inter partes review for anticipation or obviousness based on patents and printed publications.³⁷⁹ Thus, post-issuance proceedings focus on the type of prior art best suited for ex ante examination—U.S. patents and formal publications. inter partes review expressly excludes the type of prior art least suited for the structure of ex ante examination—sales and uses of the invention. It also excludes the disclosure doctrines of enablement, written description, and indefiniteness. Because these doctrines “limit how far into the future a claim can reach,”³⁸⁰ they are the best tools to police the patentability of the outer reaches of claim scope, where the patent owner claims more broadly than its technological contribution (reflected in the disclosure in the specification) would allow.³⁸¹ These outer limits are impossible for the examiner to recognize in ex ante examination.

With that said, inter partes review does have some features that further ex post invalidation’s examination function. It includes foreign patent documents and nontraditional publications, both of which are not well-suited for ex ante examination. It is a public, adversarial proceeding that can occur after market and technological developments have made the full scope of the claim readily apparent or changes to the conditions of patentability have occurred. And the PTAB has greater inquisitorial powers than examiners, including limited discovery and a live hearing, though not the full scope of inquisitorial powers of litigation,³⁸² such as subpoenas and depositions of fact witnesses or live testimony and cross-examination of such witnesses.

All the same, Patent Office post-issuance proceedings appear to have been designed under the conventional view that the purpose of ex post invalidation is to review and correct the Patent Office’s work in examination. The nine-month window for post-grant review is too short to effectively serve many of the functions of ex post invalidation, since changed circumstances are unlikely to have occurred and there often will not yet be a motivated challenger, and perhaps not time to investigate and find the types of prior art unsuited for examination. inter partes review excludes categories of prior art least suited to ex ante examination and doctrines most suitable to addressing the full expanse of claim scope not capable of recognition in ex ante

379. See *supra* Section I.A.

380. Liivak, *supra* note 303, at 1426.

381. See *id.* at 1431–32.

382. *Regents of the Univ. of Minn.*, 926 F.3d at 1336, 1339.

examination. And it is limited to the doctrines of anticipation and obviousness, preventing the Patent Office from reconsidering the issuance of a patent when other criteria of patentability have changed since initial examination. Patent-eligible subject matter offers an acute example of this last shortcoming, as commentators struggle to find ways to quickly and cheaply invalidate patents implicated by the Supreme Court's recent revolution in the section 101 requirements without the availability of Patent Office post-issuance proceedings.

Arguably, this design has it exactly backwards. Leveraging the expertise of the Patent Office to conduct those aspects of the patentability evaluation not suited for the structure of ex ante examination would seem to offer a particularly compelling justification for the additional costs and inefficiencies of adding Patent Office post-issuance proceedings to traditional examination and litigation. As a result, PTAB proceedings are not living up to their full potential as a means for evaluating the patentability of claimed inventions.

CONCLUSION

Ex ante patent examination and ex post patent invalidation are more varied, complicated, and nuanced than commonly thought. They are not interchangeable substitutes. Rather, ex ante examination is only capable of giving a partial evaluation of compliance with the statutory criteria of patentability. The patentability evaluation in examination is a snapshot evaluation at one point in time based only on a portion of the relevant prior art and only a portion of the actual scope of the claim. Patent examination and issuance is weak evidence of the patentability of a claimed invention. Conversely, the Patent Office is not entirely at fault for the presence of issued patents that fail the statutory criteria. Invalid patents exist, in part, because of the basic structure of examination, which makes the Patent Office, in part, inevitably ignorant. Indeed, patent examination may function less as a substantive screen of patentability and more as a funnel to narrow claim scope.

Ex post invalidation is not merely a means of reviewing and correcting Patent Office errors or supplementing the Patent Office's limited resources and rational ignorance. Sometimes it functions as the initial opportunity to evaluate patentability against the full scope of the claim or certain categories of prior art. Other times, it serves as a supplemental evaluation of patentability in light of changed claim scope or patentability criteria. Ex post invalidation thus serves a broad function that only partially overlaps with ex ante examination. The

heightened burden of proof in litigation is unwarranted, at least in part, not because the Patent Office is bad at its job but because the Patent Office's job in examination is not the same as a court's in litigation. Finally, the design of PTAB proceedings is bizarre because it effectively excludes circumstances in which a second look from the Patent Office would seem the most warranted.