OF PATENTS AND PATH DEPENDENCY: A COMMENT ON BURK AND LEMLEY

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ABSTRACT

This Article delves into issues surrounding the relationship between technology and the patent law. Responding to Dan Burk and Mark Lemley's earlier article, *Is Patent Law Technology-Specific?*, the piece notes that the basic question posed by Burk and Lemley's article is a relatively easy question given the several doctrines that explicitly link the subject matter context of an invention to the validity and scope of related patents. This sort of technological exceptionalism (which this Article refers to as micro-exceptionalism) is both observable and easily justifiable for a legal regime directed to technology policy. In contrast, Burk and Lemley's identification of, and advocacy for, a broader sort of exceptionalism (macro-exceptionalism) is far more troublesome, implying a role for the patent judiciary in rather detailed policy judgments, for example the optimal breadth for biotechnological or software-based patents. The Article offers a variety of reasons that macro-exceptionalism is unwarranted, and indeed, notes that a primary claim of Burk and Lemley's—that the Federal Circuit has grossly missed the mark in its (purportedly) exceptionalist approach—previews the sort of problems created by pursuing technological exceptionalism in the patent law.

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I. INTRODUCTION

In an era of accelerating technological developments, the ballooning use of patents as both swords and shields in the marketplace, and growing criticism of courts' ability to meaningfully address the challenges posed by the complex regulatory framework that is the U.S. patent system, one might expect reform-minded observers to eschew proposals based on the unbounded intervention of judges into broad, innovation policy-based analyses. Professors Dan Burk and Mark Lemley, however, boldly advocate just such a program in *Is Patent Law Technology-Specific?*.[1] Inspired in large part by what they see as an emerging technological exceptionalism within the patent law, Burk and Lemley suggest important doctrinal changes that would allow judges far more latitude to establish industry-specific patent rules—a result that, they argue, will reverse the "exactly backwards" course the Federal Circuit has traveled to date.

This Article offers a different approach. To be sure, *Is Patent Law Technology-Specific?* (and its related works) marks an important and insightful contribution to the growing literature on the institutional relationships of the patent law.[2] And yet, in the pages that follow, I suggest an alternative view of Burk and Lemley's findings—specifically, that their exposition makes a rather compelling case *against* precisely the sort of judicial ventures into technologically-specific innovation policy that they recommend. Instead, their examples of the ongoing struggle to adapt the patent law to technological changes illuminate the undesirability of entangling the patent doctrine in broad, policy-driven technological exceptionalism. As befits an expansive regulatory regime concerned with innovation policy, the patent law is inextricably intertwined with the process and de-

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1. Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155 (2002) [hereinafter Burk & Lemley, *Technology-Specific*]. Note that Burk & Lemley, *Technology-Specific* and this Article are part of a group of related works. *See* Dan L. Burk & Mark A. Lemley, *Biotechnology's Uncertainty Principle*, *in* F. SCOTT KIEFF, PERSPECTIVES ON PROPERTIES OF THE HUMAN GENOME PROJECT (forthcoming 2003) [hereinafter Burk & Lemley, *Uncertainty Principle*]; Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575 (2003) [hereinafter, Burk & Lemley, *Policy-Levers*]; R. Polk Wagner, *(Mostly) Against Exceptionalism*, *in* F. SCOTT KIEFF, PERSPECTIVES ON PROPERTIES OF THE HUMAN GENOME PROJECT (forthcoming 2003).

2. For recent related work, see, for example, Burk & Lemley, *Technology-Specific*, *supra* note 1; Arti Kaur Rai, *Facts, Law & Policy: An Allocation of Powers Approach to Patent System Reform*, 103 COLUM. L. REV. 1035 (2003) [hereinafter Rai, *Facts, Law & Policy*]; F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 84 B.U. L. REV. (forthcoming 2004); R. Polk Wagner, *Reconsidering Estoppel: Patent Administration & the Failure of Festo*, 151 U. PA. L. REV. 159 (2002).

tails of technological development. As courts and commentators alike have long recognized, both a challenge and strength of our patent system is the ongoing effort to adapt the legal infrastructure to an ever-changing environment.[3] The patent law—by explicit design—is technologically flexible, with significant adjustment points built into the system. That distinctions in treatment will exist between various technologies is both expected and unremarkable; rather than leveraging these differences for policy effect, the goal should be to embrace the flexibility while retaining the essential strengths of the unified patent system.

The argument proceeds in three parts. Part II explains that while Burk and Lemley are undoubtedly correct in noting that there is technological-specificity in the patent law—that biotechnological inventions get "treated differently" than, say, software or mechanical inventions—this observation alone is certainly no cause for alarm. Submerged in the Burk and Lemley analysis is an important conceptual distinction between two types of technological-specificity: *micro*-specificity, which applies the variable legal rules to specific technological circumstances; and *macro*-specificity, which countenances distinct legal rules across different technologies, and relatively more similar application within related technologies.[4] Determining which of these two forms best describes modern patent jurisprudence is critically important, for this explains whether the Federal Circuit has developed (or seeks to develop) an innovation regime especially for specific industries, or whether any observable distinctions are merely the expected consequence of the patent law's inherent flexibility.

Part III argues that micro-exceptionalism is both a more accurate description of the current patent law—as well as a normatively justifiable position. Even accepting Burk and Lemley's analysis of the relevant case-law as correct, I argue that there remain a number of observations and explanations—such as factual misunderstandings, doctrinal confusion between facts and law, or even the unique circumstances surrounding the set of opinions that dominate biotechnology in particular—that point rather strongly in favor of a micro-specific framework rather than *macro*-exceptionalism. That is, it may well be that *Is Patent Law Technology-Specific?* has identified potentially-serious defects in the court's jurispru-

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3. *See, e.g.*, AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 1356 (Fed. Cir. 1999) ("As this brief review suggests, this court (and its predecessor) has struggled to make our understanding of the scope of [35 U.S.C.] § 101 responsive to the needs of the modern world.").

4. For example, *micro*-specificity allows that invention A, in a newly-developing niche of the software field, would potentially have different application of the disclosure and obviousness standards than invention B, in a mature area of software, or invention C, in a groundbreaking biotechnological area. *See infra* Part II for more explanation.

dence as applied to this technological area. But this, I suggest, does not itself make the case that the doctrine is *macro*-specific, in part because there seems to be little reason to worry that path-dependency—the tendency of the court to continue in this direction—has emerged.

Indeed, as I argue in Part IV, the several problems with the Federal Circuit's doctrinal development identified by Burk and Lemley seem to quite strongly support the position that *macro*-exceptionalism is ultimately unjustified. *Is Patent Law Technology-Specific?* advocates substantial, policy-driven *macro*-specific changes to fundamental standards of patentability in order to adjust the breadth of patents towards their optimal level (depending upon the technology). And while this almost-Kitchian approach does seem to dominate alternatives involving the weakening of property rights in biotechnology, there is a third option—clarifying and stabilizing the patent law to reduce transaction costs—that seems to be even better. Indeed, a transaction-cost-focused analysis would suggest that it is Burk and Lemley, rather than the Federal Circuit, that have it "exactly backwards." Given the deep uncertainties underlying the premises of Burk and Lemley's argument, as well as the promise of increasing transaction costs resulting from a shift from the *micro*-specific to *macro*-specific approach, there seem to be strong reasons to conclude that we should remain skeptical of broadening the technological-specificity of the patent law.

II. PATENTS VS. TECHNOLOGY

That the patent law is significantly "technology-specific" is both easily apparent and fully expected. As noted above, any law purporting to provide a regulatory foundation for innovation must be able to account for both the broad range of technologies and the rapid pace of change.[5] To bind the patent law to the technological assumptions of an earlier era, or to the maturity of any particular technology, would be exceedingly foolish. And yet there is a limit: not all technological exceptionalism is benign. When the jurisprudential approach shifts from adaptation to prescription—from the application of consistent rules to variable facts to the promulgation of distinct rules to implement technology-based innovation policy—courts put at risk the very social progress they seek to enhance.[6]

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5. As Burk & Lemley note, "different industries experience both innovation and the patent system in very different ways." Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 40-41.

6. *See infra* Part IV.

A. Macro and Micro: The Two Forms of Technological Specificity

Because of the recognition that technological-specificity can be either a boon or burden to the patent system, it is critically important at the outset to determine what one means by a "technology specific" patent law. As noted above, there are two distinct conceptual schemas to consider:

> *Micro-Specificity*: the (legal) rules applied to innovations are variable, dependent upon particular technological circumstances.
>
> *Macro-Specificity*: the (legal) rules are quite distinct across different technologies—even while being relatively more similar within related technologies.[7]

To illustrate the distinction, consider three inventions, two generally in the software field, and one in biotechnology: a first deals with data management, a relatively stable and mature area of software technology; the next relates to machine learning, a relatively immature and undeveloped sub-field; and the third considers genomic research, at the high-end of biotechnology.

In a regime of micro-specificity, each of these inventions will have rather distinct patentability requirements—primarily because of the operation of the patent law's "person having ordinary skill in the art" ("PHOSITA") standard. As Burk and Lemley demonstrate, a higher PHOSITA standard (a greater degree of difficulty in the field) implies a lesser standard for obviousness and a greater disclosure requirement.[8] Table 1 notes these requirements, taking the data management invention as having the lowest (baseline) difficulty level.

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7. One might call this an "industry-specific" approach, but that implies an economic structure coincident within related technologies, which is perhaps—but not necessarily—the case.

8. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1173-82 (describing biotech jurisprudence); *id*. at 1160-73 (describing software jurisprudence). Of course, as Burk and Lemley note, the explicit coupling of the PHOSITA standard in obviousness and disclosure doctrines can obscure some small differences in the way the standard is applied to each requirement. *See* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 27-29.

Table 1: The Micro-Specific Approach

Invention	PHOSITA Level	Obviousness Standard	Disclosure Requirement
Data management	Baseline	Baseline	Baseline
Machine learning	High (difficult field)	Low	High
Genomic research	Very High (very difficult field)	Very Low	Very High

In contrast, a regime of macro-specificity contemplates that different inventions will be accorded PHOSITA standards on the basis of the invention's technological field, rather than by a more nuanced or particularistic analysis.[9] Thus, in our example, the software-related inventions will have roughly the same standards for patentability, but distinct standards from the biotechnological invention. Burk and Lemley do not address this question, but the implication is that the patentability differences in this scheme (e.g., the difference between A' and B') are more pronounced than those in the micro-specific context.

Table 2: The Macro-Specific Approach

Invention	PHOSITA Level	Obviousness Standard	Disclosure Requirement[10]
Data management	A	A'	A"
Machine learning	A	A'	A"
Genomic research	B	B'	B"

9. How one might determine the appropriate level of skill for a given *field* (as opposed to the invention before the court) is open to serious question, of course. Burk and Lemley suggest that software and biotechnology require roughly similar levels of skill—or at least do not deserve the divergent treatment they report in their review of the jurisprudence. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1191-96; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 20-21.

10. Note in this regard that Burk and Lemley suggest that in their ideal *macro*-specific regime, the obviousness and disclosure standards would be "decoupled," allowing policy-based variation for particular technologies. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1202-05; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 60.

As between these two forms of specificity, I take the micro form to be both a positive description of the patent law, as well as a normatively justifiable position. The chief advantage (and challenge) of the patent law is its ability to provide a set of clear background (i.e., "property") rules upon which private parties can build to invent, invest, and commercialize. Accordingly, the patent law must always retain the flexibility to adapt to new technological developments and economic shifts. In the micro-specific context, this flexibility is realized through the use of the PHOSITA standard as the lens through which a number of critical analyses are conducted. As a question of fact that should necessarily vary from particular innovation to particular innovation, the ordinary skill in the art framework grounds the legal abstractions of the patent law to the technological facts in any given case.

The macro form of technological exceptionalism, however, is far more problematic. Here, rather than building flexibility and innovation into the stable backdrop of the law, the project is broader, typically invoking arguments related to the "nature of the technology" or the "structure of the innovation," or perhaps even the normative profile of the participants to support essentially *sui generis* changes in the patent law. Macro-specificity shifts consideration of the patent law from a general background principle of property rights to a vehicle for particularistic, technology-specific innovation policy choices. As I note in Part IV below, there are a number of reasons why it is worth at least challenging the efficacy and appropriateness of this development in the patent law.

One important limitation of the Burk and Lemley thesis is that the distinction set forth above remains unaccounted for in their analysis. They do seem to recognize what they describe as "inherent" technological-specificity, which might be taken to correspond to what I've described as micro-specificity.[11] Yet they also quite clearly perceive (and advocate for) a broader, macro version of exceptionalism as a means by which to influence technological development in the biotechnological field.[12] Because, as I argue below, it is by no means clear that the differences they identify result from conscious macro-specific behavior on the part of the Federal Circuit, this failure to account for both forms of technological specificity weakens their argument.

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11. Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1191; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 29.

12. Burk & Lemley identify what they suggest are "extraordinary" differences in the legal standards applied to software and biotechnology, respectively. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1191; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 19-20.

B. The Indeterminate Scope-Effects of the PHOSITA

At various points in their argument, Burk & Lemley seek to connect the PHOSITA standard directly to the scope of the patent grant.[13] This linkage, I suggest, is tenuous at best, for the following reasons.

First, *both* the disclosure requirements and the obviousness requirement are scope-affecting. Obviously, a higher standard of disclosure will force a patentee to claim more closely to what she has described, narrowing the literal scope of the patent.[14] But the obviousness standard will also affect scope: a reduced standard of (non)obviousness will allow a patentee to establish claims "closer" to any relevant prior art.[15] An extremely reduced version of the obviousness requirement—call it "anticipation"—will allow claims that merely avoid the disclosure of the prior art, as well as those that cover more innovative subject matter.[16] Conversely, a higher standard of (non)obviousness will yield claims that are more distinct (in physical terms, more distant) from the prior art, and thus narrower.

Importantly, note the following: (1) the inverse relationship between the obviousness and disclosure standards (at least under current doctrine); and (2) the direct relationship between the scope-effects of the obviousness and disclosure standards. This suggests that, contrary to Burk and Lemley's assumption, the patent scope-effects of changes in the PHOSITA standard will be fundamentally indeterminate, without knowledge of the relative magnitude of the disclosure-related and obviousness-related scope effects.[17]

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13. For example, Burk and Lemley suggest that the PHOSITA level in the software cases will yield "a relatively small number of broad patents," and that the different standards in the biotechnological cases will result in narrower, but fewer patents. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1172-73, 1180-82.

14. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1170; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 10-11.

15. As well as, of course, enabling the patenting of subject matter that could not otherwise be patented. Indeed, it is this "gatekeeping" function that is perhaps the most important (and apparent) contribution of obviousness. *See generally* Robert P. Merges, *Uncertainty and the Standard of Patentability*, 7 HIGH TECH. L.J. 1 (1992).

16. *See, e.g.*, 35 U.S.C. § 102 (2000).

17. Perhaps one might assume that any obviousness-based scope effects will be swamped by those related to the disclosure requirement. This seems to me to be a problematic assumption, given the typicality of scope-reducing claim amendments as a means to overcome examiner rejections. Another possibility is to assume that patentees don't care about the scope of their claims vis-à-vis the prior art, and instead claim aggressively only towards the "outer limit" that the disclosure allows. This seems somewhat more probable, but assumes irrational behavior. In any event, neither of these assumptions seems to fit with the Burk and Lemley argument.

A second observation concerning the PHOSITA and claim scope is that the standard's effect on the scope and availability of *equivalents* infringement is also fatally indeterminate. For example, a high degree of skill in the art (a difficult field) implies:

1) a relatively *narrower* doctrine of equivalents, because the possibility of "known interchangeability" between claim elements and their purported equivalents will be reduced;[18]

2) a relatively *broader* doctrine of equivalents, because prior-art based limitations on the doctrine will be less available;[19]

3) a relatively *narrower* doctrine of equivalents, because of the efforts of the Federal Circuit to limit equivalents due to the patent's disclosure;[20]

4) a relatively *broader* doctrine of equivalents, because of the ability to more easily overcome the *Festo* presumption against equivalents in cases where a claim amendment would eliminate infringement of a technology unforeseeable by one of ordinary skill.[21]

Thus, while it is clear that the determination of a PHOSITA standard will *affect* the scope of the doctrine of equivalents, not much more can be safely concluded. Table 3 notes the relative effects of the PHOSITA standard on the scope of the patent.

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18. *See, e.g.*, Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 23-24; *see also* Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 609 (1950); Hilton Davis Chem. Corp. v. Warner-Jenkinson Co., 62 F.3d 1512, 1519 (Fed. Cir. 1995) (en banc), *aff'd in part & rev'd in part on other grounds*, 520 U.S. 17 (1997).

19. *See, e.g.*, Wilson Sporting Goods Co. v. David Geoffrey & Assocs., 904 F.2d 677, 684 (Fed. Cir. 1990) ("[S]ince prior art always limits what an inventor could have claimed, it limits the range of permissible equivalents of a claim.").

20. *See, e.g.*, Sage Prods., Inc. v. Devon Indus., 126 F.3d 1420, 1424-26 (Fed. Cir. 1997) (limiting equivalents due to clarity of the patent's disclosure).

21. *See, e.g.*, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 740 (2002).

Table 3: The Scope-Effects of the PHOSITA Standard

PHOSITA Level	Obviousness Standard	Disclosure Standard	Scope-effects (obvious-ness)	Scope-effects (disclosure)	Scope-effects (equivalents)
Low (easy field)	Higher	Lower	Lower	Higher	Indeterminate
High (hard field)	Lower	Higher	Higher	Lower	Indeterminate

Again, given the varying results in three rightmost columns (scope-effects) for each case, any conclusion concerning the overall scope-effects of a change in the PHOSITA standard would require detailed knowledge concerning the relationship among the various scope-effects. Thus, while it is clear that the PHOSITA standard influences the scope of the patent, the direction and magnitude of that effect is quite indeterminate, and no meaningful conclusions can be drawn concerning the relationship.[22]

This Part has argued that, although *Is Patent Law Technology-Specific?* correctly posits a difference in the way different technologies are treated, a more nuanced analysis suggests that both the nature and scope of the technological specificity in the modern patent doctrine is perhaps less substantially clear than Burk and Lemley suggest.

III. THE UNCERTAIN PATH-DEPENDENCIES OF THE PATENT LAW

As I established in Part II.A above, two distinct forms of technological-specificity can potentially be applied to the patent law. The first, *micro*-specificity, applies varying standards of patentability according to the specific technological circumstances—meaning that each invention (in theory at least) has a unique, contextual requirement for patentability. The second, *macro*-specificity, applies similar standards of patentability to inventions in the same technological field (or "industry," as Burk and Lemley at times refer to it), while applying distinct standards to different technological fields. This Part explores which form(s) of exceptionalism can reasonably be said to exist in the patent law.

As an initial matter, I note that there is no real question but that micro forms of technological-specificity are fundamental to the patent law. That

22. Note, of course, that Burk and Lemley's proposal that the courts "decouple" the linkage between obviousness and disclosure, and—in the biotechnological context—relax the disclosure requirement while maintaining the obviousness standard could in some cases yield the broader patents they seek. *See infra* Part IV.

is, whether the patent law is, as Burk and Lemley ask, "technology-specific," strikes me, then, as an easy and rather obvious question.[23] Of course it is: among other aspects, the ordinary skill in the art standard implements the micro-exceptionalism described above. Thus the analysis here considers whether the broader, macro, form is descriptive of the modern patent law.

A. The Dogs That Don't Bark: The Missing Evidence of Macro-Specificity

As Burk and Lemley note, the Federal Circuit's patentability jurisprudence in the biotechnological area is self-consciously distinct from that in other technological fields such as software. Indeed, Burk and Lemley juxtapose language from cases considering the disclosure requirement in the software and biotechnological fields, illuminating that in the software context, the Federal Circuit has held that the disclosure of functions is sufficient, while in the biotechnological context, the Federal Circuit has held that the disclosure of genetic function is insufficient.[24] Yet this demonstration, standing alone, does little more than highlight the importance of the PHOSITA standard: in each case, the court was viewing the technology through the prism of a particular level of skill in the art.[25] It is apparent that the court believes that the levels of skill differ in relation to the two technologies at issue; we should expect, not resist, the distinct treatment.

In order to show *macro*-specificity, Burk and Lemley must argue (as they do) that the level of skill in the art is systematically approached differently in the biotechnological and software cases and that this is an enduring (likely policy-driven) feature of the patent law rather than transient in nature.[26] Yet even taking the Burk and Lemley approach to the relevant caselaw as correct, there remain a variety of reasons that the approach to the PHOSITA standard in this area could appear systematic and yet result in a jurisprudence that is far more micro-specific than macro-specific. For example:

1) *Sample size.* One possibility is that the systematic technological specificity identified by Burk and Lemley is essentially a statistical

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23. They do, of course, acknowledge that the patent law is "inherently technology specific." Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 29.

24. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1183-84 (quoting Fonar Corp. v. Gen. Elec. Co., 107 F.3d 1543 (Fed. Cir. 1997); Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559 (Fed. Cir. 1997)); *accord* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 20-21 (same).

25. *Compare Fonar*, 107 F.3d at 1549, *with Eli Lilly*, 119 F.3d at 1568.

26. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1194-95.

artifact related to the fairly small number of cases extant in the relevant jurisprudence (i.e., those analyzed by these and other commentators).[27] The implication here is that the purported systemization would fade or disappear as more cases are decided.

2) *Judicial consistency.* Another possibility is that the technological specificity identified by Burk and Lemley is related to the (remarkably) small number of judges who have authored the opinions studied in the article (and others).[28] This suggests that any case-to-case consistency is a reflection of one judge's uniform approach, rather than either a court-wide decision or an enduring feature of the jurisprudence.[29]

3) *Factual error.* Yet another possibility is that the systematic technological specificity identified by Burk and Lemley results from a judicial misunderstanding of the relevant facts.[30] The judges who

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27. Burk & Lemley cite eight cases as representative of the suggested problematic approach to the issue. They are: *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, 296 F.3d 1316 (Fed. Cir. 2002); *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1371 (Fed. Cir. 1999); *Eli Lilly*, 119 F.3d at 1559; *In re Deuel*, 51 F.3d 1552, 1559 (Fed. Cir. 1995); *In re Goodman*, 11 F.3d 1046, 1052 (Fed. Cir. 1993); *In re Bell*, 991 F.2d 781 (Fed. Cir. 1993); *Fiers v. Rivel*, 984 F.2d 1164 (Fed. Cir. 1993); *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200 (Fed. Cir. 1991). These cases, or a subset thereof, appear to be the most relevant to the commentators.

28. Of the opinions cited in footnote 27 as being relevant, every one except for *Goodman* has been authored by Judge Lourie.

29. There is another important observation to be made here. Given the essentially random assignment of cases to panels of judges, it is extremely unlikely that cases focusing on obviousness or disclosure in the biotechnological area have been uniformly assigned to panels containing Judge Lourie. This fact further suggests that Judge Lourie (perhaps alone among Federal Circuit judges) actively seeks opportunities to use his particular brand of biotechnological PHOSITA analysis. That is, Judge Lourie presumably is far more likely to seize the opportunity to analyze the disclosure (or obviousness) of biotechnological inventions, while his colleagues are more likely to decide these cases on other issues, such as software. Absent these sorts of selection-effects, it would be difficult to reconcile the Federal Circuit's professed random case assignment procedure with the pattern of decision-making in this area.

30. Burk and Lemley initially note this explanation themselves, but seem to suggest that the court has not considered these factual issues in more recent cases. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1194-95; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 31-32. Yet the recent cases need not undermine the intuition that the factual analysis is flawed as a matter of technology: the failure to explicitly revisit technological facts might suggest that the court continues to believe them to be correct. Note that in the Federal Circuit's most recent effort at biotechnological disclosure standards, it remanded with explicit instructions to analyze the relevant technological

have addressed these issues thus far may not fully understand the detailed, fact-based distinctions—between genomic research and small molecule chemistry, for example—and thus may have been likely to simply transfer a PHOSITA standard from one context to another. Again, this concern is neither indicative of a macro-exceptionalist approach nor difficult to remedy going forward.[31]

4) *Fact/Law confusion.* A fourth possibility is that any systematic technological-specificity identified by Burk and Lemley arises as a result of confusion at the Federal Circuit concerning the nature of facts, law, and *stare decisis*. For example, the court may be failing to understand the implications of the distinctly fact-based inquiry into the PHOSITA with respect to appellate review. Or the court may simply be refusing to afford factual findings any deference, in favor of factual analysis of its own.[32]

Any one of these explanations for Burk and Lemley's observed patterns in the patent law is sufficient to undermine their macro-specific argument. The most likely situation, of course, is that a combination of the above exists.

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facts. *See Gen-Probe, Inc.,* 296 F.3d at 1324-26 ("It is not correct, however, that all functional descriptions of genetic material fail to meet the written description requirement.").

31. Indeed, the court seems to have importantly reaffirmed the basic factual nature of the disclosure inquiry in its most recent precedent. In *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, the court stated:

> Although the patent specification lacks description of the location along the bacterial DNA to which the claimed sequences bind, Enzo has at least raised a genuine issue of material fact as to whether a reasonable fact-finder could conclude that the claimed sequences are described by their ability to hybridize to structures that, while not explicitly sequenced, are accessible to the public. Such hybridization to disclosed organisms may meet the PTO's Guidelines stating that functional claiming is permissible when the claimed material hybridizes to a disclosed substrate. That is a fact question. We therefore conclude that the district court erred in granting summary judgment that the claims are invalid for failure to meet the written description requirement. On remand, the court should consider whether one of skill in the art would find the generically claimed sequences described on the basis of Enzo's disclosure of the hybridization function and an accessible structure, consistent with the PTO Guidelines. If so, the written description requirement would be met.

296 F.3d at 1328.

32. Arti Rai suggests that this is an endemic problem with the Federal Circuit's jurisprudential approach. *See* Rai, *Facts, Law & Policy*, *supra* note 2.

This is not to suggest, however, that the application of the PHOSITA standard in the biotechnological area appears anywhere near optimal. Indeed, in my view, Burk and Lemley have compellingly identified problems with the Federal Circuit's jurisprudence; at least some of these concerns—especially the judge-based effects (number two above)—suggest that the court would be well-advised to carefully consider the process by which this doctrinal development is occurring.

B. The Factual Nature of the Federal Circuit's Technological Exceptionalism

The other possibilities offered above—that the court is factually mistaken or legally misunderstanding the role and nature of the PHOSITA analysis along a number of dimensions (numbers three and four)—are also worth criticizing. And yet these problems seem quite unlikely to create the sort of path-dependencies that would raise concerns of macro-specificity.

In this vein, most commentators appear to assume the future development of this technology-specific patent doctrine will continue along the presently-observed trajectory.[33] However, the "mistakes have been made" form of criticism has an easy answer: the use of correct technological facts.[34] The distinctly factual nature of micro-exceptionalism provides ample opportunity for future panels of the Federal Circuit to establish their own analysis in any given case. Indeed, an appropriate understanding of the role of the PHOSITA in the patent law would seem to virtually *preclude* the creation and use of categorical rules.[35] The state of the art in such fields is changing rapidly. That one of ordinary skill might have been

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33. *See, e.g.*, Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1194-95; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 33-34; *see also* John M. Lucas, *The Doctrine of Simultaneous Conception and Reduction to Practice in Biotechnology: A Double Standard for the Double Helix*, 26 AIPLA Q.J. 381, 418 (1998) (cited in Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1192 n.167); Arti K. Rai, *Addressing the Patent Gold Rush: The Role of Deference to PTO Denials*, 2 WASH. U. J.L. & POL'Y 199 (2000) [hereinafter Rai, *Patent Gold Rush*]; Arti K. Rai, *Intellectual Property Rights in Biotechnology: Addressing New Technology*, 34 WAKE FOREST L. REV. 827 (1999) [hereinafter Rai, *Intellectual Property Rights*].

34. As Burk and Lemley seem to acknowledge, at least in part. Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 33.

35. To this end, the court's explicit description of aspects of the disclosure requirements in the software context as a "general rule" seems distinctly unwise. *See*, *e.g.,* Fonar Corp. v. Gen. Elec. Co., 107 F.3d 1543, 1549 (Fed. Cir. 1997). And to the extent that the court's failure to explicitly ground PHOSITA analyses in the biotechnological area to factual considerations can be taken to infer a form of the "general rule" statement noted above, corrective actions should be taken. In this vein, the recent discussion in *Enzo Biochem* might be viewed as a nod in this direction. *See* discussion and citation *supra* note 31.

unable to determine the DNA sequences that would code for EPO from a few examples circa 1984[36] seems nearly irrelevant to the level of knowledge in DNA sequence identification in the late 1990s.[37] Put another way, the explicit references to the "ordinary skill in the art to which [the invention] pertains" might be said to fundamentally *require* the reconsideration of issues of technological fact at each instance,[38] rather than perpetuating imprecise standards, even "decoupl[ed],"[39] as substitutes for technological fact. The correct rule as a matter of doctrine may also be the correct rule as a matter of policy: the courts may not, and should not, "standardize" the person of ordinary skill in the art.[40] Micro-specificity will prevail, and unhelpful path-dependencies will be avoided.

C. A Response to Burk and Lemley

Before moving to a broader critique of exceptionalist schemes, a brief response is in order. That is, in *Is Patent Law Technology-Specific?*, Burk and Lemley seek to brush aside the line of analysis in Part III of this Article, suggesting that it simply results from a different understanding of the relevant caselaw.[41] But this response is too facile; as I've repeatedly noted above, I've assumed in this Part that their view of the relevant doctrine is correct. The point here is that even evaluating the precedent *just as they do* does not resolve the question of whether what we see in the patent law is macro-specificity, or merely a version of micro-specificity colored by fac-

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36. U.S. Patent No. 4,703,008 (issued Oct. 27, 1987). The '008 patent was entitled "DNA sequences encoding erythropoietin" and was filed November 30, 1984. The '008 patent was at issue in *Amgen, Inc. v. Chugai Pharma. Co.*, 927 F.3d 1200 (Fed. Cir. 1991).

37. *See, e.g.,* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1181-82; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 25; Lucas, *supra* note 33, at 418.

38. *See* 35 U.S.C. §§ 103, 112 (2000).

39. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1202; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 27.

40. One response to this assertion is that the Federal Circuit, at least, seems to consider the prior rulings as having precedential value. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1185. This objection is unsatisfactory. First, the court always acknowledges the factual basis of the analysis. Second, notwithstanding the backwards citations, it is difficult to determine the actual weight given to earlier factual determinations in different cases. And third, I noted above the truly remarkable homogeneity of the relevant Federal Circuit decisions, which suggests that author consistency rather than doctrinal development is at issue. *See supra* note 27 and accompanying text.

41. Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 21. They note that Lawrence M. Sung has suggested that the biotechnology cases are little different in application from cases in other technological areas. *See generally* Lawrence M. Sung, *On Treating Past as Prologue*, 2001 U. ILL. J.L. TECH. & POL'Y 75 (2001). This is not, however, the argument I make.

tual error or the unusual circumstances surrounding this line of cases.[42] While it is possible that the Federal Circuit has created a policy-driven, enduring, macro-specific doctrine for the field of biotechnology, that issue has yet to be resolved.

IV. OF COASE AND COMPLEXITY: FIXING THE PATENT DOCTRINE

Even if the patent law evinces a technologically-exceptionalist approach—with disparate legal rules applied to different technological fields—there remain significant reasons to believe that the effort to formalize and tailor such exceptionalism, as Burk and Lemley advocate, is misguided.

As several commentators have observed, there is at least some concern that the field of biotechnology in particular has structural and technological features that might make it susceptible to transaction-costS and related forms of market inefficiencies.[43] Generally referred to by the term "anticommons," the theory suggests that the difficulty in arranging and aggregating the patent rights necessary to actually deliver marketable goods will stymie the participants in this field—to a degree that will ultimately reduce the pace of technological development, and thus increase social losses.[44] There are a variety of responses to this perceived problem in the literature, ranging from vertical integration,[45] to the formation of collective rights organizations,[46] to the denial of patenting altogether in some areas of the field.[47] To these, Burk and Lemley add another: the expansion

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42. *See supra* Part II.A.

43. *See, e.g.*, Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons on Biomedical Research*, 280 SCI. 698 (1998); Arti K. Rai, *The Information Revolution Reaches Pharmaceuticals: Balancing Innovation Incentives, Cost, and Access in the Post-Genomics Era*, 2001 U. ILL L. REV. 173 (2001) [hereainfter Rai, *Information Revolution*]. *But see* JOHN P. WALSH ET AL., THE PATENTING AND LICENSING OF RESEARCH TOOLS AND BIOMEDICAL INNOVATION (The Heinz School—Carnegie Mellon University, Working Paper No. 2, 2003).

44. *See* Heller & Eisenberg, *supra* note 43, at 698-99. For a full description of the anticommons theory, see Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998).

45. *See, e.g.*, Arti K. Rai, *Fostering Cumulative Innovation in the Biopharmaceutical Industry: The Role of Patents and Antitrust*, 16 BERKELEY TECH. L.J. 813 (2001) [hereinafter, Rai, *Fostering Cumulative Innovation*] (describing and criticizing this trend)

46. *See, e.g.*, Heller & Eisenberg, *supra* note 43. On collective rights organizations more generally, see Robert Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations,* 84 CALIF. L. REV. 1293 (1996).

47. *See, e.g.*, Heller & Eisenberg, *supra* note 43; Rai, *Fostering Cumulative Innovation*, *supra* note 45.

of patent rights in these areas, so as to create conditions more akin to Kitch's "prospect" theory.[48] In Burk and Lemley's view, such expansion—together with modestly increased standards for patentability—will yield fewer and more powerful patents,[49] thus decreasing the characteristics of the biotechnology field that might create an anticommons problem.[50]

Note in this regard that there are serious problems with Burk and Lemley's assumption concerning the relationship between the frequency of patents and their enforceable scope. Their suggestion seems to be that strengthening the obviousness requirement while simultaneously weakening the disclosure requirement will yield fewer yet broader patents.[51]

An initial problem is the assumption that such changes will affect patent scope in the way that Burk and Lemley suggest. In Part II.B above, I described the indeterminacy of the relationship between patent scope and simultaneous changes in the obviousness and disclosure requirements—the most that can be said without a series of difficult empirical assumptions is that scope will be affected. The magnitude and direction of the effect, however, is unclear.[52] The suggestion that those doctrines be "decoupled" might have helped their case, if they limited their proposal to loosening the disclosure requirement, for example.[53]

Perhaps even more troubling are the assumptions about patent frequency. That there will be fewer patents of course does not logically follow from broader patents. This ignores the ex ante incentives of the patent system: broader (stronger) patents will induce additional incentives to en-

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48. The prospect theory of patents analogizes patents to mineral claims—as opportunities for further investment and exploitation rather than a reward for innovation. *See* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 271-80 (1977) (broad "prospect" patents allow for better resource allocation to innovation); *see also* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 48 (noting the benefits of Kitch's "prospect" theory in the pharmaceutical context).

49. Note that there are serious problems with Burk and Lemley's assumption concerning the relationship between the frequency of patents and their scope. The suggestion seems to be that strengthening the obviousness requirement while simultaneously weakening the disclosure requirement will yield fewer yet broader patents. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1173, 1182, 1195-96; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 62.

50. *See* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 62.

51. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1173, 1182, 1195-96; Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 62.

52. *See supra* tbl. 3.

53. S*ee* Burk & Lemley, *Technology Specific*, *supra* note 1, at 1205 (advocating the "decoupling" of the standards for obviousness and disclosure); *see also* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 62 (positing simultaneous changes).

gage in inventive behavior (or at least patenting behavior). This has been empirically verified.[54] Thus, broader patents should lead to greater, not fewer, patents.[55] To the extent that Burk and Lemley rely on their proposed increase in the obviousness standard to yield fewer patents, that simply raises the fatal indeterminacy problem noted above: Will the additional difficulty of obtaining patents (the heightened (non)obviousness requirement) outweigh the effects of broader and stronger patents (due to lower disclosure requirements)? The bottom line is that the effects of the Burk and Lemley proposals on the scope and frequency of patents is unclear.

Finally, while I am generally sympathetic to Burk and Lemley's view that strengthening biotech patents is likely to be a better solution along a number of dimensions than reducing patent scope,[56] a third option appears dominant here, especially given the uncertainties surrounding the premises of the Burk and Lemley argument. That is, the possibility of an anticommons in biotechnology (in particular) could be ameliorated, perhaps significantly, via relatively straightforward efforts to clarify and stabilize the patent jurisprudence, thereby reducing the transaction costs of combining rights.[57] This point is simply Coasean: while other commentators focus on the appropriate entitlements,[58] the reduction of transaction costs (thus diminishing the importance of those entitlements) may well provide a better payoff.[59] To be sure, we can never eliminate the transaction and related

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54. *See, e.g.*, *See, e.g.*, Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: Determinants of Patenting in the US Semiconductor Industry, 1980-94*, 32 RAND J. ECON. 101-25 (2001) (documenting an increase in patenting linked to strengthening the patent law in the 1980s).

55. *Cf.* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 62.

56. *See generally* R. Polk Wagner, *Information Wants to Be Free: Intellectual Property and the Mythologies of Control*, 103 COLUM. L. REV. 995 (2003) (noting the benefits of broader, as opposed to narrower, property rights in information goods).

57. That is, the Federal Circuit could work to clarify and stabilize the patent law, rather than adopting substantive changes. And while there is some question concerning the success of the Federal Circuit in doing so, this approach is well-established as a part of the mission of the Federal Circuit. *See, e.g.*, R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. (forthcoming 2004).

Of relevance in this context would be efforts to bring additional clarity and predictability to the obviousness and disclosure doctrines that Burk and Lemley specifically address.

58. *See supra* notes 43-47.

59. Ronald Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960) (noting the importance of transaction costs in entitlement analysis). Note that Heller and Eisenberg suggested in their original, groundbreaking article that collective rights organizations—

costs inherent in the patent system, and efforts to clarify the law can only achieve part of this goal at best. But all options in this context are "second best" in nature: the goal is to improve the current situation, given the world as we find it.

One important question is how one might seek to clarify patent rights in this context. And while a full treatment of that question is well beyond the scope of this Article, one thing we would surely *not* want to do is create the additional jurisprudential and doctrinal confusion that will result from introducing macro-exceptionalism to the patent law. In this sense *Is Patent Law Technology-Specific?* is a virtually perfect indictment of itself: Burk and Lemley go to great lengths to demonstrate the troublesome aspects of macro-specificity in the patent law, reserving special criticism for the Federal Circuit's inability to adequately understand the innovation policy needs of the modern biotechnology and software industries.[60] Having demonstrated (they suggest) the error of the court's technology-specific ways, one might expect that the next step is to suggest doctrinal adjustments to eliminate the inter-industry differences they suggest are harming technological development. Instead, they suggest that the court apply an entirely new jurisprudential framework, based on underlying principles of innovation policy. (Not to mention that the new doctrine would "decouple" the relatively uniform PHOSITA standard, thus requiring *at least* two detailed factual analyses to replace one.[61]) Implicit in their proposal is the idea that this new jurisprudential framework would (a) require reconsideration of obviousness and disclosure standards in all technological fields served by the patent law[62]; and (b) be subject to (and under obligation of) revision by the court anytime the background conditions for innovation in a particular field change.[63] And all this policy-driven, unconstrained decisionmaking with incredible importance for the future of technological development is being placed into the hands of the Federal Circuit—the very body that Burk and Lemley suggest has done such a poor job to this point.

In sum, this does not seem to be a proposal that is likely to increase the certainty and stability of the patent law in the biotechnological nor other

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another transaction-cost-reducing mechanism—might be a solution to any anticommons problem. *See* Heller & Eisenberg, *supra* note 43.

60. *See* Burk & Lemley, *Technology-Specific*, *supra* note 1, at 1195-96.

61. *See id*. at 1202.

62. That is to say *all* technological fields.

63. One conjures up troubling images of the Federal Circuit reviewing evidence concerning the availability of early-stage capital investment vehicles, interest rates, market conditions, and the like in a particular field prior to establishing the levels of (non)obviousness and disclosure required.

areas. Indeed, a transaction-cost-focused analysis would suggest that it is Burk and Lemley, rather than the Federal Circuit, who have it "exactly backwards."[64] Given the deep uncertainties underlying the premises of the argument,[65] as well as the promise of increasing transaction costs resulting from a shift from the *micro*-specific to *macro*-specific approach, there seem to be strong reasons to conclude that we should instead work diligently to reduce the very sort technological-specificity that *Is Patent Law Technology Specific?* advocates.

64. *Cf.* Burk & Lemley, *Uncertainty Principle*, *supra* note 1, at 3.
65. *See supra* Parts II, III.