The Ghost in the Patent System: An Empirical Study of Patent Law's Elusive "Skilled Artisan"

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ABSTRACT: Patent law shares with tort law the presence of an artificial character that structures judicial decision-making. Much like the reasonable person in tort law, the "person having ordinary skill in the art" (or PHOSITA) frames judicial inquiries into such central patent law questions as whether an invention is obvious, set out in sufficient detail, or infringed by a competitor. The PHOSITA's perspective is considered so self-evident and foundational to the field that virtually every patent textbook and judicial opinion emphasizes that doctrinal outcomes are tied to the technical perspective of the PHOSITA, not that of the judge or an ordinary observer. Despite the field's acknowledged reliance on this artificial character, and the Supreme Court's reaffirmation of its importance, scholars and jurists have raised doubts as to whether the PHOSITA in fact plays an outcome-determinative role in the resolution of patent disputes.

In this Article, we conduct the first comprehensive empirical study of the role of the PHOSITA in patent litigation. Through close readings of seven hundred trial and appellate court opinions as well as automated textual analysis of over seven thousand cases, we evaluate the way lower courts create their artificial PHOSITA, the construct's impact on legal decision-making, and the influence of Supreme Court interventions on lower court outcomes. We find that the PHOSITA plays a surprisingly small role in judicial decision-

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making, even in the aftermath of Supreme Court decisions that emphasize its centrality.

Unpacking these results, we show that lower courts lack guidance in how to reconcile competing conceptions of the PHOSITA as a real-world construct tied to specific facts and as a legal construct designed to advance normative goals. We argue for a normative use of the construct and offer a structure for lower court decision-making. By crafting different versions of the PHOSITA tailored to the normative goals of obviousness, claim construction, and infringement that patent law seeks to answer, lower courts can create a PHOSITA that, however artificial, works more effectively to advance the goals of the patent system.

INTRODUCTION

Patents are widely understood to serve two interrelated, yet conceptually distinct, functions: They are at once legal and technical documents.[1] Like a property deed, patents set out the metes and bounds of an inventor's property rights. But patents also serve an important technological function by disclosing and explaining the technical details necessary to practice an invention, therefore contributing to the storehouse of technological knowledge that drives innovation.[2] The "person having ordinary skill in the art" (or "PHOSITA") emerged as a fulcrum to support this dual role. The word "ordinary," however, is deceptive. Although it evokes common-sense behavioral qualities that any "average" practitioner would have, it also compiles ideal characteristics not reflected by any real-world actors, therefore making understanding who the PHOSITA is and how the PHOSITA would act as much of a theoretical as a factual exercise.

Neither a real-world "person" nor a complete legal fiction, the hypothetical ordinary artisan is meant to help judges and juries achieve both technological and policy goals. From a technological perspective, the PHOSITA's vantage point ensures a patent contributes to the storehouse of knowledge and makes a technologically meaningful advance. From a policy perspective, the PHOSITA ensures that patent rights advance social welfare. This dual role can perhaps be seen most clearly in the obviousness inquiry, meant to differentiate trivial technological advances from those meriting patent protection. The obviousness PHOSITA is somewhat of a plodder with only a minimum of creativity but a wealth of factual knowledge—not likely representative of any average or ordinary inventor in any particular field.[3] From a normative perspective, however, limiting a PHOSITA's creativity arguably helps identify those inventions that would take place in a counterfactual world where only market, but not patent, incentives are present.[4]

Although emerging initially as a common law innovation in the obviousness doctrine, the concept of the PHOSITA quickly expanded to serve as a reference point in disclosure doctrines (concerned with ensuring the inventor adequately communicates details of the invention to the public) and infringement doctrines (concerned with setting out the metes and bounds of the invention). The modern-day PHOSITA scaffolds every major patent law

1. *See* Timothy R. Holbrook, *Patents, Presumptions, and Public Notice*, 86 IND. L.J. 779, 780 (2011).

2. *Id.*; *see also* Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 623–24 (2010) (describing the immediate informational value patents provide to the public).

3. *See* Rebecca S. Eisenberg, *Obvious to Whom? Evaluating Inventions from the Perspective of PHOSITA*, 19 BERKELEY TECH. L.J. 885, 891 (2004); Mark D. Janis & Timothy R. Holbrook, *Patent Law's Audience*, 97 MINN. L. REV. 72, 96–100 (2012); Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155, 1190 (2002).

4. This counterfactual is not reflected in any readily observable real-world behavior, given that patents pervade incentives available to present-day artisans and scientists.

doctrine, providing a unifying prism to determine patent validity and infringement, both at the patent office and in the courts.[5] The PHOSITA's vantage point is considered so self-evident and foundational to the field, that virtually every patent textbook and judicial opinion emphasizes that doctrinal outcomes are tied to the technical perspective of the PHOSITA, not that of the judge or an ordinary observer.[6]

And yet, court observers and legal scholars have also noted that the PHOSITA at times appears to do little work in driving doctrinal outcomes.[7] Called at turns a "ghost,"[8] a "mysterious,"[9] and an "enigmatic"[10] character, the role of the PHOSITA in patent law is a bit like "the curious incident of the dog in the night-time"[11]: Despite its theoretically expected central role in patent law, it often appears to do little real, outcome-determinative work in the very patent doctrines it is supposed to help define.

In this Article, we present a large-scale empirical analysis of the PHOSITA in litigation.[12] Through close readings of seven hundred court opinions as well as automated textual analysis of over seven thousand cases we ask: How deeply do courts engage with factual evidence to define who the PHOSITA is? Does the identity of the PHOSITA, once established, in fact drive legal decision-making? Is the court's depth of engagement correlated with the expected technical difficulty of the particular invention at issue? And, have recent Supreme Court decisions that emphasize the centrality of the PHOSITA had an impact on lower courts' decisions?

We show that, although the PHOSITA is implicated in a wide variety of patent doctrines, its appearance in litigation is in large part related to three

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5. *See infra* Section I.A.

6. *See infra* Section I.A.

7. *See, e.g.*, Eisenberg, *supra* note 3, at 888 ("Today, PHOSITA sits on the sidelines of obviousness analysis."); Janis & Holbrook, *supra* note 3, at 97 ("[T]he Federal Circuit frequently seems to ascribe little value to the perspective of the PHOSITA in claim construction.").

8. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1566 (Fed. Cir. 1987) ("With the involved facts determined, the decisionmaker confronts a ghost, i.e., 'a person having ordinary skill in the art'. . . .").

9. Joseph P. Meara, *Just Who Is the Person Having Ordinary Skill in the Art? Patent Law's Mysterious Personage*, 77 WASH. L. REV. 267, 267 (2002).

10. *See generally* John O. Tresansky, *PHOSITA - The Ubiquitous and Enigmatic Person in Patent Law*, 73 J. PAT. & TRADEMARK OFF. SOC'Y 37 (1991) (characterizing PHOSITA as enigmatic).

11. *See* CHRISTOPHER RODEN, *Explanatory Notes* to ARTHUR CONAN DOYLE, THE MEMOIRS OF SHERLOCK HOLMES 274, 276 (Oxford Univ. Press 1993) (1893).

12. In doing so we contribute to a growing body of literature that empirically examines patent law doctrine and practice. For examples, see generally John R. Allison, Mark A. Lemley & David L. Schwartz, *Understanding the Realities of Modern Patent Litigation*, 92 TEX. L. REV. 1769 (2014); John R Allison, Mark A. Lemley & David L. Schwartz, *Our Divided Patent System*, 82 U. CHI. L. REV. 1073 (2015); Ryan T. Holte & Christopher Seaman, *Patent Injunctions on Appeal: An Empirical Study of the Federal Circuit's Application of* eBay, 92 WASH. L. REV. 145 (2017); and Jason A. Rantanen, *The Landscape of Modern Patent Appeals*, 67 AM. U. L. REV. 985 (2018) (providing empirical analyses of patent law).

key doctrinal areas: obviousness, enablement, and claim construction.[13] We find little evidence to suggest that the PHOSITA plays an outcome-determinative role in litigation. On the contrary, we find that when courts do engage with skilled artisan related issues, they tend to do so in quite perfunctory ways. The majority of cases that make PHOSITA-related holdings provide little-to-no reasoning or evidentiary support to justify those holdings.[14] It is only in relatively rare instances that the court even provides limited reasoning or evidence to support its PHOSITA holdings, and quite rare indeed to see thorough reasoning and evidentiary support for holdings related to the PHOSITA.[15] Although one might expect courts to engage in more reasoning or demand more evidentiary support in technologically complex cases, our analysis finds no evidence that this occurs.[16] Finally, despite predictions that a trio of Supreme Court decisions—*KSR International Co. v. Teleflex Inc.*,[17] *Nautilus, Inc. v. Biosig Instruments, Inc.*,[18] and *Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.*[19]—would dramatically increase the importance of the PHOSITA's perspective in litigation,[20] we see only a modest increase in courts' depth of engagement following *KSR* and no change following both the *Teva* and *Nautilus* decisions.[21]

In brief, what emerges from our empirical investigation is a deep disconnect between the centrality of the PHOSITA to patent law on paper and its empirical relevance to doctrinal outcomes. We suggest two central explanations for our findings. First, judicial decisions provide little guidance on how to reconcile definitions of the PHOSITA as an empirical, real-world construct with its hypothetical (and normative) dimension. Second, courts fail to tailor the PHOSITA to the underlying normative goals of each of the different doctrines that rely on the PHOSITA as a reference point. Indeed, our empirical research shows the PHOSITA to be a monolithic construct that

13. *See infra* Section III.A.

14. *See infra* Section II.A.

15. *See infra* Section II.A.5.

16. *See infra* Section II.C (using a measure that identifies complex inventions as those that combine knowledge from cognitively distant domains); Laura G. Pedraza-Fariña & Ryan Whalen, *A Network Theory of Patentability*, 87 U. CHI. L. REV. 63, 115–28 (2020).

17. *See generally* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 398 (2007) (holding patent to be "invalid as obvious").

18. *See generally* Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 898–99 (2014) ("[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.").

19. *See generally* Teva Pharms. USA, Inc. v. Sandoz, Inc., 574 U.S. 318, 332–36 (2015) (holding that expert opinion regarding how a PHOSITA would understand patent claim language is a "subsidiary" fact that must be reviewed under a deferential, clearly erroneous standard).

20. *See, e.g.*, Eisenberg, *supra* note 3 at 889–99 (applying this argument in the context of earlier federal court decisions); Daralyn J. Durie & Mark A. Lemley, *A Realistic Approach to the Obviousness of Inventions*, 50 WM. & MARY L. REV. 989, 999–1004 (2008).

21. *See infra* Section II.B.

remains unchanged across doctrines, rather than a nimble concept that is responsive to the different underlying normative goals of the doctrines it mediates. Put differently, courts do not sufficiently examine whether the PHOSITA should be a designer and researcher, a user or reader of the technology, or a competitor in the same technological field. Because deciding whether, for example, the PHOSITA is a patent reader versus a researcher requires also engaging with the normative goals underlying each doctrinal area, addressing these questions would not only provide normative content to the PHOSITA's real-world characteristics, but would also help achieve its dual technological and policy goals. These explanations also ground our reform proposals for reimagining the PHOSITA's role as a mediator between patent law's technical and normative goals across patent doctrines.

The Article proceeds as follows: Part I provides a brief historical background of the concept of the PHOSITA, situating its origins as a common law innovation in the obviousness doctrine and tracing its expansion to other validity and infringement doctrines. Part II lays out our empirical findings. Part III turns from the empirical to the normative, developing a framework to reconcile the PHOSITA's empirical and normative dimensions. We build upon literature in tort law about the reasonable person and in sociology about expert communities, to develop three different PHOSITAs (the obviousness, enablement, and infringement PHOSITA) that reflect the distinct normative goals of each doctrine.[22]

I. THE ROLE AND HISTORY OF THE PHOSITA

This Part provides a brief description of the historical evolution of the concept of the PHOSITA, from its initial articulation in the obviousness doctrine to its expansion to every corner of patent law's inquiries. It focuses on key moments in the history of the PHOSITA: its birth in *Hotchkiss*[23]; its codification in the 1952 Act[24]; its predicted rebirth in *KSR*,[25] which seemed to breathe new life into the concept of the PHOSITA as the centerpiece of the obviousness inquiry; and its expansion to other doctrines in the years since.

A. EARLY HISTORY OF THE PHOSITA

Although the phrase "a person having ordinary skill in the art" first appears in the 1952 Patent Act codifying the obviousness doctrine,[26] its conceptual development is of an earlier vintage. Many commentators trace the idea of a technological reference person in patent law to the 1850 *Hotchkiss*

22. *See infra* Sections III.A–.D.
23. Hotchkiss v. Greenwood, 52 U.S. (11 How.) 248, 265 (1850).
24. Patent Act, 35 U.S.C. § 103 (1952).
25. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 402–03 (2007).
26. 35 U.S.C. § 103.

v. Greenwood case.[27] *Hotchkiss* represents the first clear articulation of an inventive step standard in patent law—a standard separate from the requirement that the invention be both useful and new. In *Hotchkiss*, the Court refused to grant a patent to a new and useful porcelain doorknob arguing that "an ordinary mechanic acquainted with the business" would have been able to develop the invention based on the knowledge contained in the prior art.[28] In other words, using an "ordinary mechanic" as a reference point, the invention did not represent a sufficiently large technological leap over existing knowledge to merit a patent. Later court decisions offered slightly different formulations of the concept, such as "any skilled mechanic or operator in the ordinary progress of manufactures."[29] Following *Hotchkiss*, the concept of the "ordinary mechanic" migrated to any area of patent law that implied a technological reference point. For example, in *Wright Co. v. Paulhan*, Judge Learned Hand referred to a "skilled mechanic" as the vantage point from which to determine whether the patent disclosed adequate information (the enablement requirement) and whether a product was functionally equivalent to the technology covered by the patent (the doctrine of equivalents).[30]

The 1952 Patent Act codified the concept of an "ordinary" or "skilled" mechanic under the modern-day rubric of "person having ordinary skill in the art" as the reference point in the obviousness doctrine, and also in patent enablement—the lynchpin of patent disclosure.[31] The 1952 Act also inaugurated a period of judicial decisions that standardized the use of the "person having ordinary skill in the art" not only in patent validity doctrines, but also in claim interpretation and infringement doctrines.[32] But neither its codification nor its wider usage clarified how the PHOSITA should mediate doctrinal outcomes. On the contrary, no sooner had the 1952 Act standardized the concept of the PHOSITA and established its centrality to patent validity determinations that courts began struggling to define both who the PHOSITA is and what the PHOSITA does in any given case. This struggle was in many ways covert, for as much as courts appeared to center many doctrinal tests around the concept of the PHOSITA, they also often appeared to substitute their own judgment for that of a "person having ordinary skill in the art."

27. *See, e.g.*, Jonathan J. Darrow, Note, *The Neglected Dimension of Patent Law's PHOSITA Standard*, 23 HARV. J.L. & TECH. 227, 233 (2009); Tresansky, *supra* note 10, at 38.

28. *Hotchkiss*, 52 U.S. at 253.

29. Atlantic Works v. Brady, 107 U.S. 192, 200 (1883).

30. Wright Co. v. Paulhan, 177 F. 261, 264 (C.C.S.D.N.Y 1910) ("In the patent in suit any skilled operator, who may serve pro hac vice for a 'skilled mechanic,' finding the automatic connection unsatisfactory, would at once disconnect it and attach the tiller ropes to a lever or to a foot pedal which he could directly control.").

31. 35 U.S.C. §§ 103, 112. The statutory language codifying the PHOSITA for obviousness differs from that for enablement, but most judicial decisions appear to treat the two as equivalent. *See infra* Part III (discussing why different PHOSITA standards are normatively desirable).

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

For example, the leading Supreme Court case interpreting the 1952 Act's new obviousness provision, *Graham v. John Deere*, articulated a three-prong test for obviousness that recognizes the centrality of the PHOSITA: "[1] the scope and content of the prior art are to be determined; [2] differences between the prior art and the claims at issue are to be ascertained; and [3] the level of ordinary skill in the pertinent art resolved."[33] It was "[a]gainst this background" knowledge, the Court explained, that "the obviousness or non[-]obviousness of the subject matter [was] determined."[34] But when it came to applying this three-prong test to the invention at issue, the Court was remarkably brief in its analysis of how a PHOSITA would behave, concluding without any reference to the real-world technical expertise of the PHOSITA that "[c]ertainly a person having ordinary skill in the prior art . . . would immediately see that the thing to do was what Graham did."[35]

Graham's cursory analysis of how a PHOSITA would behave presaged the continued struggles courts have faced in creating an objective PHOSITA standard grounded on the realities of technological innovation. The Federal Circuit, created in 1982 to bring uniformity to patent law, initially laid out a set of factors to determine the level of ordinary skill in the art: "(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field."[36] In *Environmental Designs, Ltd. v. Union Oil Co.*, the Federal Circuit emphasized the importance of specifying the correct level of skill in the art, differentiating the skill level of an ordinary artisan from that of "the judge," "a layman," "those skilled in remote arts," or "geniuses in the art at hand."[37] *Environmental Designs*'s approach would make fact-findings about the technological skill of the PHOSITA often outcome determinative. In subsequent cases, however, the Federal Circuit would marginalize the concept of the PHOSITA by privileging formal rules of decision based on "the four corners of the patent document" that limited the importance of contextual, real-world technological information.[38] The Federal Circuit's quest for uniformity also resulted in a preference for treating arguably mixed questions of law and fact as questions of law, further

33. Graham v. John Deere Co., 383 U.S. 1, 17–18 (1966).

34. *Id.* at 17.

35. *Id.* at 25.

36. Env't Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 696–97 (Fed. Cir. 1983).

37. *Id.* at 697.

38. *See, e.g.*, Sarah A. Geers, Comment, *Common Sense and the Fact Finder Without Skill in the Art: The Role of Objective Evidence in Achieving Proper Technology Specificity*, 40 SETON HALL L. REV. 225, 263–71 (2010).

sidelining the type of technological, on the ground fact-finding that is necessary for giving content to the concept of the PHOSITA.[39]

The diminishing importance of the PHOSITA to patent litigation was part of a larger trend of increasing formalism at the Federal Circuit. This trend has been heavily criticized by scholars for divorcing judicial decisions from the realities of technological innovation.[40] For example, Timothy Holbrook argued that the Federal Circuit's focus on the four corners of the patent specification "has marginalized the PHOSITA to the point of near irrelevance"[41] in claim construction, written description, and enablement—a legalistic approach that, while providing rules of decision that facilitate judicial engagement with technological areas, ultimately undermines the purpose of the patent system to foster technological innovation.[42] Kristen Osenga likewise argued that in its claim construction jurisprudence, the Federal Circuit paid insufficient attention to the underlying "background of assumptions and practices" that PHOSITAs would understand and use.[43] In the obviousness context, Rebecca Eisenberg criticized the Federal Circuit for ignoring the tacit, non-codified knowledge of ordinary artisans in the relevant technological community.[44] Mark Lemley and Daralyn Durie have called for a redefinition of the PHOSITA as grounded exclusively on real-world economic and technological facts.[45] And Dan Burk and Mark Lemley have criticized the Federal Circuit for not paying sufficient attention to on-the-ground, evolving technological realities to give content to the PHOSITA in different industries.[46] All of these critiques share a common call for elevating the role of the PHOSITA in patent claim construction, enablement, or obviousness. Only

39. *See, e.g.*, Arti K. Rai, *Who's Afraid of the Federal Circuit?*, 121 YALE L.J.F. 335, 338–40 (2011); Laura G. Pedraza-Fariña, *Understanding the Federal Circuit: An Expert Community Approach*, 30 BERKELEY TECH. L.J. 89, 98–102 (2015); Arti K. Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, 17 BERKELEY TECH. L.J. 877, 881–87 (2002); Arti K. Rai, *Allocating Power over Fact-Finding in the Patent System*, 19 BERKELEY TECH. L.J. 907, 907–09 (2004); Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1060–65 (2003); Arti Rai, *Addressing the Patent Gold Rush: The Role of Deference to PTO Patent Denials*, 2 WASH. U. J.L. & POL'Y 199, 226 (2000).

40. *See, e.g.*, Eisenberg, *supra* note 3, at 889–97; Meara, *supra* note 9, at 286–90; Burk & Lemley, *supra* note 3, at 1185–87; Kristen Osenga, *Linguistics and Patent Claim Construction*, 38 RUTGERS L.J. 61, 83–87 (2006); Greg Reilly, *Rethinking the PHOSITA in Patent Litigation*, 48 LOY. U. CHI. L.J. 501, 513–14 (2016).

41. Holbrook, *supra* note 1, at 792.

42. *See id.* at 807; *see also* Janis & Holbrook, *supra* note 3, at 97 ("[T]he Federal Circuit frequently seems to ascribe little value to the perspective of the PHOSITA in claim construction.").

43. *See* Osenga, *supra* note 40, at 101.

44. *See* Eisenberg, *supra* note 3, at 897–99; *see also* Glynn S. Lunney, Jr. & Christian T. Johnson, *Not So Obvious After All: Patent Law's Nonobviousness Requirement, KSR, and the Fear of Hindsight Bias*, 47 GA. L. REV. 41, 64–65 (2012) (discussing the Federal Circuit's reliance on "secondary considerations" in its patent analysis).

45. *See* Durie & Lemley, *supra* note 20, at 1015–19.

46. *See* Burk & Lemley, *supra* note 3, at 1194–96.

then, these commentators argued, can patent law reflect the real-world dynamics of technological innovation.

The Supreme Court appears to have responded to many of these early critiques in its first obviousness opinion after *Graham*, *KSR v. Teleflex*.[47] The next Section describes the *KSR* opinion and its aftermath—an event that was widely seen at the time as recapturing a central role for the PHOSITA across patent doctrines.

B. THE KSR REVOLUTION AND ITS AFTERMATH

KSR v. Teleflex marked the return of the Supreme Court to obviousness jurisprudence after a half a century absence.[48] Although the question presented in *KSR* concerned the test for obviousness[49], *KSR* also brought the PHOSITA back to the center of the obviousness inquiry by rejecting what it called the Federal Circuit's "formalistic" approach.[50] Instead, it provided lower courts with a picture of a PHOSITA that is more flexible, more resourceful, and more creative than the vanishing PHOSITA of the Federal Circuit. More specifically, the Supreme Court characterized the PHOSITA in realistic terms: as a member of a technological community that is subject to market pressures, as a person who can implement predictable variations of pre-existing technology, and as a person of ordinary creativity.[51] Based on these observations, in the aftermath of *KSR* we might expect courts to pay a lot more attention to defining who the PHOSITA is and what it does, and commentators have in fact predicted as much.[52]

At the same time, *KSR* gave permission to judges to insert their own "common sense" into the obviousness inquiry—in effect allowing judges to

47. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 399 (2007).

48. *Id.*

49. For a comprehensive analysis of how *KSR* changed the doctrinal landscape in obviousness jurisprudence, see Ryan T. Holte & Ted Sichelman, *Cycles of Obviousness*, 105 IOWA L. REV. 107, 118–30 (2019); and Dmitry Karshtedt, *Nonobviousness: Before and After*, 106 IOWA L. REV. 1609, 1617 (2021); *see also* Pedraza-Fariña & Whalen, *supra* note 16, at 89 (analyzing two different theoretical justifications for non-obviousness that underlie judicial decisions).

50. *See* Shaun D. Wong, Note, *Flexible Yet Tailored: Developing a Standard for Patent Nonobviousness in Biological and Chemical Technologies Consistent with* KSR, 52 U.C. DAVIS L. REV. 2207, 2215 (2019).

51. *See* Durie & Lemley, *supra* note 20, at 1001–02; Darrow, *supra* note 27, at 248; Amy L. Landers, *Ordinary Creativity in Patent Law: The Artist Within the Scientist*, 75 MO. L. REV. 1, 3–4 (2010); Joseph Scott Miller, *Remixing Obviousness*, 16 TEX. INTELL. PROP. L.J. 237, 244 (2008); Sean B. Seymore, *Heightened Enablement in the Unpredictable Arts*, 56 UCLA L. REV. 127, 134–35 (2008).

52. *See, e.g.*, Eisenberg, *supra* note 3, at 888; Durie & Lemley, *supra* note 20, at 993; Miller, *supra* note 51, at 240; Jeanne C. Fromer, *The Layers of Obviousness in Patent Law*, 22 HARV. J.L. & TECH. 75, 76 (2008); Holbrook, *supra* note 1, at 781; Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1606 (2011); Reilly, *supra* note 40, at 515.

substitute their own judgement for that of a PHOSITA.[53] This revindication of judicial common sense, however, runs counter to *Environmental Designs*'s admonition that "[t]he important consideration lies in the need to . . . hold that an invention would or would not have been obvious, as a whole, when it was made, to a person of 'ordinary skill in the art'—*not to the judge*, or to a layman, or to those skilled in remote arts, or to geniuses in the art at hand."[54] By announcing a test both grounded in real-world evidence and decentered from it through its endorsement of judicial "common sense," *KSR* generated a large amount of uncertainty around the doctrinal role and importance of the PHOSITA's perspective.

KSR also left open the question of how to reconcile evidence about the new creative, market-influenced PHOSITA with other real-world measures of non-obviousness, such as the commercial success of the invention, the skepticism of experts in the field, and the long-felt need for the invention.[55] Arguably, many of these so-called "secondary" or "objective" indicia of obviousness are actually indicia of the real-world incentives and constraints experienced by a PHOSITA.[56]

Despite these limitations, *KSR* was widely recognized as a watershed decision in obviousness jurisprudence. Commentators predicted that its articulation of a real-world PHOSITA would migrate to other patent doctrines, and there is some evidence that this has indeed been the case.[57] For example, Sean Seymore argues the Federal Circuit appears to have relied on *KSR* to amplify the role of the PHOSITA in enablement.[58] Similarly, in claim construction, the recent Supreme Court decision in *Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.* makes more room for a PHOSITA's interpretive understanding of patent claims by requiring a more deferential standard of review (clear error) for subsidiary findings of fact in claim construction.[59]

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53. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 403 (2007) ("Rigid preventative rules that deny recourse to common sense are neither necessary under, nor consistent with, this Court's case law."). *See* Holte & Sichelman, *supra* note 49, at 158 (showing how reliance on "common sense" in obviousness determinations jumped from three percent pre-*KSR* to tweny percent and twenty-one percent in district court and Federal Circuit opinions, respectively, following *KSR*).

54. Env't Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 697 (Fed. Cir. 1983) (emphasis added).

55. *See* Karshtedt, *supra* note 49, at 1617.

56. *See id.*

57. Several commentators celebrated *KSR* as returning the obviousness inquiry to a context-sensitive analysis of the incentives operating onto real-world communities of innovators. *See* sources cited *supra* notes 49–51.

58. Seymore, *supra* note 51, at 134–35 ("If *KSR* also implicates the enablement PHOSITA's abilities, Examiners may have a harder time proving nonenablement.").

59. *See* Teva Pharms. USA, Inc. v. Sandoz, Inc., 574 U.S. 318, 333 (2015) ("In some instances, a factual finding may be close to dispositive of the ultimate legal question of the proper meaning of the term in the context of the patent."); Reilly, *supra* note 40, at 510 (interpreting *Teva* as emphasizing "the PHOSITA's background knowledge and understanding more than the Federal Circuit case law"); Jason Rantanen, Teva, Nautilus, *and Change Without Change*, 18 STAN. TECH. L.

Finally, in *Nautilus v. Biosig*, the Supreme Court injected the PHOSITA's perspective into the standard for claim definiteness, holding "that a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, *those skilled in the art* about the scope of the invention."[60] Although empirical scholarship has analyzed the impact of *KSR* on obviousness determinations,[61] there has been no empirical research on whether *KSR* has had a systemic, on-the-ground impact on judicial engagement with the PHOSITA across patent doctrines.

The concept of the PHOSITA has evolved from its humble origins as a reference point in the judge-made obviousness inquiry to its present-day use as a universal compass that guides decisions across patentability and infringement doctrines. The oft-repeated view of the PHOSITA as the "prism or lens through which a judge or jury views the . . . invention,"[62] however, also hides deep theoretical ambiguities. We turn to these theoretical ambiguities in the next Section. The PHOSITA's dual nature as a *legal* construct reflecting normative policy goals, and an *empirical* construct reflecting real-world practices, complicates the judicial task of articulating a clear test for determining the PHOSITA's perspective in each relevant doctrine. We then turn to the use of the PHOSITA across doctrines, considering whether the disparate normative goals animating different doctrines suggest the need to develop different "PHOSITA" reference points.

C. THEORETICAL AND PRACTICAL CHALLENGES TO A UNIFIED PHOSITA STANDARD

The PHOSITA of the early obviousness cases was much closer to a "real person" than its subsequent incarnations. *Hotchkiss* itself defined the PHOSITA

REV. 430, 447 (2015) (interpreting *Teva* as endorsing an approach that privileges the perspective of the PHOSITA over intrinsic evidence).

60. Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 901 (2014) (emphasis added); *see also* John R. Allison & Lisa Larrimore Ouellette, *How Courts Adjudicate Patent Definiteness and Disclosure*, 65 DUKE L.J. 609, 614 (2016) (discussing *Nautilus*'s impact on courts' analysis of definiteness).

61. For examples of this empirical scholarship, see generally Holte & Sichelman, *supra* note 49; Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051 (2007); Christopher A. Cotropia, *Nonobviousness and the Federal Circuit: An Empirical Analysis of Recent Case Law*, 82 NOTRE DAME L. REV. 911 (2007); Ali Mojibi, *An Empirical Study of the Effect of* KSR v. Teleflex *on the Federal Circuit's Patent Validity Jurisprudence*, 20 ALB. L.J. SCI & TECH. 559 (2010); Jennifer Nock & Sreekar Gadde, *Raising the Bar for Nonobviousness: An Empirical Study of Federal Circuit Case Law Following* KSR, 20 FED. CIR. B.J. 369, 370 (2011); Jason Rantanen, *The Federal Circuit's New Obviousness Jurisprudence: An Empirical Study*, 16 STAN. TECH. L. REV. 709 (2013); Brendan Seth O'Brien O'Shea, Note, *What Is Obvious: Empirical Assessment of* KSR*'s Impact*, 45 AIPLA Q.J. 517 (2017); and Emer Simic, *The TSM Test Is Dead! Long Live the TSM Test! The Aftermath of* KSR*, What Was All the Fuss About?*, 37 AIPLA Q.J. 227 (2009).

62. Al-Site Corp. v. VSI Int'l Inc., 174 F.3d 1308, 1324 (Fed. Cir. 1999).

as "an ordinary mechanic acquainted with the business"[63] and differentiated this mechanic from the actual inventor. "Inventors" as a class were defined as possessing something which set them apart from workers of ordinary skill.[64] The ordinary mechanic was simply not an inventor, but she was not a member of the public either; rather, she was someone who did not "undertake[] to innovate" and thought "along the line[s] of conventional wisdom in the art."[65] In these early cases tied almost exclusively to real-world contexts, it may have been possible for a judge or jury, with the aid of factual findings about the field of invention, to step into the shoes of this mechanic and understand whether such a mechanic could come up with the invention at issue.

But the PHOSITA is also a hypothetical legal construct. In obviousness cases, the PHOSITA is presumed to know all of the pertinent prior art (or background knowledge), no matter how obscure or difficult to access.[66] The PHOSITA is even charged with knowledge of prior art that was in fact unavailable to the public at the time of the invention.[67] The enablement PHOSITA, the only doctrine other than obviousness in which a reference point is codified into the statute,[68] is sometimes mentioned in the literature as equivalent to the obviousness PHOSITA. Courts appear to treat the two PHOSITAs interchangeably, with one exception.[69] In enablement cases, the hypothetical PHOSITA can also be a composite of multiple real-world persons—combining the insights of multiple disciplines if those insights are needed to "make and use" the invention.[70] Before this empirical study, however, the centrality of the PHOSITA to other doctrines that use the PHOSITA as a reference point remained underexplored in the literature.

There are plausible normative reasons for creating a hypothetical PHOSITA distinct from a more descriptive PHOSITA tied to real-world communities of innovators, but courts do not seem to have clearly articulated them.[71] For example, requiring knowledge of all of the available prior art can incentivize inventors to search the prior art more broadly and engage in more risky research projects. It could also sidestep complicated evidentiary issues

63. Hotchkiss v. Greenwood, 52 U.S. (11 How.) 248, 253 (1850).

64. *See* Standard Oil Co. v. Am. Cyanamid Co., 774 F.2d 448, 454 (Fed. Cir. 1985).

65. *Id.*

66. *In re* Winslow, 365 F.2d 1017, 1020 (C.C.P.A. 1966) ("We think the proper way to apply the 103 obviousness test to a case like this is to first picture the inventor as working in his shop with the prior art references—which he is presumed to know—hanging on the walls around him.").

67. *Id.*

68. 35 U.S.C. § 112.

69. Holbrook, *supra* note 1, at 781–84.

70. *In re* Naquin, 398 F.2d 863, 866 (C.C.P.A. 1968).

71. *Cf.* Alan D. Miller & Ronen Perry, *The Reasonable Person*, 87 N.Y.U. L. Rev. 323, 325–28 (2012) (arguing that the reasonable person in tort law should be defined on the basis of a normative commitment ("normative reasonableness"), not empirical observation about how individuals behave in the real world).

that would arise from a rule that requires weighing the likelihood a PHOSITA would have access to each relevant reference. A hypothetical obviousness PHOSITA could also incorporate insights from models of innovation that capture assumptions about how innovators would respond to market and social incentives in a counterfactual world without patents. Crucially, these normative considerations are likely to differ across doctrines, as we explore in the next Section.

D. THE PHOSITA ACROSS PATENT DOCTRINES

The PHOSITA's migration across doctrines appears to have happened largely wholesale, without tailoring its content to the different and specific normative goals underlying different doctrines. Indeed, the tacit consensus in the academic literature is that the identity and skill level of the PHOSITA remains unchanged across doctrines.[72] The statutory text codifying obviousness and enablement differs only slightly in wording. The obviousness standard specifies "a person having ordinary skill in the art to which the claimed invention pertains,"[73] while section 112 codifying enablement describes "any person skilled in the art" as the relevant reference point.[74] Both texts suggest a shared inquiry based on defining the "person having skill in the art." The enablement language omits the word "ordinary," although the significance of this omission is unclear.

Some commentators have departed from the majority view and have pointed to both case law language and policy reasons to support the existence of at least two different PHOSITAs: the "obviousness" and "enablement" PHOSITAs.[75] Indeed, some isolated cases do appear to distinguish the obviousness from the enablement PHOSITA on the basis of their level of engagement with the innovation process.[76] Under this analysis, the obviousness PHOSITA is a designer or researcher of ordinary skill involved in the innovation process—albeit with limited or "ordinary" creativity. The enablement PHOSITA, on the other hand, simply has the skills and background technical knowledge to read the patent disclosure and use the invention. But not all cases appear to make this distinction, and some often-

72. *See* Holbrook, *supra* note 1, at 781; Darrow, *supra* note 27, at 236.

73. 35 U.S.C. § 103.

74. *Id.* § 112.

75. *See* Burk & Lemley, *supra* note 3, at 1189–90; Tresansky, *supra* note 10, at 42–50.

76. *See, e.g.*, *In re* Grout, 377 F.2d 1019, 1022 (C.C.P.A. 1967) (finding, in an invention concerning hinges for beehives, that the PHOSITA for obviousness purposes was not a "beekeeper" who may use the invention but "one skilled in the art of fasteners"); I. U. Tech. Corp. v. Research-Cottrell, Inc., 641 F.2d 298, 303 (5th Cir. Unit A Apr. 1981) ("With uniformity the cases adhere to the view that it is . . . not the user of the solution who must be the focus of inquiry."); Systematic Tool & Mach. Co. v. Walter Kidde & Co., Inc., 555 F.2d 342, 348 (3d Cir. 1977) (explaining that the PHOSITA is "not the user of the solution").

cited obviousness cases belie a view of the obviousness PHOSITA as a designer or researcher.[77]

The obviousness and enablement PHOSITAs also differ along two additional dimensions: their knowledge base and the time at which their knowledge is tested. While the obviousness PHOSITA is charged with knowing all relevant prior art available at the time of the invention, the enablement PHOSITA need only know those references that were "reasonably available" to her, but at a later time—that of patent filing.[78] Thus, while the knowledge bases of the obviousness and enablement PHOSITAs are largely coterminous, there are two significant areas of non-overlap. The obviousness PHOSITA knows obscure references that would not be "reasonably available" to the enablement PHOSITA, while the latter possesses more technological knowledge by virtue of her access to later-in-time technological advances. The differences between obviousness and enablement along these two dimensions—content of the prior art and time—suggest that the obviousness and enablement PHOSITAs are not of a piece.[79] As a matter of court practice, however, it is ultimately unclear whether courts routinely differentiate the enablement from the obviousness PHOSITA, let alone the "other" PHOSITAs relevant to claim construction and infringement doctrines. We return to this important question in Part III, where we use data from our empirical analysis to propose that the PHOSITA is best divided into three conceptually distinct categories: the obviousness, enablement, and infringement PHOSITAs.[80]

The next Part presents the results of our empirical analysis. Our research seeks to evaluate the importance of the PHOSITA to case outcomes as well as judicial decisions' depth of engagement with the concept of the PHOSITA. We also investigate two questions that are crucial to ground the further theoretical development of the PHOSITA as a fulcrum connecting patent law's technical and normative goals across doctrines. First, whether cases consistently distinguish between two key doctrinal PHOSITAs—the "enablement" and "obviousness" PHOSITA. Second, whether the *KSR*, *Nautilus*, and *Teva* opinions have made a meaningful difference in the depth of judicial engagement with who the PHOSITA is, what she would know, and how she would act.

77. *See, e.g.*, Standard Oil Co. v. Am. Cyanamid Co., 774 F.2d 448, 454 (Fed. Cir. 1985) ("A person of ordinary skill in the art is also presumed to be one who thinks along the line of conventional wisdom in the art and *is not one who undertakes to innovate*, whether by patient, and often expensive, systematic research or by extraordinary insights, it makes no difference which." (emphasis added)).

78. *See* Burk & Lemley, *supra* note 3, at 1189–90; Tresansky, *supra* note 10, at 42–50.

79. *See* Burk & Lemley, *supra* note 3, at 1189–90; Tresansky, *supra* note 10, at 42–50.

80. *See infra* Part III and Table 1.

II. THE PHOSITA IN COURT PRACTICE

To determine how courts engage with the notion of the PHOSITA, we first identify a set of judicial opinions where the PHOSITA is raised. We use the CourtListener API[81] to identify all opinions that mention 'patent' and any of a collection of terms or phrases associated with the person skilled in the art.[82] During our data collection period in early 2021, this provided a set of 7,053 cases. These cases are diverse, arising across American history and raising a variety of legal issues.[83] After sampling cases that were likely to engage with PHOSITA-related issues, we then randomly sampled 690 from these 7,053 cases for closer examination—of this 690, 367 were appellate cases. We trained coders to read and code cases by answering a variety of questions, including questions about each case's procedural posture, which PHOSITA-related questions arose, and how deeply the court engaged with assessing those questions.[84] To check coding reliability, we subject a random subset of two hundred cases to cross coding and calculate the overall intercoder agreement, showing a total agreement percentage of approximately 89.9 percent.[85]

A. CONSTRUCTING THE PHOSITA IN LITIGATION

Despite how central the PHOSITA is to patent law, there is scant empirical data on precisely how and when the PHOSITA is raised in litigation. To remedy this, we initially present a variety of descriptive analyses exploring which patent doctrines engage with the PHOSITA. In subsequent Sections, we then turn to questions of how deeply the court engages with the notion of the PHOSITA and whether that depth varies depending on the nature of the invention at issue.

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81. *CourtListener APIs and Bulk Legal Data*, COURTLISTENER, https://www.courtlistener.com/api [https://perma.cc/9HB9-VP3R].

82. We included any opinions in our dataset that included both the word "patent" as well as any of the following phrases: skill in the art, ordinary skill, PHOSITA, skilled in the art, skilled artisan.

83. CourtListener provides wide ranging coverage of U.S. court documents, including data on over 4.7 million judicial opinions. *Data Coverage—What's in CourtListener?*, COURTLISTENER, https://www.courtlistener.com/coverage [https://perma.cc/SU5D-MPSM]. Nonetheless, all available sources of judicial opinion data are in some ways incomplete. Thus, our analyses below are subject to the standard caveats that arise due to possible sampling bias. Charlotte S. Alexander & Mohammad Javad Feizollahi, *On Dragons, Caves, Teeth, and Claws: Legal Analytics and the Problem of Court Data Access*, *in* COMPUTATIONAL LEGAL STUDIES 95, 98–108 (Ryan Whalen ed., Edward Elgar Publ'g Ltd. 2020).

84. For a full coding scheme, see *infra* Appendix A.

85. This aligns with acceptable thresholds identified in the literature. *See* Matthew Lombard, Jennifer Snyder-Duch & Cheryl Campanella Bracken, *Content Analysis in Mass Communication: Assessment and Reporting of Intercoder Reliability*, 28 HUM. COMMC'N RSCH. 587, 590–91 (2002).

1. The PHOSITA's Doctrinal Context

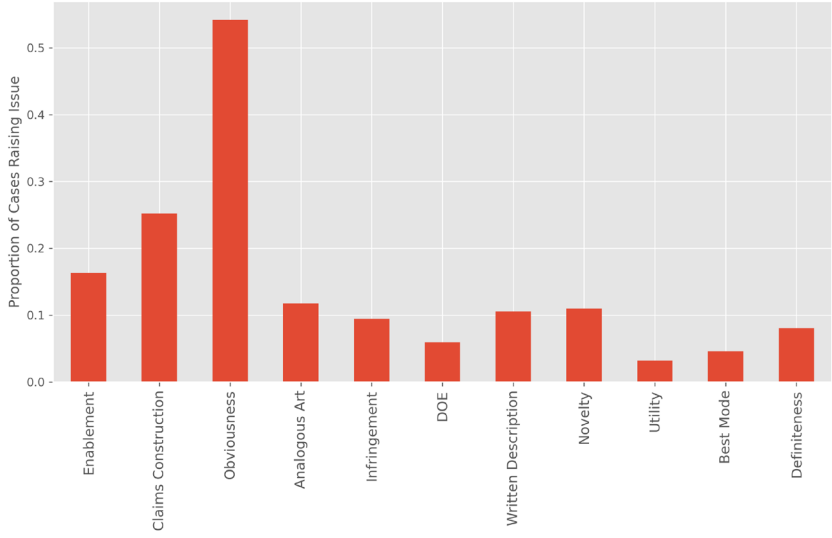
As a threshold question, we first set out to determine how often the PHOSITA is raised in relation to different doctrinal areas. Doing so reveals that the question of an invention's obviousness is by far the most common context for courts to engage with the notion of the PHOSITA (Figure 1). Over half the cases in our sample raised the PHOSITA in relation to obviousness. This dominance of the obviousness question in cases engaging with the PHOSITA is perhaps to be expected. After all, obviousness is often considered the key patentability doctrine,[86] and the PHOSITA is directly referenced in its statutory framework.[87] Furthermore, patent infringement litigation frequently entails defenses of invalidity, which often turn on whether or not the patented invention was obvious.

Other doctrinal areas involving the PHOSITA arise less frequently, ranging from the 3.3 percent of the cases that invoke the PHOSITA in relation to utility to the twenty-five percent of cases doing so in relation to claim construction. That claim construction arises comparatively frequently is perhaps, at least in part, a function of its relevance across a variety of related legal questions. Claim construction can be required when assessing a wide variety of legal questions related to a patent, including questions of patentability and infringement.

86. *See* Pedraza-Fariña & Whalen, *supra* note 16, at 65; Abramowicz & Duffy, *supra* note 52, at 1593.

87. 35 U.S.C. § 103.

Figure 1



Showing the proportion of sampled cases raising the PHOSITA in relation to specific doctrinal areas.[88]

2. The PHOSITA on Appeal

We next turn to exploring how the notion of the PHOSITA manifests on appeal. We do so by exploring both the appellate opinions in our dataset, and by identifying and reading the party briefs in these cases.[89] This allows us to examine both the frequency with which parties actively appeal PHOSITA-related holdings, and subsequently how courts adopt or reverse them. Examining the treatment of PHOSITA-related issues at the appeals court level reveals that, despite its central importance to a variety of patent law issues, the PHOSITA is not a source of significant disagreement. There are few dissents relating to the PHOSITA (only about ten percent of appellate cases); it is rarely an issue that is directly appealed; and, when it does arise on appeal, courts tend to be quite deferential.[90]

88. This figure shows the occurrence of doctrines across the entire 690 coded case sample and thus includes both appellate and district court cases. Results are highly similar if we subset to only district court cases.

89. We used Westlaw's search feature to identify briefs in 101 of the appellate cases in our sample. These were then read and coded to determine whether they mention the PHOSITA standard, and whether they make arguments related to the PHOSITA.

90. This is at least partly related to the standard of review associated with PHOSITA-related legal issues. *See supra* Section I.B. But even taking into account the deferential standard of review to issues of fact, rates of appeal fall well below appellate rates for other issues of fact such as written description and enhanced damages. *See infra* note 95.

We identified sixty-five dissents that reference the PHOSITA in our sample. Of those sixty-five, only twelve engaged with either the PHOSITA's factual or legal context. Although limited in number, many of these dissents articulated concerns with how the majority sidelined the PHOSITA, concerns that are reflected in our empirical outcomes. Taken together, the dissents represent two types of concerns. First, concerns that the majority is only paying lip service to the centrality of the PHOSITA to litigation while ultimately sidelining it in decision-making. For example, in *K-2 Corp. v. Salomon S.A.*, Judge Rader pointedly remarks: "As this court verbally recognizes but substantively ignores, the understanding of one of ordinary skill in the art sets the proper context for the meaning of claim terms."[91] This is the judicial dissent version of our "shallow" depth of engagement coding, which we discuss below. Second, some dissents engage with the PHOSITA's legal standard, arguing that the majority often substitutes either the "inventors' exceptional intellect"[92] or its own common sense for the PHOSITA's knowledge.[93]

Although briefs by parties to appellate cases frequently invoke the PHOSITA (eighty-five percent of the time), they generally do so to reference a rule, such as the obviousness standard, that mentions the PHOSITA. Of the 101 appellate cases we coded briefs for, only twelve briefs in eleven cases actually make arguments relating to the substance of the lower court's treatment of the PHOSITA. Of those twelve, the majority argue that the lower court erred either in its factual findings (six briefs) or its legal conclusions (four briefs) relating to the PHOSITA.

When the appeals court does make rulings pertaining to the PHOSITA, they tend to defer to the court of first instance (Figure 2). We separate appellate court decisions to adopt or reverse lower courts into those that pertain to PHOSITA-related factual findings, legal findings, and holdings as to how the PHOSITA would behave. Of the appeals cases that make PHOSITA-related holdings, we see that seventy-four percent of those cases explicitly adopt the lower court's PHOSITA-related factual holdings and sixty-nine percent adopt the lower court's legal holdings. Appellate cases only infrequently make reversals pertaining to the PHOSITA. In only 4.5 percent

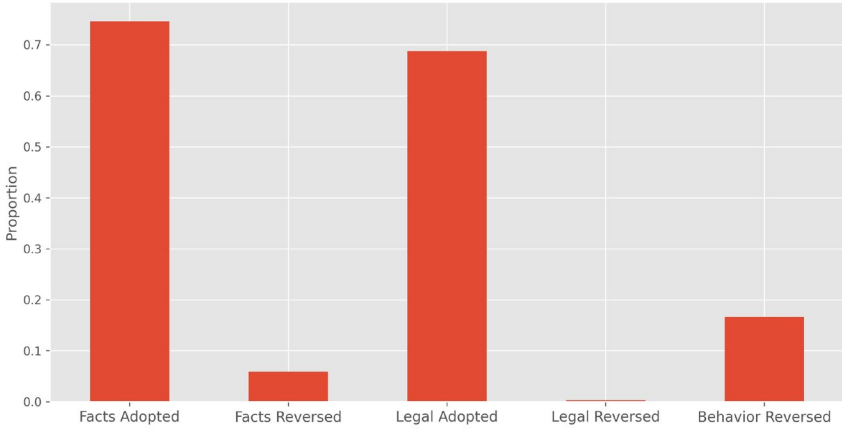
91. K-2 Corp. v. Salomon S.A., 191 F.3d 1356, 1370 (Fed. Cir. 1999) (Rader, J., dissenting).

92. Novo Nordisk Inc. v. Caraco Pharm. Lab'ys Ltd., 719 F.3d 1346, 1361 (Fed. Cir. 2013) (Newman, J., concurring in part, dissenting in part).

93. *See, e.g.*, Westinghouse Elec. Corp. v. Titanium Metals Corp. of Am., 454 F.2d 515, 520 (9th Cir. 1971) (Choy, J., dissenting) ("But we are given nothing about the level of ordinary skill in the art, about the metallurgist or technician of ordinary skill and how obvious or unobvious the invention was to him when it was made. Obviously, the expert cannot be equated with the 'person having ordinary skill in the art' . . . ."); *In re* Bigio, 381 F.3d 1320, 1327 (Fed. Cir. 2004) (Newman, J., dissenting) ("Neither the PTO nor my colleagues on this panel points to any ground on which a person seeking to design an improved hairbrush would deem the toothbrush art to be a source of usable technology, and thus 'analogous,' whereby that source is relevant to a determination of obviousness.").

of these cases did the court reverse on factual findings, and in less than one percent did they hold that the lower court's legal definition of *who* a PHOSITA is was incorrect. It was somewhat more likely (sixteen percent of cases) to observe appellate opinions that reversed the lower court's holdings related to what the PHOSITA's behavior was.[94] These reversal rates stand out for being significantly lower than Federal Circuit reversal rates for both issues of fact and law in any other doctrine.[95]

Figure 2



Showing the proportion of the 363 appellate cases in our sample adopting/reversing the lower court's factual and legal PHOSITA-related findings.

3. The PHOSITA in Multiple Doctrines

The person skilled in the art is a central figure in many areas of patent law.[96] Whether determining patentability, disclosure, or simply trying to define the scope of a patent claim's language, courts and patent examiners are asked to view the world and the invention in question through the perspective of the PHOSITA. However, the extent to which these PHOSITA-related questions arise together, and subsequently whether courts are using unique definitions of the PHOSITA for each, is unclear.

To provide some empirical insight into how these multiple PHOSITA-related doctrines manifest in practice, we next turn to examining how often courts engage with the PHOSITA in relation to multiple doctrines in any

94. For example, a holding about whether a PHOSITA would be likely to combine two references relates to the hypothetical PHOSITA's behavior.

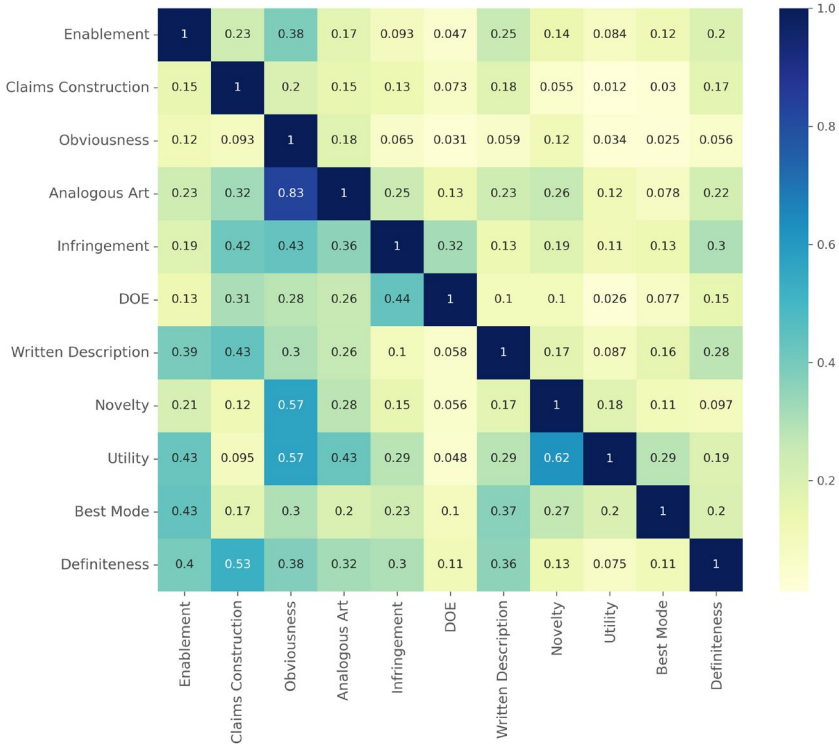
95. *See* Ted Sichelman, *Myths of (Un)Certainty at the Federal Circuit*, 43 LOY. L.A. L. REV. 1161, 1174–76 (2010) (calculating reversal rates by issue at the Federal Circuit for the 2000–2007 period and finding the average reversal rate across all issues other than claim construction to be eighteen percent and the lowest reversal rate (for enhanced damages, an issue of fact) to be just below ten percent).

96. *See supra* Part I.

single opinion, and when they do so how likely they are to tailor the definition of who the PHOSITA is based on which doctrine is in question. Of the 690 opinions we manually coded, just over thirty-five percent discussed the PHOSITA in relation to more than one legal doctrine. Figure 3 shows the probability of observing various doctrine pairs occurring together in the same opinion. This provides insight into how frequently the various legal doctrines implicating the PHOSITA are raised in the same opinions. We can see that, for the most part, the most common pairs of PHOSITA doctrines raised together involve the question of obviousness and its related questions. For instance, eighty-three percent of cases engaging with the PHOSITA in relation to determining what is analogous art also engage with the PHOSITA in relation to determining obviousness.[97] We also see that the other two core patentability doctrines of utility and novelty frequently occur together with both one another and other PHOSITA-related issues.

97. This is because the question of what is an analogous art is generally raised in the context of obviousness. *See* Jeffrey T. Burgess, *The Analogous Art Test*, 7 BUFF. INTELL. PROP. L.J. 63, 65 (2009) ("Regardless of the terminology used, if a non-analogous reference is considered to be outside the prior art, or if it is considered to be within the prior art but not relevant to determining obviousness, the result is the same: the reference goes away.").

Figure 3



Showing the pairwise cooccurrence rates for different PHOSITA related doctrines. Directionality is row-to-column. So, the second cell of the first row shows the proportion of all cases raising the PHOSITA in relation to enablement that also did so in relation to claims construction—twenty-three percent.

4. The Monolithic PHOSITA Across Doctrines

Some PHOSITA-related questions are more similar to one another than others, and thus more amenable to using a shared definition of who the PHOSITA is in their analysis. For instance, the questions of "claims construction" and "definiteness" are closely related, and it makes sense for courts to often use the same hypothetical PHOSITA's perspective to analyze each. After all, to understand whether the boundaries of a claim are reasonably certain to one skilled in the art, we first need to construe its claims and determine what that person would understand the claims to mean.[98]

Other legal questions that rely on the PHOSITA are less similar to one another, and thus may—in theory at least—be more likely to lead courts to

98. *See generally* Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1744 (2009) (discussing the role and importance of claim construction in patent cases).

tailor specific understandings of who the PHOSITA is in relation to each question. For instance, the questions of enablement and obviousness both raise the PHOSITA, but the statutory language defining this person differs, and the theoretical motivation for each test is also distinct. The section 103 obviousness requirement is formatted in relation to the "person having ordinary skill in the art to which the claimed invention pertains."[99] This helps establish the patentability standard, ensuring that only those inventions that have taken a sufficiently large inventive step are granted patent protection.[100] Contrast this to the section 112 enablement requirement, which requires a patent's specification enable its practice by "any person skilled in the art to which it pertains, or with which it is most nearly connected."[101] As we discussed in Section II.D., because the normative goals underlying obviousness and enablement differ, there are plausible arguments that the enablement and the obviousness PHOSITA should represent distinct communities of practice, with the obviousness PHOSITA standing in for a researcher and the enablement PHOSITA for the user of the invention. Despite these different normative goals and the distinct language introducing the PHOSITA in relation to enablement, when courts deal with both doctrines in the same opinion, we find that—at least within our sample of cases—they do not make an explicit differentiation between the two standards. Rather than tailoring the PHOSITA for specific doctrinal applications, courts appear to be using a universal, monolithic notion of who the PHOSITA is.

5. Depth of Engagement

Because litigation outcomes theoretically turn on who the PHOSITA is and what they would know or do in a given situation, the degree to which courts engage deeply with the PHOSITA and provide thorough reasoning to support their findings is a central question about the role the PHOSITA plays in litigation. To explore this, we code cases according to how deeply the opinion engages with the notion of the PHOSITA. This engagement spans a spectrum, from very shallow engagement with only cursory discussion of the PHOSITA to very deep engagement with a thorough discussion of who the PHOSITA is, what they would know, and what sorts of behavior they would have.

Our depth of treatment coding assigns one of three levels to each coded case. Each opinion is classified as engaging with the PHOSITA in either a shallow, moderate, or deep fashion. We define the shallowest level of engagement as that occurring when "[t]he court makes holdings regarding

99. 35 U.S.C. § 103.

100. *See* Abramowicz & Duffy, *supra* note 52, at 1613–14; Pedraza-Fariña & Whalen, *supra* note 16, at 89–97. *See also generally* Michael J. Meurer & Katherine J. Strandburg, *Patent Carrots and Sticks: A Model of Nonobviousness*, 12 LEWIS & CLARK L. REV. 547 (2008) (developing a model of nonobviousness that conceptualizes patents as incentivizing inventors to choose more technically difficult projects).

101. 35 U.S.C. § 112(a).

the PHOSITA . . . but offers little-to-no reasoning or evidentiary support for those findings."[102] Moderate engagement includes instances when "[t]he court makes holdings regarding the PHOSITA, and offers some limited reasoning and/or evidentiary support to justify why it held the way it did."[103] Finally, deep engagement occurs when "[t]he court makes holdings regarding the PHOSITA, and supports those holdings thoroughly with evidence and reasoning that considers what the PHOSITA would know and/or what they would do."[104]

What we refer to as the shallowest level of engagement provides little-to-no reasoning or evidence to support PHOSITA-related holdings. For example, the following would be an example of shallow engagement with PHOSITA questions:

> The foregoing, and other equally detailed and comprehensive statements in the specification clearly describe, first in general terms and then by specific example, the preparation of Interferon; and we are more than satisfied that a person skilled in this art would thereby be enabled to use the claimed process to prepare the claimed substance.[105]

We can see here that the court makes an enablement-related holding about what the PHOSITA would be able to do without providing any substantial reasoning or evidence. Without defining who the PHOSITA is or how they would approach the invention in question, the court here simply states that the patent clearly discloses the invention and that a PHOSITA would find that disclosure enabling.

Moderate engagement provides some limited reasoning and evidence to support PHOSITA-related holdings. For example, consider the following reasoning where the PHOSITA's identity and training are not clearly defined, but still some evidence—in this case a dictionary definition—is used to justify the relevant holding as to how they would understand a technical term: "One of ordinary skill in the art would understand a record to be 'an item in a database.' *The Illustrated Computer Dictionary*, 245 (3d ed. 1986). I adopt this construction of the term."[106] This shows somewhat more engagement with the evidence and reasoning that underlies a PHOSITA-related holding.

Finally, deeper engagement with the PHOSITA requires a court to provide more thorough reasoning and evidence to support its holdings. Consider the below example, where the court both provides a discussion of and definition of who the PHOSITA is and what their relevant educational

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102. *See infra* Appendix A.

103. *See infra* Appendix A.

104. *See infra* Appendix A.

105. *In re* Isaacs, 347 F.2d 887, 891 (C.C.P.A. 1965).

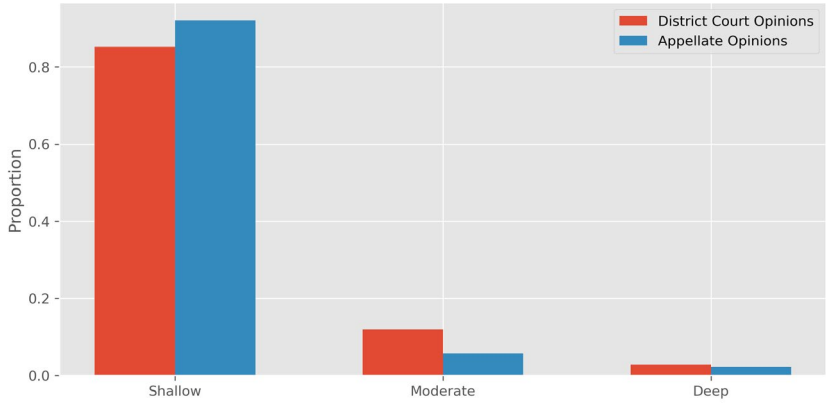
106. Broad. Innovation, LLC v. Echostar Commc'ns Corp., 240 F. Supp. 2d 1127, 1141 (D. Colo. 2003) (quoting *Record*, THE ILLUSTRATED COMPUTER DICTIONARY 245 (3d ed. 1986)).

credentials are, as well as expert testimony on what the PHOSITA would know:

> The obviousness analysis here asks whether a person of ordinary skill in the art at the time of the invention—an electrical engineer with at least a bachelor's degree and several years of CDR experience—would have had a reason to modify Pickering to include a "data path."
>
> . . . Indeed, expert testimony indicated that the proposed combination of Pickering with a data path would not have resulted in the invention of the '150 patent's claim 8 and would not have worked for its intended purpose.[107]

We perform the depth of engagement analysis on a subset of our random sample of cases that both mention "patent" and some variation on "skilled artisan." Coding a random set of 500 of these cases for their depth of engagement with PHOSITA issues reveals that 318 made at least one PHOSITA-related holding. Of this subset, we see (Figure 4) that when courts make PHOSITA-related holdings, they tend to provide little-to-no reasoning or evidentiary support. District court opinions are somewhat more likely to provide moderate depth of engagement with the PHOSITA (twelve percent of opinions as opposed to just six percent of appellate opinions) whereas neither appellate nor district court opinions demonstrate deep engagement with the PHOSITA in more than three percent of cases.

Figure 4



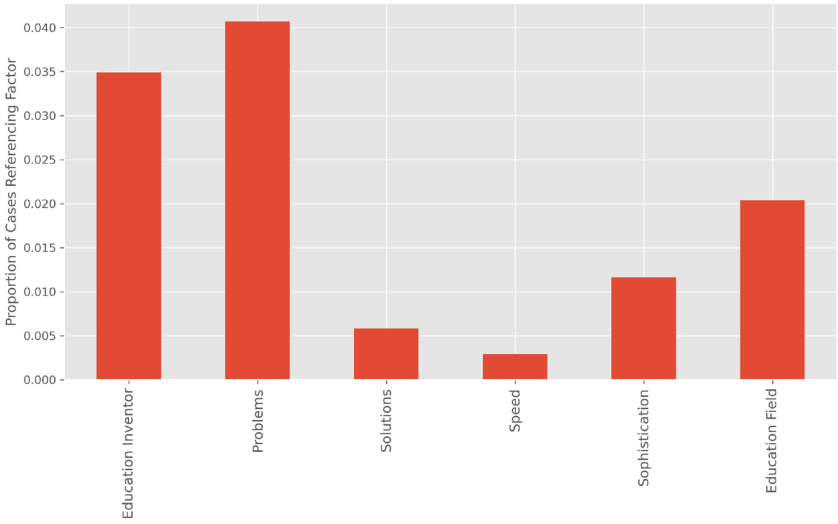
Courts tend to provide little reasoning or evidence to support their PHOSITA-related holdings in most cases.

These findings suggest that courts tend to engage with the notion of the PHOSITA in a shallow fashion, providing little in the way of evidence or

107. Broadcom Corp. v. Emulex Corp., 732 F.3d 1325, 1334–35 (Fed. Cir. 2013).

reasoning to support their conclusions. Another way to explore how deeply courts are engaging in their PHOSITA-related analyses is to look to the frequency with which they refer to the variety of objective factors that have been used to inform PHOSITA inquiries. These factors include looking to: "(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field."[108] As courts engage more deeply with their PHOSITA analyses, one would expect references to these factors to increase.

Figure 5



The fraction of cases making PHOSITA-related holdings that reference factors used to inform the PHOSITA analysis.

Examining the same cases coded for the depth of treatment above, we identify how often cases within that sample which made holdings regarding the PHOSITA reference these various factors. We see (Figure 5) that courts raise these factors relatively rarely. The most common factor, which explores the type of problems encountered in the art, is only referenced in just over four percent of the cases that make PHOSITA-related holdings. This provides further evidence that courts give scant explication to their PHOSITA inquiries.

B. THE REVOLUTION THAT WASN'T: THE SUPREME COURT'S MARGINAL IMPACT ON THE CENTRALITY OF THE PHOSITA IN LITIGATION

The above has explored both which contexts the PHOSITA arises in, as well as how deeply courts engage with the notion of the PHOSITA when

108. Env't Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 696 (Fed. Cir. 1983).

drafting their opinions. We turn next to examine change over time and how Supreme Court decisions have influenced how lower courts engage with the PHOSITA. The *KSR* case[109] offers a possible inflection point that we can use to examine whether courts have changed their treatment of the PHOSITA in recent years. Evidence suggests that *KSR* led to meaningful changes in the way the Federal Circuit and lower courts determine obviousness.[110] However, it remains unclear whether these changes were accompanied by differences in the way courts engaged with the PHOSITA analysis. On the one hand, we might expect that the Supreme Court's updating of the obviousness test could lead to greater engagement with the notion of the PHOSITA. After all, by insisting that the obviousness test account not only for objective evidence of obviousness, but also for the PHOSITA's common sense, the Court encourages decision-makers to explore just what the PHOSITA would know or do, and how far their common sense extends. On the other hand, "common sense" is a vague standard, providing decision-makers with little in the way of structured analytic techniques, which could lead the post-*KSR* world to see even less explicit engagement with the PHOSITA.

To determine which of these scenarios actually played out following *KSR*, we examine courts' depth of engagement with the PHOSITA immediately before and after the 2007 opinion date. We identify opinions available via the CourtListner API that were published in the five years before and after *KSR*'s decision date (April 30, 2007) that mention both 'patent' and the PHOSITA phrases. We then assess these cases to determine their depth of engagement with the PHOSITA. As we do not have the resources to hand code all cases, we use a text-based approach that counts the number of times the court's opinion refers to the PHOSITA. We take this as a proxy of the opinion's depth of engagement with the PHOSITA and assume that mentions of the PHOSITA correlate with discussion about who that person is and what they would know or do. Indeed, comparing the text-based measure to those in our hand-coded depth of treatment results, reveals that the two measures are significantly correlated with one another.[111]

Comparing the distributions of the text references to the PHOSITA before and after the *KSR* decision, reveals a moderate change, at least in the frequency with which courts refer to the PHOSITA. Prior to *KSR*, courts used an average of 1.45 PHOSITA related phrases per one thousand words of an opinion. After *KSR* that number grows to 1.68, an increase of approximately

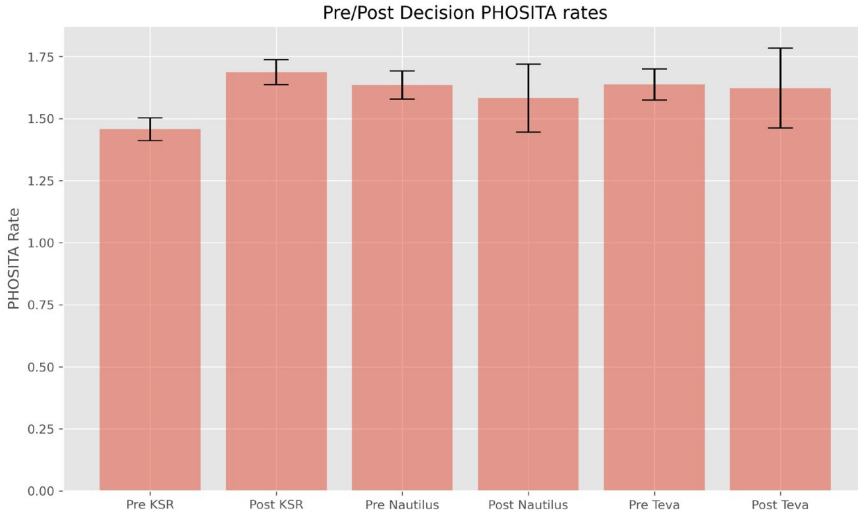
109. *See* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 401–03 (2007).

110. *See* Mark D. Janis, *Tuning the Obviousness Inquiry after* KSR, 7 WASH. J.L. TECH. & ARTS 335, 342–52 (2012); Rantanen, *supra* note 61, at 732–51; Rachel Teitelbaum & Mark Cohen, *Obviousness, Hindsight and Perspective: The Impact of* KSR v. Teleflex *on Biotech and Pharmaceutical Patents*, 25 NATURE BIOTECHNOLOGY 1105, 1105–06 (2007). *But see* Simic, *supra* note 61, at 255–56; Holte & Sichelman, *supra* note 49, at 160–67.

111. The Spearman rank correlation coefficient between the hand-coded depth of treatment measure and the number of mentions of PHOSITA related phrases is 0.57 ($p < 0.001$).

sixteen percent.[112] This modest change in the depth with which courts engaged with the PHOSITA following the *KSR* opinion suggest that this inflection point was more evolutionary than revolutionary in nature.

Figure 6



Mean PHOSITA-related mentions per one thousand words in opinions published five years pre/post KSR/Nautilus/Teva. *Error bars show the standard error of the mean.*

To determine whether subsequent Supreme Court opinions increased, as predicted, the importance of the PHOSITA in definiteness and claim construction, we perform a similar analysis for the opinions drafted five years before and after the publication of the *Nautilus v. Biosig* and *Teva Pharmaceuticals v. Sandoz* cases.[113] *Nautilus* clarified the appropriate standard for claim indefiniteness by detailing how the PHOSITA's perspective is central to the inquiry, while *Teva* engaged with the PHOSITA's role in patent claim construction. We can see from Figure 6 that, these cases led to no significant change in the depth with which subsequent opinions engaged in their PHOSITA analyses.[114] Although *KSR* led to a modest increase in the amount of PHOSITA-related discussion, it was not the major shift that some might have expected, and the increase was not compounded by the later *Nautilus* or *Teva* decisions.

112. This difference is statistically significant ($T = -3.34$, $p < 0.001$).

113. Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 900 (2014); Teva Pharms. USA, Inc. v. Sandoz, Inc., 574 U.S. 318, 331–32, 348–49 (2015).

114. The pre/post *Nautilus* T-statistic is 0.35 ($p = 0.72$), pre/post *Teva* $T = 0.08$ ($p = 0.93$).

C. THE PROBLEM OF TEAMWORK: WHO IS THE PHOSITA WHEN MULTIPLE COMMUNITIES COLLABORATE?

For our final empirical perspective on how courts engage with the notional PHOSITA, we examine whether the nature of the invention in question affects the court's depth of engagement with the PHOSITA. We do so by comparing the depth of engagement with the PHOSITA to the degree to which a patent brings together closely or distantly related technical areas.

Conceiving of the technical areas that inventions are related to as embedded in a network—with some areas closely related to one another and others sharing more distant relationships—offers a perspective on the person skilled in the art that allows us to determine whether courts take special consideration of potential "boundary spanning" PHOSITAs and what they might mean for the associated doctrinal tests. We use this network perspective to help us compare the treatment of the PHOSITA in cases related to inventions that pertain largely to a single technical "area" as compared to those that bring together disparate technical fields.[115]

If litigants and courts are cognizant of the issues raised by inventions that are grounded in disparate technical communities, we would expect to see this reflected in the associated opinions. After all, when a patent relates to distinct and distant technical fields, identifying who the relevant PHOSITA is and what they would know are less straightforward.

To determine whether courts actually engage with the notion of the PHOSITA in more depth when the associated invention draws on distinct technical fields, we draw on earlier work that defines and computes a "network non-obviousness" score for patents.[116] This method leverages the patent classification provided by the patent office, to infer how proximate or disparate the combined technical areas are, based on their prior probability of being combined on a patent. We associate these network non-obviousness scores with our dataset by extracting patent numbers from the cases in our sample. To minimize our chances of identifying the wrong patent number (i.e. one that is not directly litigated), we only retain patent numbers from cases that mention a single patent in the opening paragraphs. Doing so, reveals 580 opinions for which we have an associated network non-obviousness score.

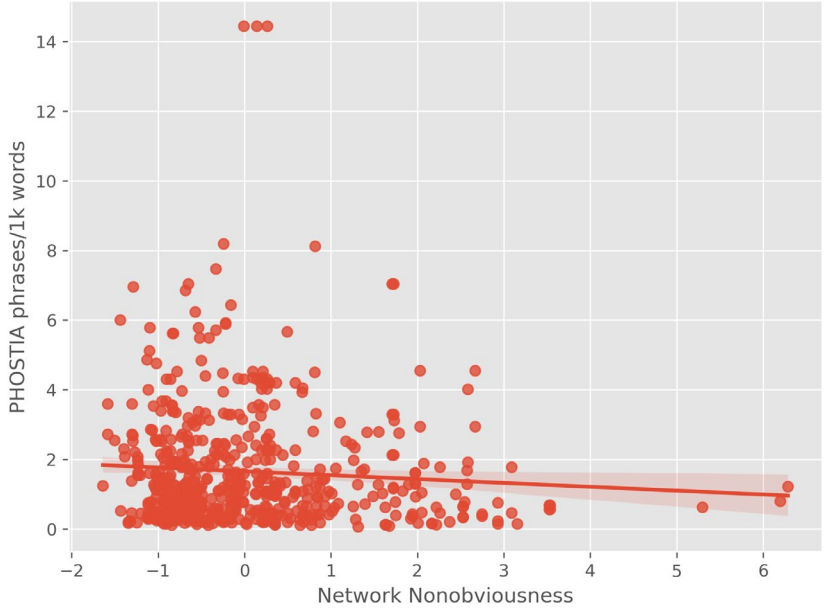
Examining the relationship between the inter-category distance of the technical classifications combined on a patent and the depth of the associated opinion's engagement with PHOSITA-related issues reveals no significant

115. For more details on using a network perspective on technical fields to compare inventions, see generally Pedraza-Fariña & Whalen, *supra* note 16; *see also* Laura G. Pedraza-Fariña, *Patent Law and the Sociology of Innovation*, 2013 WIS. L. REV. 813, 861 (arguing that the PHOSITA should be reconceptualized as a "team having ordinary skill in the art" "[w]here interdisciplinary team approaches to problem solving are the norm").

116. Pedraza-Fariña & Whalen, *supra* note 16, at 115–21.

relationship (Figure 7).[117] This suggests that varying the degree to which a litigated patent brings together divergent technical areas is associated with no difference in the court's tendency to engage in longer discussions about who the appropriate PHOSITA should be or what they would know or do. That is to say, courts spend no more words in discussing who the PHOSITA is, or what the PHOSITA would do, when a patent brings together highly proximate technical areas, as compared to when it brings together technical areas that are distant and rarely combined and that reflect a higher level of technological complexity. This finding underscores the minimal role that the PHOSITA plays in patent litigation. Were the PHOSITA a leading character in patent litigation, as the Supreme Court has long emphasized it *should* be, it would stand to reason that more complex inventions, involving potential teams of scientists from distant disciplines, would deserve a more in-depth analysis aimed at understanding the precise set of skills embodied by the hypothetical PHOSITA. But this type of analysis is far from what courts are actually doing, suggesting that the PHOSITA is perhaps less important in practice than it is in theory.

Figure 7



Showing the lack of relationship between a patent's network non-obviousness, and the associated opinion's depth of engagement with PHOSITA-related issues. High network-non-obviousness scores reflect frequently observed combinations of patent classes (i.e. a combination of proximate fields) and vice versa.

117. Pearson's r=-0.07, p = 0.07.

III. RECONCILING PHOSITA'S POSITIVE AND NORMATIVE DIMENSIONS

The PHOSITA in patent law has much in common with its not-too-distant cousin, the "reasonable person" in tort law. Both areas of law rely on these constructs as reference points to center legal determinations of reasonableness (in tort law) or inventiveness (in patent law). Both the PHOSITA and the reasonable person also share a certain slipperiness and imprecision that has long bedeviled commentators and decision-makers alike—engendering labels such as "the common law's most enduring fiction,"[118] "typically vague or quasi-circular,"[119] or "a ghost."[120] In short, both the PHOSITA and the reasonable person are as ubiquitous and foundational to law as they are vague and malleable.

A long line of tort law scholarship and legal opinions engages with this vagueness, seeking to both understand its origins and to provide theoretical justifications for warring conceptions of the reasonable person.[121] In contrast, there is no comparable depth of engagement in either judicial opinions or legal scholarship in patent law.[122] As our empirical data shows, patent law's "one-size-fits-all" PHOSITA, consisting largely of a litany of educational attainments, sits largely disconnected from the PHOSITA's varied underlying normative purposes. In this Part, we argue that this disconnect can explain why, despite repeated Supreme Court interventions that emphasize the PHOSITA's vantage point in obviousness,[123] definiteness,[124] and claim construction,[125] subsequent lower court and Federal Circuit decisions have continued to engage only shallowly with the PHOSITA.[126] We build upon tort law scholarship and patent theory to sketch a way forward that ties the empirical PHOSITA to patent law's normative goals.

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118. Mayo Moran, *The Reasonable Person: A Conceptual Biography in Comparative Perspective*, 14 LEWIS & CLARK L. REV. 1233, 1234 (2010).

119. Andrew Ingram, Note, *Parsing the Reasonable Person: The Case of Self-Defense*, 39 AM. J. CRIM. L. 425, 427 (2012).

120. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1566 (Fed. Cir. 1987) ("With the involved facts determined, the decisionmaker confronts a ghost, i.e., 'a person having ordinary skill in the art' . . . .").

121. *See generally* Miller & Perry, *supra* note 71 (examining whether the reasonable person standard should be normative or positive); Jeffrey J. Rachlinski, *Misunderstanding Ability, Misallocating Responsibility*, 68 BROOK. L. REV. 1055 (2003) (examining assigning fault in tort cases); Ingram, *supra* note 119 (examining the reasonable person standard in self-defense cases); Christopher Jackson, *Reasonable Persons, Reasonable Circumstances*, 50 SAN DIEGO L. REV. 651 (2013) (examining how circumstances should factor into the reasonable person analysis).

122. *See* Meara, *supra* note 9, at 268.

123. *See supra* Section II.B.

124. *See supra* Section II.B.

125. *See supra* Section II.B.

126. *See* Holbrook, *supra* note 1, at 784.

A. THE UNDERTHEORIZED PHOSITA IN PATENT LAW

Discussions in tort law provide a promising starting point for translating the PHOSITA's centrality to patent law on paper to real-world relevance. An important strand of tort scholarship focuses on analyzing whether the "reasonable person" should be a positive (empirical) or normative concept. Distinctions between the positive and normative dimensions of the "reasonable person"—commentators argue—can help explain much of the vagueness that plagues judicial decisions in tort law.[127]

In the paradigmatic case of the "reasonable person" as a normative construct, *Carroll Towing Co.*,[128] Judge Learned Hand famously developed the "Hand Formula"—tying the reasonable person's behavior to normative expectations of efficiency.[129] Many other normative baselines are possible, focusing, for example, on distributive justice, equality, or retribution.[130] These normative constructs are not devoid of empirical content; rather, the normative goals underlying tort law *dictate* which on-the-ground facts are relevant to the analysis. For example, the Hand Formula (B=PL) ties liability to empirical measurements of investment in precaution (B) to prevent the accident, and the probability (P) and magnitude (L) of harm resulting from the accident.[131] Other normative baselines would focus on a different set of relevant facts.[132] In contrast, the court in *Osborne v. Montgomery* ties the reasonable person's judgment to that of "the great mass of mankind in determining what is proper conduct of an individual under all the circumstances"—a positive view.[133] Positive versions of the "reasonable person" often emphasize "ordinariness"—a term meant to connote that the positive description of the reasonable person is not some unattainable normative ideal, but rather a reflection of the type of behavior we would expect even from the lowest common denominator in society.[134] A third definition,

127. *See* Meara, *supra* note 9, at 267.

128. United States v. Carroll Towing Co., 159 F.2d 169, 173 (2d Cir. 1947).

129. *Id.* There are many other possible measures of normativity. For example, Jeffrey J. Rachlinski advances a definition of the reasonable person that incorporates both deterrence and corrective justice concerns as "a person exercising those qualities of attention, knowledge, intelligence and judgment which society requires of its members for the protection of their own interests and the interests of others." Rachlinski, *supra* note 121, at 1061; *see also* Ingram, *supra* note 119, at 442 (discussing the roles judges may be better suited to play in determining what actions are reasonable in criminal cases).

130. *See* Miller & Perry, *supra* note 71, at 328.

131. Peter Z. Grossman, Reed W. Cearley & Daniel H. Cole, *Uncertainty, Insurance and the Learned Hand Formula*, 5 L. PROBABILITY & RISK 1, 2–7 (2006).

132. *Carroll Towing Co.*, 159 F.2d at 173.

133. Osborne v. Montgomery, 234 N.W. 372, 375–76 (Wis. 1931).

134. Moran, *supra* note 118, at 1238 ("[T]he reasonable man bears a rather closer resemblance to us ordinary mortals, thus we cannot presume that he possesses 'the courage of Achilles, the wisdom of Ulysses or the strength of Hercules.'" (quoting R.E. MEGARRY, MISCELLANY-AT-LAW: A DIVERSION FOR LAWYERS AND OTHERS 260 (8th Impression 1986))). Some jurisdictions appear

sometimes termed the "community ideals" view of reasonableness, straddles the line between positivity and normativity, linking society's normative expectations to positive on-the-ground behavior prevalent in the community.[135]

Our empirical analysis of the PHOSITA makes clear that, in legal opinions, the PHOSITA has both positive and normative elements. The multi-factor test announced in *Environmental Designs v. Union Oil*, ties the PHOSITA's identity to empirical, on-the-ground characteristics of innovator communities and their fields—examining, for example, the education level of active workers in the field and the sophistication of the available technology.[136] At the same time, *who* the PHOSITA is reflects a normative choice that is distinct from how innovators behave empirically. Despite this set of empirical factors that seem to ground the PHOSITA to empirical realities, the Federal Circuit has made clear that it considers the PHOSITA a hypothetical person.[137] For example, as a matter of law the PHOSITA should be distinguished from the inventor, who is assumed to have superior talent and imagination.[138] This distinction makes it hard to empirically "find" the PHOSITA since in many fields, including crucial fields such as biotechnology, most workers hold PhD's and are hypothetically capable of inventing. Put differently, there are no on-the-ground metrics to empirically distinguish an "ordinary artisan" from an "extraordinary inventor."

The PHOSITA's normative dimension goes beyond the ordinary artisan/inventor distinction. In obviousness jurisprudence, the PHOSITA is thought to have perfect, universal access to every single piece of prior art in her own field—no matter how obscure, and with no concern for real-world language barriers.[139] This is clearly not how researchers process information in the real world: Some types of knowledge are more readily accessible than

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to mark their preference for this version of the reasonable person by using the locution "person of ordinary prudence" or "ordinary and prudent man." *See* Pittsburgh, C., C. & St. L. Ry. Co. v. Arnott, 126 N.E. 13, 16 (Ind. 1920); Mata v. State, 627 S.W.2d 838, 840 (Tex. App. 1982).

135. *See* Allen v. Shiroma, 514 P.2d 545, 571 (Or. 1973) ("[R]epresent[ing] the general level of moral judgment of the community, what it feels ought ordinarily be done, and not necessarily what is ordinarily done, although in practice the two would very often come to the same thing." (quoting 2 FOWLER HARPER & FLEMING JAMES, JR., THE LAW OF TORTS 903 (2d ed. 1956))).

136. Env't Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 696 (Fed. Cir. 1983).

137. *See generally* Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561 (Fed. Cir. 1987) (discussing designation of the PHOSITA as a hypothetical person).

138. Standard Oil Co. v. Am. Cyanamid Co., 774 F.2d 448, 454 (Fed. Cir. 1985) ("It is only that hypothetical person [PHOSITA] who is presumed to be aware of all the pertinent prior art. The actual inventor's skill is irrelevant to the inquiry . . . . Inventors, as a class, . . . possess something—call it what you will—which sets them apart from the workers of *ordinary* skill."). The personage of the inventor is also quite puzzling: At times, courts appear to define the inventor as the particular, embodied patentee/inventor before them in the case at issue. But other times, courts conceptualize the inventor as simply another hypothetical construct with superordinary abilities. Whether that "something," as the court in *Standard Oil* calls it, that differentiates the inventor from the PHOSITA is empirically quantifiable, remains unclear. *See id.* At any rate, cases have never attempted to define empirical factors that distinguish an inventor from a PHOSITA.

139. *See* Pedraza-Fariña, *supra* note 115, at 817 n.10.

others, and an obviousness doctrine that is fully based on empirical realities would take this fact into account.[140] The PHOSITA is also assumed aware of information described in patents or patent applications as to the date of filing—even though applications are only made public eighteen months after their filing date.[141] Why the hypothetical PHOSITA *should* be a perfectly informed PHOSITA, however, is unclear from judicial decisions.[142] On the contrary, as we explore further below, there are persuasive normative reasons why a normative PHOSITA for obviousness purposes should not be a perfectly informed one.

In addition, the Court in *KSR* emphasized that the obviousness inquiry should not center on the *actual* problem the inventor was trying to solve.[143] Rather, *KSR* directed courts to focus on whether the invention solved *any* known problem in the field and to ask whether, in light of that problem, a PHOSITA would find it obvious to combine prior art knowledge. This ex-post reconstruction of the path of invention—picking a problem that was not in fact addressed by the invention and reverse engineering a potential solution, takes the inquiry some steps away from real-world observable behavior and toward theoretical predictions. It is of course possible to develop an empirical predictive measure for this analysis (and we suggest as much in our prior work)[144]—but this empirical measure should be grounded on the normative goals that animate obviousness.

It is precisely at this nexus between empirical observations and normative goals that current doctrine falls short. Whereas tort doctrine and scholarship has articulated (relatively) precise formulations that tie tort law's normative goals to on-the-ground observations,[145] patent law has not articulated how the different normative lenses that underlie the myriad doctrines involving the PHOSITA guide relevant fact-finding. Instead, a "one-size-fits-all" PHOSITA, consisting principally of a litany of educational attainments, sits largely disconnected from the PHOSITA's varied normative purposes. As our data shows, even when a single legal opinion addresses multiple doctrines, the definition of the PHOSITA remains one and the same across them.[146] This disconnect between normativity and fact-finding invites a sort of judicial sleight of hand: Opinions move seamlessly from describing a set of factual attributes characteristic of the PHOSITA to predictions of PHOSITA behavior

140. *Id.* at 857.

141. Durie & Lemley, *supra* note 20, at 1001.

142. *Id.* at 993.

143. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 402 (2007) ("The Circuit first erred in holding that courts and patent examiners should look only to the problem the patentee was trying to solve. Under the correct analysis, any need or problem known in the field and addressed by the patent can provide a reason for combining the elements in the manner claimed.").

144. Pedraza-Fariña & Whalen, *supra* note 16, at 63.

145. *See supra* text accompanying notes 127–35.

146. *See supra* Sections II.A.3–.4.

that are not firmly grounded on those factual attributes. Instead, judicial common sense or other unobservable mental steps replace what should be a clearer nexus between who the PHOSITA is and how that PHOSITA behaves (this is ultimately what we coded as "shallow" analysis). This lack of a normative-empirical nexus can also help explain why, despite repeated Supreme Court interventions that emphasize the PHOSITA's vantage point in obviousness,[147] definiteness,[148] and claim construction,[149] subsequent lower court and Federal Circuit decisions have continued to engage only shallowly with the PHOSITA.

We have identified no judicial decision that engages with the question of whether the PHOSITA *should* be a normative or positive construct. Even more pressingly, given that the PHOSITA in fact is not a purely empirical construct—what precisely are the underlying normative goals served by this construct? An even cursory examination of this question makes clear that if different patent law doctrines, such as obviousness, enablement, and infringement, have different underlying normative goals, the PHOSITA in each one of them should be individualized to reflect this normative diversity.

The next Sections detail how the concept of the PHOSITA can be tailored to the different normative goals underlying the patent doctrines of obviousness, enablement, and infringement. Because obviousness is the PHOSITA's doctrinal home, the PHOSITA's identity is most developed in this context. We therefore begin our analysis in the next Sections with obviousness, exploring how understandings of the PHOSITA should be tied into the doctrine's normative goals. We then move on to an analysis of the enablement and infringement PHOSITAs.

B. Restructuring the Obviousness PHOSITA

Scholarship in patent law has underlined the PHOSITA's seeming irrelevance to the ultimate doctrinal outcome in obviousness jurisprudence, while also celebrating *KSR* as an important turning point. For example, Rebecca Eisenberg criticizes the Federal Circuit for ignoring the PHOSITA in obviousness decisions, observing that findings about the level of skill in the art "seem to do little work in guiding [the Federal Circuit's] own review of the ultimate conclusion as to patentability."[150] Eisenberg blames the PHOSITA's irrelevance on a tendency in obviousness decisions to focus on economic instead of technological considerations. An assessment of an invention's obviousness that focuses exclusively on the market success of an invention, however, changes the reference point from the technology-grounded

147. *See supra* Section II.B.
148. *See supra* Section II.B.
149. *See supra* Section II.B.
150. Eisenberg, *supra* note 3, at 890.

PHOSITA to the consumer.[151] Durie and Lemley focus more squarely on the factual/normative divide, arguing for an empirical PHOSITA, grounded "on the factual determination of what scientists would actually think and do about a particular invention."[152] They interpret *KSR*, as do we, as emphasizing the real-world constraints and incentives that impact a PHOSITA's behavior.[153] They also criticize the hypothetical PHOSITA who has perfect information about the prior art as divorced from these real-world constraints and from the ultimate goal of the obviousness inquiry: to identify those innovations that would not exist but for the patent incentive.[154] Their article predicted that *KSR* would usher an era of revived interest in the PHOSITA, tied to understanding the on-the-ground behavior of innovator communities.[155]

KSR, however, has not been the powerful watershed moment many observers predicted it would be. Although our empirical analysis detects a statistically significant increase in courts' depth of engagement with the PHOSITA in obviousness decisions following *KSR*, this increase is minor. A likely reason for this limited impact is *KSR*'s lack of engagement with the empirical/normative connection. Put differently, *KSR* reimagined the PHOSITA as a creative member of an innovation community, but it did not engage with crucial questions that would tie characteristics of this innovation community with obviousness's normative goals.

First, *KSR* left open the question of *which* is the relevant innovation community. In combination inventions, of which *KSR* was an example, there are often at least two potentially relevant communities of innovation. Indeed, we can identify at least two communities in *KSR* itself (which concerned an adjustable automotive pedal system with a modular electric sensor): first, the community of car engineers; second, the community of software developers for sensor equipment.[156] Rather than engage directly with this question, the Court appears to assume that the car engineer community is the relevant reference point, and that developments in sensor technology are

151. *See id.* at 894 (suggesting that reception of the invention by consumers is a more reliable indicator of its obviousness or non-obviousness than a technological evaluation from the perspective of PHOSITA).

152. Durie & Lemley, *supra* note 20, at 991.

153. *Id.* at 999 ("But the one consistent strand that runs through the opinion is a rejection of rigid rules, replaced with a case-by-case focus on what actual scientists in the field would know or could develop with ordinary inventive skill. The Court wants to know whether scientists in *this particular discipline* would believe *this particular invention* to be obvious.").

154. *Id.* at 1000 ("[C]ourts will have to pay more attention than they have in the last quarter-century to who the PHOSITA is and what he or she thinks."). We think that obviousness in the wake of *KSR* should truly be a realistic test. That means not only that we should inquire into what the PHOSITA knows, could learn, and would create, but also into what limits there are on that PHOSITA's knowledge.

155. *Id.* at 1001 ("We expect to see greater reliance on expert testimony regarding what those of skill in the art would have known and been capable of developing.").

156. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007).

"exogenous" to this main reference community.[157] This implicit assumption sidesteps a crucial normative question for complex inventions, what we may term the "community of reference" problem.

In prior work, we showed empirically that the pairwise recombination frequencies of two technology areas present in any given patent can differ dramatically.[158] To make this point more concrete, if we take two technology areas that appear together in any given patent, and we calculate how often those two technology areas co-occur in all patents that came before that patent, we obtain two—often widely divergent—frequencies. These frequencies can roughly be correlated to the dual questions: What are the chances that a person in community A would take information from community B to arrive at the invention at issue? *And* what are the chances that a person in community B would take information from community A to arrive at the invention at issue? In this hypothetical scenario, if courts define the PHOSITA as a member of community A, they are implicitly assuming that members of community A are casting about for information (including from community B) to make their invention. This is a normative choice, but one that is completely untheorized. In our prior work we argued that, from a normative perspective, courts should choose as a reference community the community with the highest chance of making the invention at issue.[159] Importantly, this relevant community may not in fact be the inventor's own community.[160] This efficiency-based normative choice would ensure that the obviousness doctrine only grants patents for inventions that would not exist but for the patent incentive. Our point in this Article, however, is not to argue for any specific normative baseline for obviousness; rather, it is to emphasize that when normative goals are not precisely specified, empirical considerations float untethered and are rendered both irrelevant and ineffective.

Second, as much as *KSR* ignored the "community of reference" normative problem, it also maintained the fiction that the PHOSITA is a perfectly informed researcher—a fiction that differentiates the PHOSITA from how real-world researchers would behave. But the crucial problem with a perfectly informed PHOSITA is not that it is not tied to real-world facts; rather, the problem is that this construct is not justified by any of the normative goals underlying obviousness. Indeed, the very opinions that announced this hypothetical PHOSITA standard, fail to justify it on

157. *See* Pedraza-Fariña & Whalen, *supra* note 16, at 82–85. The Court frames the relevant question as "whether it would have been obvious to a person having ordinary skill in the art to modify existing adjustable pedals with an electronic sensor, given the exogenous development of electronic sensor." *Id.* at 83.

158. *See id.* at 112–21.

159. *Id.* at 135.

160. *See id.* This is consistent with the Court's arguments in *KSR* that it is incorrect to focus solely on "the problem the patentee was trying to solve." *KSR Int'l Co.*, 550 U.S. at 420.

normative grounds. A perfectly informed PHOSITA fails the normative/empirical nexus.

One thing is clear after *KSR*: The PHOSITA for obviousness purposes is a member of a community of researchers whose members attempt to innovate. The normative goals underlying obviousness are similarly clear in the doctrine: to identify those inventions that but for patent protection would either not come to be or be significantly delayed. Linking these normative commitments to empirical observations would require (1) identifying the inventing community that ex ante has the greatest chance of achieving invention, regardless of actual inventor identity (the normative dimension) and (2) mapping of on-the-ground inventor communities and both non-patent hurdles and incentives to innovate (the empirical or positive dimension).[161]

We suggest that a useful way to conceptualize the obviousness PHOSITA is to articulate more precisely the type of expertise of a representative member of this reference community. The obviousness PHOSITA has the highest, most direct form of expertise consisting of both codified and tacit knowledge. Put differently, an obviousness PHOSITA is a researcher actively engaged in learning and research who both understands written documents *and* is steeped in everyday experimental life. This embeddedness in an innovator community allows the obviousness PHOSITA to acquire informal, tacit knowledge about how to make things "work"—knowledge that emerges out of researcher interactions but that is seldom fully codified in research articles.[162] Sociologists of science call this type of expertise "contributory expertise" to denote the ability of this type of expert to contribute to technological advances in his/her given field.[163] As we elaborate below, because the normative goals that animate the obviousness doctrine differ from those that animate enablement and infringement, this obviousness PHOSITA should differ in important ways from the enablement and infringement PHOSITAs.[164]

C. RESTRUCTURING THE ENABLEMENT PHOSITA

As our empirical data makes clear, courts draw no distinction between the obviousness and enablement PHOSITAs. Patent law scholarship similarly describes the PHOSITA for enablement purposes as identical to the obviousness

161. *See infra* Table 1.

162. *See* Laura G. Pedraza-Fariña, *The Social Origins of Innovation Failures*, 70 S.M.U. L. REV. 377, 401 (2017); *see also* Pedraza-Fariña, *supra* note 39, at 114–16 (discussing how novices become experts in the community); Harry Collins, *Interactional Expertise as a Third Kind of Knowledge*, 3 PHENOMENOLOGY & COGNITIVE SCIS. 125, 125–43 (2004) (discussing informal interactional expertise as a knowledge base).

163. Collins, *supra* note 162, at 128–29.

164. *See infra* Table 1.

PHOSITA.[165] And yet, enablement and obviousness serve two very different normative purposes. The obviousness doctrine is concerned with granting patents to those inventions that represent a sufficiently creative "inventive step" that would not have taken place in a counterfactual world without patents.[166] Enablement is the linchpin of patent law's disclosure doctrine. It is therefore designed to teach the public the invention, to extract patent law's "quid pro quo" of disclosure in exchange for exclusivity, and to ensure the scope of the patent is commensurate with its teachings. The doctrinal test for enablement reflects its teaching purpose: A patent is enabled if a PHOSITA can practice the full scope of the claimed invention without undue experimentation.[167]

Who is the relevant PHOSITA to ensure patent law fulfills its' teaching function? It is clear that the PHOSITA cannot be the general public, as patents are directed to members of a more specialized community. But the community of researchers and putative inventors that is implicated in the inventive process captured by the obviousness doctrine, may have a higher level of skill than the community of those who read or use a patent. Adjusting the enablement PHOSITA to the *user* of the invention would tie the empirical PHOSITA to enablement's normative goals by ensuring a patent is teaching anyone who wants to *use* the invention, not only those involved in active invention activities. Burk and Lemley have made a similar point, suggesting that the "*inventor* of section 103 [may] be a very different person—with a different knowledge set—from the ordinary *user* of section 112."[168]

From an expertise perspective, the enablement PHOSITA, as a user who is not embedded in an innovator community, has less access to informal, tacit knowledge than the obviousness PHOSITA. This means that an enablement PHOSITA is guided almost exclusively by codified knowledge in order to reproduce (or use) the invention. As a practical matter, this means that the enablement PHOSITA is not as able to fill gaps in the specification as the obviousness PHOSITA. For this reason, courts should be skeptical of enablement arguments that rely heavily on access to tacit, informal knowledge. In the language of expertise, the enablement PHOSITA has limited contributory expertise—limited to the ability to reproduce experiments by relying on codified knowledge, but lacking the ability to meaningfully contribute to advances in the field.[169]

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165. *See* Burk & Lemley, *supra* note 3, at 1189–90 (noting that it is commonly presumed that the PHOSITA standard is constant throughout the patent statute, but that it is not necessarily the case).

166. *See* Naina Gulati & Jasmeet Gulati, *Knowledge/Skill Standards of a "Person Skilled in Art": A Concern Less Visited*, 17 J. MARSHALL REV. INTELL. PROP. L. 588, 606 (2018).

167. *In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988).

168. Burk & Lemley, *supra* note 3, at 1205.

169. *See infra* Table 1.

D. RESTRUCTURING THE DEFINITENESS AND INFRINGEMENT PHOSITA

Both definiteness and infringement rely on the PHOSITA to interpret a patent's claim language. Because patent claims are directed at an expert audience, the PHOSITA in this context serves as an expert reader who is able fill in gaps when words in the claims are ambiguous.[170] The infringement inquiry begins with claim construction: Only after any disputed elements in the claims have been construed can the claims be compared with the putatively infringing product. In turn, the definiteness requirement seeks to foster clarity and precision in claim drafting. Until quite recently, however, the PHOSITA was a supporting character in both the infringement and definiteness inquiries.[171] This is because both doctrinal tests hinged upon judicial claim construction—an exercise long considered a matter of "law" to which no deference was owed to the fact finder.[172] More specifically, because claim construction was a matter of law that privileged intrinsic evidence, the PHOSITA's external and factual perspective did not play a large role in claim construction. The PHOSITA still served as a background reference point, because decision-makers are required to step into the PHOSITA's shoes when making legal determinations. Nevertheless, this hypothetical exercise suffered from the same disconnect from on-the-ground facts that we described for the pre-*KSR* obviousness PHOSITA. In turn, the doctrinal test for definiteness held claims definite so long as they were amenable to judicial interpretation.[173] In practice, this meant that a claim was definite as long as a court could in fact arrive at a construction (that is, as long as the claim was "construable").

Two decisions, *Teva v. Sandoz*[174] and *Nautilus v. Biosig*,[175] appeared to elevate the PHOSITA to a leading role in both definiteness and claim construction. In *Teva*, the Supreme Court held that district court fact-findings regarding extrinsic evidence are reviewed for clear error, therefore increasing the deference owed the district court in claim construction and the centrality of findings of fact about the PHOSITA.[176] In *Nautilus*, the Court made it arguably easier to invalidate a claim for indefiniteness by specifying that a patent is sufficiently definite when the patent "inform[s] those skilled in the art about the scope of the invention with reasonable certainty."[177] In other

170. Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005) (specifying that claim terms are to be interpreted with the "meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention").

171. *See, e.g.*, Janis & Holbrook, *supra* note 3, at 97 ("[T]he Federal Circuit frequently seems to ascribe little value to the perspective of the PHOSITA in claim construction.").

172. *See* Burk & Lemley, *supra* note 3, at 1186–90.

173. *See id.*

174. Teva Pharms. USA, Inc. v. Sandoz, Inc., 574 U.S. 318, 318 (2015).

175. *See generally* Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898 (2014) (establishing that definiteness is to be evaluated from the perspective of a PHOSITA).

176. *Teva*, 574 U.S. at 318, 324.

177. *Nautilus*, 572 U.S. at 910.

words, the test after *Nautilus* is no longer whether a court can construe a claim, but whether a PHOSITA who reads the patent can be reasonably certain of a specific construction. Despite these developments, our empirical data shows no statistically significant difference in courts' depth of engagement with the PHOSITA before and after *Teva* and *Nautilus*, suggesting that the Supreme Court's interventions to bolster the centrality of the PHOSITA have not had much on-the-ground impact.

A possible explanation for this continued neglect of the PHOSITA in definiteness and infringement is a persistent uncertainty regarding *how* to define the PHOSITA for the purpose of claim construction, as well as how to tie on-the-ground facts about the PHOSITA to both definiteness and infringement's normative justifications. Indeed, although courts' definition of the PHOSITA remains unchanged across doctrines, claim construction is the doctrine that has generated the largest number of competing proposals in academic writing. For example, Fromer and Lemley understand patent infringement's key goal as policing whether a competitor has manufactured a product that free rides and mimics the patentee's technology.[178] Under this interpretation, a competitor is free to create a product that serves as a market substitute, so long as that product's technology is different from what has been patented.[179] In this sense, infringement seeks to foster the availability of multiple products representing a variety of technological solutions to any given problem. For this reason, they argue that an expert audience familiar with the underlying technology, rather than a consumer audience, is the correct standard in patent law in most cases.[180] Because their analysis centers on distinguishing consumers from experts, Fromer and Lemley do not engage with the question of whether the expert community for infringement is coterminous with the expert community for obviousness or enablement purposes.

John Golden argues that the correct reference point in claim construction is not the PHOSITA (viewed as a community of experts in the particular technology) but rather the "interpretive community" to which patent claims are directed: those who read and interpret patent claims in the real world.[181]

178. Jeanne C. Fromer & Mark A. Lemley, *The Audience in Intellectual Property Infringement*, 112 MICH. L. REV. 1251, 1255 (2014).

179. *Id.*

180. *See id.* at 1254. Fromer and Lemley also argue for a limited role for a market-substitution, consumer perspective in cases where the technology at issue has been used in a completely different market. In other words, if a technological similar product is market in a radically different, non-overlapping market, patent law's goals may be best served by a finding of non-infringement. *See id.* ("[P]atent law tends to find infringement whenever two products are sufficiently similar technically, without regard to the market relationship between the products.").

181. John M. Golden, *Construing Patent Claims According to Their "Interpretive Community": A Call for an Attorney-Plus-Artisan Perspective*, 21 HARV. J.L. & TECH. 321, 331 (2008) (defining this interpretive community as "the community of people for whom understanding patent claims is an important and regular enterprise").

Under Golden's proposal, this interpretive community is a big tent, including "[a] mixture of businesspersons, lawyers, USPTO examiners, and judges."[182] Notably, what this community excludes is individuals with an artisan's skill in the relevant technological art.[183] Underlying this proposal is a different normative interpretation of the goals of claim construction. Golden emphasizes the *notice* function of claim construction and focuses on who, in the real world, reads patent claims.[184] This audience of readers is composed largely of market competitors who want to know how to make non-infringing substitutes and their lawyers. Golden rephrases this "perspective [as that] of a patent attorney with access to the technological knowledge of an ordinary artisan."[185]

Janis and Holbrook use a different perspective to analyze the audience in patent law—or what we have termed the "reference point" in this Article. They argue that claim construction, with its complex system of cannons of interpretation and presumptions, faces a translation problem: Its intended audience (be it the public at large, competitors, or even other inventors) is often ill-equipped to understand the legal framework surrounding claim construction.[186] Janis and Holbrook call for a reinvigoration of the PHOSITA as an "intermediary" who can interpret patent claims to the receiving public.[187] Ultimately, however, they reject the PHOSITA's perspective in claim construction as too rooted in technology to address "what is essentially a legal analysis."[188] Instead, they put forth two alternatives: first, Golden's "interpretive community" perspective that melds technological and legal expertise.[189] Second, they suggest the perspective "of the '[r]easonable [c]ompetitor,'" a standard initially articulated by the Federal Circuit for a subset of claim construction cases involving prosecution history estoppel.[190]

Wissam Aoun, in his study of the PHOSITA in comparative U.K. and U.S. practice, argues that both U.S. and U.K. courts have moved toward a vision of the PHOSITA as a hypothetical infringer, as opposed to the PHOSITA as a reader of patentable technology.[191] The PHOSITA-as-hypothetical infringer

182. *Id.* at 334.

183. *See id.*

184. *Id.* at 328 ("Such claims are not generated primarily to increase scientific or technological understanding, but instead to provide notice of patent scope to United States Patent and Trademark Office ('USPTO') examiners, patent attorneys and agents, and interested businesspersons.").

185. *Id.*

186. Janis & Holbrook, *supra* note 3, at 83.

187. *Id.* at 75.

188. *Id.* at 98–99.

189. *Id.* at 99–100; *see* Golden, *supra* note 181, at 328.

190. Janis & Holbrook, *supra* note 3, at 101.

191. Wissam Aoun, *The Hypothetical Infringer? Implications of the Synthesis of Professional Patent Agency and the Anglo-American Hypothetical Person Skilled in the Art* 2 (June 9, 2022), http://dx.doi.org/10.2139/ssrn.4132519 [https://perma.cc/4TKA-EEHH].

reads a patent with a view toward avoiding infringement, not one to learn from the patent document.[192] For this reason, this infringement-PHOSITA is less of a technological expert and more of a skilled patent drafter who understands patent claiming conventions.[193]

Both Golden and Janis & Holbrook take issue with the character of the PHOSITA as an overly technical construct that has insufficient legal expertise to provide notice to the public about what the inventor claims as her invention.[194] In contrast, Aoun argues that on-the-ground patent practice has moved toward a conception of the PHOSITA that not only incorporates legal expertise, but that often does so at the expense of technological expertise.[195] But nothing in the PHOSITA definition mandates that it be a monolithic construct tied to technological skill in the art. The PHOSITA is only codified in the statutory provisions for obviousness and enablement. It is doctrinally possible, and indeed desirable, to develop different versions of the PHOSITA based on the different normative underpinnings of different doctrines. In fact, as we outline in Table 1, there are likely at least three different PHOSITAs that underlie the three broadly different doctrinal areas of obviousness, enablement, and claim construction. It is in this last doctrinal area in particular, claim construction, that academic perspectives come closest to the normative analysis on the reasonable person that is more prevalent in tort scholarship. We think this is a salutatory development that should expand to every single doctrine where the PHOSITA serves as a reference point.

It is beyond the scope of this Article to resolve normative disagreements about what the reference point in claim construction *should* be. We see at least two potential options, each reflecting different normative baselines in the claim construction literature. First, Fromer and Lemley focus on patent infringement's ultimate goal of ensuring wide availability of market substitutes with objectively different underlying technologies.[196] Emphasizing technological diversity as the normative end goal of claim construction and infringement naturally suggests that experts in technology should serve as the final arbiters in claim interpretation and infringement. It also suggests changes to claim construction methodology to emphasize the real-world perspective of an expert audience, although Fromer and Lemley do not fully take up how to define which experts make up this audience. One possibility, as we depict in Table 1, is that these experts (and therefore the PHOSITA) are competitors in the relevant technology markets seeking to make noninfringing substitutes.

192. *Id.* at 3.

193. *Id.*

194. *See* Janis & Holbrook, *supra* note 3, at 98–99; Golden, *supra* note 181, at 327.

195. Aoun, *supra* note 191, at 20 ("With claims becoming reified, abstract statements operating according to their own language and constituting almost the entire scope of protection, patentees place little emphasis on building robust disclosures.").

196. Fromer & Lemley, *supra* note 178, at 1290–91.

This formulation would mimic one of Janis and Holbrook's proposals and reflect the Federal Circuit's now-abandoned standard for prosecution history estoppel. Second, Golden focuses on the notice function of claim construction, both in the definiteness and infringement inquiry.[197] Notice about what in fact are the boundaries of any given invention reduces the zone of uncertainty around patent claims. In turn, this reduction in uncertainty increases social welfare by lowering the risk of inventing the invention. Although overlapping somewhat with Fromer and Lemley's definition, focusing squarely on notice takes current methodology as a given and asks: Who is in a better position to interpret the content of patent claims? The answer here as Golden articulates is not technologists, but rather a technologically informed patent attorney who both understands the legal dimension of claim construction and can translate this dimension to a technological audience, or what Golden calls the "interpretive community."[198]

Here again, an expertise perspective can help more sharply define the qualities of a PHOSITA that are responsive to the dual normative underpinnings of definiteness and infringement. We have mentioned two types of expertise that map roughly to the ideal normative types for obviousness and enablement: codified and tacit expertise (obviousness); and codified expertise (enablement). A third type of expertise, interactional expertise, captures much of the work that the hypothetical PHOSITA is expected to do in claim construction. Interactional expertise, as sociologists of expertise define it, captures the work of a linguistic interpreter or translator.[199] An interactional expert cannot carry out experiments in the field like an expert possessing codified and tacit knowledge. In other words, an interactional expert does not have contributory expertise. An interactional expert cannot reproduce experiments like a user with experience in and access to codified knowledge. Rather, an interactional expert can *read*, *understand*, and *translate* empirical results in any given technological field to a broader audience.[200] This type of definition, reflecting the PHOSITA as a reader and interpreter of patent documents, can help conceptually differentiate the infringement PHOSITA from its cousins, the obviousness and enablement PHOSITAs.[201]

197. *See* Golden, *supra* note 181, at 374.
198. *Id.* at 383–86.
199. *See, e.g.*, Collins, *supra* note 162, at 127.
200. *See id.*
201. *See infra* Table 1.

Table 1: Mapping PHOSITA's Normative and Empirical Dimensions Across Patent Doctrines

Type of Expertise	PHOSITA Def.	Representative Doctrines	Normative Goal	PHOSITA: Normative Dimension	PHOSITA: Empirical Dimension
Codified + tacit expertise (contributory expertise)	Field/ Laboratory Researcher	Obviousness Utility Doctrine of equivalents	Incentivize innovations that would not occur or would be substantially delayed *but for* patent incentive	Reference community as the **inventing community** that *ex ante* has greatest chance of achieving invention, regardless of actual inventor identity	Mapping of on-the-ground inventor communities and both non-patent hurdles and incentives to innovate
Codified expertise (limited contributory expertise)	User of patent knowledge	Enablement Written description	Teach how to make and use full breadth of invention	Reference community as **users of innovation**—a broader set with lower skills than inventors	Mapping on-the-ground users
Interactional expertise	Reader/ Consumer of patent knowledge	Definiteness; claim construction; infringement	Notice to competitors about boundaries of invention	Reference community as **"interpretive community"?**	Mapping actual actors involved in interpretation of patent law (investors, judges, attorneys)
			Foster availability of technologically distinct substitutes	Reference community as **"reasonable competitor"** in same competitive market seeking to make non-infringing substitutes?	Mapping actual markets for products embodying patents and competitors in that space

CONCLUSION

The PHOSITA is central to a host of patent doctrines, arising frequently across varied contexts including when defining what a patent claim means, when determining patentability standards, and when assessing disclosure or infringement. Despite this centrality, there is little empirical research that examines the PHOSITA as a whole, exploring when it appears in litigation, and how courts engage with it when it does. We addressed this by hand coding almost seven hundred cases mentioning patents and phrases related to the PHOSITA, and by performing automated text analysis on over seven thousand such cases.

Our analysis showed that the question of obviousness is the PHOSITA's most frequent role in patent disputes. We subsequently showed that who the PHOSITA *is* (an issue of fact) or the legal PHOSITA standard are very seldom

appealed. When appealed, reversal rates are very low: Indeed, our data reveals that reversal rates centering around the PHOSITA are lower than reversal rates for any other issue in litigation, based on prior reversal rate studies.

Looking to these cases with multiple PHOSITA issues more closely, we reveal that courts rarely adopt definitions of the PHOSITA that are tailored to different doctrinal areas. Rather, courts predominantly rely on a unitary PHOSITA to guide all of the related analyses.

Following our exploration of the various contexts the PHOSITA arises in, we examined how deeply the courts engage with the notion of the PHOSITA when making related holdings. In the vast majority of cases, courts provide little to no evidence or reasoning to support their PHOSITA-related holdings. Less than thirty percent of cases even provide moderate levels of support for their PHOSITA inquiries. This finding is supported by our analyses of the use of objective factors that courts rely on to help determine the appropriate level of skill in the art. We find that the six factors as summarized in *Environmental Designs*[202] are rarely actually referenced in cases relating to the PHOSITA.

Finally, we turned our eyes to examining variation in the depth with which courts engage with determining who the PHOSITA is or what they would know or do. We found that there was a relatively small, but significant, change in the tendency of courts to engage with the PHOSITA in opinions following the Supreme Court's *KSR* opinion, with post-*KSR* opinions referencing the PHOSITA approximately twenty percent more than pre-*KSR* ones. We found no difference, however, in courts' engagement with the PHOSITA pre- and post- two other key Supreme Court opinions that were predicted to increase the centrality of understanding who the PHOSITA is and how he/she behaves: *Nautilus* and *Teva*. We also found that there is no significant difference in the depth with which courts engage with the PHOSITA when assessing inventions with varied levels of interdisciplinarity, which we take as a marker for invention complexity. Despite expectations that inventions that bring together disparate technical fields might engender more fulsome discussions of who the appropriate PHOSITA is and what their level of skill would be, we found no relationship between spanning technical boundaries and depth of PHOSITA engagement.

Our findings are surprising. Given the PHOSITA's centrality to the entire corpus of patent law, and repeated Supreme Court interventions designed to enhance the PHOSITA's role in litigation, it is startling how little attention decision-makers pay to the questions of the PHOSITA's identity and ability. This lack of explicit attention paid to the PHOSITA is, at least in part, by design. The U.S. Patent and Trademark Office's own manual synthesizing the law of patentability and guiding patent examiners through the examination process explains that the "indication of the level of ordinary skill" in the prior

202. Env't Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 696 (Fed. Cir. 1983).

art may be provided "explicitly or implicitly."[203] This shallow engagement with the difficult questions of who the appropriate PHOSITA is, and what they would know, think, or do, then, begins at the patent examination stage.

Future work should explore whether patent examiners (and examination guidelines) have responded to the Supreme Court's increased emphasis on the PHOSITA's perspective. It is at this initial stage where the lack of clear guidelines to engage with empirical evidence about the PHOSITA increases uncertainty in the patent system and leaves the law of the PHOSITA underdeveloped. It is also at this stage where targeted guidelines may generate a course correction from the bottom-up.

District courts, however, fare no better. By leaving an insufficient record of how to determine the level of appropriate skill and how to subsequently reason from that PHOSITA's perspective, courts have left both future decision-makers and patent system participants underequipped to definitively assess the myriad questions of patent law that depend upon the PHOSITA's perspective. It frequently remains unclear whether the PHOSITA is referred to as a hypothetical idealized objective inventor or reader, or whether they are instead oblique references to some realistic individuals such as the actual inventor or alleged infringer.

This uncertainty has direct implications for patent law and the greater innovation system. Because so much turns on the identity and abilities of the PHOSITA—that is to say, their level of skill, and how they would behave in a given circumstance—a lack of clarity as to how to identify the appropriate level of skill or how to determine what the PHOSITA would think or do, leaves both potential patent owners, as well as potential patent infringers uncertain about their legal status. Would-be applicants, especially those for patents that implicate a variety of disparate technical areas, cannot be sure how courts will determine who the appropriate PHOSITA is and what they would know. Meanwhile, those using technologies and at possible risk of infringement have to try and determine whether relevant patents are valid and precisely what they disclose without sufficient guidance about how to do so.

In short, encouraging more explicit engagement with the tasks of both identifying the appropriate PHOSITA, as well as what they would do in a given circumstance, would facilitate both more certainty while also enabling more meaningful appellate review and thus clearer guidance in the development of related law. Fostering such explicit engagement, however, will require addressing the foundational theoretical question of whether the PHOSITA is a positive or normative construct. This undertheorized and underexplored question, we argue, underlies much of the current shallow analysis and its attendant uncertainty. In our final Section, we provided a blueprint for thinking through three different types of PHOSITAs that emerge from the different underlying normative goals of obviousness, enablement, and infringement. It

203. MPEP § 2141(II)(C) (9th ed. Rev. 10.2019, June 2020).

is only by recognizing that a fully realized PHOSITA is also a flexible PHOSITA that responds to the different normative goals of the doctrines it is employed to serve, that this hypothetical person will live up to its promise as a fulcrum to support patent law's dual legal and technological functions.

APPENDIX A

Case Coding Handbook

What follows is an outline of all the questions that should be coded for each case, and some detailed discussion about the questions. In addition, there is a short section summarizing each relevant area of patent doctrine. A few general notes:

- Every question has a "Yes" or "No" answer. To code the answers in the spreadsheet, please enter these as either "1" or "0." To be clear:
  - 1 = Yes
  - 0 = No
- There are three possible values for all cells: 1, 0, and "no value entered."
- If a question is indented in the outline below, it need only be answered if its "parent" question is answered in the affirmative. If the parent question is negative, you may leave the child question blank.
- You will be assigned a range of cases identified by the "file_name" column (e.g., 42.html). There's no need to read/code the other cases. We will overlap the assignments ensuring cases are coded by more than one individual so that we can assess inter-coder reliability.
- Please don't rearrange the spreadsheet (e.g., move columns, etc.).
- The question codes in brackets (e.g., [fact_finding]) in the question outline below correspond to the column headers in the coding spreadsheet.

Round 1 Coding
Question Outline
[with_question_codes_in_brackets]

Threshold:

- Does the court refer to the notion of the PHOSITA or skilled person? [PHOSITA]

District court questions:

- Does the court make factual findings on the skill level and/or knowledge of the PHOSITA? [fact_finding]
- Does the court use expert evidence to inform its factual findings on the PHOSITA determination? [expert_evidence]

Both district court/appellate court questions:

- Does the court use "common sense" to determine the level of skill or background knowledge of a PHOSITA *or* to make legal findings relating to the PHOSITA? [common_sense]
- Does the court rely on a definition of the PHOSITA determined in a Markman (claim construction) hearing? [markman_reliance]

Doctrine specific questions:

- Does the court refer to the PHOSITA in relation to enablement? [enablement]
  - Does the court use the correct enablement-specific standard "any person skilled in the art" to define the reference person? [enablement_specific]
  - In reference to enablement, does the court treat the PHOSITA definition in a conclusory manner? [enablement_conclusory]
- Does the court refer to the PHOSITA in relation to claims construction? [claims_construction]
  - In reference to claims construction, does the court treat the PHOSITA definition in a conclusory manner? [claims_construction_conclusory]
- Does the court refer to the PHOSITA in relation to obviousness? [obviousness]
  - In reference to obviousness, does the court treat the PHOSITA definition in a conclusory manner? [obviousness_conclusory]
  - Does the court rely on the skill level of a PHOSITA to find a motivation to combine references (for nonobviousness)? [motivation_to_combine]
- Does the court refer to the PHOSITA in relation to analogous art? [analogous_art]
  - In reference to analogous art, does the opinion-writing court treat the PHOSITA definition in a conclusory manner? [analogous_art_conclusory]
- Does the court refer to the PHOSITA in relation to infringement? [infringement]
  - In reference to infringement, does the court treat the PHOSITA definition in a conclusory manner? [infringement_conclusory]
- Does the court refer to the PHOSITA in relation to the doctrine of equivalents ("DoE")? [DOE]
  - In reference to the DoE, does the court treat the PHOSITA definition in a conclusory manner? [DOE_conclusory]
- Does the court refer to the PHOSITA in relation to written description sufficiency? [written_desc]
  - In reference to written description sufficiency, does the court treat the PHOSITA definition in a conclusory manner? [written_desc_conclusory]
- Does the court refer to the PHOSITA in relation to novelty? [novelty]
  - In reference to novelty, does the court treat the PHOSITA definition in a conclusory manner? [novelty_conslusory]
- Does the court refer to the PHOSITA in relation to utility? [utility]
  - In reference to utility, does the court treat the PHOSITA definition in a conclusory manner? [utility_conclusory]

- Does the court refer to the PHOSITA in relation to the invention's best mode [best_mode]
  - In reference to best mode, does the court treat the PHOSITA definition in a conclusory manner? [best_mode_conclusory]
- Does the court refer to the PHOSITA in relation to definiteness? [definiteness]
  - In reference to definiteness, does the court treat the PHOSITA definition in a conclusory manner? [definiteness_conclusory]
- If the PHOSITA was raised in relation to multiple doctrines, does the court use doctrine-specific definitions of the PHOSITA to inform different analyses? [doctrine_specific]

Appellate case questions:

- Is this an appeals court case? [appellate]
- Is who the PHOSITA is at issue on appeal? [PHOSITA_appealed]
- Does the appeals court adopt the factual findings on the PHOSITA used in the lower court? [facts_adopted]
- Does the appeals court reverse because of incorrect factual findings of who PHOSITA is? [facts_reversed]
- Does the appeals court adopt the lower court's legal conclusions involving PHOSITA? [legal_adopted]
- Does the appeals court reverse because of incorrect legal conclusions based on what the PHOSITA would or could do? [legal_reversed]
- If opinion is appellate, are there any dissents focusing on the PHOSITA? [dissent]

Detailed Description

Threshold:

- Does the court refer to the notion of the PHOSITA or skilled person?
  This is a threshold question—we want to exclude cases in which the PHOSITA doesn't play a doctrinal role. We have sampled cases to intentionally include those with phrases that correspond to PHOSITA references, so we expect this to almost always be answered in the affirmative. As long as the concept of the PHOSITA is mentioned, this is a "Yes." This question doesn't require exact reference to the name "PHOSITA" but just to all the different ways a court may refer to the reference person in patent law (ordinary artisan, etc.). If the PHOSITA is not referred to, enter "No," and disregard the rest of the questions.

District court questions:

- Does the court make factual findings on the skill level and/or knowledge of the PHOSITA?
  This question asks whether the court weighs in on who the PHOSITA is and/or what they would know. For instance, if a court holds that the PHOSITA in this case would have an engineering degree, or would have known about some

specific prior art reference, these are factual findings about the PHOSITA and this question would be answered "Yes."

- Does the court use expert evidence to inform its factual findings on the PHOSITA determination?
  If the court refers to any expert testimony to help in the determination of who the PHOSITA is and what they might know, this question should be answered "Yes." Be inclusive here. Any reference to expert testimony in answering factual questions related to the should count as "using" expert evidence. For instance if a court says "Dr. Zhivago testified that a skilled biochemist would have . . . ." This question would be answered in the affirmative.

Both district court/appellate court questions:

- Does the court use "common sense" to determine the level of skill or background knowledge of a PHOSITA *or* to make legal finding relating to the PHOSITA?
  Here we are interested in knowing whether the refers to common sense to establish traits of the PHOSITA. The term "common sense" was introduced by the Supreme Court in the KSR *decision to allow judges to use their own "common sense" to rule on the ultimate legal determination of whether an invention is "obvious." We expect to find several cases that explicitly use the term "common sense" when deciding on obviousness. It may also show up in other doctrinal areas such as enablement or claim construction.*
- Does the court rely on a definition of the PHOSITA determined in a Markman (claim construction) hearing?
  This question asks whether the court adopts the definition of the PHOSITA from an earlier Markman hearing. For instance, if the opinion makes a statement like: "The level of skill in the art was determined to include knowledge of X, Y, and Z, in earlier claim construction hearings" then the answer to this question would be "Yes."

Doctrine-specific questions:

For these questions, we want to know which doctrinal issues the court is using the notion of the PHOSITA in relation to and the depth of consideration given to each. Often only one doctrinal issue will involve the PHOSITA (e.g., nonobviousness). At other times, the PHOSITA might come up in relation to a number of issues (e.g., the PHOSITA might come up in both a court's treatment of nonobviousness and potential infringement).

The "conclusory" questions ask whether or not the courts provide reasoning/support for the way in which they treat the PHOSITA. If the court provides reasoning or evidence to support their treatment of the PHOSITA, this will be answered in the negative. However, if the court simply invokes the notion of the PHOSITA and proceeds to reach their conclusion without support, then this question will be answered "Yes."

For example:

Here's an example of a non-conclusory treatment of the PHOSITA in terms of nonobviousness. In it, the court refers to earlier discussion of evidence, including expert testimony, that informs their conclusions:

> We have determined from the patent material submitted by the defendant and discussed above, that the ordinary level of skill in the art of food slicing is that possessed by an individual performing that task. Our conclusion is based on the following factors: (1) the central factor in the development of a food slicer is the identification of the unique problems associated with the preparation of a particular category of fruits or vegetables; (2) while diverse elements of food slicers are well-known in the art, it is the synergistic result of arranging these elements in a specific manner that is significant in the issuance of a patent for the invention; (3) it would be unusual for an engineer to have either the need for such a device, or the method of accomplishing the desired result; and (4) the activity of an engineer in those circumstances would be cumulative toward a successful embodiment of the concept, and not independent of the actual creative work involved in isolating the problems before arriving at a solution.
>
> Systematic Tool & Mach. Co. v. Walter Kidde & Co., 390 F. Supp. 178, 191–92 (E.D. Pa. 1975).

Here's an example of a conclusory treatment of the PHOSITA in terms of the doctrine of equivalents. Note that the court's entire reasoning is "We think . . . "—and then it states its conclusion, failing to refer to evidence to support its conclusion. This is a conclusory treatment and would be answered "Yes."

> We think successive baths with alcohol and naphtha are not the equivalent of one bath with a mixture of the two, and the use of the former practice is not an infringement of the patent teaching the latter.
>
> Newport Indus., Inc. v. Crosby Naval Stores, Inc., 139 F.2d 611, 612 (5th Cir. 1944).

Appellate case questions:

- Is this an appeals court case?
  If this is an appeals court case (e.g., federal circuit, court of appeals, state appellate court, etc.) answer "Yes" and proceed to the final few questions, otherwise answer "No" and disregard the remaining questions.
- Is who the PHOSITA is at issue on appeal?
  Here, we want to know whether the appeals court engages with disputes/questions regarding who the PHOSITA is and their associated traits. For instance, if the

parties dispute that the PHOSITA would have a graduate education in chemistry, this question would be answered in the affirmative.

- Does the appeals court adopt the factual findings on the PHOSITA used in the lower court?
  Here, we're interested in understanding whether the appeals court disagrees in any way with the lower court's factual findings on what the level of skill in the art is (who the PHOSITA is—either by supplementing additional facts or by rejecting the lower court's facts altogether). A "Yes" means complete agreement with the lower court's factual findings.
- Does the appeals court reverse because of incorrect factual findings of who PHOSITA is?
  Here, we want to know whether the appeals court reverses the lower court's holdings because they deem the lower court made incorrect factual findings about the nature of the PHOSITA.
- Does the appeals court adopt the lower court's legal conclusions involving PHOSITA?
  Here, we're interested in understanding whether the appeals court disagrees in any way with the lower court's legal findings related to the PHOSITA (e.g., whether an invention would have been obvious to a PHOSITA). A "Yes" means complete agreement with the lower court's legal findings related to the PHOSITA.
- Does the appeals court reverse because of incorrect legal conclusions based on what the PHOSITA would or could do?
  Here, we want to know whether the appeals court reverses the lower court's holdings because they deem the lower court made legal holdings related to the PHOSITA.
- If opinion is appellate, are there any dissents focusing on the PHOSITA?
  Answer "Yes" if there are any dissents that raise disagreements about the majority's treatment of the PHOSITA (either legal or factual issues).

Round 2 Coding

Depth of treatment scale:

There is now a "Depth of Treatment" sheet in the coding worksheet. In it, we have details for each case to be coded and three columns you can enter data into on this sheet:

- PHOSITA_depth: This is where you enter your main finding about the depth with which the court engages with PHOSITA-related questions. There are four possible answers. Please only enter one of these digits—0, 1, 2, or 3:
  - 0 – The court makes no holdings regarding the PHOSITA.
  - 1 – The court makes holdings regarding the PHOSITA (e.g., who the PHOSITA is—like an engineer, computer programmer, etc.—or how they would behave or interpret a document) but offers little-to-no reasoning or evidentiary support for those holdings.

- *An example showing the court making a very conclusory holding about the PHOSITA:*

  > The foregoing, and other equally detailed and comprehensive statements in the specification clearly describe, first in general terms and then by specific example, the preparation of Interferon; and we are more than satisfied that a person skilled in this art would thereby be enabled to use the claimed process to prepare the claimed substance.

  In re Isaacs, 347 F.2d 887, 891 (C.C.P.A. 1965).

- 2 – The court makes holdings regarding the PHOSITA and offers some limited reasoning and/or evidentiary support to justify why it held the way it did.
  - *An example showing the court using reference documents from the field to support its conclusion. This does not appear to engage deeply with the PHOSITA-related question but does at least offer some support for their holding:* One of ordinary skill in the art would understand a record to be "an item in a database." *The Illustrated Computer Dictionary,* 245 (3d ed.1986). I adopt this construction of the term. Broad. Innovation, LLC v. Echostar Commc'ns Corp., 240 F. Supp.2d 1127, 1141 (D. Colo. 2003).
- 3 – The court makes holding regarding the PHOSITA and supports those holdings thoroughly with evidence and reasoning that considers what the PHOSITA would know and/or what they would do.
  - *An example showing the court carefully identifying both who the PHOSITA is, and using evidence to inform the holding about what the PHOSITA would have thought about the invention:*

    > The obviousness analysis here asks whether a person of ordinary skill in the art at the time of the invention—an electrical engineer with at least a bachelor's degree and several years of CDR experience—would have had a reason to modify Pickering to include a 'data path.' . . . Indeed, expert testimony indicated that the proposed combination of Pickering with a data path would not have resulted in the invention of the '150 patent's claim 8 and would not have worked for its intended purpose.

    Broadcom Corp. v. Emulex Corp., 732 F.3d 1325, 1334–35 (Fed. Cir. 2013).

- We will also include a set of binary variables that represent the different elements of the PHOSITA definition from *Environmental Design* v. *Union Oil*. Each of these should be coded 1 or 0. If the court explicitly engages with an element, you should code it 1. Otherwise, it should be coded 0. These include:
  - Education_inventor: The inventor's educational background.

        - If the court explicitly discusses the educational background of the inventor in relation to the PHOSITA, this should be coded 1.
    - Problems: The kinds of problems confronted in the art.
        - If the court explicitly discusses the kind of problems confronted in the art, this should be coded 1.
    - Solutions: Solutions found previously.
        - If the court explicitly discusses other solutions to similar problems, this should be coded 1.
    - Speed: The speed of innovation in the art.
        - If the court explicitly discusses the speed of innovation in the field, this should be coded 1.
    - Sophistication: The level of sophistication of the technology.
        - If the court explicitly discusses the sophistication of technology in the relevant field, this should be coded 1.
    - Education_field: The educational level of workers in the field.
        - If the court explicitly discusses the level of education of workers in the relevant technological area, this should be coded 1.
- Example_text: Use this cell to add examples of court language that demonstrate depth of engagement with PHOSITA issues. If there are particular examples of non-deep engagement (e.g., just invoking a rule and making a holding without offering reasoning or evidence) you can cut/paste this into the cell. The same goes for middling and deep engagement with PHOSITA concepts. So, if the court has a paragraph carefully describing how/why it came to its conclusions related to the PHOSITA, please cut/paste those here. This cell isn't required, but rather is intended to allow you to identify text for us that you think is a good example of the various 'tiers' of the depth of engagement.