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Dear Oxford Workshop Participants:

I am very much looking forward to visiting Oxford next week and presenting the attached draft on legal tech, civil procedure, and the future of adversarialism.

Some of the paper, you'll find, focuses on uniquely American procedural debates—for instance, the “plausibility” pleading standard. But plenty else in the paper is generalizable and applicable to the UK system, including Part I.B’s account of the possibilities and limits of natural language processing in performing higher order legal cognitions, Part II.A’s analysis of the effect of predictive coding on the distribution of litigation costs, Part II.B’s skepticism about legal tech tools that perform outcome prediction, and Part II.C’s treatment of legal tech’s challenge to the work product doctrine and litigation privilege.

In any event, I hope that the paper provides rich fodder for a transatlantic discussion of the future of litigation.

Sincerely,



David Freeman Engstrom

LEGAL TECH, CIVIL PROCEDURE, AND THE FUTURE OF ADVERSARIALISM

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“Legal tech” is transforming litigation and law practice, and its steady advance has tapped a rich vein of anxiety about the future of the legal profession. Much of the resulting debate narrowly focuses on what legal tech portends for the professional authority, and profitability, of lawyers. It is also profoundly futurist, full of references to “robolawyers” and “robojudges.” Lost in this rush to foretell the future of lawyers is what should be an equally or even more important concern: What effect will legal tech’s continued advance have on core features of our civil justice system and the procedural rules that structure it? This Article seeks to enrich—and, in places, reorient—budding debate about legal tech’s implications for law and litigation by zeroing in on the near- to medium-term, not out at a distant, robotic horizon. It does so via three case studies, each one exploring how a specific legal tech tool (e-discovery tools, outcome-prediction tools, tools that perform advanced legal analytics) might alter litigation, for good and ill, by shifting the distribution of costs and information within the system. Each case study then traces how a concrete set of civil procedure rules—from Twombly/Iqbal’s pleading standard and the work product doctrine to the rules and doctrines that govern forum-shopping—can, or should, adapt in response. When these assorted dynamics are lined up and viewed together, it is not a stretch to suggest that legal tech will remake the adversarial system, not by replacing lawyers and judges with robots, but rather by unsettling, and even resetting, several of the system’s procedural cornerstones. The challenge for courts—and, in time, for rulemakers and legislators—will be how best to adapt a digitized litigation system using civil procedure rules built for a very different, analog era. This Article aims to jumpstart thinking about that process by identifying the principal ways that legal tech will reshape “our adversarialism” and mapping a research agenda going forward.

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INTRODUCTION

“Legal tech,” most agree, is transforming litigation and law practice, and its steady advance has tapped a rich vein of anxiety about the future of the legal profession.¹ Is law like a driverless car, or is it irreducibly complex and grounded in dynamic human judgment? How to square online dispute resolution and automated legal advice with rules governing unauthorized practice of law? Can BigLaw survive? Much of this has a profession-centered and even defensive quality in its narrow focus on what legal tech portends for the professional authority, and profitability, of lawyers. Much of it is also profoundly futurist—full of predictions of “robo lawyers,”² “robojudges,”³ or even an eventual state of “legal singularity,”⁴ when machines can perfectly predict the outcomes of cases before they are filed.

Lost in this rush to foretell the future of lawyers and their robotic replacements is what should be an equally or even more important concern: What effect will legal tech’s continued advance have on core features of our civil justice system and, in particular, the procedural rules that structure it? This Article seeks to enrich—and, in places, reorient—budding debate about what many see as a coming revolution in legal tech. Simply put, if law and the legal profession will look different ten or fifteen years from now, then civil procedure, and the inner workings and structure of the adversarial system, will look different as well. Indeed, though virtually unmentioned in an emerging and lively literature on legal tech, it is the rules of civil procedure and related doctrines that will serve as the front-line regulators of the new legal tech tools, and critically shape their evolution, in the near-to medium-term. As a result, judges, rulemakers, and legislators should begin to think about whether, and if so how, to adapt civil procedure to new litigation realities as legal tech continues its move to the center of the civil justice system.

¹ See, e.g., BENJAMIN BARTON, *GLASS HALF FULL: THE DECLINE AND REBIRTH OF THE LEGAL PROFESSION* (2015); RICHARD SUSSKIND, *TOMORROW’S LAWYERS: AN INTRODUCTION TO YOUR FUTURE* (2013); RICHARD SUSSKIND & DANIEL SUSSKIND, *THE FUTURE OF THE PROFESSIONS: HOW TECHNOLOGY WILL TRANSFORM THE WORK OF HUMAN EXPERTS* (2015); Daniel Martin Katz, *Quantitative Legal Prediction - Or - How I Learned to Stop Worrying and Start Preparing for the Data-Driven Future of the Legal Services Industry*, 62 EMORY L.J. 909 (2013); John O. McGinnis & Russell G. Pearce, *The Great Disruption: How Machine Intelligence Will Transform the Role of Lawyers in the Delivery of Legal Services*, 82 FORDHAM L. REV. 3041 (2014); Dana A. Remus & Frank Levy, *Can Robots Be Lawyers: Computers, Lawyers, and the Practice of Law*, 30 GEO. J. LEGAL ETHICS 501 (2017); Tanina Rostain, *Robots versus Lawyers: A User-Centered Approach*, 30 GEO. J. LEGAL ETHICS 559 (2017); Sean Semmler & Zeeve Rose, *Artificial Intelligence: Application Today and Implications Tomorrow*, 16 DUKE L. & TECH. REV. 85 (2017); Harry Surden, *Machine Learning and Law*, 89 WASH. L. REV. 87 (2014); Eric Talley, *Is The Future of Law a Driverless Car? Assessing How the Data Analytics Revolution Will Transform Legal Practice*, 174 J. INST. & THEORETICAL ECON. 183 (2018); David C. Vladeck, *Machines without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117 (2014). For treatments in the popular and lawyer-trade presses, see Mark A. Cohen, *Legal Innovation Is Not an Oxymoron—It’s Further Along Than You Think*, FORBES (Mar. 14, 2017), <https://www.forbes.com/sites/markcohen1/2017/03/14/legal-innovation-is-not-an-oxymoron-its-farther-along-than-you-think/>; Jason Koebler, *Rise of the Robo lawyers*, THE ATLANTIC (Apr. 2017), <https://www.theatlantic.com/magazine/archive/2017/04/rise-of-the-robo-lawyers/517794/>; Steve Lohr, *AI Is Doing Legal Work, But It Won’t Replace Lawyers, Yet*, N.Y. TIMES (Mar. 19, 2017), <https://www.nytimes.com/2017/03/19/technology/lawyers-artificial-intelligence.html>; John Markoff, *Armies of Expensive Lawyers, Replaced by Cheaper Software*, N.Y. TIMES (Mar. 4, 2011), <https://www.nytimes.com/2011/03/05/science/05legal.html>; Debra Cassens Weiss, *Will Technology Create a Lawyer ‘Jobs-Pocalypse’?*, A.B.A. J. (Jan. 5, 2016), http://www.abajournal.com/news/article/does_technology_presage_a_lawyer_jobs_pocalypse_naysayers_overstate_impact.

² Gary Marchant & Josh Covey, *Robo-Lawyers*, 45 LITIGATION 27 (2018); Koebler, *supra* note 1.

³ Eugene Volokh, *Chief Justice Robots*, 68 DUKE L.J. 1135 (2019); Aziz Huq, *The Right to a Human Decision*, 105 VA. L. REV. (forthcoming 2020). See also Richard M. Re & Alicia Solow-Niederman, *Developing Artificially Intelligent Justice*, 22 STAN. TECH. L. REV. 323 (2019) (asserting that “the prospect of ‘robot judges’ suddenly seems plausible—even imminent”).

⁴ See Benjamin Alarie, *The Path of the Law: Toward Legal Singularity*, 66 U. TORONTO L.J. 443 (2016) [hereinafter Alarie, *Path*].

We aim to spark concrete thinking about this mediating role for civil procedure by focusing on the near future—not out at a horizon dotted with robojudges and robolawyers—and then asking how legal tech will change litigation and, in turn, how civil procedure can or should adapt in response. The core of our argument proceeds from the premise that legal tech’s proliferation is likely to alter two foundational aspects of any litigation system: the distribution of litigation costs and the distribution of information. In a nutshell, there is good reason to believe that the concern about high and asymmetric litigation costs that has fueled several decades’ worth of litigation reforms will progressively fade as new and powerful e-discovery tools propagate. By contrast, it is plausible that increasing uptake of legal tech tools, including e-discovery tools but also tools that perform legal research and analytics and predict case outcomes, will worryingly widen information asymmetries within the system, between judges and litigants, and also between litigants and litigants, particularly litigation’s “haves” as against its “have nots.”

Isolating legal tech’s effects on these deep dimensions of the system provides needed analytic traction and grounds a set of concrete judgments about how an array of civil procedure rules and doctrines—among them the plausibility pleading standard set forth in *Twombly* and *Iqbal*, the bundle of procedural rules, doctrines, and statutes concerned with forum-shopping, and the work product doctrine—can, or should, adjust in response. When these assorted dynamics are lined up and viewed together, it is not a stretch to say that legal tech will, in time, remake the adversarial system, not by replacing lawyers and judges with robots, but rather by unsettling, and even resetting, several of its procedural cornerstones.

These are big claims, and they demand both a technical grasp of the legal tech toolkit and command of contemporary civil procedure. Given these complexities, we build our argument deliberately, in three steps.

Part I offers a full and quasi-technical accounting of where legal tech currently is and where it is likely to go in the near- to medium-term as natural language processing (NLP) and other machine learning techniques that power the most consequential legal tech tools continue to improve. In so doing, we strike a skeptical note and also go about our labors with a heavy dose of humility. As with any emergent technology, legal tech is a fast-moving field, and any effort to capture its many facets risks becoming antiquated almost as soon as the ink dries. We manage this contingency by surveying the legal tech landscape in three pieces. Part I.A reviews legal tech’s flavors and offers some ways to slice and dice them. Part I.B turns to legal tech’s technical trajectory. It shows that, while the frontier is quickly moving beyond e-discovery and digital referencing tools (think Westlaw or Lexis) to tools that automatically gather legal materials, predict case outcomes, and even draft legal documents, there are also legitimate questions about how far and how quickly legal tech can advance. Just how much progress can be made on outcome prediction tools given pervasive confidential settlements and the resulting lack of well-labeled data, or the current technical limits of natural language processing (NLP) in extracting and analyzing legal argumentation? Part I.C summarizes some key implications of legal tech—for the legal profession, for the distribution of power within the legal system, and for law itself—as sketched in an emerging academic literature. A thorough survey of the legal tech landscape provides the raw material for the more focused case studies to come.

Armed with Part I's extended account of legal tech's pathways of innovation and diffusion, we turn in Part II to offering three concrete cuts at how legal tech's advance will reshape American litigation and how procedural rules might mediate those effects.

Part II.A starts on familiar ground: e-discovery or, in more technical terms, the "predictive coding" tools that are quickly becoming a fixture of complex litigation practice. Our core claim is that, contrary to the views of some, civil litigation may well see a steady decline in overall discovery costs and, by extension, a narrowing of the litigation cost asymmetries that have motivated decades of litigation reforms, from the Civil Justice Reform Act of 1990 to the 2015 amendments reshuffling Rule 26's proportionality constraint. In a lower-friction world, we predict, battles over proportionality would largely abate. Narrowing litigation cost asymmetries may also alter, or at least destabilize, the normative foundation of a very different, and controversial, part of civil procedure: the plausibility pleading doctrine set forth in *Twombly* and *Iqbal*. That doctrine sits at the intersection of two competing concerns: litigation cost asymmetries, with attendant concerns about undue settlement leverage and the conversion of low- or even negative-value cases into positive-dollar settlements, and information asymmetries in cases where only discovery can dislodge privately held information about wrongdoing. By systematically narrowing litigation cost asymmetries, predictive coding could undermine the positive foundation of the new plausibility pleading regime.

Part II.B turns to legal tech tools that predict case outcomes. An obvious concern is that continued advances in outcome prediction tools will foster forum shopping, placing pressure on the rules, statutes, and doctrines—venue, removal, *Erie* doctrine—that seek to limit or shape its pursuit. Here we sound a more skeptical note about legal tech's implications for civil procedure. Current procedural rules and doctrines touching upon forum shopping strike a permissive pose, and so an initial question is whether successful deployment of predictive analytics *should* change that pose. Further grounds for skepticism are the technical and practical limits of outcome prediction tools, which may not "work" well enough to meaningfully increase forum-shopping in the first place. Even if the technical hurdles can be leapt, two other major obstacles stand in legal tech's way. First is the huge cost of assembling enough docket and document data to obtain sufficiently large and representative samples for contemporary prediction methods. Second are a pair of endogeneity problems that raise profound questions about either the initial or subsequent usefulness of even predictions based on large samples of data. Still, we think it useful to ask: If predictive analytics did "work," and if machine-aided forum shopping falls into disfavor, what follows? Here lie some of the most bracing procedural possibilities. Effective outcome-prediction tools and supercharged forum-shopping might steadily widen asymmetries in the quantity and quality of information available to litigants and *judges*. This might warrant changes in the treatment of forum shopping motives, in the discoverability of work product, or both. It would also raise questions about whether judges making choice-of-forum determinations, or deciding motions to dismiss and for summary judgment, should be empowered to order parties to disclose their machine outputs or perhaps even equipped with the same prediction tools litigants are using. Either scenario would press on the bounds of current conceptions of "managerial judging" and the proper allocation of authority between judge and jury.

Part II.C asks a key question that looms in the background of the other case studies and, indeed, all of legal tech: How might the work product doctrine need to change to accommodate a world

in which a non-trivial amount of lawyering, including not just discovery and outcome prediction, but also legal (re)search, brief-writing, and strategic litigation judgment, takes the form of machine-generated outputs? The fount of the work product rule, *Hickman v. Taylor*, famously brackets distributive concerns—*i.e.*, the fact that some parties can afford better counsel than others—and instead protects against “wits borrowed from the adversary,” as Justice Jackson put it, so that parties, and the system, can capture the benefit of good lawyering. In so doing, the work product rule secures the conditions necessary for a well-functioning adversarial system by ensuring returns on, and thus investment in, legal talent. But as legal tech tools grow more powerful, and if the “haves” have them and the “have nots” do not, legal tech could well shift the normative ground out from under a cornerstone of the American procedural system. In this new machine-driven world, should we, to invoke Justice Jackson’s turn of phrase in *Hickman*, protect against “borrowed bits” the same way we protect against “borrowed wits”?

Part III steps back and draws out some connections across the case studies. In particular, we show how legal tech’s continued advance will place civil procedure in a new and uncharted posture. In particular, judges—and, in time, rulemakers and legislators—will come to preside over what amounts to a shadow innovation policy because their procedural choices will shape the terms of legal tech’s use, its value to litigants, and its market for production. Just as important, legal tech’s advance will compel judges and policymakers to make explicit or implicit judgments about the optimal balance of adversary as against judicial control of civil proceedings and, in making those judgments, they will shape the future of American adversarialism.

Before launching, some caveats: First, we make no claims to comprehensiveness. Nor is ours a case study approach in the rigorous comparativist sense of making causal judgments about legal tech’s effect on procedure or vice versa. Rather, our aim is to map legal tech’s conceptual landscape and, by identifying a set of key procedural questions it implicates, chart further productive lines of inquiry. Last, we seek to be both far-thinking and concrete—thus achieving a salutary, middle-level of abstraction that is grounded in actual, not hypothetical, legal tech tools, as mediated by existing, not hypothetical, procedural rules. In other words, we aim to cut through the “AI fever” that infects the literature on legal tech, and on AI and law more broadly, without losing generality or zing. This is not to say legal tech lacks implications for the civil justice system beyond civil procedure. Will legal tech further vanish the vanishing trial, blunt incentives for private litigants to conduct socially valuable discovery, or stunt the dynamic evolution of legal norms? Throughout the Article, we address these and other wider-aperture questions in passing. However, our focus remains how procedure can, or should, mediate the legal tech revolution over the near- to medium-term.

I. THE LEGAL TECH LANDSCAPE

In *Law’s Empire*, Ronald Dworkin builds his influential theory of legal interpretation around a mythical uber-judge, Hercules, with a superhuman capacity to read and understand every available scrap of legal material and thus reach a unique right answer in every case.⁵ Dworkin’s project was to critique the legal positivism of H.L.A. Hart, and so it sits far away, intellectually speaking, from the world of legal tech. But Dworkin’s Hercules has recently taken

⁵ See RONALD DWORKIN, *LAW’S EMPIRE* (1986).

on renewed relevance as legal tech's advance has allowed us to glimpse a world in which machines, not just mythical judges, can unerringly adjudicate cases or even predict a case's outcome before it is filed. As Michael Livermore and Daniel Rockmore recently put it, judges, lawyers, and much of the legal system as we know it may someday soon be replaced by "blinking computerized Herculi" that sit in "server farms rather than law offices."⁶

This image of server farms replacing courthouses is an emotive one, and a cottage industry of mostly academic commentators has seized on it and set about imagining futuristic end-points—an event horizon of sorts, where law and technology meet. Blinking Herculi, it is said, will in turn bring a state of "legal singularity," when all legal outcomes are perfectly predictable *ex ante*, and all uncertainty is banished from the system.⁷ And law itself will be steadily transformed into a "vast catalogue of precisely tailored laws," or "microdirectives,"⁸ made up of "up-to-the-second individualized"⁹ rules that adjust in real-time—for instance, an individualized speed limit for a given driver with a given amount of experience operating in specific driving conditions—and are enforced via automatic penalties.¹⁰ As this new and "seamless legal order" settles into place, there is no longer any need, or any room, for lawyering, adjudication, judges, or judicial discretion. Law becomes "self-driving."¹¹

But just how likely are we to get there, and, assuming we make it at all, how soon? More importantly, what can we expect in the meantime? This Part addresses these questions. In so doing, we lower our gaze to a useful middle distance—our eyes neither inside the boat nor drifting out to a distant, Herculi-blinking horizon—and provide a systematic accounting of what we currently know, and don't know, about the state of legal tech. We address: legal tech's current range of applications (Part I.A); its trajectory, as shaped in particular by the technological possibilities and limits of text-based analytics (Part I.B); and its implications for the legal profession, the legal system, and law itself (Part I.C). The resulting composite portrait provides the raw materials necessary for Part II's exploration of some concrete ways the rules of civil procedure will mediate legal tech's incorporation into the adversarial system in the near- to medium-term.

A. Flavors of Legal Tech

An initial task is to survey legal tech's sprawling landscape. In what ways, and toward what ends, are legal tech tools being deployed within the American litigation system?

⁶ See Michael A. Livermore & Daniel N. Rockmore, *Introduction: From Analogue to Digital Legal Scholarship*, in *LAW AS DATA: COMPUTATION, TEXT, & THE FUTURE OF LEGAL ANALYSIS* xiv (Livermore & Rockmore eds., 2019) [hereinafter *LAW AS DATA*].

⁷ See Alarie, *Path*, *supra* note 4, at 445.

⁸ See Anthony J. Casey & Anthony Niblett, *The Death of Rules and Standards*, 92 *IND. L. REV.* 1401, 1403 (2017) [hereinafter Casey & Niblett, *Death*].

⁹ See Brian Sheppard, *Warming Up to Inscrutability: How Technology Could Challenge Our Concept of Law*, 68 *U. TORONTO L.J.* 36, 40 (2018). Casey & Niblett, *Death*, *supra* note 8, at 1404-06; Anthony Casey & Anthony Niblett, *Self-Driving Contracts*, 43 *J. Corp. L.* 1, 7-10 (2017) [hereinafter Casey & Niblett, *Self-Driving*].

¹⁰ See Sheppard, *supra* note 9, at 40. Casey & Niblett, *Death*, *supra* note 8, at 1404; Casey & Niblett, *Self-Driving*, *supra* note 9, at 7-10.

¹¹ See Casey & Niblett, *Self-Driving*, *supra* note 9, at 5.

A small literature surveys the legal tech field and offers some ways to slice and dice its component parts.¹² One approach honors legal tech's entrepreneurial tilt and focuses on sales channel, categorizing tools based on their end users (*e.g.*, lawyers, clients/parties, businesses).¹³ Among its virtues, this approach separates out tools that substitute for legal representation (*e.g.*, online legal advice tools) from those that remain within lawyers' locus of control (*e.g.*, e-discovery tools). Another plausible approach would focus on the type of task performed: legal research, document management and creation, and document- and case-level analytics, among others. Still another approach could focus on the point in litigation time at which a tool is used. Categories include tools used, beginning with the front-end of a case, lawyer-client matching, legal research and analysis, discovery, the drafting of pleadings and documents, and trial. A final approach allocates legal tech tools to categories based on subject area. This approach highlights proliferating domain-specific tools, particularly in the contracts area, but also patents (*e.g.*, tools that value patents and patent portfolios), divorce (the area closest to fully automated generation of legal documents), torts (the area where case valuation tools are most regularly in use), and tax (the area where legal analytics and prediction tools appear to be most advanced), with the rest allocated to a residual, "general" category.

The truth is that none of these approaches will be mutually exclusive and collectively exhaustive. Instead, Table 1 offers a mash-up of approaches in an effort to capture, at a glance, the main contours of the legal tech terrain. The result is nine categories of tools.

¹² See, *e.g.*, KEVIN D. ASHLEY, ARTIFICIAL INTELLIGENCE AND LEGAL ANALYTICS: NEW TOOLS FOR LAW PRACTICE IN THE DIGITAL AGE (2017) [hereinafter ASHLEY, LEGAL ANALYTICS]; Benjamin Alarie et al., *How Artificial Intelligence Will Affect the Practice of Law*, 68 U. TORONTO L. J. 106 (2018) [hereinafter Alarie, *How Artificial Intelligence Will*]; Daniel Ben-Ari et al., *Artificial Intelligence in the Practice of Law: An Analysis and Proof of Concept Experiment*, 23 RICH. J.L. & TECH. 2 (2017); Kathryn D. Betts & Kyle Jaep, *The Dawn of Fully Automated Contract Drafting: Machine Learning Breathes New Life Into a Decades-Old Promise*, 15 DUKE L. & TECH. REV. 216 (2017); Maura R. Grossman & Gordon V. Cormack, *Technology-Assisted Review in e-Discovery Can Be More Effective and More Efficient than Exhaustive Manual Review*, 17 RICH. J. L. & TECH. 1 (2011); David Lat, *How Artificial Intelligence Is Transforming Legal Research*, ABOVE THE LAW (2018), <https://abovethelaw.com/law2020/how-artificial-intelligence-is-transforming-legal-research/>.

¹³ See Daniel W. Linna, Jr., *What We Know and Need to Know About Legal Startups*, 67 S.C. L. REV. 389, 402-03 (2016).

TABLE 1. “LEGAL TECH” AT A GLANCE

| Category | End User | Description | Litigation Time | Examples |
|---|---|--|--|--|
| Lawyer Marketplace and Matching | lawyers, litigants, businesses | Tools that match lawyers with clients or facilitate a would-be client’s evaluation and choice of potential counsel. This category also includes tools that assist lawyers with business and client development via assessments of a current or potential client’s past legal entanglements or present legal exposure. | pre-filing | Avvo, Ravel, Lexicata, Atticus |
| Legal (Re)Search | lawyers | Tools that help lawyers locate and gather relevant raw materials (caselaw, statutes, regulations). | pre-filing, throughout litigation | CaseText, Judicata, Ross Intelligence |
| Outcome Prediction | lawyers, businesses (including litigation financiers) | Tools that predict case outcomes. Predictions can be jurisdiction- or judge-specific and are used to compare forums and assess case quality at intake, filing (<i>i.e.</i> , forum-shopping), or, once litigation is underway, to inform the strategic litigation and settlement calculus by predicting likely damages, how the assigned judge will rule, and the likely case stage and timeframe for resolution. | pre-filing, throughout litigation | Colossus, Ravel, CaseCrunch, Lex Machina, Gavelytics, Blue J Legal |
| Legal Analytics | lawyers, businesses | Tools that perform analytic tasks other than legal search and outcome prediction, including citation mappings, judge-level analytics (<i>e.g.</i> , tailoring arguments to a specific judge) and document-level analytics (<i>e.g.</i> , brief evaluation). | throughout litigation | Ravel, FastCase, Gavelytics, Premonition, CaseText |
| Discovery | lawyers | Tools that support or supplant the process of identifying relevant documents and tagging them for privilege. | discovery phase | Everlaw, Relativity, OpenText, Exterro |
| Document Assembly and Creation | lawyers, litigants | Tools that draft legal documents, from simple pleadings (answers) to more complicated pleadings and papers (discovery requests, motions, and even simple briefs). | pre-filing and throughout litigation | Legalmotion, RockerLawyer |
| Practice Management | lawyers | Litigation conduct tools, including dashboards that manage client intake, organize key case facts and documents, and support billing or other administrative tasks. | throughout litigation, post-litigation | Needles |
| Contract Management and Analysis | lawyers, businesses | Tools that store, analyze, create, and monitor performance of contracts. | pre-litigation | Kira Systems, Ravn, eBrevia, LexCheck, KMStandards, UnitedLex |
| DIY Dispute Resolution, Onlien Legal Advice, Court Vendor Services | litigants, businesses | Tools that facilitate extra-legal resolution of disputes; also tools that provide automated (often online) legal advice or assist unrepresented litigants with legal proceedings. | pre-filing, throughout litigation | LegalZoom, RocketLawyer, Modria, Intraspexion, Nolo |

A further task is to identify the subset of legal tech tools that are most likely to play a central role in the legal system going forward and, in particular, will press most strongly on its adversarial structure and procedural rules. This requires more than a laundry list of applications. We need to understand how existing legal tech tools intersect with the system, and we also need to look under their hood and understand their technical and operational details. Toward that end, consider three further ways to carve up the field.

First, legal tech tools vary based on whether they operate inside or outside the litigation system and, in turn, whether they implicate procedural rules as opposed to other rules or policies. E-discovery, legal research, legal analytics, and outcome prediction tools all operate squarely *within* litigation because they assist lawyers or litigants seeking judicial resolution of disputes.¹⁴ As Part II will argue, they thus press on, and may even reshape, a range of civil procedure rules. Other legal tech tools, however, largely operate *outside* the litigation system—and, indeed, may seek to supplant it.¹⁵ Table 1’s DIY dispute resolution systems plainly fit this mold. So might automated (and typically online) legal advice systems in light of the large mass of disputes that are currently resolved, with little or no court proceedings, via direct negotiation by injured parties with insurance companies, court-ordered ADR (*e.g.*, mediation), or arbitration.¹⁶ To be sure, these latter tools hold implications for the litigation system. They shrink its domain. And by fueling alternative modes of dispute resolution, they exert pressure on the litigation system to adapt and can thus shape its inner procedural workings. Still, these tools more directly implicate legal-ethical rules sounding in consumer protection, such as unauthorized practice of law and solicitation restraints, than procedure.¹⁷

Second, legal tech tools plainly differ in their technical sophistication and their degree of advance over analog legal practice. Many of the business development tools in Table 1’s “Lawyer Marketplace and Matching” category may be little more than glorified docket monitoring.¹⁸ Similarly, some tools falling into the “Legal (Re)search” category are merely more feature-rich versions of search platforms like Westlaw and Lexis that have long been part of the lawyer’s workbench. These tools offer enhanced filtering capacities—*e.g.*, by judge, or by procedural posture—or improved user interfaces but otherwise provide much the same basic service as incumbent tools.¹⁹ Other tools, however, go well beyond lawyer-directed digital

¹⁴ See NAT’L CTR. FOR STATE COURTS, *THE LANDSCAPE OF CIVIL LITIGATION IN STATE COURTS* vi (2015), <https://www.ncsc.org/~media/Files/PDF/Research/CivilJusticeReport-2015.ashx> (noting, after large-scale survey of urban state court systems, self-representation by at least one party in 75% of cases) [hereinafter *LANDSCAPE OF CIVIL LITIGATION*]; see also Resnik (various).

¹⁵ See J.J. Prescott, *Improving Access to Justice in State Courts with Platform Technology*, 70 VAND. L.R. 199 (2017); Amy J. Schmitz, *Expanding Access to Remedies through E-Court Initiatives*, 67 BUFFALO L. REV. 101-173 (2019); Amy L. Schmitz, *Dangers of Digitizing Due Process*, Published Proceedings with CyberJustice Laboratory (2020), <file:///Users/dme/Downloads/SSRN-id3525757.pdf>.

¹⁶ See *LANDSCAPE OF LITIGATION*, *supra* note 14, at v (finding most litigants with resources have “already abandoned the civil justice system” through contract or private ADR). Even smart contracting may qualify given that it may obviate the need for any adjudication at all. Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 339 (2017).

¹⁷ Other tools, particularly court vendor companies, have significant access to justice implications but fewer procedural implications. See *Judiciary and court management*, THOMSON REUTERS, <https://legal.thomsonreuters.com/en/solutions/government/courts-judiciary> (last visited Jan. 26, 2020); *Integrated Software for Courts & Justice Agencies*, TYLER TECH., <https://www.tylertech.com/solutions/courts-public-safety/courts-justice> (last visited Jan. 26, 2020).

¹⁸ See Patrick Flanagan & Michelle H. Dewey, *Where Do We Go from Here? Transformation and Acceleration of Legal Analytics in Practice*, 35 GA. ST. U. L. REV. 1245, 1253 (2017).

¹⁹ An example is Judicata, which highlights its ability to filter based on appealing party, cause of action, court, and procedural posture. See *Introducing Clerk*, JUDICATA, <https://www.judicata.com/> (last visited Jan. 26, 2020) (noting

referencing by permitting a lawyer to drag and drop a complaint or brief and receive on-point cases (*i.e.*, cases sharing facts, legal issues, and jurisdiction). Still other tools feel different in kind. After ingesting only the pleadings and papers to that point in a specialized tax or labor litigation, some advanced legal tech tools can generate a simple draft motion or brief or response to an agency’s civil investigative demand at the touch of a button.²⁰ Table 1 attempts to capture this distinction across the “Legal (Re)search” and “Legal Analytics” categories, with the former skewing toward lawyer-controlled tools that return less digested baskets of legal materials—a kind of “hunting and gathering”—and the latter encompassing, and aspiring to, more advanced legal cognitions.²¹

A further generalization regarding technical sophistication is that the most potentially game-changing legal tech tools perform prediction tasks and incorporate one or more elements of machine learning (ML). The first part of this—a focus on prediction—should not surprise. Litigation takes place in the “shadow of the law,” as Mnookin and Kornhauser famously put it,²² and much of lawyering involves making predictive judgments in that shadow. Which cases are winners and which losers? Which documents are relevant and which can be defensibly withheld on privilege grounds? And which legal arguments and precedents will this judge find most persuasive? Machine prediction tools aim to replicate these fundamentally predictive cognitions.

Nor should it surprise that the most promising legal tech tools deploy ML. For the uninitiated, machine learning is a family of algorithm-based techniques that use statistical models to “learn” from data in specific contexts rather than relying on more structured rules that an analyst programs directly.²³ Beyond this high-level commonality, however, ML methods are a varied lot, and the techniques that power legal tech are no exception. First, many legal tech tools use “supervised” ML methods that analyze a set of previously and typically human-labeled data inputs—referred to as “training data”—in order to draw predictive inferences about the labels humans would assign to new and unseen instances.²⁴ At least for the moment,

“advanced filters”). See also *Make today the last day you dread legal research*, ROSS INTELLIGENCE, <https://www.rossintelligence.com> (last visited Jan. 26, 2020) (claiming to be “easier to use than Westlaw and LexisNexis” and providing a feature-rich search tool based on unique case facts and procedural posture).

²⁰ See Susan Beck, *Inside ROSS: What Artificial Intelligence Means for Your Firm*, LAW.COM (Sept. 28, 2016), <http://www.law.com/sites/almstaff/2016/09/28/inside-ross-what-artificial-intelligence-means-for-your-firm/>; Rob Carty, *Computer-Written Legal Briefs Are Closer Than You Think*, ARTIFICIAL LAWYER (Apr. 11, 2019), <https://www.artificiallawyer.com/2019/04/11/computer-written-legal-briefs-are-closer-than-you-think/>.

²¹ See, e.g., Kevin D. Ashley, *Automatically Extracting Meaning from Legal Texts: Opportunities and Challenges*, 35 GA. ST. L. REV. 1117, 1133-34 (2019) (arguing that “QA” tools that allow a lawyer to ask questions in natural language are a key frontier of legal tech) [hereinafter Ashley, *Automatically Extracting*]; Kingsley Martin, *Deconstructing Contracts: Contract Analytics and Contract Standards*, in DATA-DRIVEN LAW: DATA ANALYTICS AND THE NEW LEGAL SERVICES 37 (Ed Walters ed., 2019) (describing automated contracting); Albert H. Yoon, *The Post-Modern Lawyer: Technology and the Democratization of Legal Representation*, 66 U. TORONTO L.J. 456, 457 (2016) (noting that most promising tools focus “not on replacing lawyers’ routinized tasks but, rather, on facilitating how they understand and analyze legal materials”) [hereinafter Yoon, *Post-Modern*]. A good example is CaseText’s CARA, which allows users to input a brief and receive back a list and summary of cases. See Tara, *What is CARA A.I. and how do I use it?*, CASETEXT, <https://help.casetext.com/en/articles/1971642-what-is-cara-a-i-and-how-do-i-use-it> (last visited Jan. 26, 2020).

²² See Robert N. Mnookin & Lewis Kornhauser, *Bargaining in the Shadow of the Law: The Case for Divorce*, 88 YALE L.J. 950 (1979).

²³ A common way of putting this is that machine learning models learn from “examples rather than instructions.” IBM *Design for AI*, IBM (May 2019), <http://ai-design.eu-de.mybluemix.net/design/ai/basics/ml>.

²⁴ A full accounting of machine learning is beyond the scope of this Article. For a lawyer-accessible overview of key concepts (train-test splits, k-fold validation, optimizing bias and variance, overfitting), see Ryan Copus et al., *Big Data, Machine Learning, and the Credibility Revolution in Empirical Legal Studies*, in LAW AS DATA: COMPUTATION, TEXT, & THE FUTURE

fewer legal tech applications use “unsupervised” methods that find patterns in data without pre-labeled examples, leaving to humans to determine post hoc which ones matter.²⁵ Second, many current legal tech tools leverage conventional ML techniques built around highly flexible statistical models, or combinations of models. These approaches are powerful because they dispense with the rigid, across-the-board assumptions about the functional form of data that characterize, and limit, conventional data science methods, but they are recognizable to those with quantitative training.²⁶ Going forward, however, the most advanced legal tech tools are likely to use “neural networks”—inspired by the structure of neurons in the human brain, and the most common exemplar of an advanced form of ML referred to as “deep learning”—to perform extremely subtle, multi-layered analyses.²⁷ In Part I.B. below, we offer a quasi-technical accounting of the possibilities and limits of deep learning applied to natural language processing (NLP), the family of techniques that performs text analytics and so holds the most promise for a discipline like law that trades in words.²⁸ For now, it is enough to note that ML in all its forms can generate highly accurate predictions where conventional data science may not, and so it is—and is likely to continue to be—the technical guts of the more consequential legal tech tools.²⁹

Third, looking across Table 1’s entrants reveals a set of technical and operational distinctions that will condition legal tech’s trajectory and implications. For instance, legal tech tools vary in the degree to which they draw upon technical versus legal expertise and, relatedly, the stage at which that expertise plugs into the tool’s development and use. A case-level outcome prediction tool that aids a litigant’s forum-shopping calculus by analyzing a sea of past cases to estimate her relative chances across available jurisdictions may largely pose problems of data science. As we detail in Part II.B, key challenges will be empirical measurement (*e.g.*, how to quantify judge ideology), extracting case features from docket sheets or other texts, and obtaining sufficiently large datasets. Moreover, the technical expertise needed to create such a tool may largely feed into an up-front process of software development. Once a software platform has been built, a lawyer need only input key case features—or, as technology advances, perhaps just feed in a complaint and pleadings—to prime it.

Other legal tech tools, in contrast, will require significant lawyerly engagement throughout the design and implementation process. For example, a legal analytics tool that tells lawyers which arguments to advance or avoid in a case before a specific judge will likely require, at least given current technology, substantial lawyer input to construct logical models of doctrinal tests or legal factors that past courts have applied in order to guide, and then iteratively revise, the

OF LEGAL ANALYSIS 25 (Livermore & Rockmore eds., 2019). A leading textbook treatment is GARETH JAMES, DANIELA WITTEN, TREVOR HASTIE, & ROBERT TIBSHIRANI, *AN INTRODUCTION TO STATISTICAL LEARNING* 183 (2017) [hereinafter *STATISTICAL LEARNING*]. For an accessible exploration of causal inference in statistics, see ANGRIST & PISCHKE, *MOSTLY HARMLESS ECONOMETRICS* (2008). [EDITORS: We can include an overview of machine learning here if it’s helpful.]

²⁵ *STATISTICAL LEARNING*, *supra* note __, at 26, 373; *see also* ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 246.

²⁶ An example of a flexible ML model is a decision tree model. *See* *STATISTICAL LEARNING*, *supra* note __, at 303; Copus et al., *supra* note 24, at 25. Less flexible methods, which might be faster or easier to understand, enlist a computer to search across a predetermined set of ways to make predictions. *Id.*

²⁷ For an accessible introduction to neural networks, see Victor Zhou, *Machine Learning for Beginners: An Introduction to Neural Networks*, TOWARDS DATA SCI. (Mar. 5, 2019), <https://towardsdatascience.com/machine-learning-for-beginners-an-introduction-to-neural-networks-d49f22d238f9>.

²⁸ *See* Mireille Hildebrandt, *Law as computation in the era of artificial legal intelligence: Speaking law to the power of statistics*, 68 U. TORONTO L.J. 12, 27 (2018) (noting NLP’s centrality) [hereinafter Hildebrandt, *Computation*].

²⁹ On ML’s predictive superiority, *see* Jon Kleinberg et al., *Prediction Policy Problems*, 105 AM. ECON. REV. 491 (2015).

machine's identification and analysis of relevant case law.³⁰ Another example, and the starkest contrast from the outcome-prediction tool just described, is the suite of “predictive coding” tools increasingly used in discovery in large and complex cases. As discussed in more detail in Part II.A, predictive coding tools follow a common protocol in which lawyers first perform manual review of a subset of documents—called a “seed set”—to provide the “labeled” data upon which supervised machine learning tools rely.³¹ Thereafter, as the machine surfaces documents, lawyers are re-deployed to review documents flagged by the machine and add them to the training set as the system iterates toward a best model.³²

To be sure, the expertise required to implement a given tool need not be exclusively technical or legal. At least for the moment, predictive coding tools depend on lawyers but also require significant technical expertise, both up front and during implementation. Contrary to popular belief, machine learning models are not merely turned loose on data; rather, programmers make myriad decisions about how to partition data, model types and data features, and how much to tune the model.³³ For now, the takehome point—returned to below—is that a tool's ratio of technical to lawyerly expertise and the point at which that expertise plugs into its design and use may shape a tool's effect on the role and status of lawyers within the system, the ability of generalist judges to oversee its use, and its distributive impact as between litigation's haves and have nots.

A final notable operational distinction is that legal tech tools vary in their data inputs and, in particular, whether those inputs are widely available at little or no cost, or instead are proprietary and thus held only by certain actors within the system. Of course, much of the legal system operates in full view, and one might think it provides a treasure trove of constantly updating and curated data as an army of litigants and judges move product through it. However, data limitations will significantly shape legal tech's future. A core challenge for outcome prediction and legal analytics tools is the pervasiveness of “secret settlements” and the fact that most settled cases exit docket sheets via unelaborated voluntary dismissals under Rule 41.³⁴ Importantly, however, these constraints may affect some system actors more than others. Past representations give large law firms a ready-made source of data—including case outcomes, but also document productions and repositories of contracts—to develop and optimize legal tech tools, subject only to client consent to use them.³⁵ Other actors within the system who trade in large case volumes—among them insurance companies and litigation financiers—may likewise have privileged access to data and be uninclined to share it.

³⁰ See Kevin D. Ashley & Stefanie Bruninghaus, *A Predictive Role for Intermediate Legal Concepts*, in LEGAL KNOWLEDGE AND INFORMATION SYSTEMS: JURIX 2003 153 (D. Bourcier ed., 2003); see also JAROMIR SAVELKA & MATTHIAS GRABMAIR, (BRIEF) INTRODUCTION TO (SELECTED ASPECTS OF) NATURAL LANGUAGE PROCESSING AND MACHINE LEARNING (2015), <http://people.cs.pitt.edu/~jsavelka/docs/20150612ASAILTutorial.pdf> (describing iterative ML processing for analyzing statutory texts). For more discussion, see notes ___, *infra*, and accompanying text.

³¹ *The Sedona Conference Glossary: E-Discovery and Digital Information Management* (4th Ed.), 15 SEDONA CONF. J. 305 (2014) (providing an overview).

³² *Id.* See also ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 241 (describing predictive coding process).

³³ Deven R. Desai & Joshua A. Kroll, *Trust But Verify: A Guide to Algorithms and the Law*, 31 HARV. J.L. & TECH. 1, 28 (2017); David Lehr & Paul Ohm, *Playing with the Data: What Legal Scholars Should Learn About Machine Learning*, 51 U.C. DAVIS L. REV. 653, 683-700 (2017).

³⁴ See Nora Freeman Engstrom, *Legal Ethics: The Plaintiffs' Lawyer* (2019) (unpublished manuscript) (collecting sources estimating secret settlements).

³⁵ See Flanagan & Dewey, *supra* note 18, at 1261.

Mapping the full landscape in this way suggests an entirely different set of frameworks for thinking about legal tech than the current debate's overriding focus on the future health of the legal profession. In so doing, it helps to tee up more expansive thinking about legal tech's trajectory and implications—the subject of Parts I.B and I.C—and ultimately informs Part II's case studies of how civil procedure might adapt in response.

B. Technical Limits and the Trajectory Puzzle

A second key task in taking legal tech's measure is to realistically and concretely predict its future trajectory. Just how far will of Table 1's tools advance in the near- to medium-term? Though it runs contrary to the futurist orientation of much of the existing literature, the best way to accomplish this is not by imagining robotic endpoints but rather by gauging legal tech's current capabilities and then soberly evaluating the barriers to further advances.

A growing literature starts down that road by exploring the barriers that will condition legal tech's future. A significant regulatory constraint is Model Rule of Professional Conduct 5.4 and state counterparts outlawing unauthorized practice of law (UPL). Because “practice of law” is capaciously defined, UPL rules have the potential to stunt legal tech tools that operate outside the litigation system, such as lawyer-client matching, automated legal advice, and DIY dispute resolution.³⁶ A vivid example is the trench warfare between state bars and lawyer-client matching system Avvo.³⁷ Invoking these struggles, some commentators bet on lawyers' guild-like capacity to fend off even the most potent tech innovations,³⁸ while others see technology as an unstoppable force even for a strong professional monopoly.³⁹ Still others focus on broader professional and cultural barriers, emphasizing the inherent conservatism of lawyers as a profession,⁴⁰ their aversion to “mathiness,”⁴¹ or the disconnect between the heavy, up-front, fixed costs necessary to develop many legal tech tools and a legal services industry that remains economically organized around the billable hour and pass-through of case-specific costs to clients.⁴²

These barriers are real and substantial. But the most significant determinant of legal tech's trajectory is likely to be technical, and it extends from an inescapable fact: Law “has language at its heart.”⁴³ As a result, many legal tech tools depend on text analytics and, more specifically,

³⁶ Some suggest that UPL rules apply to predictive coding. See Dana Remus, *The Uncertain Promise of Predictive Coding*, 99 IOWA L. REV. 1691, 1711 (2014) [hereinafter Remus, *Uncertain Promise*].

³⁷ See Benjamin H. Barton & Deborah L. Rhode, *Access to Justice and Routine Legal Services: New Technologies Meet Bar Regulators*, 70 HASTINGS L.J. 955 (2019).

³⁸ See, e.g., Ray Worthy Campbell, *Rethinking Regulation and Innovation in the U.S. Legal Services Market*, 9 N.Y.U. J.L. & BUS. 1, 1 (2012); Gillian Hadfield, *Legal Barriers to Innovation: The Growing Economic Cost of Professional Control over Corporate Legal Markets*, 60 STAN. L. REV. 1689, 1724-5 (2008); Larry E. Ribstein, *The Death of Big Law*, 2010 WIS. L. REV. 749, 807 (2010).

³⁹ See McGinnis & Pearce, *supra* note 1, at 3057-64; see also BENJAMIN H. BARTON, *GLASS HALF FULL: THE DECLINE AND REBIRTH OF THE LEGAL PROFESSION* (2015). Part of this debate centered on whether adoption of legal tech reflects economic pressure from the 2009 downturn or a deeper trend. See William Henderson, *From Big Law to Lean Law*, 3 INT'L REV. L. & ECON. 1, 4 (2013); Linna, *supra* note 13, at 393; RICHARD SUSSKIND, *TOMORROW'S LAWYERS: AN INTRODUCTION TO YOUR FUTURE* (2013); Yoon, *Post-Modern*, *supra* note 21, at 462; see also Alarie, *How Artificial Intelligence Will*, *supra* note 12, at 110; Eli Wald, *Foreword: The Great Recession and the Legal Profession*, 78 FORDHAM L. REV. 2051, 2061-62 (2010).

⁴⁰ See Flanagan & Dewey, *supra* note 18, at 1256 (noting lawyers' “professionally honed risk aversions”).

⁴¹ See Remus & Levy, *supra* note 1, at 540.

⁴² See Flanagan & Dewey, *supra* note 18, at 1260-61.

⁴³ See Robert Dale, *Law and Word Order: NLP in Legal Tech*, MEDIUM (Dec. 15, 2018), <https://towardsdatascience.com/law-and-word-order-nlp-in-legal-tech-bd14257ebd06>.

a family of ML techniques noted previously called natural language processing (NLP).⁴⁴ At a high level of abstraction, NLP aims to identify patterns in human language in ways that facilitate problem-solving. But, as with machine learning more generally, NLP has many tributaries.

The earliest NLP techniques were simple expert systems—*i.e.*, hand-written rules using, for instance, regular expressions to parse text.⁴⁵ A second generation relied upon statistical analysis keyed to the frequencies of words appearing in a corpus of documents in order to draw inferences about their content.⁴⁶ The current research frontier, and a rapidly advancing one, is a mix of linguistics and “deep learning” (*i.e.*, neural network) techniques.⁴⁷ In a nutshell, deep-learning NLP machines make language computationally tractable by converting words, sentences, documents, or, in the legal context, entire cases into unique vectors, called “embeddings.” Each vector can be envisioned as an arrow from the origin to a point that represents the item of interest in a large, *n*-dimensional space, its magnitude a function of the presence of words, case citations, indexing concepts, or other features.⁴⁸ Once this vast vector space has been constructed and human-annotated labels affixed to training materials (again, words, sentences, documents, cases), a sophisticated machine learning model can manipulate the vectors mathematically using large numbers (on the order of billions) of calculations to model relationships between them.⁴⁹ With sufficient data and computing power, the system’s outputs enable a range of legal tasks, such as identifying relevant or privileged documents, past legal decisions that may be controlling, or, though we will see it is far trickier, the winning argument in a case.

Many of the technical challenges that will shape legal tech’s trajectory are generic NLP challenges. As data science method, machine learning developed alongside increases in

⁴⁴ See notes __-__ *supra* and accompanying text; Hildebrandt, *Computation*, *supra* note 28, at 27 (noting NLP’s centrality to legal automation).

⁴⁵ Canonical overviews of NLP include: CHRISTOPHER D. MANNING & HINRICH SCHÜTZE, *FOUNDATIONS OF STATISTICAL NATURAL LANGUAGE PROCESSING* (1999); DANIEL JURAFSKY & JAMES H. MARTIN, *SPEECH AND LANGUAGE PROCESSING* (2d ed. 2008).

⁴⁶ The basic assumption is that each document was generated from a mix of topics, and each topic was generated from a mix of words. Through statistical analysis of word frequencies, an analyst can infer the topic(s) of new documents and deploy those inferences. See Joakim NIVRE, *On Statistical Methods in Natural Language Processing* (unpublished and undated manuscript), <https://cl.lingfil.uu.se/~nivre/docs/statnlp.pdf>; David M. Blei, *Probabilistic Topic Models*, 55 COMM. ACM 77 (2012). Note that the frequencies used, as contained in a “term-document matrix,” are not just simple counts. Many statistical NLP applications depend on tf-idf values—short for term-frequency/inverse-document frequency—in which a term’s frequency in a document is discounted by its frequency in the full corpus to avoid merely classifying based on the most common words. ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 218. Statistical NLP can be either supervised or unsupervised. A good example of the latter is Latent Dirichlet allocation, or LDA, a topic modelling tool used to cluster words and documents into topics without up-front guidance. See generally CHRIS TUFTS, *THE LITTLE BOOK OF LDA: AN OVERVIEW OF LATENT DIRICHLET ALLOCATION AND GIBBS SAMPLING*, <https://ldabook.com/index.html> (last visited Jan. 26, 2020) (describing LDA); David M. Blei et al., *Latent Dirichlet Allocation*, 3 J. MACHINE LEARNING RES. 993 (2003) (same).

⁴⁷ See Christopher D. Manning, *Computational Linguistics and Deep Learning*, 41 COMPUTATIONAL LINGUISTICS 1 (2015), https://doi.org/10.1162/COLI_a_00239.

⁴⁸ See Ashley, *Automatically Extracting*, *supra* note 21, at 1120. For technical and applied examples, see Benjamin R. Baer, Skyler Seto, & Martin T. Wells, *Exponential Family Word Embeddings: An Iterative Approach for Learning Word Vectors*, Paper presented at 32nd Conference on Neural Information Processing Systems, Montréal, Canada (2018), https://pdfs.semanticscholar.org/f9f6/2ffb8fd399b62007bc2ecbe5c3b63ca29bcd.pdf?_ga=2.127344014.2010417352.1579903473-1888858941.1576249256; see also Elliott Ash, Daniel L. Chen, & Arianna Ornaghi, *Stereotypes in High-Stakes Decisions: Evidence from U.S. Circuit Courts* (January 22, 2020), http://elliottash.com/wp-content/uploads/2019/11/200122_Ash-Chen-Ornaghi.pdf.

⁴⁹ Vector space similarity uses a measure of Euclidian distances between the end-points of the vectors in the *n*-dimensional vector space. By computing the cosine of the angle between a pair of vectors, one can quantify the similarity of vector pairs. The smaller the cosine/angle, the greater the similarity.

computing power and “big data”—defined as larger *quantities* of data, but also *higher-dimension* data (*i.e.*, data with more predictors)—which presented rich analytic possibilities while exposing the shortcomings of conventional econometrics.⁵⁰ But textual data brings further unique challenges. The easiest to see arise from the richness of human language.⁵¹ Sarcasm, implicit meanings, multiple words with the same meaning (synonymy), and the same word with multiple meanings (polysemy) are just the beginning.⁵² The result is that advanced NLP requires extensive pre-processing of text before analytics can be performed. NLP machines first break text down into manipulable pieces by normalizing and tokenizing it (*i.e.*, eliminating superficial variations in words via “stemming” and removing punctuation and “stop words”⁵³), parsing it (*e.g.*, tagging words for parts of speech and other syntactic structure, including grammatical roles), and fine-tuning it (*e.g.*, converting the reduced form “tokens” to vector-based embeddings that permit semantic comparisons).⁵⁴ This latter step relies upon an encoder-decoder that assigns semantic value to a word based on its context—that is, the words appearing before and after it—to disambiguate it and link it to synonyms to move its representation closer to its intended human meaning.⁵⁵

A related challenge is that advanced NLP is computationally demanding. The most cutting-edge applications require enormous compute power to perform the billions of calculations required for even seemingly straightforward tasks. In one sense, NLP’s cost has declined recently due to the availability of open-source tools (*e.g.*, Google’s TensorFlow software and its BERT encoder-decoder system,⁵⁶ Stanford’s CoreNLP,⁵⁷ and IBM’s PyTorch⁵⁸). There is, however, a potential trade-off. Open-source, off-the-shelf NLP models are trained on general text corpora (*e.g.*, Wikipedia, the so-called “Books Corpus,” IMDb movie reviews), and their language representations may not “transfer” well to domain-specific, technocratic areas, particularly “legalese.”⁵⁹ For many discrete legal tasks, fully harnessing NLP may thus require significant re-training of pretrained models—and may also require data and computing power that tend to be concentrated in key industrial players, such as law firms or tech companies.⁶⁰ While domain adaptability remains an open research question in computer science, the need for retraining to improve upon benchmark NLP tasks could be a significant constraint.

⁵⁰ See Marion Dumas & Jens Frankenreiter, *Text as Observational Data*, in LAW AS DATA, *supra* note 6, at 61.

⁵¹ Adam Zacary Wyner, *Weaving the Legal Semantic Web with NLP*, CORNELL LEGAL INFO. INST. (May 17, 2010) <https://blog.law.cornell.edu/voxxpop/2010/05/17/weaving-the-legal-semantic-web-with-natural-language-processing/>.

⁵² A more technical framing is that language’s large lexicon, rich grammar, and near-infinite semantic realizations renders text analytics a sparse and underdetermined problem.

⁵³ Stop words are high-frequency words with “low information content,” such as articles or pronouns. See Peter D. Turney & Patrick Pantel, *From Frequency to Meaning: Vector Space Models of Semantics*, 37 J. ARTIFICIAL INTELLIGENCE 141 (2010).

⁵⁴ [CITE]

⁵⁵ Attention is where the most rapid recent advances in NLP have come, particularly the 2018 publication of Google’s BERT model. See Jacob Devlin et al., *BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding*, ARXIV:1810.04805 [CS.CL] (2019), <https://arxiv.org/abs/1810.04805>.

⁵⁶ *Id.*

⁵⁷ See Stanford CoreNLP – Natural language software, STANFORD CORENLP, <https://stanfordnlp.github.io/CoreNLP/>.

⁵⁸ See Vinay Rao, *Get Started with PyTorch*, IBM (Jan. 18, 2018), <https://developer.ibm.com/articles/cc-get-started-pytorch/>.

⁵⁹ [CITE]

⁶⁰ See Flanagan & Dewey, *supra* note 18, at 1259 (noting transfer problem in legal context); Remus & Levy, *supra* note 1, at 522 (providing accessible overview language parsing tools).

The most acute challenge facing legal tech is more law-specific: NLP cannot yet reliably “read” legal texts in the sense of extracting legal concepts or legal rules in logical forms.⁶¹ One reason is that, while second-nature to seasoned lawyers, legal reasoning consists of a dizzying array of analytic moves. Case outcomes often turn on a dense mix of rule-based reasoning and case-based reasoning, including: linguistic arguments about a statutory or regulatory term’s “ordinary” meaning; systemic arguments about harmonization across statutory sections; analogical arguments from past case law; evidentiary arguments about key facts; and teleological arguments from legislative purposes or other substantive values.⁶² Not only must the machine identify and manipulate different types of legal argument—linguistic, systemic, analogical, evidentiary, teleological—it must also develop traffic rules for navigating between them.⁶³

To be sure, NLP has improved rapidly in its capacity to parse legal argument. NLP can now identify the rhetorical roles played by sentences in court decisions (*e.g.*, statements of legal rules, fact determinations) and who among possible speakers (judge, litigants, testifying expert, evidentiary document) is making an assertion.⁶⁴ Classification and attribution of this sort are canonical NLP tasks and a critical step for analyzing legal texts.⁶⁵ But NLP has not yet made the leap from these simpler tasks to full-on argument mining—that is, automated discovery of discourse structure and argument-related information, including propositions, premises, conclusions, and exceptions.⁶⁶ This is important, because argument representations serve as the bridge between legal texts and a wide range of legal cognitions to which legal tech aspires, from information retrieval and legal analytics to outcome prediction.⁶⁷ For each of these tasks, it is only with a jump to fully computational analysis of substantive legal merits that legal tech can perform tasks with robust reasoning and thus *explain* machine outputs in ways that a lawyer can put to use or a client or judge might expect.⁶⁸ A machine prediction that a case has an 80 percent chance of victory might help a lawyer decide whether to file a complaint or seek

⁶¹ See Ashley, *Automatically Extracting*, *supra* note 21, at 1120, 1136; see also ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 3 (distinguishing between “legal information retrieval” and “argument retrieval”).

⁶² ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 88.

⁶³ *Id.* Law is also indeterminate because legal language is ambiguous semantically (*e.g.*, “reasonable,” “discrimination”—that create uncertainty about the boundaries of what a term refers to) and syntactically (the logical connectors—the “ands” and “ors”—that structure propositions). EDWARD LEVI, *AN INTRODUCTION TO LEGAL REASONING* 3 (2013). Computational modeling requires “propositionalizing” legal rules in ways that reduce both forms of ambiguity and then weight each proposition.

⁶⁴ See, *e.g.*, Vanessa Wei Feng & Graeme Hirst, *Classifying Arguments by Scheme*, 1 *PROC. 49TH ANN. MEETING ASS’N FOR COMPUTATIONAL LINGUISTICS: HUM. LANGUAGE TECH.* 987 (2011); Ben Hachey & Claire Grover, *Extractive Summarization of Legal Texts*, 14 *ARTIFICIAL INTELLIGENCE & L.* 305 (2006); Marie-Francine Moens et al., *Automatic Detection of Arguments in Legal Texts*, *PROC. 11TH INT’L CONF. ARTIFICIAL INTELLIGENCE & L.* 225 (2007); Manimaran Saravanan et al., *Improving Legal Information Retrieval Using an Ontological Framework*, 17 *ARTIFICIAL INTELLIGENCE & L.* 101 (2009); Vern R. Walker et al., *Argumentation Mining from Judicial Decisions: The Attribution Problem and the Need for Legal Discourse Models*, *International Conference on Artificial Intelligence and Law, WORKSHOP ON AUTOMATED DETECTION, EXTRACTION, & ANALYSIS OF SEMANTIC INFO. IN LEGAL TEXTS* (2015).

⁶⁵ On text summarization techniques, see Mehdi Allahyari et al., *Text Summarization Techniques: A Brief Survey*, ARXIV:1707.02268 (2017), <https://arxiv.org/pdf/1707.02268.pdf>.

⁶⁶ See Ashley, *Automatically Extracting*, *supra* note 21, at 1117; see also Remus & Levy, *supra* note 1, at 538 (describing still-embryonic field of argument mining).

⁶⁷ See Faraz Dadgosari et al., *Modeling Law Search as Prediction*, *ARTIFICIAL INTELLIGENCE & LAW* (2020), <https://doi.org/10.1007/s10506-020-09261-5>.

⁶⁸ See ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 18; Ashley, *Automatically Extracting*, *supra* note 21, at 1138. See generally Frederick Schauer, *Giving Reasons*, 47 *STAN. L. REV.* 633 (1995).

an early settlement, but it tells her precisely nothing actionable about how to go about actually winning the case.⁶⁹

A consequence is that legal tech tools are currently bounded by their supervised nature—that is, by their need for labeled, typically *lawyer*-labeled, data.⁷⁰ For the moment, even the most cutting-edge legal analytics tools require lawyers to perform two critical and resource-intensive tasks. First, lawyers must *translate* an operative doctrinal test into a hierarchical structure of pre-defined elements—for instance, a list of factors that appear in past cases adjudicating, say, the line between employees and independent contractors.⁷¹ Second, lawyers must *annotate* legal texts in order to train machines to identify these argument-related elements—here again, legal factors or other discourse structures—in old cases in order to compare them to new ones.⁷² The results of this lawyer-intensive process of translation and annotation can be powerful. Fed well-labeled data, machine learning tools can determine that factor X, long thought to drive case outcomes, has become, or has always been, irrelevant.⁷³ Put another way, legal tech tools perform well in assigning weights to legal factors, even if they cannot, as of yet, discover those factors on their own.⁷⁴ But the result is still a long way from the fully automated robolawyers and robojudges in the more futurist accounts of legal tech.⁷⁵ It is only with significant further NLP advances that legal tech will achieve the holy grail: a legal app that can, in fully automated fashion, construct an “ontology” of a legal area, extract substantive legal features from relevant legal texts, and then link those features to computational models to perform key tasks, from retrieving well-tailored legal materials to predicting case outcomes.⁷⁶

Finally, even with significant advances in NLP, it is possible that legal tech tools will not, or at least not soon, be able to mimic the legal cognitions that seasoned lawyers possess. There is no single way to capture what lawyers do, but a rough approximation is that sound legal judgment

⁶⁹ ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 23 (noting that fully functional computational legal analysis requires “an ability to explain its reasoning, and that reasoning has to be intelligible to legal practitioners”); Remus & Levy, *supra* note 1, at 550 (noting that most prediction programs “give a user results without showing the precise combination of factors that produced those results”).

⁷⁰ See ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 5 (noting that CS has not yet learned to “automate the knowledge representation process”). See also Talley, *supra* note 1, at 185 (noting law’s “irreducible complexity” and concluding that it “will necessarily implicate significant human input over the longer term”).

⁷¹ ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 11, 209 (noting legal tech’s “knowledge acquisition bottleneck” and need for “hand-tooled knowledge representations”).

⁷² Even then, detection of argumentative structures is far from perfect. See, e.g., Kevin D. Ashley & Stefanie Bruninghaus, *Automatically Classifying Case Texts and Predicting Outcomes*, 17 ARTIFICIAL INTELLIGENCE & L. 125 (2009) (describing results of the SMILE interface for extracting argument-related legal factors in legal texts but noting reliability concerns); Adam Wyner & Wim Peters, *Semantic Annotations for Legal Text Processing Using GATE Teamware*, PROC. LANGUAGE RESOURCES & EVALUATION CONF: SEMANTIC PROCESSING OF LEGAL TEXTS WORKSHOP 34 (2012) (describing an annotation pipeline for identifying legal factors in court decisions); Adam Wyner & Wim Peters, *Towards Annotating and Extracting Textual Legal Case Factors*, PROC. LANGUAGE RESOURCES & EVALUATION CONF., SEMANTIC PROCESSING OF LEGAL TEXTS WORKSHOP 36 (2010) (same).

⁷³ For an effort to computationally model “concept change” in case law, see Edwina L. Rissland & Timur M. Friedman, *Detecting Change in Legal Concepts*, PROC. 5TH INT’L CONF. ON ARTIFICIAL INTELLIGENCE & L. (1995).

⁷⁴ ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 125 (noting distinction between assigning weights to factors and discovering them).

⁷⁵ See notes ___ *supra* and accompanying text. See also Remus & Levy, *supra* note 1, at 521 (noting that the closest legal tech has come to retrieving underlying arguments are the Q/A—i.e., question-and-answer—systems touted by Ross Intelligence and others that purport to retrieve case passages in response to natural language questions).

⁷⁶ ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 172, 354.

must be both synoptic and subtle.⁷⁷ It must be synoptic in simultaneously marrying an “internal” perspective on a case (grappling with law on its own terms and under its own logic—*i.e.*, its legal “merit”) with an “external” perspective (how a particular judge or litigant or myriad other case characteristics external to a case’s internal logic or “merit” relate to the outcome).⁷⁸ Legal judgment must also be subtle in its capacity to parse highly individualized, near-infinite fact patterns, work back and forth between minor fact shadings and legal propositions, sift holdings and dicta, transport concepts from one legal area to another, and account for policy-based and equitable “teleological” reasons.⁷⁹ Legal judgment further depends on an ability to predict subtle changes over time, particularly social (and thus judge- or jury-held) norms.⁸⁰ Indeed, law’s dynamism means that weighing both the “internal” and “external” determinants of a case is more than just a brute-force analytic exercise. It is a subtle, trend-sensitive, predictive one.

When it comes to synopticism, computation may well prove superior to human cognition. Indeed, computation’s comparative advantage may be its ability to perform sweeping analyses of myriad case factors, whether “internal” or “external” to law, and perfectly weight each. An insightful way to capture legal tech’s promise in this regard, highlighted by Livermore and Rockmore, is that NLP permits a kind of “distant reading”—an idea lifted from literary criticism to describe analysis of large text corpora at a coarse level of abstraction, as contrasted with the “close reading” literary critics and lawyers perform.⁸¹

The more difficult question may be whether machines can perform legal judgment’s subtler analytic tasks as well as or better than humans. Here, there is more reason to doubt machine prowess. Machine-based legal analytics, focused as they are on “distant” or coarse pattern recognition, may only be able to handle easy cases, not hard ones,⁸² and may miss subtly evolving internal (doctrinal) or external (social) trends.⁸³ Human cognition, the argument

⁷⁷ Another helpful framing reduces legal cognition to two problems: haystack problems (*i.e.*, assembly of relevant “needles” from a haystack of materials) and forest problems (extracting overall trends and themes and/or weighing the “gravitas” of particular trees—a form of dimensionality reduction). See Vlad Eidelman et al., *Analyzing Public Comments*, in *LAW AS DATA*, *supra* note 6, at 235, 257.

⁷⁸ See Michael A. Livermore & Daniel N. Rockmore, *Distant Reading the Law*, in *LAW AS DATA*, *supra* note 6, at 8-9 [hereinafter Livermore & Rockmore, *Distant Reading*]. See also ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 107 (offering a similar internal-versus-external accounting); Katz, *supra* note 1, at 962 (same).

⁷⁹ Remus & Levy, *supra* note 1, at 549. For more on case equities, see Frank Pasquale & Glyn Cashwell, *Four Futures of Legal Automation*, 63 *UCLA L. REV. DISC.* 26, 45 (2015); Trevor Bench-Capon & Giovanni Sartor, *A Model of Legal Reasoning with Cases Incorporating Theories and Values*, 150 *ARTIFICIAL INTELLIGENCE* 97 (2003); Donald H. Berman & Carole D. Hafner, *Representing Teleological Structure in Case-Based Legal Reasoning: The Missing Link*, *PROC. 4TH INT’L CONF. ON ARTIFICIAL INTELLIGENCE & L.* 50-59 (1993); Alison Chorley & Trevor Bench-Capon, *AGATHA: Automated Construction of Case Law Theories Through Heuristic Search*, *Proc. 10th Int’l Conf. on Artificial Intelligence & L.* 45-54 (2005).

⁸⁰ See LEVI, *supra* note 63, at 1-4 (describing law as a “moving classification scheme”). This is especially true with case-based reasoning, where courts working against a precedential backdrop must decide whether to restrict, extend, or replace legal concepts to deal with new and proximate fact contexts or shifting social values—a process that often turns on teleological considerations. ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 80; see also KARL BRANTING, *REASONING WITH RULES AND PRECEDENTS* 8-28 (1999) (describing approach that isolates “criterial facts” driving judicial decisions and then calculating the ratio of matched criterial facts in the present case and past cases).

⁸¹ See Livermore & Rockmore, *Distant Reading*, *supra* note 78. See also FRANCO MORETTI, *GRAPHS, MAPS, TREES. ABSTRACT MODELS FOR A LITERARY HISTORY* (2005) (coining the term in the literary criticism context); Mireille Hildebrandt, *The Meaning and Mining of Legal Texts*, in *UNDERSTANDING DIGITAL HUMANITIES: THE COMPUTATIONAL TURN AND NEW TECHNOLOGY* (D.M. Berry ed., 2011).

⁸² See Pasquale & Cashwell, *supra* note 79, at 43.

⁸³ Remus and Levy frame this latter point as ML’s limited ability to handle “unanticipated contingencies.” Remus & Levy, *supra* note 1, at 538, 541.

goes, is strongest in its capacity for parsimonious reasoning with incomplete information—precisely the cases at the doctrinal frontier where fine-grained fact distinctions or less tractable “teleological” arguments control.⁸⁴

A pair of conclusions follow from this quasi-technical accounting of legal tech’s possibilities and limits. First, legal tech’s advance will not be monolithic. Rather, its incorporation into the civil justice system will be siloed, incremental, and halting—across prediction tasks and subject-matter silos.⁸⁵ In particular, it is a good bet that legal tech tools will arrive sooner, and advance most rapidly, in legal areas where data is abundant, regulated conduct takes repetitive and stereotypical forms, legal rules are inherently stable, and case volumes are such that a repeat player stands to gain financially by investing.⁸⁶ This helps to explain why some of the most advanced legal tech tools are found in technocratic and self-contained areas of law (*e.g.*, tax, labor and employment, patents), or highly routine ones (*e.g.*, auto accidents), but not more open-ended legal contexts.⁸⁷ The question is whether, or how quickly, prediction tools can move beyond those self-contained legal areas, and how soon it will reliably perform other higher-order legal cognitions, including legal search and analysis that goes beyond simple “hunting and gathering” to return cases based on argumentation structure or legal analytics that can identify the best argument to lay before *this* judge.⁸⁸

Second, understanding legal tech’s current technical limits suggests that, in the near to medium-term, even the most advanced legal tech tools will entail substantial lawyer engagement. Rather than full automation, legal tech may instead yield a kind of “advanced lawyering”—a spin on chess-master Gary Kasparov’s notion of “advanced chess,” in which human and machine ally and compete against other human-machine teams, working symbiotically, rather than merely pitting human against machine.⁸⁹ Lawyers, on this view, may often use commoditized systems that fully substitute for human lawyering.⁹⁰ But a large slice

⁸⁴ See Alarie, *Path*, *supra* note 4, at __; ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 12; Frank Pasquale & Glyn Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviourism*, 68 U. TORONTO L.J. 63, 104 (2018) [hereinafter Pasquale & Cashwell, *Prediction*]. The counter from computer scientists is that parsimonious reasoning under limited information is just a form of “dimensionality reduction”—separating wheat from chaff—and a task that computers can and will perform better than humans. Even grasping trending social dynamics may ultimately favor machines because messy social processes tend to be enshrined in speech that NLP can access more efficiently. See Marion Dumas & Jens Frankenreiter, *Text as Observational Data*, in *LAW AS DATA*, *supra* note 6, at 67.

⁸⁵ Remus & Levy, *supra* note 1, at 511-37 (offering predictions about which legal tasks will be subject to “light, moderate, or heavy employment effects”).

⁸⁶ See Casey & Niblett, *Self-Driving*, *supra* note 9, at 436; see also Remus & Levy, *supra* note 1, at 538 (noting “major inroads” in some areas, especially e-discovery, but legal tech tools remain “embryonic” in other areas, particularly legal analytics). See generally ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 72.

⁸⁷ Compare Alarie, *Path*, *supra* note 4, at __; Benjamin Alarie et al., *Using Machine Learning to Predict Outcomes in Tax Law*, 58 CAN. BUS. L.J. 231 (2016) (reporting success in tax area); Blakeley McShane et al., *Predicting Securities Fraud Settlements and Amounts: A Hierarchical Bayesian Model of Federal Securities Class Action Lawsuits*, 9 J. EMPIRICAL LEG. STUD. 482 (2012) (same as to securities); Mihai Surdeanu et al., *Risk Analysis for Intellectual Property Litigation*, PROC. 13TH INT’L CONF. ARTIFICIAL INTELLIGENCE & L. 116 (2011) (reporting a predictive accuracy rating of 64% in patent cases) with Charlotte S. Alexander et al., *Using Text Analytics to Predict Litigation Outcomes*, in *LAW AS DATA*, *supra* note 6, at 310 (describing prediction challenges in the employment law context). For general discussion, see Ashley, *Automatically Extracting*, *supra* note 21, at 1123.

⁸⁸ Katz, *supra* note 1, at 957.

⁸⁹ See, *e.g.*, Cummings, *Man versus Machine or Man + Machine?*, IEEE INTELLIGENT SYSS. 2 (Sept./Oct. 2014); Livermore & Rockmore, *Introduction*, in *LAW AS DATA*, *supra* note 6, at xiv; Yoon, *Post-Modern*, *supra* note 21, at 466.

⁹⁰ SUSSKIND, *supra* note 39 (comparing commoditized and customized/bespoke tools).

of legal tech will remain customized and operate within a paradigm of “cognitive computing” defined by intensive human-machine collaboration rather than simple keystrokes.⁹¹

C. Implications

While legal tech’s precise technical trajectory is unknowable, the field has nonetheless begun to sketch a set of claims, though often abstract and conflicting ones, about legal tech’s likely impacts on lawyers, law, and the legal system. Three concerns predominate: (i) legal tech’s effect on the legal profession; (ii) its effect on the conceptions and implementations of rule of law; and (iii) its distributive effects. Armed with a Part I.A’s overview of the legal tech toolkit and Part I.B’s account of its technical trajectory, we can begin to distill a set of more concrete ways legal tech will impact the litigation system.

1. Legal Tech and the Legal Profession

“Predictions of structural change in the legal industry,” Michael Simkovic and Frank McIntyre recently noted, “date back at least to the invention of the typewriter.”⁹² But this has not stopped commentators from weighing in on legal tech’s effect on the legal profession. The result is a welter of competing claims running the gamut from continuation of business as usual, with only modest shifts to the traditional set-up of law firms selling billable-hour legal services in a leveraged partner-associate hierarchy, to the near-complete effacement of lawyers by robotic stand-ins. But whatever legal tech’s effect on the economic and organizational structure of the legal services industry, most agree that its proliferation will reshape the professional status and authority of lawyers.

Core to the debate over the future of lawyers—but also emblematic of its unsettled nature—is the application of a standard pair of economics concepts: Are legal tech and analog lawyering substitutes or complements? On the one hand, it is hard to deny that legal tech will function, to at least some degree, as a substitute for conventional legal services, thus shrinking the profession and reducing aggregate lawyer income (even if it increases the income of law firm equity holders). Big firm lawyers now spend perhaps less than 5% of their time on document review—previously a profit center for the profession’s upper echelon.⁹³ Predictive coding may shrink this further. On the other hand, legal tech and analog, human lawyering can also act as complements, increasing demand for, and thus the premium on, higher-order lawyer judgment, from parsing machine-distilled “hot docs” to crafting litigation strategy. Though some lawyers will be displaced, law practice for the remainers may enjoy more profitable and more stimulating work.⁹⁴ Finally, many analyses of displacement miss the fact that the supply of and demand for legal services are endogenous to its cost. The cheaper legal representation is, the more of it litigants can afford, opening new and potentially profitable markets for legal services

⁹¹ ASHLEY, *LEGAL ANALYTICS*, *supra* note 12, at 12, 35, 255, 350, 355-56 (noting likely ascendance of tools that “engage users in collaboratively posing, testing, and revising hypotheses about how an issue should be decided”).

⁹² Michael Simkovic & Frank McIntyre, *The Economic Value of a Law Degree*, 43 J. LEG. STUD. 249, 275 (2014).

⁹³ See Remus & Levy, *supra* note 1, at 508 (finding large-firm lawyers spent 4.1% of billable hours on document review from 2012-2015).

⁹⁴ Casey & Niblett, *Death*, *supra* note 8, at 1448; Livermore & Rockmore, *Introduction*, in *LAW AS DATA*, *supra* note 6, at xiv; Remus & Levy, *supra* note 1, at 533-37; see also Cummings, *supra* note 89.

to those with cognizable claims who currently, lacking willing counsel, choose to “lump it.”⁹⁵ Some lawyers will be displaced, but others will find entirely new markets for their skills.

A separate literature stakes out the poles of debate about legal tech’s effect on the structure of the legal services industry. Some predict that legal tech will doom BigLaw’s leveraged business model by allowing smaller firms to perform as well as larger ones without the leverage—*i.e.*, small armies of associates—that BigLaw has uniquely had at its disposal.⁹⁶ Legal tech may also reduce BigLaw’s economies of scale by sharpening the case intake and risk management of smaller firms and litigation financiers.⁹⁷ Others, however, have their doubts. Indeed, many legal tech tools will not be off-the-shelf tools developed by entrepreneurs and delivered across the industry, but rather more tailored, bespoke ones designed via lawyer-technologist collaborations *within* law firms.⁹⁸ And here larger firms, with privileged access to data and the capacity to build internal capacity, may enjoy a decisive advantage. Indeed, even the crustiest of white-shoe law firms—for instance, New York’s Cravath—have built dedicated data analytics groups,⁹⁹ and others are actively entering the legal tech space and marketing their own proprietary tools.¹⁰⁰ While many entrepreneurs talk of disrupting the industry, legal tech may not spell doom for BigLaw. It may provide a new profit center.

Both of these debates—about substitutes and complements and the structure of the legal services industry—center on profitability and so bear only a weak relationship to the question of how legal tech will reshape the adversarial system or its rules. But a final strand of the debate turns toward legal tech’s effect on the professional authority and orientation of lawyers and, in so doing, moves closer to procedural concerns. Summarizing a diffuse literature, two dynamics loom largest: lawyer de-skilling and lawyer de-centering. Both proceed from the premise that legal tech’s rise will not merely *displace* lawyers but rather effect a subtler

⁹⁵ See Yoon, *Post-Modern*, *supra* note 21, at 470; see also Remus & Levy, *supra* note 1, at 535 (noting possibility that legal tech is “tapping into a latent market of previously unserved individuals or taking business away from lawyers”). On claiming, see William L.F. Felstiner et al., *The Emergence and Transformation of Disputes: Naming, Blaming, Claiming...*, 15 L. & SOC’Y REV. 631 (1980); DAVID M. ENGEL, *THE MYTH OF THE LITIGIOUS SOCIETY: WHY WE DON’T SUE* (2016).

⁹⁶ Alarie, *How Artificial Intelligence Will*, *supra* note 12, at 121 (predicting legal tech will leave lawyers “less tethered to working in large law firms”); Yoon, *Post-Modern*, *supra* note 21, at 470 (predicting lawyers will be “less reliant on law firm economies of scale, empowering solo practitioners and small-firm lawyers”). For an overview, see Luis Garciano & Thomas N. Hubbard, *Specialization, Firms, and Markets: The Division of Labor Between and Within Law Firms*, 25 J.L. ECON. & ORG. 339 (2009).

⁹⁷ John C. Coffee Jr., *Understanding the Plaintiff’s Attorney: The Implications of Economic Theory for Private Enforcement of Law Through Class and Derivative Actions*, 86 COLUM. L. REV. 669, 706-12 (1986); Nora Freeman Engstrom, *Re-Re-Financing Civil Litigation: How Lawyer Lending Might Remake the American Litigation Landscape, Again*, 61 UCLA L. REV. DISC. 110 (2013). In addition, legal tech may empower corporate clients to do their own legal work by “in-sourcing” it and thus moving it from outside counsel to their own general counsel offices. See Daniel N. Kluttz & Deirdre K. Mulligan, *Automated Decision Support Technologies and the Legal Profession*, BERKELEY TECH. L.J. 22 (forthcoming 2020).

⁹⁸ E-discovery advances are not limited to predictive coding. Other tools can decompose nodes in an expansive communication network—say, the vast email correspondence of a major corporation—and use an algorithm to measure the importance of each node, thus guiding discovery requests and depositions. See Ashley, *Automatically Extracting*, *supra* note 21, at 1132.

⁹⁹ See Scott B. Reents, Lead Attorney, Data Analytics and E-Discovery, Litigation, <https://www.cravath.com/sreents/>.

¹⁰⁰ See Katz, *supra* note 1, at 945; Zach Abramowitz, *The Disruption of Biglaw Might Come, Not from Startups, But Lawyers Themselves*, ABOVE THE LAW (July 6, 2015, 5:44 PM), <http://abovethelaw.com/2015/07/the-disruption-of-biglaw-might-come-not-from-startups-but-lawyers-themselves/>. Littler Mendelson provides a useful example. See Roy Strom, *Littler Mendelson Gambles on Data Mining as Competition Changes*, LAW.COM (Oct. 26, 2016), <https://www.law.com/sites/almstaff/2016/10/26/littler-mendelson-gambles-on-data-mining-as-competition-changes/>.

reshaping of relationships among lawyers, courts, and clients by introducing new kinds of professionals into litigation and by diminishing lawyers' professional agency and skill.¹⁰¹

Deskilling comes through reductions in learning opportunities and “automation bias,” defined as uncritical reliance on machine outputs.¹⁰² Both dynamics lead lawyers to invest less, and have fewer opportunities to invest,¹⁰³ in the skillsets and knowledge necessary to validate and check machine outputs.¹⁰⁴ The unhappy result might be a segregated profession, with tech-savvy domain experts developing and using highly effective, skill-augmenting tools, and the rest of the profession progressively losing its capacity to understand those uses or counter or question their use.¹⁰⁵ More generally, the legal profession could experience a kind of “judgmental atrophy” or a creeping “epistemic sclerosis.”¹⁰⁶ We return to this idea shortly in considering legal tech's effect on rule of law.

Decentering is easiest to see in the e-discovery context. As use of predictive coding proliferates, discovery disputes will play out as expert battles in which dueling technologists opine about the propriety of data manipulations, modeling choices, and performance metrics.¹⁰⁷ Predictive coding thus encroaches on the legal profession's control over one of the fundamental domains of litigation procedure and, as commentators have put it, “transform[s] litigation procedure—traditionally the exclusive domain of judges and lawyers—into a domain that is shared with computer scientists, commercial vendors, and others.”¹⁰⁸ Put another way, lawyers will progressively cede professional jurisdiction to technologists. Even if law remains a profession with most of its current trappings—partial professional monopoly, self-regulation, sizeable returns to talent—the result will be a steady leakage of professional status and authority.

2. *Legal Tech and Rule of Law*

A second strand of an emerging literature explores legal tech's implications for conceptions and implementations of rule of law. Some of the most dramatic follow from the futurist predictions noted previously about a state of “legal singularity” and a “self-driving” legal order.¹⁰⁹ Those scenarios, however, hold few implications for litigation over the near- to medium-term—and, if

¹⁰¹ See Kluttz & Mulligan, *supra* note 97, at 8-9 (noting quiet revolution centered not on lawyer displacement but rather a subtler reshaping of professional role and status).

¹⁰² See John D. Lee & Bobbie D. Seppelt, *Human Factors in Automation Design*, in SPRINGER HANDBOOK OF AUTOMATION 417 (Shimon Y. Nof ed., 2009) (analyzing risks from failure to address automation's restructuring of tasks, including deskilling).

¹⁰³ Medicine provides a useful analogy here, particularly the rise of robotic surgery, which has reduced training opportunities and pushed surgical residents into “shadow learning” practices. See Matthew Beane, *Shadow Learning: Building Robotic Surgical Skill When Approved Means Fail*, 64 ADMIN. SCI. Q. 87 (2019).

¹⁰⁴ Hildebrandt, *supra* note 81, at 28.

¹⁰⁵ Kluttz & Mulligan, *supra* note 97, at 27; Pasquale & Cashwell, *supra* note 84, at 35.

¹⁰⁶ [CITE]

¹⁰⁷ See Remus, *Uncertain Promise*, *supra* note 36, at 1711.

¹⁰⁸ *Id.* at 1711 (warning that lawyers are “ceding control” over procedure); Kluttz & Mulligan, *supra* note 97, at 40 (reporting that lawyers increasingly rely upon “non-lawyer support staff and vendor judgment” on selection and configuration of systems and model-testing); Shannon H. Kitzer, *Garbage In, Garbage Out: Is Seed Set Disclosure a Necessary Check on Technology-Assisted Review and Should Courts Require Disclosure?*, 1 J.L. TECH. & POL'Y 197, 201 (2018) (same).

¹⁰⁹ See notes __-__, *supra*, and accompanying text.

realized, will ultimately render much of the legal tech toolkit irrelevant because procedures, judicial discretion, and legal systems as we know them will cease to exist.¹¹⁰

A more tractable set of rule-of-law concerns posed by legal tech's advance can be bucketed into two categories: *personnel*-based concerns (*i.e.*, concerns rooted in the changing role and status of lawyers) and *process*-based concerns (*i.e.*, concerns rooted in coming changes to the process of adjudicating legal claims). Understanding each highlights some trade-offs of legal tech's incorporation into the civil justice system that may demand a procedural response.

Personnel-based concerns extend from the twin processes of lawyer “decentering” and “deskilling” just noted. Hildebrandt puts it well: As the practice of law is progressively turned over to technologists, there are fewer “legal natives” with a “vested interest in, or experience with, the issues of the Rule of Law.”¹¹¹ In lawyers' stead will come an array of non-lawyer experts with a very different worldview, built around using and promoting technology. As one commentator puts it, these new legal professionals “have no reason to recognize, much less incorporate within their opinions, lawyers' ethical obligations to clients, the courts, and the public”—and, worse, may have “internalized their employers' profit motive.”¹¹²

Process-based concerns, in contrast, stem from the basic insight that legal tech tools will actively shape law rather than just being used to deploy it. Outcome prediction tools are not, as Frank Pasquale and Glyn Cashwell artfully put it, just “a camera trained on the judicial system,” but rather an “engine of influence.”¹¹³ One easily glimpsed possibility is that outcome prediction tools, and likely other parts of the legal tech toolkit as well, will progressively drain the system of its flexibility and its dialogic core. Legal automation, on this view, brings “a fast and refined prediction of the relevant legal effect”¹¹⁴ and thus achieves one of the highest purposes of law. But it comes at a steep cost, draining the law of its capacity to adapt to new developments or to ventilate legal rules in formal, public interpretive exercises.¹¹⁵ At the extreme, legal tech may even work a change in our conception of legality itself, substituting prediction for persuasion and reason-giving and shifting law's normative center to a Skinnerian model of cognition in which law is merely “a black-boxed transformation of inputs into outputs.”¹¹⁶ The resulting “reductionism and functionalism” does more than impair the system's adaptive capacity. The system also loses its legitimacy as a way to manage social conflict when the process of enforcing collective value judgments plays out in server farms rather than a messy deliberative and adjudicatory process, even where machine predictions prove perfectly accurate.¹¹⁷

¹¹⁰ See, e.g., Casey & Niblett, *Death*, *supra* note 8, at 1436, 1440.

¹¹¹ Hildebrandt, *supra* note 81, at 29 (noting how lawyers buttress rule of law); Hildebrandt, *Computation*, *supra* note 28 (same). For an historical account, see DANIEL R. ERNST, *TOCQUEVILLE'S NIGHTMARE: THE ADMINISTRATIVE STATE EMERGES IN AMERICA, 1900-1940* (2014).

¹¹² Remus, *Uncertain Promise*, *supra* note 36, at 1711.

¹¹³ See Pasquale & Cashwell, *Prediction*, *supra* note 84, at 67.

¹¹⁴ Hildebrandt, *Computation*, *supra* note 28, at 21.

¹¹⁵ *Id.* at 22. See also DANIEL MARKOVITS, *A MODERN LEGAL ETHICS: ADVERSARY ADVOCACY IN A DEMOCRATIC AGE* (2008).

¹¹⁶ See Sheppard, *supra* note 9, at 36; Pasquale & Cashwell, *Prediction*, *supra* note 84, at 105.

¹¹⁷ See Joshua P. Davis, *Law Without Mind: AI, Ethics, and Jurisprudence*, 55 CAL. W. L. REV. 165 (2018); Mireille Hildebrandt, *Law as Information in the Era of Data-Driven Agency*, 79 MOD. L. REV. 1 (2016) (noting threat of “mindless agency”). See generally LON L. FULLER, *THE MORALITY OF LAW* (1964).

3. Legal Tech and Distribution

A third and final broad implication of legal tech, related to but distinct from the other two, is political in the classic distributive sense of that term—the “who gets what, when and how” of political science¹¹⁸ or, in Marc Galanter’s litigation-specific formulation, whether and how the “haves” come out ahead.¹¹⁹

The promise is that if, as some predict, legal tech erodes BigLaw’s economies of scale and empowers smaller firms and solo practitioners, then one might expect a leveling of the playing field between “haves” and “have nots.”¹²⁰ Perhaps most important of all, and to circle back to a claim explored previously, supply and demand are endogenous to legal costs.¹²¹ The declining cost of supplying legal services may render claims marketable that cannot currently draw counsel, particularly given the paring back of aggregation mechanisms like the class action.¹²² For champions of civil rights or consumer protection, among others, the result could be a golden age of litigation in which those priced out of the current litigation system can more reliably vindicate their rights.¹²³ Legal tech, on this view, might have its greatest impact in areas where would-be litigants with quality claims are not currently being served.¹²⁴

If some see legal tech as a democratizing force, others have their doubts. A common theme is that legal tech will at best replicate and at worst exacerbate existing power and resource disparities within the litigation system. As already noted, few legal tech tools are turnkey; most require significant mid-stream customization in order to enrich search results, refine predictions of case outcomes, or iteratively label documents for relevance and privilege.¹²⁵ The result is that legal tech tools may merely replicate asymmetries in the quantity and quality of lawyering within the system. Similar dynamics might play out as the process of lawyer decentering noted previously steadily converts traditional procedural wrangling, particularly around discovery, into expert battles between technologists.¹²⁶ In the current system, better-heeled litigants can afford better experts and so may systematically win out over less-resourced ones. Legal tech may reproduce or amplify those effects.

The darkest predictions of all imagine a world that is more different in kind than in degree. As just noted, some of the best legal tech tools may emerge from in-house expertise and privileged data access, something larger law firms are more likely to have.¹²⁷ From there, one can imagine a more significant divergence in the counsel available to the better and worse off, with the

¹¹⁸ HAROLD D. LASSWELL, *POLITICS: WHO GETS WHAT, WHEN AND HOW* (1990).

¹¹⁹ See Marc Galanter, *Why the Haves Come Out Ahead: Speculations on the Limits of Legal Change*, 9 L. & Soc’y REV. 95 (1974).

¹²⁰ See Paul Gowder, *Transformative Legal Technology and Rule of Law*, 68 U. TORONTO L.J. 82, 83 (2018); Yoon, *Post-Modern*, supra note 21, at 457, 470.

¹²¹ See notes __–__, supra and accompanying text.

¹²² For example, Radvocate is an internet-based tool that helps individual consumers pursue arbitration claims, in return for a contingency fee. See <https://myradvocate.com/>.

¹²³ See notes __–__ supra and accompanying text.

¹²⁴ See Remus & Levy, supra note 1, at 529. Other examples: Firms are developing Q/A systems covering aspects of tax or privacy law compliance that would be unlikely to justify retaining a lawyer. See <https://www.nortonrosefulbright.com/en/knowledge/publications/bcf33bd9/australian-privacy-compliance-packages>.

¹²⁵ See notes __–__ supra and accompanying text.

¹²⁶ Seth Katsuya Endo, *Technological Opacity & Procedural Injustice*, 59 B.C.L. REV. 821, 862-68 (2018) [hereinafter Endo, *Technological Opacity*]; Remus, *Uncertain Promise*, supra note 36, at 1712

¹²⁷ See notes __–__ supra and accompanying text.

“haves” enjoying the services of a new kind of super-lawyer whose superior skill and connections are further augmented by software, and the “have nots” settling for unboosted human lawyering or, perhaps worse, an inferior machine-only version.¹²⁸ A still bleaker view is that legal tech may yield proportionally greater deployment of law by “haves” than “have nots.”¹²⁹ Witness, for instance, the use of robo-approaches in evictions, mortgage foreclosures, or consumer credit disputes.¹³⁰ On this view, it may be better-heeled litigants—who are also often a system’s repeat-players¹³¹—who will capture the benefits of procedural streamlining. Rather than leveling the playing field, legal tech may make it easier for employers, creditors, and landlords to prosecute cases against employees, debtors, and tenants.¹³²

Finally, legal tech’s distributive effects will turn on the economic and legal structure of access to it. Legal tech tools that act as force-multipliers cannot democratize litigation if most lawyers and clients are priced out of their use. Nor can they serve as levelers if the falloff from the advanced versions sitting behind paywalls and simpler open-source versions is too steep.¹³³ For those who worry above all about legal tech’s distributive effects, the overriding imperative going forward will be to ensure that all parties to disputes have access to key technology.¹³⁴ But that access, and legal tech’s broader incorporation into the litigation system, will also be modulated by a legal structure, including the twin workings of IP and the trade secrets evidentiary privilege. The legal structure of access to legal tech and its cost structure will profoundly shape its distributive impacts, yielding wide access to legal tech’s fruits or, to the contrary, ensuring that legal tech remains a proprietary tool of litigation’s “haves.”¹³⁵ We return to this below, particularly in Part II.C, because civil procedure rules, particularly the work product doctrine, may act to bolster or curtail those rights.

* * *

More than a hundred years ago, Justice Holmes, in *The Path of the Law*, wrote: “For the rational study of the law, the black-letter man may be the man of the present, but the man of the future is the man of statistics and the master of economics.”¹³⁶ Shorn of its fusty, turn-of-the-century diction, this statement could just as easily have come, in 2020 rather than 1897, from the mouth of a legal tech entrepreneur. And there is for sure an element of puffery in such claims, both then and now, in light of significant technical challenges. There is, however, no doubt that substantial change is afoot, even if its particulars remain fuzzy. In the next two decades, we will likely see a substantial change in how lawyers do their work, sometimes for the better, sometimes not. We are also likely to see a diminution in lawyers’ professional role, stature, and

¹²⁸ See Remus & Levy, *supra* note 1, at 551 (imagining a similar “two-tiered system”).

¹²⁹ See Gowder, *supra* note 120, at 90.

¹³⁰ See Danielle Keats Citron & Frank Dasquale, *The Scored Society: Due Process for Automated Predictions*, 89 WASH. L. REV. 1, 4 (2014).

¹³¹ See Galanter, *supra* note 119.

¹³² See Pasquale & Cashwell, *Prediction*, *supra* note 84, at 65.

¹³³ Brian Sheppard, *Why Digitizing Harvard’s Law Library May Not Improve Access to Justice*, BLOOMBERG LAW (Nov. 12, 2005), <https://biglawbusiness.com/why-digitizing-harvards-law-library-may-not-improve-access-to-justice> (noting that Ravel makes its baseline tools freely available, but its more advanced tools sit behind a paywall).

¹³⁴ See Pasquale & Cashwell, *Prediction*, *supra* note 84, at 81.

¹³⁵ See Remus, *Uncertain Promise*, *supra* note 36, at 1712 (“[P]atent protection threatens to increase unequal access to predictive-coding technologies, which will entrench existing disparities in resources and power.”).

¹³⁶ Oliver Wendell Holmes, Jr., *The Path of the Law*, 10 HARV. L. REV. 457, 469 (1897).

authority, but also a newly powerful cadre of tech-savvy super-lawyers. And we will witness a shift in the litigation landscape toward both democratization and domination.

But amidst all of this contingency is a single, undeniable certainty: Over the near to medium-term, legal tech will be shaped in important part by how the litigation system and, in particular, the rules of civil procedure manage and guide its uptake. In the next Part, we aim to add missing concreteness to current thinking about legal tech by asking, in three case studies, how particular legal tech tools will reshape the litigation system and how civil procedure can, or should, adapt in response.

II. LEGAL TECH AND CIVIL PROCEDURE: THREE CASE STUDIES

This Part climbs down from the heights of thinking about legal tech's longer-run effects on law and the legal system and offers three concrete cuts at legal tech's evolution over the near- to medium-term. As to each, we ask: Assuming continuing advances in legal tech tools over the next ten or fifteen years, how will legal tech change litigation, and how might civil procedure adapt?

This posture, we believe, brings two advantages. First, in focusing on the near- to medium-term, we aim to avoid some of the pitfalls of working at the intersection of law and technology. Technology can evolve in wholly unexpected ways, and even short-range predictions about technological innovation can be deeply misguided.¹³⁷ Yet hewing too closely to present-day technology can yield an analysis akin to rearranging deck chairs on the Titanic, imagining a modest set of altered litigation realities, and a set of legal procedural responses, just before a wave of innovation upends the system. Limiting our inquiry to the foreseeable trajectory of legal tech over the near- to medium-term aims to steer between these two extremes.

Second, by grounding our analysis in civil procedure, we gain traction by focusing in on a discrete set of more litigation-centered legal tech tools. We further maintain focus by building each case study around specific legal tech tools, a prediction about its effect on the distribution of costs or information within the system, and potential amendments to one or more specific civil procedural rules or doctrines. More specifically, Part II.A links predictive coding tools, the distribution of litigation costs within the system, and rules governing proportionality and pleading. Part II.B links outcome-prediction tools, the distribution of information as between judges and litigants, and the rules and doctrines that govern forum-shopping. Part II.C. links predictive coding and legal analytics and outcome-prediction tools, the distribution of information among litigants, and the work product doctrine.

A. Predictive Coding, Proportionality, and Plausibility Pleading

No analysis of legal tech, civil procedure, and the future of the adversarial system would be complete without attending to the technological revolution in discovery practices that is already well underway. This section glimpses the new world of discovery as predictive coding

¹³⁷ See Ryan Calo, *Commuting to Mars: A Response to Professors Abraham and Rabin*, 105 VA. L. REV. ONLINE 84, 85 (2019) (noting that technological change occurs against the backdrop of social, cultural, and economic forces that shape the technology's trajectory).

proliferates and then spins out the implications for civil procedure, focusing in particular on legal tech's capacity to shift the distribution of litigation costs within the system.

1. *The New World of Discovery*

Discovery is variously described as the “centerpiece,” “backbone,” “focal point” and “foundation” of American litigation, and with good reason.¹³⁸ Because discovery is the backdrop for everything that follows it—motions, trial, appeal—cases are often won or lost at the discovery stage. And indeed, at least since the 1938 Federal Rules of Civil Procedure, discovery has been deliberately structured—some say overly so—to facilitate settlement and thus obviate the need for trial at all.¹³⁹ To be sure, this was not always so. In an era of “non-suits,” trial was discovery and, if new facts surfaced, a do-over called. Even today, large swathes of cases—low-stakes auto accidents, among many others—involve no discovery at all.¹⁴⁰ Still, no part of the litigation system has generated more heated debate in recent decades, including a parade of reform proposals¹⁴¹ and frequent amendments to the federal and state rules—likely more than any other litigation area.¹⁴²

Discovery is a lightning rod not just because of its centrality in modern litigation, but also because it has been one of the most dynamic parts of the system. Two seismic developments have remade the discovery process in recent decades. The first is the pervasive digitization of society, which has fueled a steady rise, beginning in the 1990s, of ESI, or electronically stored information. Some estimate that the total amount of digitized material in the current “Big Data” era doubles every few years—a kind of Moore’s law of digital information.¹⁴³ The second development is the advent of new automated tools for identifying, retrieving, processing, and

¹³⁸ Ronald J. Allen et al., *The German Advantage of Civil Procedure: A Plea for More Details and Fewer Generalities in Comparative Scholarship*, 82 NW. U. L. REV. 705, 705 (1988); Nora Freeman Engstrom, *The Lessons of Lone Pine*, 129 YALE L.J. 2, 67 (2019).

¹³⁹ J. Maria Glover, *The Federal Rules of Civil Settlement*, 87 N.Y.U. L. REV. 101, 103-04 (2012); John H. Langbein, *The Disappearance of Civil Trial in the United States*, 122 YALE L.J. 522, 542 (2012).; Stephen C. Yeazell, *The Misunderstood Consequences of Modern Civil Process*, 1994 WIS. L. REV. 631, 631 (1994). Compared to civil law countries and even most common law ones, American discovery yields far broader information exchange. See generally Owen M. Fiss, Comment, *Against Settlement*, 93 YALE L.J. 1073 (1984); Judith Resnik, *Managerial Judging*, 96 HARV. L. REV. 374 (1982).

¹⁴⁰ The data is noisy. PAUL R. CONNOLLY ET AL., FED. JUDICIAL CTR., JUDICIAL CONTROLS AND THE CIVIL LITIGATIVE PROCESS: DISCOVERY 28 (1978) (suggesting more than half of cases involve little discovery); EMERY G. LEE III & THOMAS E. WILLGING, FED. JUDICIAL CTR., NATIONAL CASEBASED CIVIL RULES SURVEY: PRELIMINARY REPORT TO THE JUDICIAL CONFERENCE ADVISORY COMMITTEE ON CIVIL RULES 7 (2009) (2009) (no discovery in 15% of cases); James S. Kakalik et. al., *Discovery Management: Further Analysis of the Civil Justice Reform Act Evaluation Data*, 39 B.C.L. REV. 613, 636 (1998) (38% of general civil cases do not involve lawyer hours worked on discovery); Susan Keilitz et al., *Is Civil Discovery in State Trial Courts out of Control?*, ST. CT. J., Spring 1993, at 9 (42% of general litigation cases lack discovery, and 37% of those with discovery had three or fewer pieces).

¹⁴¹ Seth Katsuya Endo, *Discovery Hydraulics*, 52 U. CALIF. DAVIS. L. REV. 1317, 1347-49 (2019) [hereinafter Endo, *Hydraulics*] (summarizing reform proposals). See also ROBERT G. BONE, CIVIL PROCEDURE: THE ECONOMICS OF CIVIL PROCEDURE 217-19 (2003); Robert D. Cooter & Daniel L. Rubinfeld, *An Economic Model of Legal Discovery*, 23 J. LEGAL STUD. 435, 455 (1994); Frank H. Easterbrook, *Discovery as Abuse*, 69 B.U. L. REV. 635, 638 (1989); Martin H. Redish, *Electronic Discovery and the Litigation Matrix*, 51 DUKE L.J. 561, 608 (2001).

¹⁴² See Stephen B. Burbank, *Private Enforcement*, 17 LEWIS & CLARK L. REV. 637, 657 n. 79 (2013); Endo, *Hydraulics*, *supra* note 141, at 1343-49.

¹⁴³ See JOHN GANTZ & DAVID REINSEL, THE DIGITAL UNIVERSE IN 2020: BIG DATA, BIGGER DIGITAL SHADOWS, AND BIGGEST GROWTH IN THE FAR EAST (2012); PETER LYMAN & HAL R. VARIAN, HOW MUCH INFORMATION? 1 (2003), http://www2.sims.berkeley.edu/research/projects/how-muchinfo-2003/printable_report.pdf). For discussion in the legal context, see Jason R. Baron, *Law in the Age of Exabytes: Some Further Thoughts on ‘Information Inflation’ and Current Issues in E-Discovery Search*, 17 RICH. J.L. & TECH. 1, 4 (2011).

analyzing this crush of materials. At first, managing it meant a move beyond “linear manual review,” in which lawyers put eyeballs on every document, to more automated approaches centered around processing techniques that make documents machine-readable (*e.g.*, OCR) and searchable (*e.g.*, keywords).¹⁴⁴ More recently, automated discovery has leaped ahead with the advent of the “predictive coding” tools described previously that use machine learning classifiers to flag relevant and privileged documents.¹⁴⁵ Taken together, these two trends—proliferating ESI and new automated ways of analyzing it—have progressively remade the world of discovery and ensured that the discovery process, already a burning topic, has remained at the white-hot center of debate about procedure and litigation’s role in American society.

This new world of discovery has generated a predictable set of concerns, some new and some reaching back to the old world. The first is the acceleration of the trend away from comprehensiveness in discovery.¹⁴⁶ At the creation of the Federal Rules of Civil Procedure in the 1930s, some cheered that the new rules permitted “an almost unlimited discovery.”¹⁴⁷ Soon after, Justice Jackson penned an iconic statement of comprehensiveness: “Mutual knowledge of *all* the relevant facts gathered by both parties is essential to proper litigation.” But that utopian ideal has steadily eroded as litigation has grown in scale and complexity. The first dents in the armor came with the 1976 Pound Conference, which some see as the wellhead of a cost-obsessed, anti-litigation strain that has defined American law and politics ever since.¹⁴⁸ A rule-based version came in 1983, when the Judicial Conference amended Rule 26 of the federal rules to require proportionality between discovery requests and the needs of a case, and then again in 2006, when the rules were amended to adapt e-discovery to this goal. The crush of ESI and increasing use of automation has been the final nail in the coffin. Indeed, in complex litigations, it is already the case that the *Hickman* mindset of exhaustive discovery has been eclipsed by a far less ambitious approach in which discovery is more a negotiation about quantitative error tolerance—that is, the production of an acceptable percentage of documents at an acceptable level of accuracy—and a truly exhaustive surfacing of evidence is only rarely cost-justified.¹⁴⁹

A second broad concern, and one noted previously,¹⁵⁰ is that the rising sophistication of e-discovery tools is eroding lawyers’ professional jurisdiction and authority.¹⁵¹ Predictive coding does not cut lawyers out of the equation entirely. Rather, they perform traditional document review on a subset of a production to create a “labeled” set of documents—or a “seed set”—to train the model, then engage in further such efforts as the system iteratively moves toward a best model.¹⁵² But beyond this lawyer-centered data-labeling role, predictive coding is a highly

¹⁴⁴ See, *e.g.*, Remus & Levy, *supra* note 1, at 515; see also Benjamin L. S. Ritz, *Will This Dog Hunt?: An Attorney’s Guide to Predictive Coding*, 57 S. TEX. L. REV. 345, 348 (2016) (suggesting keyword searches return as little as one-quarter of relevant documents). See generally Symposium, *The Sedona Conference Best Practices Commentary on the Use of Search and Information Retrieval Methods in E-Discovery*, 8 SEDONA CONF. J. 189 (2007).

¹⁴⁵ Predictive coding sometimes passes under the label “technology-assisted review,” or TAR.

¹⁴⁶ Remus, *Uncertain Promise*, *supra* note 36, at 1718.

¹⁴⁷ See Edson R. Sunderland, *Discovery Before Trial under the New Federal Rules*, 15 TENN. L. REV. 737, 738 (1939).

¹⁴⁸ SEAN FARHANG & STEPHEN B. BURBANK, RIGHTS AND RETRENCHMENT: THE COUNTERREVOLUTION AGAINST FEDERAL LITIGATION (2017).

¹⁴⁹ Remus, *Uncertain Promise*, *supra* note 36, at 1718; Geoffrey P. Miller, *On the Costs of Civil Justice*, 80 TEX. L. REV. 2115 (2002).

¹⁵⁰ See Part I.C.2, *supra*.

¹⁵¹ See notes __-__, *supra*, and accompanying text.

¹⁵² See notes __-__, *supra*, and accompanying text.

technical exercise. It involves an array of methodological choices, as evidenced by a growing literature evaluating seed set selection strategies,¹⁵³ choices among “learning protocols” at the more iterative stage of model training,¹⁵⁴ and performance metrics,¹⁵⁵ that sit far beyond the average lawyer’s ken. Lawyers, the worry goes, will progressively cede professional authority to technologists (the people who develop, tune, and deploy the models) and technologist experts (the people who opine about the quality of this or that approach before judges in motions practice) in a key procedural domain.

Perhaps the most significant concern connecting the old and new worlds of discovery is litigation costs. The American approach to liberal discovery, embedded in an adversarial scheme in which parties (mostly) bear their own costs, has many virtues, but it creates two glaring incentive problems. First, the propounding party can externalize a large share of the cost of discovery requests onto her adversary,¹⁵⁶ constrained only by the cost the party subsequently incurs in requesting and then processing and reviewing the material produced.¹⁵⁷ Second, tasking the responding party with responsibility for determining relevance creates “cross-party agency problems.”¹⁵⁸ The responding party both has superior information about the value of the discovery in question and is also strongly incentivized to produce as little relevant material as possible. By producing limited *relevant* information, she can minimize her own discovery costs and legal exposure and, by burying that information in a mountain of extraneous materials, raise her adversary’s review costs or even prevent her adversary from finding the “needle in the haystack.”¹⁵⁹ The system in effect trusts a party to act as her “adversary’s agent” and “decide whether a document is useful to her adversary’s case.”¹⁶⁰

The result of these misaligned incentives is two types of cost concern. One is that excessive discovery can yield high aggregate litigation costs relative to case stakes—*i.e.*, the (dis)proportionality concern that has long occupied courts and rulemakers. Adjudication of these disputes, the argument goes, diverts valuable social resources that could be better

¹⁵³ See Christian J. Mahoney et al., *Evaluation of Seed Set Selection Approaches and Active Learning Strategies in Predictive Coding*, LEGAL AIIA ’19 AT ICAIL ’19 2 (2019) [hereinafter Mahoney et al., *Evaluation*] (evaluating seed set selection strategies, including “random” sampling and more complex, “judgmental” sampling in which attorneys use case-specific knowledge).

¹⁵⁴ At the second iterative step, one chooses an “active learning protocol” to select further training documents to add to the seed set. Protocol options include: the strongest matches, borderline matches, a random set of matches, or a mix of each. Mahoney et al., *Evaluation*, *supra* note 153, at 3. See also G.V. Cormack & M.R. Grossman, *Autonomy and Reliability of Continuous Active Learning*, ARXIV:1504.06868 (2015); R. Chhatwal et al., *Empirical Evaluations of Active Learning Strategies*, LEGAL DOCUMENT REV., 2017 IEEE INT’L CONF. ON BIG DATA 1428 (2017).

¹⁵⁵ These metrics include measures of when the system has stabilized and requires no further iteration. They also include performance metrics, including recall (the percentage of targeted documents returned by the algorithm); precision (the percentage of recalled documents that meet targeting criteria); and the F1-Score (the harmonic mean of precision and recall—*i.e.*, $2*(P*R)/(P+R)$). A final metric is the area under the receiver operating characteristic curve (AUC), which plots true positive and false positive rates against a set of possible thresholds and thus gives information for various levels of precision and recall how confident one can be that the model captures relevant documents. See ASHLEY, LEGAL ANALYTICS, *supra* note 12, at 257. An AUC score of 100% is perfect; a score of 50% means it is no more likely than chance that all relevant documents have been ranked more highly than irrelevant ones. *Id.*

¹⁵⁶ See Jonah B. Gelbach & Bruce H. Kobayashi, *The Law and Economics of Proportionality in Discovery*, 50 GA. L. REV. 1093, 1103 (2016).

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ Bruce H. Kobayashi, *Law’s Information Revolution as Procedural Reform: Predictive Search as a Solution to the In Terrorem Effect of Externalized Discovery Costs*, 5 U. ILL. L. REV. 1473, 1478, 1498-1501, 1505 (2014); see also Gelbach & Kobayashi, *supra* note 156, at 1105.

¹⁶⁰ *Id.* at 1104; Kobayashi, *supra* note 156, at 1478.

deployed elsewhere. The other is that discovery costs are often asymmetrically distributed among the parties. As a result, one side in a litigation, often the defendant, bears more of the cost of litigation, giving the other side, often the plaintiff, undue settlement leverage and perhaps even yielding settlements in cases lacking any merit at all.¹⁶¹ These two types of litigation costs need not, of course, yield an inefficient system. Even costly litigations or litigations featuring wide cost asymmetries produce a mix of social costs (excessive litigation) and social benefits (deterrence, surfacing additional wrongdoing) that can be, on net, positive or negative depending on the circumstances.¹⁶² In economics terms, the private and the social motive can diverge in welfare-increasing or welfare-decreasing ways.

Despite their centrality in legal and policy debates, litigation costs have drawn little careful rigorous empirical inquiry, particularly recently.¹⁶³ Indeed, much of the best empirical evidence dates back to the 1970s and 1980s, as private litigation grew in importance as a regulatory mechanism and concern about litigation's inefficiencies crested.¹⁶⁴ While generalizations across litigation systems (federal, state) and litigation types make generalizations difficult, three core findings establish an empirical baseline about cost concerns while leaving plenty of room for debate as to their salience. First, discovery is a substantial, though probably not dominant, source of litigation costs—perhaps one-quarter to one-third of the total.¹⁶⁵ But discovery's share of overall litigation costs varies significantly across case types, accounting for as much as two-thirds of total litigation costs in antitrust cases, for instance, and as much as three-quarters of total costs in larger-scale litigations.¹⁶⁶ Second,

¹⁶¹ See Bone, *supra* note 141, at 45–50; Cooter & Rubinfeld, *supra* note 141, at 437; David Rosenberg & Steven Shavell, *A Model in Which Suits Are Brought for their Nuisance Value*, 5 INT. REV. L. & ECON. 3, 4–5 (1985); Martin H. Redish & Colleen McNamara, *Back to the Future: Discovery Cost Allocation and Modern Procedural Theory*, 79 GEO. WASH. L. REV. 775 (2011).

¹⁶² See Gelbach & Kobayashi, *supra* note 156, at 1102. See also Steven Shavell, *The Fundamental Divergence between the Private and the Social Motive to Use the Legal System*, 26 J. LEG. STUD. 575 (1997).

¹⁶³ See, e.g., Alexandra D. Lahav, *A Proposal to End Discovery Abuse*, 71 VANDERBILT L. REV. 2037, 2052 (2018) (lamenting lack of empiricism and calling for required docketing of discovery requests); see also Judith A. McKenna & Elizabeth C. Wiggins, *Empirical Research on Civil Discovery*, 39 B.C. L. REV. 785, 796–97 (1998) (making similar complaints about lack of empiricism).

¹⁶⁴ On the anti-litigation trend, see Farhang & Burbank, *supra* note 148; Resnik, *supra* note 139. Key empirical studies throughout the 1970s and 1980s include: PAUL R. CONNOLLY ET AL., *supra* note 140; WILLIAM A. GLASER, PRETRIAL DISCOVERY AND THE ADVERSARY SYSTEM 162–77 (1968); Wayne D. Brazil, *Civil Discovery: Lawyers' Views of Its Effectiveness, Its Principal Problems and Abuses*, 1980 AM. B. & J. RES. J. 787; Wayne D. Brazil, *Views from the Front Lines: Observations by Chicago Lawyers about the System of Civil Discovery*, 1980 AM. B. FOUND. RES. J. 217 (1980); Susan Keilitz et al., *Attorneys' Views of Civil Discovery*, JUDGES' J., Spring 1993; Susan Keilitz et al., *supra* note 140; David M. Trubek et al., *The Costs of Ordinary Litigation*, 31 UCLA L. REV. 72, 90–91 (1983); Walker, *supra* note 140.

¹⁶⁵ LEE III & WILLING, *supra* note 140, at 38–39 (2009) (considering individual federal cases in 2008, including those that went to trial, and reporting that the median portion of total litigation costs incurred for discovery was 20% for plaintiffs and 27% for defendants); James S. Kakalik et al., *Discovery Management: Further Analysis of the Civil Justice Reform Act Evaluation Data*, 39 B.C.L. REV. 613, 682 (1998) (finding that lawyer hours per litigant was 232 hours, with an average of 83 hours, or 36% spent on discovery, including motions practice); David M. Trubek et al., *supra* note 164, at 90–91 (dropping “megacases” to get a bead on “ordinary” litigation costs and finding that only 16.7% of attorney time was spent on discovery); Paula Hannaford-Agor, *Measuring the Cost of Civil Litigation: Findings from a Survey of Trial Lawyers*, VOIR DIRE 26. (Spring 2013) (reporting survey results and concluding that in six common types of disputes discovery accounted for 21% of lawyer and paralegal hours). Interestingly, older studies tend to find relatively higher discovery costs. See Thomas E. Willging et al., *An Empirical Study of Discovery and Disclosure Practice Under the 1993 Federal Rule Amendments*, 39 B.C. L. REV. 525, 531 (1998) (finding that, conditional on a case involving discovery, 50% of litigation costs came in discovery); *Judicial Conference Adopts Rules Changes, Confronts Projected Budget Shortfalls*, THIRD BRANCH, Oct. 1999, at 2–3 (reporting a similar 50% figure).

¹⁶⁶ NICHOLAS M. PACE & LAURA ZAKARAS, *WHERE THE MONEY GOES: UNDERSTANDING LITIGANT EXPENDITURES FOR PRODUCING ELECTRONIC DISCOVERY* xv (2012).

while many lawyers believe that discovery costs are often out of proportion with case stakes,¹⁶⁷ the best recent study puts attorney estimates of discovery's proportion at 1.5 to 3.5 percent of total stakes in the median case, and roughly one-quarter to one-third at the top end.¹⁶⁸ Third, litigation cost asymmetries are real but vary in magnitude throughout the system. For instance, older studies found that, in patent cases, discovery consumed more than twice the defendant's costs as plaintiff's.¹⁶⁹ More recent data suggests that, in the more general run of cases, defendant-side discovery costs are somewhat smaller—perhaps not quite double plaintiffs'.¹⁷⁰

An even harder question to interrogate empirically is where costs will go in the new world of AI-boostered discovery.¹⁷¹ One oft-articulated view is that discovery costs will continue to rise because of the ever-growing universe of discoverable material—"infinite ESI"—and because ever cheaper digital storage will allow us to keep all of it.¹⁷² Some of this has come from the usual precincts—the Chamber of Commerce and other anti-litigation standard bearers who have worked hard, and successfully, to establish an often-misleading "cost-and-delay narrative" about litigation.¹⁷³ But it has also come from more official and less conflicted quarters, including judges¹⁷⁴ and rulemakers,¹⁷⁵ among others.¹⁷⁶

However, close attention to data, economic theory, and a technical understanding of predictive coding and related e-discovery tools, suggests something very nearly the opposite may prove

¹⁶⁷ LEE III & WILLING, *supra* note 140, at 28 (attorneys in 25% of cases believe discovery costs are too high relative to AIC). In addition, numerous studies survey lawyers and report that they erroneously believe that discovery consumes two-thirds of litigation costs and that 50% would be a more appropriate number. AM. BAR ASS'N, ABA SECTION OF LITIGATION MEMBER SURVEY ON CIVIL PRACTICE: FULL REPORT 98 (2009); KIRSTEN BARRETT ET AL., MATHEMATICA POL'Y RES., ACT'L CIVIL LITIGATION SURVEY: FINAL REPORT 51 (2008); REBECCA M. HAMBURG & MATTHEW C. KOSKI, NAT'L EMP'T LAWYERS ASS'N, SUMMARY OF RESULTS OF FEDERAL JUDICIAL CENTER SURVEY OF NELA MEMBERS 34 (2010).

¹⁶⁸ See LEE III & WILLING, *supra* note 140, at 42-43.

¹⁶⁹ WILLIAM A. GLASER, PRETRIAL DISCOVERY AND THE ADVERSARY SYSTEM 162-77 (1968).

¹⁷⁰ The most comprehensive recent federal-level study is the 2009 FJC report, which finds that the median proportion of total litigation costs incurred in discovery was 20% of \$15,000 in total litigation costs, or \$3,000, for plaintiffs, and 27% of \$20,000 in total litigation costs, or \$5,400, for defendants, rising by approximately 5 percentage points for both parties in cases with ESI. See LEE III & WILLING, *supra* note 140, at 2. By contrast, the 1998 FJC study, which found that 50% of total litigation costs went to discovery, found no difference across plaintiffs and defendants. See Thomas E. Willing et al., *supra* note 165, at 531. It is important to remember that case cost statistics are necessarily based on cases that are selected for litigation. See notes __-__, *infra*, and accompanying text (exploring academic literature on selection of disputes for litigation).

¹⁷¹ See NORTON ROSE FULBRIGHT, 2018 LITIGATION TRENDS ANNUAL SURVEY: PERSPECTIVES FROM CORPORATE COUNSEL (2018) (reporting a survey of corporate counsel finding that 54% of companies had used TAR); see also Kluttz & Mulligan, *supra* note 97.

¹⁷² See, e.g., Andrew Jay Peck, *Foreword*, 26 REGENT U.L. REV. 1, 3 (2014) (noting explosion and inability to catch up); see also John H. Beisner, *Discovering a Better Way: The Need for Effective Civil Litigation Reform*, 60 DUKE L.J. 547, 550 (2010) (arguing that "exponential growth" in documents has fueled "abusive discovery"); Endo, *Hydraulics*, *supra* note 141, at 1338 (noting that cost concerns animate most discovery reforms).

¹⁷³ Danya Chocair Reda, *The Cost-and-Delay Narrative in Civil Justice Reform: Its Fallacies and Functions*, 90 OR. L. REV. 1085 (2012) (reviewing and criticizing the debate). For an example of claims from within the interest group landscape, see AM. COLL. OF TRIAL LAWYERS & INST. FOR THE ADVANCEMENT OF THE AM. LEGAL SYS., FINAL REPORT ON THE JOINT PROJECT OF THE AMERICAN COLLEGE OF TRIAL LAWYERS TASK FORCE ON DISCOVERY AND THE INSTITUTE FOR THE ADVANCEMENT OF THE AMERICAN LEGAL SYSTEM 2 (2009) [hereinafter COLL. OF TRIAL LAWYERS].

¹⁷⁴ See *Zubulake v. UBS Warburg LLC*, 217 F.R.D. 309, 311 (S.D.N.Y. 2003) (referring to an "exponentially" increasing universe of discovery material).

¹⁷⁵ See JUDICIAL CONFERENCE OF THE U.S., REPORT OF ADVISORY COMMITTEE ON CIVIL RULES 83-84 (2014) (noting impact of the "information explosion" on the 1993 amendments to Rule 26).

¹⁷⁶ Pace & Zakaras, *supra* note 165, at 26 (explaining participant's concerns with "high costs" of discovery review); The Sedona Principles, *Third Edition: Best Practices, Recommendations & Principles for Addressing Electronic Document Production*, 19 SEDONA CONF. J. 1, 59 (2018) (describing growth of ESI).

true. Indeed, largely missing from the debate is a key and, we believe, unmistakable observation: In recent decades digitization has produced a substantial uptick in the volume of ESI, while the advanced analytics necessary to manage that volume have lagged behind. As predictive coding continues to proliferate and improve, however, the discovery cost curve is likely to bend down more quickly than the digitization curve bends up. This, we submit, will have important implications for procedure, potentially draining the proportionality constraints built into federal and state civil procedure rules in recent decades of much of their importance. Further, powerful new e-discovery tools seem poised to steadily narrow the litigation cost asymmetries that have motivated a second key procedural reform in recent years: *Twombly/Iqbal's* shift in the pleading rules.

2. Proportionality's Retreat in a Frictionless World

Growing concern about litigation costs has spurred a wide catalog of reform ideas in recent decades,¹⁷⁷ but the reform that judges and policymakers have arguably preferenced above all others is the imposition of proportionality constraints on discovery. As noted previously, proportionality became part of the federal rules in 1983, but it was beefed up significantly in 2006, when the Advisory Committee added an ESI-specific rule built around cost-shifting. In 2015, the Committee re-centered the proportionality constraint by moving it front and center in Rule 26(b)(1)'s provisions governing discovery's scope, although the operative text changed little.¹⁷⁸ In its current guise, Rule 26(b)(1) now permits discovery:

regarding any nonprivileged matter that is relevant to any party's claim or defense and proportional to the needs of the case, considering the importance of the issues at stake in the action, the amount in controversy, the parties' relative access to relevant information, the parties' resources, the importance of the discovery in resolving the issues, and whether the burden or expense of the proposed discovery outweighs its likely benefit.¹⁷⁹

Many states have followed suit.¹⁸⁰

The newly centered proportionality provisions have, by most accounts, had a substantial effect, drawing both criticism and praise.¹⁸¹ However, there are two reasons to believe that legal tech will shift the ground out from under proportionality constraints, progressively eliminating much of their force.¹⁸² First, there are reasons to doubt pervasive claims about "infinite" ESI that has helped drive reform efforts. In trial litigation, much discovery comes from communication, which is, in important ways, bounded by the limits of human attention and cognition and may bear only a weak relationship to the growth in other kinds of digital

¹⁷⁷ See notes __-__, *supra*, and accompanying text.

¹⁷⁸ The proportionality mandate was moved from Rule 26(b)(2)(C)(iii) to Rule 26(b)(1).

¹⁷⁹ Fed. R. Civ. P. 269(b)(1).

¹⁸⁰ [CITES]

¹⁸¹ See Richard L. Marcus, *Discovery Containment Redux*, 39 B.C. L. REV. 747, 773-74 (2000) (collecting views); Ion Meyn, *The Haves of Procedure*, 60 WM. & MARY L. REV. 1765, 1791 (2019) (decrying test's vagueness and resulting judicial discretion); Gelbach & Kobayashi, *supra* note 156, at 1117 (proportionality brings "subjectivity and a reduction of predictability").

¹⁸² Endo, *Hydraulics*, *supra* note 141, at 1354-55; see also Ralph C. Losey, *Predicting Coding and the Proportionality Doctrine: A Marriage Made in Big Data*, 26 Regent U.L. Rev. 7, 15 (2013); Peck, *supra* note 172, at 3.

materials. Simply put, there are likely to be limits to the quantity of email that even large, sprawling organizations can generate.¹⁸³

Second, and more importantly, evidence is mounting that continued diffusion of predictive coding tools will reduce, perhaps substantially, total discovery costs. Only recently, commentators expressed doubt about the accuracy and efficiency of predictive coding relative to manual review.¹⁸⁴ But a growing cluster of studies establishes that well-implemented predictive coding tools are as good as, and often better than, purely human review in terms of recall (*i.e.*, the proportion of documents in the total pool of documents that the tool accurately identifies as relevant) and almost certainly *better* than humans in precision (*i.e.*, the proportion of documents among those the tool identifies that are in fact relevant). And, they do so at a fraction of the cost.¹⁸⁵ Put another way, predictive coding may not consistently capture more relevant or privileged documents, but it yields less surplusage and requires a fraction of attorney time.¹⁸⁶

All of this comes with caveats—and spotlights future avenues for research. First, the performance metrics that underpin claims about predictive coding's cost-savings are not ironclad. We lack perfectly accurate "ground truth" because we can never "know" which documents in a production are relevant within Rule 26's meaning because that meaning is subjective and contestable.¹⁸⁷ However, while it is possible that skepticism about these measures will retard predictive coding's advance, the better bet remains that predictive coding will continue to improve and continue to earn judicial sanction.¹⁸⁸ Second, it is important to concede that predictive coding, while reducing the need for lawyers, will add new entries to the cost side of the discovery ledger, including software, technologists, and litigation experts.¹⁸⁹

¹⁸³ THE RADICATI GROUP, EMAIL STATISTICS REPORT, 2015-2019 at 3-4 (2015) (reporting that business email per user will grow from 122 to 126 from 2015-2019, an increase of just 3% over 4 years).

¹⁸⁴ See Remus, *Uncertain Promise*, *supra* note 36, at 1720. Other S.D.N.Y. judges agree. *Chevron Corp. v. Donzinger*, No. 11 Civ. 0691, 2013 WL 1087236, at n.255 (S.D.N.Y. Mar. 15, 2013) (rejecting argument about burdensome discovery and noting that predictive coding allows for review at a "fraction of the cost"); *Hyles v. New York City*, 2016 WL 4077114 *3 (stating that "TAR is the best and most efficient search tool").

¹⁸⁵ A comprehensive accounting of studies, ranging from academic studies to exercises at conferences, can be found in PACE & ZAKARAS, *supra* note 165, at 61-69. For key specific studies, see RISHI CHHATWAL ET AL., EMPIRICAL EVALUATIONS OF ACTIVE LEARNING STRATEGIES IN LEGAL DOCUMENT REVIEW (2018) (reporting 90% recall based on review of only 40% of the documents and concluding automation can be better than "linear" human review); Grossman & Cormack, *supra* note 12, at 43 (noting high performance after review of only 1.9% and suggesting "a fifty-fold savings over exhaustive manual review"). Some courts have begun to hear testimony on predictive coding's efficiency gains. See *Dynamo Holdings Lt. P'ship v. Comm'r*, 143 T.C. 183 (2014) (featuring expert testimony that predictive coding would reduce discovery costs from \$500k to \$80k).

¹⁸⁶ Predictive coding will not be the only source of cost-savings. Cheaper storage means that fewer resources will also be spent extracting ESI from inefficient storage (*e.g.*, backup tapes). See THE SEDONA PRINCIPLES: BEST PRACTICES RECOMMENDATIONS AND PRINCIPLES FOR ADDRESSING ELECTRONIC DOCUMENT PRODUCTION 3 (The Sedona Conference Working Grp. 2007).

¹⁸⁷ See Peter Bailey et al., *Relevance Assessment Are Judges Exchangeable and Does It Matter?*, PROC. 31ST ANNUAL INT'L ACM SIGIR CONF. ON RES. & DEV. IN INFO. RETRIEVAL 667 (2008). The best studies manage this concern by reporting numerous pair-wise comparisons of multiple manual (human) reviews and machine outputs. See Pace & Zakaras, *supra* note 165, at 62.

¹⁸⁸ See, *e.g.*, *Nat'l Day Laborer Org. Network v. U.S. Immigration & Customs Enforcement Agency (NDLON)*, 877 F. Supp. 2d 87, 109 (S.D.N.Y. 2012) ("[P]arties can (and frequently should) rely on . . . machine learning tools to find responsive documents."); *Dynamo Holdings Ltd. P'ship v. Comm'r*, 143 T.C. 183, 191-192 (T.C. 2014) ("[W]e understand that the technology industry now considers predictive coding to be widely accepted for limiting e-discovery to relevant documents and effecting discovery of ESI without an undue burden."); *Rio Tinto PLC v. Vale S.A.*, 306 F.R.D. 125, 126 (S.D.N.Y. 2015) (holding that TAR is "an acceptable way to search for relevant ESI in appropriate cases.").

¹⁸⁹ Remus, *Uncertain Promise*, *supra* note 36, at 1707.

These new inputs could render predictive coding inefficient in smaller-scale productions.¹⁹⁰ The more general question is whether the uptick in costs will be less or more than the downtick in lawyer time necessary to perform linear manual review.¹⁹¹ The smart money is less, but one cannot predict with certainty where reality will land.

A final caveat looms larger: Studies proclaiming predictive coding's superiority assume a static litigation system. This assumption, however, may not hold. To begin, cost reductions can reshape how much of the task is demanded and/or supplied, and this is no less true in law than elsewhere.¹⁹² The unit cost of discovery can drop precipitously, but aggregate costs may not budge if judges proceed to green-light ever more expansive discovery requests.¹⁹³ Moreover, most studies touting predictive coding do not account for possible shifts under the discovery rules. But in a growing set of cases, lower courts are struggling with whether to compel party cooperation. In early cases, courts declined to mandate disclosure of seed sets because the parties had arrived at arrangements themselves.¹⁹⁴ Where conflicts arise, however, courts must choose, with some strongly encouraging disclosure but not mandating it¹⁹⁵ and others requiring disclosure or making it a condition of a responding party's use of predictive coding.¹⁹⁶ Academic commentators go furthest of all, proposing that the *requesting* party be made solely responsible for constructing the seed set and tuning the machine learning model.¹⁹⁷ We provide a fuller analysis of the implications of these positions in Part II.C below, including the possibility that the work product doctrine might protect seed sets from disclosure. For now, it is enough to observe that each of these positions could have a range of as-yet-unanalyzed effects on the distribution of discovery costs, including perhaps *increasing* costs in certain cases.¹⁹⁸

¹⁹⁰ Remus & Levy, *supra* note 1, at 534; *see also* Endo, *Technological Opacity*, *supra* note 126, at 855 (assessing whether predictive coding is “fiscally efficient” across all cases).

¹⁹¹ *See* Silvia Hodges Silverstein, *What We Know and Need to Know About Legal Procurement*, 67 S.C. L. Rev. 485 (2016).

¹⁹² *See* notes __–__, *supra*, and accompanying text (noting that the amount of legal services sought and provided is endogenous to its cost). Health care is an often-invoked example. [CITE]. *See also* Francis McGovern & John G. Heyburn II, *Evaluating and Improving the MDL Process*, 38 LITIGATION 26 (2012).

¹⁹³ *See, e.g.,* *Chevron Corp. v. Donziger*, No. 11 Civ. 0691, 2013 WL 1087236, at n.255 (S.D.N.Y. Mar. 15, 2013) (rejecting claims of burdensome discovery and noting that predictive coding allows document review at a “fraction of the cost”).

¹⁹⁴ *See* *Rio Tinto PLC v. Vale S.A.*, 306 F.R.D. 125, 129 (S.D.N.Y. 2015); *Bridgestone Americas, Inc. v. International Business Machines Corp.*, No. 3:13-1196, 2014 WL 4923014, at *1 (M.D. Tenn. July 22, 2014); *In re Actos (Pioglitazone) Products Liability Litigation*, No. 6:11-MD-2299, 2012 WL 7861249, at *4–5 (W.D. La. July 27, 2012).

¹⁹⁵ *Aurora Cooperative Elevator Co. v. Aventine Renewable Energy-Aurora W., LLC*, No. 4:12CV230, 2015 WL 10550240, at *2 (D. Neb. Jan. 6, 2015) (noting that Rule 26(b)(1) does not authorize discovery of the *irrelevant* documents in a seed set but then “encourag[ing]” the parties to work cooperatively); *In re Biomet M2a Magnum Hip Implant Products Liability Litigation*, No. 3:12-MD-2391, 2013 WL 6405156, at *2 (N.D. Ind. Aug. 21, 2013) (noting lack of authority under Rule 26(b)(1) but “urg[ing] Biomet to re-think its refusal”); *Winfield v. City of New York*, No. 15CV05236LTSKHP, 2017 WL 5664852, at *12 (S.D.N.Y. Nov. 27, 2017) (“[e]ncouraging” but not requiring disclosure).

¹⁹⁶ *Moore v. Publicis Groupe*, 287 F.R.D. 182, 199 (S.D.N.Y. 2012), *adopted sub nom.* *Moore v. Publicis Groupe SA*, No. 11 CIV. 1279 ALC AJP, 2012 WL 1446534 (S.D.N.Y. Apr. 26, 2012) (ordering collaboration, including “iterative seed selection” and “quality control processes”).

¹⁹⁷ Kobayashi, *supra* note 159, at 1504.

¹⁹⁸ As an example, privilege (as opposed to relevance) determinations cannot be re-allocated to the requesting party under current versions of the work product doctrine and attorney-client privilege. As a result, even if the requesting party is given sole responsibility for tagging the seed set for relevance, the responding party must *still* review documents for privilege prior to turning over the seed set, embroiling *both* parties in substantial review work. Particularly in smaller-scale cases where predictive coding brings only small efficiency gains, an approach that imposes review obligations on both parties could *increase* total litigation costs.

These are important caveats, and yet the broader conclusion seems sound. Short of substantial changes to current discovery rules, the near- to medium-term is likely to see a reduction in overall discovery costs. As a corollary, the proportionality concerns that have animated much recent litigation reform activity are likely to fade in importance, particularly in cases whose major costs are driven by large-corpus electronic document discovery.

3. *Re-Centering Twombly and Iqbal*

If proportionality has created a slow burn of reform skirmishes in recent decades, then recent changes to the pleading rules, anchored by the U.S. Supreme Court's opinions in *Twombly* and *Iqbal*, were more of a surprise revolution.¹⁹⁹ In its *Twombly* and *Iqbal* opinions, the Supreme Court, ostensibly interpreting Rule 8 of the Federal Rules of Civil Procedure, swept away the "notice pleading" system that had prevailed since the creation of the federal rules in 1938 and replaced it with a regime in which a plaintiff's complaint must assert a "plausible" claim for relief in order to withstand a motion to dismiss. Heated debate has ensued about whether this is in fact just a probability requirement in fancy clothes, and lower courts have often struggled with how to implement the Court's new mandate in any other way. A long academic literature of varying rigor and sophistication has also questioned whether and to what extent the change matters, particularly for specific case types (*e.g.*, civil rights).²⁰⁰ And whether or not *Twombly* and *Iqbal* have had tangible effects on *judicial* decisions, the new pleading regime has plainly impacted pleading practice—for instance, causing many plaintiffs to make costly investments in pre-filing investigation to avoid dismissal.²⁰¹

At the normative core of the *Twombly/Iqbal* debate is a value judgment about the collision of two kinds of asymmetries: asymmetric discovery costs and asymmetric information. The first of these, we just noted, arises from the misaligned incentives of the American system of discovery in which costs lie where they fall, allowing parties to externalize the costs of discovery requests onto adversaries. By subjecting a party's claims to pre-discovery scrutiny, *Twombly/Iqbal*'s pleading rule seeks to blunt such *in terrorem* effects on settlement.²⁰² But whatever its value in paring back litigation cost asymmetries, plausibility screening also creates a countervailing concern founded upon information asymmetries. Simply put, not all claimants have access to needed evidence at the pleading stage, and only coercive discovery and compulsory process can dislodge privately held information about wrongdoing. The result is that the effects of litigation cost asymmetries can be mitigated only by exacerbating information asymmetries, and vice versa. *Twombly/Iqbal*'s plausibility pleading standard is merely a choice, and a highly subjective one, along a spectrum of possible accommodations of the two concerns.

¹⁹⁹ See Richard L. Marcus, *The Revival of Fact Pleading Under the Federal Rules of Civil Procedure*, 86 COLUM. L. REV. 433 (1986) (predicting notice pleading's demise).

²⁰⁰ David Freeman Engstrom, *The Twiqbal Puzzle and Empirical Study of Civil Procedure*, 65 STAN. L. REV. 1203 (2013).

²⁰¹ [CITES]

²⁰² *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544, 559 (2007) (justifying plausibility pleading on need "to avoid the potentially enormous expense of discovery in cases with no 'reasonably founded hope that the [discovery] process will reveal relevant evidence' to support a . . . claim"). See also Samuel Issacharoff & Geoffrey Miller, *An Information-Forcing Approach to the Motion to Dismiss*, 5 J. LEGAL ANALYSIS 437 (2013); Jonah B. Gelbach, Note, *Locking the Doors to Discovery? Assessing the Effects of Twombly and Iqbal on Access to Discovery*, 121 YALE L.J. 2270 (2012).

Twombly/Iqbal's balancing act may involve distributional considerations, but it is not necessarily intractable. One option is to relax the “plausibility” mandate in the subset of cases most afflicted by asymmetric information (though doing so would violate the American commitment to transubstantivity).²⁰³ Another partial solution is phased discovery, akin to jurisdictional discovery, to target key evidentiary issues—the “jugular” of a case—at the pleading stage in order to test plausibility, but leaving the bulk of discovery to later stages, once a motion to dismiss has been beaten back.

For those cases in which document discovery is a key cost driver, predictive coding adds a third potential solution to this menu of options. A small academic literature has begun to explore this possibility, and the reasoning, pivoting off of the earlier discussion of predictive coding's effect on proportionality, should now be familiar.²⁰⁴ The core of the argument is that predictive coding will substantially narrow asymmetric discovery costs because a prime source of those asymmetries—review of documents for relevance and privilege—is the discovery cost that is most directly abated by predictive coding.²⁰⁵ Moreover, these review costs tend to be unevenly distributed between requesting and responding parties, the argument continues, because the responding party must review the full set of collected documents for both relevance and privilege before producing them while the requesting party receives and reviews only the distilled set.

As with our claims around proportionality, the empirical case for predictive coding's capacity to narrow cost asymmetries is less than ironclad. Time will tell, opening significant opportunities for future research. First, predictive coding's capacity to mitigate the *in terrorem* effect of cost asymmetries may not be evenly felt on both sides of the “v,” yielding substantial reductions in discovery costs among responding and requesting parties alike.²⁰⁶ Requesting parties, for instance, might utilize predictive coding to more efficiently distill a large document production for review. If new algorithmic tools cut the requesting party's costs as much or nearly as much as the responding party's, then cost asymmetries, and the *in terrorem* effect they underwrite, may not budge. Predictive coding's capacity to narrow cost asymmetries may also be limited in smaller-stakes cases. Because predictive coding's economies fade as the quantity of discovery declines, there is a point at which the fixed cost of software, seed set construction, and model tuning is not worth the candle. This is important, because at least some empirical evidence suggests that cost asymmetries may be at their widest in smaller-stakes cases, not the mega-litigations that feature most prominently in litigation reform debates.²⁰⁷

Second, predictive coding's capacity to mitigate the effects of cost asymmetries will—as with predictive coding's effect on proportionality—depend on how courts modulate its use by litigants. As just noted, lower courts are grappling with how much inter-party cooperation to require when implementing predictive coding protocols, and some academics go further and advocate a shift to a “task allocation” rule in which the requesting party performs the work, and bears the cost, of constructing the seed set and training the model as a way to limit cost

²⁰³ See, e.g., *Swanson v. Citibank, N.A.*, 614 F.3d 400 (7th Cir. 2010); see also Andrew Blair-Stanek, *Twombly is the Logical Extension of the Mathews v. Eldridge Test to Discovery*, 62 FLA. L. REV. 1 (2010).

²⁰⁴ Kobayashi, *supra* note 159, at 1502.

²⁰⁵ NICHOLAS PACE & LAURA ZAKARAS, *supra* note 165, at 41.

²⁰⁶ See note 98, *supra*.

²⁰⁷ See 2009 FJC Data at 42-43.

externalization and cross-party agency costs.²⁰⁸ However, privilege determinations, we also noted, may be non-delegable, making any re-allocation of discovery tasks to the requesting party at best partial.²⁰⁹ The result is that predictive coding might narrow, but likely cannot flatten, discovery costs.

These and other objections to predictive coding's capacity to mitigate litigation cost concerns provide fruitful avenues for future research, both theoretical and empirical, particularly as predictive coding proliferates and the judicial response crystallizes. However, from the current vantage, and with appropriate humility about predicting technological change, predictive coding's proliferation is likely to progressively erode the cost asymmetries upon which the Court's *Twombly/Iqbal* doctrine is founded.

B. Predictive Analytics and Forum Selection

Forum selection offers a second concrete context in which to explore the intersection of legal tech and procedure. Indeed, legal tech firms are already marketing software that helps litigants choose the most advantageous forum in which to litigate their dispute. A leading example is Ravel Law, whose website features the following client testimonial: "With Ravel I can quickly perform a deep dive into how certain types of cases fare in a jurisdiction and the law that tends to control in a particular kind of case."²¹⁰ In this section, we seek to understand the possibilities, and also the significant limits, of outcome-prediction tools. In so doing, we offer a more skeptical take on legal tech's potential than in the e-discovery domain. Even so, focusing on forum selection offers an invaluable opportunity to probe legal tech's effect on the distribution of information within the system and explore how that might warrant a procedural response.

1. Forum-Shopping in Federal Courts and the Promise of Predictive Analytics

A trio of features of the American litigation system has drawn entrepreneurial attention to forum selection as a legal tech target. First, the American system of federalism means that lawsuits can be heard in multiple fora, and a basic organizing principle is that plaintiffs in the U.S. civil justice system have the "venue privilege"—the right to choose the default place where a case is adjudicated.²¹¹ Even so, defendants at both the federal and state level may move for statutory transfer to a new district or, in the federal system, seek dismissal from the federal system entirely using a common law *forum non conveniens* motion. The result is that litigants on both sides of the "v" have a say in where a case is adjudicated.

Second, forum choice can have a significant impact on case outcomes, and so parties will have powerful strategic incentives to select or avoid particular fora by engaging in "forum-shopping." One set of incentives is the cost and convenience of litigating the suit. A party may hesitate to fight if forced to litigate in a faraway courthouse, or one that won't entitle the party

²⁰⁸ See notes __-__, *supra*, and accompany text. Kobayashi, *supra* note 159, at 1504.

²⁰⁹ See note __, *supra*.

²¹⁰ *What People are Saying*, RAVEL LAW, <https://home.ravellaw.com> (last visited Sept. 28, 2019) (quoting Daniell Newman, Shareholder, Greenberg Traurig).

²¹¹ See, e.g., *Atlantic Marine Construction Co. v. U.S. District Court for the Western District of Texas*, 571 U.S. 49 (2013).

to compulsory process for key witnesses.²¹² Parties may also prefer a fast or slow resolution. Finally, a litigant's choice of forum can affect which law applies. In federal court cases involving state law claims, the court where a case is originated might affect choice of law because, under the Supreme Court's *Erie-Klaxon-Van Dusen* framework, courts typically apply the choice of law rule of the state where a civil action was removed or originally filed.²¹³

Some of these differences are amenable to relatively low-cost analysis using conventional legal approaches—by reading cases and thinking like a lawyer. But forum choice can also matter for *how* law is applied. If advanced predictive analytics can be made to work in this arena—a very big “if” for reasons we discuss below—then it is there that it would enjoy a decisive advantage. Regardless what law applies, judges in some jurisdictions might be more plaintiff-friendly than others in adjudicating motions to dismiss or for summary judgment, and the jury that awaits at trial if those motions are denied might be more generous.²¹⁴ The salience of these “discretionary” choices may grow over time amidst an increasingly politicized judiciary, as selected by an increasingly polarized political process,²¹⁵ and a jury pool shaped by Americans' growing tendency to sort along socioeconomic and ideological lines.²¹⁶

A third feature of American litigation that makes predictive forum selection a potentially valuable growth area is that, by and large, American courts accept forum shopping as an intrinsic part of the system. An obvious exception, of course, is the *Erie* doctrine, which is explicitly structured around curtailing law-based incentives for forum-shopping as between federal and state courts.²¹⁷ But beyond *Erie*, and despite occasional judicial outbursts noting “the danger of forum shopping”²¹⁸ or declaring it “evil,”²¹⁹ the underlying doctrinal story, from the Supreme Court on down, is a far more accommodating one.²²⁰ Part of this is a brute accommodation of the messiness of American federalism.²²¹ Part of it may be a determination

²¹² For classic examples, see *Carnival Cruise Lines, Inc. v. Shute*, 499 U.S. 585 (1991); *J. McIntyre Machinery, Ltd. v. Nicastro*, 564 U.S. 873 (2011).

²¹³ *Klaxon Company v. Stentor Electric Manufacturing Company*, 313 U.S. 487 (1941); see also *Van Dusen v. Barrack*, 376 U.S. 612 (1964) (applying the choice of law rules of the filing state even if the case is transferred in the interests of convenience under 28 U.S.C. § 1404(a)). *Klaxon* and *Van Dusen* further ensure that this is also true for removable cases initially filed in state court. However, there are two exceptions. If venue was improper in the original district, then following a transfer under 28 U.S.C. § 1406, the choice of law rules of the destination court's state will apply instead. In addition, the destination court's rules apply when an action is transferred to one designated in a forum selection clause. See *Atlantic Marine Construction*, 571 U.S. at 66-67.

²¹⁴ See Debra Lyn Bassett, *The Forum Game*, 84 N. CAR. L. REV. 333, 350 (2006) (noting these more “subjective and personal factors”); see also Mary Garvey Algero, *In Defense of Forum Shopping: A Realistic Look at Selecting a Venue*, 78 NEB. L. REV. 79, 99 (1999).

²¹⁵ See NATHANIEL PERSILY, *SOLUTIONS TO POLITICAL POLARIZATION IN AMERICA* (2015); Richard L. Hasen, *Polarization and the Judiciary*, 22 ANN. REV. POL. SCI. 261 (2019).

²¹⁶ See, e.g., BILL BISHOP & ROBERT CUSHING, *THE BIG SORT: WHY THE CLUSTERING OF LIKE-MINDED AMERICA IS TEARING US APART* (2008).

²¹⁷ See *Erie R.R. Co. v. Tompkins*, 304 U.S. 64 (1938).

²¹⁸ See *Agency Holding Corp. v. Malley-Duff & Assocs.*, 483 U.S. 143, 154 (1987).

²¹⁹ See *Wells v. Simonds Abrasive Co.*, 345 U.S. 514, 521 (1953) (Jackson, J., dissenting).

²²⁰ See Kermit Roosevelt III, *Choice of Law in Federal Courts: From Erie and Klaxon to CAFA and Shady Grove*, 106 NW. U.L. REV. 1, 32–33 (2012) (describing normative ambivalence about forum shopping). For case law, see *Ferens v. John Deere Co.*, 494 U.S. 516, 528 (1990) (recognizing that plaintiffs engage in forum shopping); *Van Dusen v. Barrack*, 376 U.S. 612, 633 (1964) (same as to defendants); *Keeton v. Hustler Magazine, Inc.*, 465 U.S. 770, 779 (1984) (characterizing state-to-state forum shopping as a standard litigation strategy); *Piper Aircraft Co. v. Reyno*, 454 U.S. 235, 250 (1981) (same). Interestingly, American ambivalence about forum shopping does not hold for global forum shopping. See Pamela Bookman, *The Unsung Virtues of Global Forum Shopping*, 92 NOTRE DAME L.R. 579, 589, 592 (2016).

²²¹ See Friedrich K. Juenger, *Forum Shopping, Domestic and International*, 63 TUL. L. REV. 553, 569 (1989).

that other procedural doctrines and statutes—among them personal jurisdiction, statutory limits on venue, and, as just noted, *Van Dusen*'s effort to ensure that transfers on convenience grounds do not affect which law applies—place reasonable bounds around forum-shopping opportunities.²²² And part of it may be an artifact of a thoroughgoing adversarial system that sees litigation strategy, including forum-shopping, as synonymous with zealous representation and perhaps even an ethical duty.²²³ Whatever the cause, even where litigants seek a venue transfer on convenience grounds, courts rarely scrutinize the deeper strategic purpose that that request often reflects.

2. Will Predictive Forum Selection “Work”?

While some believe predictive analytics methods hold great promise for litigants seeking to maneuver their dispute into an advantageous forum, serious questions, unrelated to the NLP challenges discussed previously, remain as to legal tech's ability to deliver on any such promise. These concerns may or may not be insuperable. At a bare minimum, they indicate that strong headwinds must shape thinking about any procedural response.

Start with a concrete example: whether a defendant in an already-filed case should move to transfer to another forum, given that the defendant plans to move to dismiss for failure to state a claim (and, if she loses, for summary judgment later). In this setting, a defendant might want to know what share of all Rule 12(b)(6) motions has been granted in each district. A more refined approach would filter cases by additional available details, such as the PACER-reported nature of suit code, case characteristics such as the number of parties on each side, the corporate status of parties, the number of claims filed, the presence of state or federal law questions, and the court and assigned district court judge. Machine learning methods can determine which, if any, of these variables importantly predict the result of Rule 12(b)(6) motions among the universe of already-litigated cases. If the district court is one of the important predictors, then a transfer to a more favorable district might be a good bet.

This simple example surfaces a key criterion for thinking about what it means for predictive analytics to “work”: Available data must be useful in predicting the ways important case outcomes would vary across districts. Call this the *APU criterion*—the requirement that Available data is Predictively Useful.

Predictive analytics applied to forum selection could fail the APU criterion in any of three ways. First is insufficient data of the right type. While many of the variables relevant to predicting case outcomes are available in the docket reports that reside on the federal courts' PACER e-filing system, capturing the key case features with respect to, say, the plausibility standard applied to motions to dismiss under *Twombly/Iqbal* might vary in ways that require a wider catalog of case materials—for instance, complaints, memoranda of law supporting a motion to dismiss, or other documents. One problem is that PACER's search interface, which has all the sophistication and user-friendliness of its mid-1990s design, makes it almost useless for data filtering. The more significant issue is that, even if efficient filtering were possible, PACER fees,

²²² See Bassett, *supra* note 214, at 369. For key personal jurisdiction cases, see *Goodyear Dunlop Tires Operations, S. A. v. Brown*, 564 U.S. 915 (2011); *Daimler AG v. Bauman*, 571 U.S. 117 (2014); *BNSF Railway Co. v. Tyrrell*, 137 S. Ct. 1549 (2017); *Bristol-Myers Squibb Co. v. Superior Court*, 137 S. Ct. 1773 (2017).

²²³ Bassett, *supra* note 214, at 344.

assessed on a document-by-document basis, would mount quickly in any effort to generate enough observations to support viable machine learning methods.²²⁴

Could some alternative mechanism arise that duplicates PACER's holdings and then allows smart sharing of massive numbers of case documents? True, Westlaw, Lexis, and Bloomberg already download all PACER docket reports and large numbers of underlying case documents. And large law firms surely possess expansive document collections they have filed and downloaded in their own work. There is also the insurgent RECAP archive, which makes freely available any document the archive's users have paid PACER to download.²²⁵

But there is little way to know whether these document collections currently are representative of the full population of cases. And foreboding economics give good reason to doubt that any such collection will become comprehensive. One estimate found that the cost of downloading all of PACER would have been as much as \$1 billion several years ago. And that estimate doesn't include the cost of updating the data pool with the tens of millions of additional documents filed in the federal courts each year going forward.²²⁶ In economics terms, PACER enjoys a natural monopoly and seems uninclined to relinquish that position, making it hard for new entrants to gain a foothold.²²⁷ Further, the magnitude of data costs suggests that, even if an entity were willing to invest, the tools that ultimately made it to market would not likely be made widely available. Indeed, the more likely outcome is that litigation's "have nots" will be priced out, particularly since, as explored more fully below, the value of the tool to litigation's "haves," and thus the price they are willing to pay for it, will derive at least in part from exclusive access to its outputs. That leaves the possibility of public sector-driven reform, perhaps as a result of litigation challenging PACER's policies or because the Judicial Conference or Congress steps in. Short of this, however, data limitations may well place a ceiling on predictive forum selection.

²²⁴ If, based on a power analysis, a litigant needs to download information on 20,000 cases to make useful predictions, and each case featured an average of three documents at an average cost of \$1.50, total costs—for one case—could exceed \$90,000, not including the costs of employing data scientists.

²²⁵ See Advanced RECAP Search, Court Listener, <https://www.courtlistener.com/recap/> (last visited Jan. 26, 2020). RECAP, for those who missed it, is "PACER" spelled backward.

²²⁶ John Brinkema & J. Michael Greenwood, *E-Filing Case Management Services in the US Federal Courts: The Next Generation: A Case Study*, 7 INT'L J. CT. ADMIN. 4, 4 (2015); Michael Lissner, *The Cost of PACER Data? Around One Billion Dollars*, FREE LAW PROJECT (Oct. 10, 2016), <https://free.law/2016/10/10/the-cost-of-pacer-data-around-one-billion-dollars/>.

²²⁷ Natural monopolies are characterized by declining average costs as output increases, meaning high fixed and low marginal costs. PACER is an instance because the fixed costs of collecting and indexing the data dwarf the marginal costs of searching and sharing it over the internet. See *Natural Monopoly*, INTELLIGENT ECONOMIST, <https://www.intelligenteconomist.com/natural-monopoly/> (last visited Jan. 26, 2020). To concretely play out PACER's potential invulnerability to competition, consider first that PACER generates \$150 million in annual fees. See, e.g., Judiciary Information Technology Fund, USCourts.gov, https://www.uscourts.gov/sites/default/files/fy_2020_jitf_0.pdf (last visited Jan. 26, 2020) (reporting revenue on "Electronic Public Access," which encompasses PACER). If a competitive entrant could buy a stream of revenue of that size for "only" \$1 billion, it would be profitable to do so as long as the entrant's next-best investment yielded returns below 15%, or \$150 million. This, of course, ignores operating costs, but there is reason to think such costs, including data warehousing and bandwidth, would be low. See Lissner, *supra* note 226, at n.3 (estimating a cost of \$128,000 annually for data warehousing); *Comparing Bandwidth Costs of Amazon, Google and Microsoft Cloud Computing*, ARADOR (May 3, 2017), <https://arador.com/ridiculous-bandwidth-costs-amazon-google-microsoft/> (suggesting bandwidth costs of roughly \$100 per TB per month). But, as noted previously, the entity would also have to download from PACER tens of millions of additional documents each year. And there is no guarantee—indeed, plenty of reason to doubt—that PACER would continue to operate if a competitor gobbled up its revenue stream. With no PACER, there would be no bulk source of federal court data. And this ignores the possibility that new entrants would appear; once they have sunk the entry costs, price competition could render *all* providers unprofitable.

A second way that predictive analytics applied to forum selection might fail the APU criterion derives from a particular kind of endogeneity. Using predictive analytics to drive forum selection decisions might well cause changes in litigant behavior that erode any initial accuracy or usefulness. This is an instance of the “Lucas critique”—named for economist and Nobel laureate Robert Lucas.²²⁸ Put in simplest terms, systematic patterns in litigation outcomes reflect endogenous strategic behavior by litigants. Patterns revealed by deployment of predictive analytics methods can be expected to induce behavior changes *as a result of the use of predictive analytics methods themselves*. This, in turn, might destroy the future accuracy of the very prediction methods that drove the change in behavior.

Here’s an example of how the Lucas critique problem might operate. One core feature of concern to litigants is the amount of time a case takes to wend its way to the finish line. If predictive analytics indicate that a particular forum is better for parties with the ability to select it, then parties will flock to this “magnet” forum, clogging up its docket, thereby slowing down *all* litigation there. The opposite will happen in “source” forums. In principle, Congress could respond to such a result by increasing the number of judgeships in magnet forums. But that would take time, and it presumes that Congress would act for efficiency’s sake, which has not always been the case. This example of source-magnet dynamics shows how behavioral changes could endogenously reduce the value of the information gained.

A third issue, which also reflects endogeneity, operates prior to the Lucas critique problem. Ever since Priest and Klein’s seminal article, it has been a commonplace that the set of cases that make it to judgment is systematically selected.²²⁹ Some cases settle before trial, and it is unlikely to be random which ones do.²³⁰ A reasonable conclusion to draw is that cases for which we observe litigation outcomes differ from cases that settle before those outcomes would be observed, as well as from cases in which those outcomes never would be observed.

To make this more concrete, suppose parties have access to two forum options, A and B, of roughly equal size. All cases are diversity cases, and each involves one Forum A party and one Forum B party. Without predictive analytics, suppose it is essentially random where cases are heard in the sense that the plaintiff just files where she lives, and defendants move to transfer in some but not all cases. Now assume that some defendants gain access to predictive analytics. They find that motions to dismiss are granted 60% of the time in tort cases heard in Forum A but only 20% of the time in Forum B. With predictive analytics, (i) all tort defendants will decline to seek transfer out of Forum A and (ii) all defendants will seek transfer out of Forum B. In short, the advent of predictive analytics causes many more tort cases to be heard in Forum A, and many fewer in Forum B. Will 12(b)(6) grant rates remain three times greater in Forum A? Only if the cases newly litigated there are similar to those previously heard there.

²²⁸ See Robert E. Lucas, Jr., *Econometric Policy Evaluation: A Critique*, 1 Carnegie-Rochester Conference Series on Public Policy 19 (1976).

²²⁹ See George Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 133 J. LEGAL STUDS. 1 (1984). For more recent revisions, see Daniel M. Klerman & Yoon-Ho Alex Lee, *Inferences from Litigated Cases*, 43 J. LEGAL STUDS. 209 (2014); Jonah B. Gelbach, *The Reduced Form of Litigation Models and the Plaintiff’s Win Rate*, 61 J.L. & ECON. 125 (2018) [hereinafter Gelbach, *Reduced Form*]; Eric Helland et al., *Maybe there Is No Bias in the Selection of Disputes for Litigation*, 174 J. INST. & THEORETICAL ECON. 143 (2018); Jonah B. Gelbach, *Comment, Maybe There is No Bias in the Selection of Disputes for Litigation*, 174 J. INST. & THEORETICAL ECON. 171 (2018).

²³⁰ This same logic has been applied in other areas of pre-trial litigation, including 12(b)(6), summary judgment, removal, patent litigation, and so on. See Gelbach, *supra* note _ (reviewing the literature).

If, however, pre-analytics Forum B tort cases were stronger or better pleaded than in Forum A, then the grant rate will not be 60%. Because the parties' strategic choices will shape observed outcomes, it will be difficult to lay down clear and verifiable conditions under which win rates are predictable.

Thus, whereas the Lucas critique suggests that initially value prediction methods will induce behavioral changes that destroy predictive usefulness, the selection problem Priest and Klein describe might render the initial predictions too inaccurate to be useful. Both sources of endogeneity support healthy skepticism of the ability of predictive analytics methods to “work” in guiding forum selection choices.

Perhaps all is not lost for legal tech entrepreneurs, because analysts could try modeling endogenous behavior directly. Successful estimation of what economists call “structural models” of behavior would allow predictions that are robust to both the Lucas and Priest-Klein forms of endogeneity described above. But such estimation typically must rely critically on contestable behavioral and statistical assumptions. And it is rarely if ever the focus of predictive analytics methods, which are usually regarded as a black-box-ish alternative to structural modeling. Still, it is at least possible that, as predictive analytics methods proliferate and become pervasive, the system will reach a more-or-less stable equilibrium.²³¹ If so, and if enough people behave in ways in line with what predictive analytics indicate—possibly *because* of those predictions—then the predictions may turn out to be right in equilibrium. So long as no large shocks hit the system, predictions would then be useful. But overall, endogeneity of litigant behavior poses yet another technical barrier to the world of robojudges and robolawyers imagined in much of the existing legal tech literature.

3. *The Future of Forum Selection and Civil Procedure*

The above discussion provides grounds for skepticism that predictive forum selection will gobble up the litigation world. But it is at least possible that it will “work” well enough to support a robust market for its use. What are the implications if legal tech tools applied to forum selection turn out to be predictively useful, and reliably so? We address two possibilities.

First, the emergence of robust outcome prediction tools and a consequent rise in digitized forum selection game-playing could revive concerns among judges—and, eventually, rulemakers and policymakers—about “manipulable justice” and “unprincipled gamesmanship” that have otherwise largely fallen away within the American system.²³² If forum-shopping lost legitimacy as an intrinsic part of the litigation landscape, a reformist impulse might break through.

The opening of policy windows is rarely a given. Of particular importance will be the cogency of the empirical showings that can be made—about, say, the volume of satellite litigation or the degree to which litigation’s “haves” are systematically gaining advantage over its “have

²³¹ In mathematical terms, the iteration of predictions and forum choices might function together as a “contraction mapping,” causing the system to converge to a stable equilibrium. [CITES]

²³² See Bassett, *supra* note 214, at 388; Pamela Bookman, *The Unsung Virtues of Global Forum Shopping*, 92 NOTRE DAME L.R. 579 (2016).

nots.”²³³ So would evidence of a sharpening of what some see as a worrying practice of courts openly competing for business by offering procedural or other carrots—a phenomenon that likely fueled recent patent venue reforms.²³⁴ A shift in forum shopping’s valence might also gain momentum from interventions elsewhere, such as France, where warnings about the “Ravelization of law” accompanied recent legislation banning judicial analytics and, indeed, imposing criminal penalties for their use.²³⁵ To be sure, the French reaction can be chalked up to its status as a civil code country committed to *ex ante* codification of law.²³⁶ In common law systems founded on judge-made decisional law, the threat that predictive analytics will yield a legal realist unmasking of law’s politics and indeterminacies is less acute. That said, the France example may also reflect growing and more universal distrust, particularly in democratic systems, of use of algorithmic decision-making throughout society.²³⁷

Forum shopping’s demotion will be important because it is likely to be a precondition of a second possible consequence: With forum-shopping’s valence flipped in the judicial or legislative mind, either type of actor might take action to reform the system. Congress could, à la France, prohibit use of predictive analytics for forum selection purposes. It could also revise the federal venue statute to narrow or outright eliminate transfers on pure convenience grounds. Either of these approaches, however, brings obvious challenges. The former would be hard, if not impossible, to police. The latter would be hard to maneuver through the current Congress, or any Congress, since any constriction of venue transfer would systematically disadvantage defendants, often corporate ones.²³⁸

Instead, the most likely procedural response to an escalation in effective predictive forum selection practices will come from judges, not legislators. And given this, the most likely intervention over the near- to medium-term will not take the form of prohibition or tweaks to the venue rules but rather a regime of *disclosure*, via judicial demands for litigants’ machine outputs.

²³³ See Ori Aronson, *Forum by Coin Flip: A Random Allocation Model for Jurisdictional Overlap*, 45 SETON HALL L. REV. 63 (2015); Michael H. Gottesman, *Draining the Dismal Swamp: The Case for Federal Choice of Law Statutes*, 80 GEO. L.J. 1 (1991); Kevin M. Clermont & Theodore Eisenberg, *Exorcising the Evil of Forum-Shopping*, 80 CORNELL L. REV. 1507 (1995).

²³⁴ See J. Jonas Anderson, *Court Competition for Patent Cases*, 163 U. PA. L. REV. 631 (2015); Daniel Klerman & Greg Reilly, *Forum Selling*, 89 S. CAL. L. REV. 241 (2016); Scott E. Atkinson at al., *The Economics of a Centralized Judiciary: Uniformity, Forum Shopping, and the Federal Circuit*, 52 J.L. & ECON. 411 (2009).

²³⁵ See Jason Tashea, *France Bans Publishing of Judicial Analytics and Prompts Criminal Penalty*, ABA JOURNAL (June 7, 2019).

²³⁶ [CITE]

²³⁷ See generally FRANK PASQUALE, *THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION* (2016).

²³⁸ Equally unlikely, and more the stuff of academic inquiry, is a statutorily prescribed *randomized* allocation system. See Aronson, *supra* note 233. Still another possibility is that Congress could enact a federal choice-of-law statute to reduce the advantage plaintiffs can gain by filing in a forum to get their preferred choice of law under *Van Dusen*. Note, however, some problems. Many have questioned whether choice of law is amenable to statutory codification at all, and most proposals coming out of the last round of anxiety about forum-shopping, in the 1990s, advanced a thicket of competing canons tailored to specific subjects or types of collisions between legal rules. See, e.g., Larry Kramer, *Rethinking Choice of Law*, 90 COLUM. L. REV. 277, 322-40 (1990). See also LEA BRILMAYER, *CONFLICT OF LAWS: FOUNDATIONS AND FUTURE DIRECTIONS* 161-67, 185-89 (1991); Gottesman, *supra* note __. The bigger problem is that a unified choice-of-law regime might not accomplish much if, as noted previously, predictive forum selection proves most useful in exploiting the ideology-inflected decisions of an increasingly politicized judiciary and demographically sorted jury pools. See notes __, *supra*, and accompanying text. After all, these choices operate within law’s interstices; they do not depend on choices among legal rules.

What, precisely, would this look like? Consider several options. Judges facing a transfer motion could require the parties to disclose only the fact of their use of predictive analytics. More aggressively, parties could be required to disclose to all sides, including the judge, their models' predictions for each forum they considered. Most aggressive of all would be a requirement that a party who uses predictive analytics give direct access to the programs and/or code used to generate predictions. Disclosure could, in turn, lead to the crafting of new rules distinguishing types of reasons surfaced via predictive analytics. Some predictions could be treated as affirmative reasons for transfer, akin to reduced litigation costs. That would make sense in the case of timing-related predictions. After all, it may be less costly to litigate in a district where, all else equal, the case moves more quickly. By contrast, predictions related to who will win dispositive motions relate to a zero-sum variable, so the associated "convenience" for one party is "inconvenience" for the other. The case for transfer in such cases turns importantly on distributional considerations—which party do we want to favor?—rather than on efficiency-based arguments.

In the current political climate, a judge-made disclosure regime is more realistic than Congress tweaking the venue statute, but it is also, in a system founded upon adversarialism, more bracing. Compelled disclosure of machine outputs or source code would implicate the anti-free-riding justification for work product protection. We systematically address issues related to the work product doctrine momentarily, in Section II.C. For now, however, it is worth noting that there remain many further questions about whether and when a disclosure regime would make sense as a policy matter.

For instance, a threshold issue—and one we also return to later—is whether judge-litigant or litigant-litigant information asymmetry is the critical challenge. In cases with sophisticated, well-financed parties on all sides, perhaps adversarialism will take care of judge-litigant information asymmetry. If both sides have access to the same quality predictions, then at least one of them will have the incentive to inform the court that predictive analytics likely motivates the quest for a change of venue. Thus, litigant-litigant information asymmetry—itsself likely to result from *litigant-litigant resource* asymmetry—is ultimately the source of *judge-litigant information* asymmetry. This interesting result indicates that predictive forum selection, if it comes to be disfavored, likely requires active policing by judges only in the presence of significant litigant resource disparities—that is, only when litigation's "haves" and "have nots" face off.

Another key policy question is whether compelled disclosure would chill use of predictive analytics for forum selection and whether we should care. For example, disclosure might induce some defendants—particularly those with pre-existing knowledge about a "magnet" district's desirability—not to use predictive analytics at all. Our hunch is that this should not matter: It is in middle-ground cases where forum choices are less obvious that defendants would use analytics even when forced to disclose, and these are, by construction, the cases where analytics are likely most valuable to defendants. Even so, more thinking will clearly be required to work through the costs (*e.g.*, distributive concerns across litigation's "haves" and "have nots") as against its benefits (*e.g.*, earlier and potentially socially efficient settlements²³⁹).

²³⁹ Suppose predictive analytics tells its users where each party is most likely to win. One view might be that it involves nothing but a redistribution from plaintiffs to defendants. But that's too facile. After transfer, both parties might become certain the defendant would win, so the case is likely to settle, reducing both private and public litigation costs.

That benefit-cost comparison, and the many other research questions flagged above, will provide fruitful avenues for further inquiry as predictive forum selection tools improve and their procedural regulation comes into clearer focus.

C. From Borrowed Wits to Borrowed Bits: Legal Tech and the Work Product Doctrine

This section turns to an issue that has lurked in the background of the analysis to this point: the treatment of legal tech tools, including predictive coding and predictive forum selection tools but also tools that perform advanced legal analytics, under the work product doctrine.

1. Information and Adversarialism: Reframing Legal Tech's Distributive Costs

Legal tech, we noted way back in Part I, is likely a double-edged sword as a distributive matter. On one hand, it can narrow adversarial inequities by providing a force multiplier to under-resourced counsel and by making legal redress available to categories of claimants who are not served, or poorly served, within the current system. On the other hand, legal tech can deepen distributive divides. The “haves,” for instance, may be better positioned to capture legal tech’s efficiencies and then use them to deploy more law, and deploy law more effectively, against the “have nots” rather than the other way around.

These are important and interesting possibilities that will surely repay further research as legal tech proliferates. But command of the full landscape of legal tech and some of its technical possibilities and limits also permits a more focused and concrete set of claims about legal tech’s likely distributive consequences. In particular, virtually every tool in the legal tech toolkit aspires to confer on users better information than their adversaries—about the best forum in which to litigate, the most damaging documents in a vast production, the likelihood of winning before *this* judge or jury, and the best arguments to lay before either actor to get there. It follows that, as various tools within the legal tech toolkit improve, and if only the “haves” can access the best of them, one could expect a widening of information asymmetries—whether in particular litigation areas, or even across the system as a whole—that will exacerbate, rather than mitigate, distributive concerns and permit some groups to systematically win out over others.

Consider two concrete examples. First, a key question in emerging e-discovery debates is whether predictive coding increases or decreases gaming and abuse.²⁴⁰ Predictive coding’s

Presumably the settlement would be on poor terms for the plaintiff, so now we have a tradeoff between normative considerations related to the plaintiff’s loss of bargaining power and litigation-cost considerations related to early settlement. Such effects on settlement behavior greatly complicate any attempt to predict the net benefits of changes in litigation policy. See Jonah B. Gelbach, *Can the Dark Arts of the Dismal Science Shed Light on the Empirical Reality of Civil Procedure?*, 2 STAN. J. COMPLEX LITIG. 223 (2014); Jonah B. Gelbach, *Rethinking Summary Judgment Empirics: The Life of the Parties*, 162 U. PA. L. REV. 1663 (2014).

²⁴⁰ For an overview of longstanding debate about discovery abuse’s prevalence, see Linda S. Mullenix, *Discovery in Disarray: The Pervasive Myth of Pervasive Discovery Abuse and the Consequences for Unfounded Rulemaking*, 46 STAN. L. REV. 1393 (1994). For empirical studies, see COLL. OF TRIAL LAWYERS, *supra* note 173, at B-1 to B-2 (reporting that 45% of lawyers surveyed believed discovery abuse occurred in “almost every case”); INST. FOR THE ADVANCEMENT OF THE AM. LEGAL SYS., *CIVIL CASE PROCESSING IN THE FEDERAL DISTRICT COURTS: A 21ST CENTURY ANALYSIS* 46 (2009) (finding discovery sanctions are filed in 3% of cases and imposed in 2% of cases); LEE III & WILLING, *supra* note 140, at 14 (same).

champions hold that it can replace human subjectivity and bias with the “mechanical objectivity” of a machine.²⁴¹ Predictive coding also leaves a decision-making trail with methods and models and, taking a page from the wider algorithmic accountability literature, means that litigants must “show their work” in ways that can increase transparency relative to analog approaches.²⁴² However, predictive coding may also increase gaming opportunities.²⁴³ Indeed, better-heeled parties can construct seed sets and make modeling choices they know will yield fewer relevant documents and exclude especially harmful ones. Many of these artifices, embedded deep in code, will go unnoticed and unchallenged. Even if the litigants negotiate *ex ante* a protocol governing seed set construction, statistical methods, and back-end evaluation and validation techniques,²⁴⁴ the opacity of algorithmic outputs and the hands-on nature of training and tuning machine learning models can deprive predictive coding systems of basic “contestability,” particularly where less sophisticated parties sit on the other side.²⁴⁵ Far from bringing transparency and “mechanical objectivity,” automated discovery might breed *more* abuse, and prove less amenable to oversight, than an analog system built upon “eyes-on” review.

A second example focuses on a type of legal tech tool that has not yet occupied much of the discussion to this point: legal analytics tools that help a litigant predict a case’s resolution once it sits before a particular judge and identify the best arguments to urge upon her. These tools, we noted previously, are currently most advanced in technical, self-contained areas of law like tax and employment, but they are likely to branch out, particularly as entities with privileged data access—large, repeat institutional players like Wal-Mart, or law firms that specialize in particular litigation areas—use their privileged access to data to develop potent versions in other less siloed areas. The distributive concern these tools raise draw from the long literature on settlement bargaining, emphasizing the idea that litigation’s “haves” will have more precise information about the likely outcome of the case and the best arguments to lay before the judge to get there. If true, will superior information yield settlement bargaining power over those with less?

This is a harder question than it might seem at first blush. Standard Coasean models of litigation and settlement are of little use because they assume that parties have common knowledge of one another’s beliefs about who would win if the case does not settle. This does not describe one-sided use of legal tech, whose very purpose is to improve the (paying) party’s information.²⁴⁶ More apposite are a family of models that involve one-sided asymmetric

²⁴¹ Remus, *Uncertain Promise*, *supra* note 36, at 1701.

²⁴² The analogy here is the “algorithmic accountability” literature’s argument that algorithmic tools may render decisions—of employers, manufacturers, governments—*more* transparent than their analog versions. *See, e.g.*, David Freeman Engstrom & Daniel E. Ho, *Algorithmic Accountability in the Administrative State*, 37 YALE J. REG. (forthcoming 2020); Cass R. Sunstein, *Algorithms, Correcting Biases*, SOC. RES. (forthcoming 2020).

²⁴³ *Cf.* Dan H. Willoughby, *Sanctions for E-Discovery Violations: By the Numbers*, 60 DUKE L.J. 789 (2010) (finding sharp uptick in motions seeking discovery sanctions).

²⁴⁴ Some say reliability and quality control measures (*e.g.*, confidence intervals, prediction score thresholds) are either slippery or suffer from a lack of ground truth (*e.g.*, a baseline relevance rate), limiting their ability to discipline the responding party. *See* Endo, *Technological Opacity*, *supra* note 126, at 854.

²⁴⁵ *Id.* at 863. *See also* Mireille Hildebrandt, *Law as Information in the Era of Data-Driven Agency*, 79 MOD. L. REV. 1, 29-30 (2016) (describing contestability conditions); Klutts & Mulligan, *supra* note 97, at 34-39 (calling for new approaches to “validation and testing” focused on “contestable design”).

²⁴⁶ Unless one can construct a mechanism through which legal tech output would always credibly be conveyed to the other side, the Coasean common knowledge assumption is tough to defend. Of course, the side using legal tech could just show the other side printed output. But that might be in the (tech-using) defendant’s interests only sometimes.

information and some form of equilibrium bargaining.²⁴⁷ Taken at face value, these models contemplate at least some information-sharing in equilibrium, making them potentially useful for thinking about how changes in one side's information might affect party outcomes. Distilled to their essentials and glossing over substantial complexity, these models suggest that defendants armed with superior information will enjoy better litigation and settlement outcomes than less informed plaintiffs. The reason is that, without precise probabilities, defendants facing a slew of suits cannot tell the stronger cases from the weaker ones and so must settle at a weighted average of their probabilities. With better information about the probability of a win in each case, defendants can litigate the weak cases and settle the strong ones.²⁴⁸ More research is plainly needed to say something systematic on this point, but our intuition—concededly contestable and not founded on a single theoretical framework or

In cases in which the defendant did not display results, it might not be discernible to the plaintiff whether the defendant actually used tech and just got a result that would improve the plaintiff's bargaining situation. There is also the possibility of unraveling, as described by Steven Shavell, *Sharing of Information Prior to Settlement or Litigation*, 20 RAND J. ECON. 183, 188 n.11 (1989), in the general discovery context. That said, if Coasean models are the right ones, then legal tech's effect might be ambiguous. For more on patterns of settlement and litigation in a "reduced form" model of litigation, see Jonah B. Gelbach, *The Reduced Form of Litigation Models*, 71 J. L. & Econ. 125 (2018).

²⁴⁷ See, e.g., Lucian Ayre Bechuk, *Litigation and settlement under imperfect information*, 15 RAND J. ECON. 404 (1984); Daniel Klerman & Yoon-Ho Alex Lee, *Inferences from Litigated Cases*, 43 J. LEGAL STUDS. 209 (2014); Ivan P'ng, *Litigation, Liability, and Incentives for Care*, 34 J. PUB. ECON. 61 (1987); Jennifer Reinganum & Louise L. Wilde, *Settlement, Litigation, and the Allocation of Litigation Costs*, 17 RAND J. ECON. 557 (1986).

²⁴⁸ Consider the Bechuk, *supra* note 247, screening model with informed defendants. In this model, there are many cases, and there is a distribution over the plaintiff's probability of winning in the event of trial. Thus, plaintiffs are highly likely to win some cases and less likely to win others. The plaintiff makes a settlement demand, and the defendant either accepts or rejects. If the defendant rejects, the case goes to trial. In each case, the defendant knows the probability with which the plaintiff will win, but the plaintiff knows only the overall distribution of probabilities with which plaintiffs win. Thus, plaintiffs must choose their settlement demand behind a veil of ignorance about their probability of winning. Defendants facing plaintiffs with strong cases will accept the settlement demand, while those facing plaintiffs with weak cases will go to trial.

To address the possibility that legal tech allows defendants to usefully refine their beliefs about plaintiffs' win probabilities, consider a set of cases in which the plaintiff's probability of winning is P ; call these, "P-type cases." Suppose that among P-type cases, some are actually the sub-type in which plaintiffs would win with probability $P_{\text{low}} < P$, and some are the sub-type in which plaintiffs would win with probability $P_{\text{high}} > P$. We assume that without legal tech, at least some defendants in P-type cases can't tell the difference between P_{low} and P_{high} cases. For these defendants, P equals a weighted average of P_{low} and P_{high} (the weights are the shares of cases that are of the respective type). (We allow that there may be some defendants who know as much without as with legal tech. If these defendants are arrayed at the extremes of the type distribution, then it should be possible to construct the model such that the overall distribution of plaintiff win-probability types will be unaffected by the introduction of legal tech, which simplifies the rest of our discussion.) Defendants who use legal tech can always tell the difference. Thus, in our simple extension of the screening model, legal tech allows defendants to refine their knowledge of what would occur if the case went to trial. We will suppose defendants do not choose to share the output of legal tech with plaintiffs. Note that the issue of whether credible voluntary disclosure is possible or desirable arises here as well. In the screening model with informed defendants, defendants benefit from being informed, because they get to litigate only when the plaintiff is weak. Thus, it might not be in their interests to share information with plaintiffs. We will assume for simplicity that no information sharing occurs.

Assuming that the overall distribution of case types is the same with legal tech as without, plaintiffs have the same information as before and thus make the same settlement offers. Now suppose P_{low} is low enough that defendants would litigate a case with that probability of plaintiff's win, and let P be high enough that defendants would not litigate a case with that probability. Without legal tech, defendants would settle all P-type cases. With legal tech, defendants will choose to litigate those P-type cases that have probability P_{low} of plaintiff win. Plaintiffs are worse off as a result of legal tech, because they now have to litigate a weak case that previously would have settled for an amount pegged in part to the settlement value of stronger cases. What about defendants in P-type cases that have probability P_{high} of a plaintiff win? Defendants using legal tech will continue to settle these cases, because $P_{\text{high}} > P$, and we know from the no-legal-tech world that P-type cases are best settled from defendants' point of view. Thus, plaintiffs in P_{high} cases are unaffected by the adoption of legal tech. In other words, unilateral adoption of legal tech by defendants makes some defendants better off at the expense of their corresponding plaintiffs, and leaves all other parties unaffected.

rigorous empirical test—is that, on balance, unilateral use of legal tech can be expected to benefit the party using it, while harming less-informed opposing parties.

In the e-discovery context, where the advantages legal tech confers are clearer, a growing literature proposes ways to mitigate distributive concerns. Among the fixes are creation of an ethical duty to disclose defects in the other side’s predictive coding protocol,²⁴⁹ or the subjection of discovery-centered expert battles to *Daubert* constraints and Federal Rule of Evidence 702 in order to narrow expertise asymmetries.²⁵⁰ Another proposal, as noted previously, would re-allocate seed set construction and model tuning to the requesting party—referred to as a “task allocation” rule, to distinguish it from a “cost allocation” rule—as a way to mitigate cost-externalization and cross-party-agency concerns that afflict the system.²⁵¹ Each of these can be thought of as a discovery-specific patch on the distributive concerns raised by the continued proliferation of legal tech.

Our central claim in what follows is that, even if one or more of these silo-specific fixes could work, then legal tech’s continued diffusion throughout the litigation system will place increasing pressure on, and often come to be analyzed through the lens of, a cross-cutting and critical tenet of the adversarial system: the work product doctrine. In particular, if legal tech is unevenly distributed and is seen to confer a significant advantage, then litigants will seek the other side’s machine outputs, through contention interrogatories and during discovery battles and settlement conferences. What labels did you apply to the seed set? How much does your software say this case is worth? What legal arguments did your software say would be most persuasive? A question that judges will increasingly face is whether and when the venerable work product rule should bend.

2. Hickman’s Work Product Bargain

For better or worse, the American litigation system is a thoroughgoing adversarial one.²⁵² This litigant-driven system pits the parties against one another on virtually all matters, particularly discovery, by requiring the combatants to negotiate a mutual exchange of information in order to surface all claims and defenses and the materials relevant to each. In discovery in particular, the judge is called in only to resolve disagreements that arise during an otherwise non-public process. While American law is full of paeans to this adversarial approach and the role that lawyers play within it, much of the hard work of maintaining it is a quiet, technocratic corner of civil procedure: the work product doctrine.²⁵³ First set forth in the U.S. Supreme Court’s opinion in *Hickman v. Taylor* and inserted into federal and state rules of civil procedure

²⁴⁹ Remus, *Uncertain Promise*, *supra* note 36, at 1716 (describing Sedona proposal to create Rule 3.4 violation to fail to suggest a revised predictive coding protocol that captures documents known to be responsive). *See also* Endo, *Technological Opacity*, *supra* note 126, at 863 (advocating broader duty to ensure that opposing party has access to needed technology); Remus, *Uncertain Promise*, *supra* note 36, at 1715 (same).

²⁵⁰ Note that this could raise barriers to entry to participate in discovery disputes at all. Also, the FRE (and *Daubert*) typically does not apply to the pre-trial stage—though a growing chorus argues that it should apply to predictive coding. *See, e.g.*, Daniel K. Gelb, *The Court as Gatekeeper: Preventing Unreliable Pretrial c-Discovery from Jeopardizing a Reliable Fact-Finding Process*, 83 FORDHAM L. REV. 1287, 1288 (2014); David J. Waxse & Brenda Yoakum-Kriz, *Experts on Computer-Assisted Review: Why Federal Rule of Evidence 702 Should Apply to Their Use*, 52 WASHBURN L.J. 207, 220 (2013). *See also* Kitzner, *supra* note 108, at 215.

²⁵¹ *See* notes __-__, *supra*, and accompanying text (make sure Kobayashi CITE is there).

²⁵² *See* ROBERT A. KAGAN, *ADVERSARIAL LEGALISM: THE AMERICAN WAY OF LAW* (2001).

²⁵³ *See* *United States v. Nobles*, 422 U.S. 225, 238 (1975).

thereafter, the work product doctrine protects from an adversary's discovery those documents and other tangible and intangible "things" that are prepared at the direction of counsel in anticipation of litigation.²⁵⁴ Importantly, although the doctrine's protection is near-absolute in cloaking attorney mental impressions and other "opinion" work product, it can give way with respect to other types of materials, dubbed "fact" work product, where the requesting party can show a compelling need.

The rationale for the work product doctrine is contested, but most accounts settle upon one of two grounds. First, the work product doctrine creates a "zone of privacy" within which counsel can operate free of interference and without worry that outputs will fall into others' hands, thus permitting them to maintain a laser focus on zealous client representation.²⁵⁵ Permitting discovery of litigation-related materials, on this view, would lead to inadequate strategic preparation and recording of information.²⁵⁶ Much lawyerly judgment would remain "unwritten," as Justice Murphy put it in *Hickman*, depriving the system of sustained and rigorous consideration of legal obligations and options for compliance. Attorneys who fear discovery of their outputs might also minimize the negative aspects and exaggerate the positive aspects of their cases. This will engender mutual (and undue) optimism among clients and even the lawyers themselves that can stymie settlement efforts and yield inefficient resort to full-blown trials.²⁵⁷

Second, the work product rule protects against free-riding on the other side's diligence. A "learned profession," as Justice Jackson famously but somewhat cryptically put it in his *Hickman* concurrence, should not be made "to perform its functions either without wits or on wits borrowed from the adversary."²⁵⁸ Part of this is properly read as just a clarifying extension of the zone-of-privacy rationale: Attorneys may incompletely prepare their cases for fear of developing adverse information in the process of investigation and analysis and may even forego inquiry that might expose information helpful to the other side.²⁵⁹ But Justice Jackson's invocation of a "learned profession" and "borrowed wits" should not be read to

²⁵⁴ *Hickman v. Taylor*, 329 U.S. 495 (1947). *Hickman* remains a slice of federal common law and covers intangible things even though Rule 26(b)(3) does not.

²⁵⁵ See *Hickman*, 329 U.S. at 510-11 ("[I]t is essential that a lawyer work with a certain degree of privacy, free from unnecessary intrusion by opposing parties and their counsel."). See also John M. Facciola & Philip J. Favro, *Safeguarding the Seed Set: Why Seed Set Documents May Be Entitled to Work Product Protection*, 8 FED. CTS. L. REV. 1, 7 (2015); Kitzer, *supra* note 108, at 212.

²⁵⁶ See Jeff A. Anderson et al., *The Work Product Doctrine*, 68 CORNELL L. REV. 760, 785 (1983) (voicing conventional view that work product permits attorneys to develop facts and legal theories in private, and thus more fully). For other analyses of work product's incentive scheme, see Ronald J. Allen et. al., *A Positive Theory of the Attorney-Client Privilege and the Work Product Doctrine*, 19 J. LEGAL STUD. 359 (1990); Frank H. Easterbrook, *Insider Trading, Secret Agents, Evidentiary Privileges, and the Production of Information*, 1981 SUP. CT. REV. 309, 313 (1981); James A. Gardner, *Agency Problems in the Law of Attorney-Client Privilege: Privilege and "Work Product" Under Open Discovery (Part II)*, 42 U. DET. L.J. 253, 270 (1965); Kathleen Waits, *Work Product Protection for Witness Statements: Time for Abolition*, 1985 WIS. L. REV. 305, 327-35 (1985).

²⁵⁷ Edward H. Cooper, *Work Product of the Rulesmakers*, 53 MINN. L. REV. 1269, 1283 (1969) ("[L]awyers would quickly become accustomed to formulation of only the most glowing prospects for success," yielding "unduly optimistic forecasts" that would inflate client expectations and undermine reasonable settlements). See also Waits, *supra* note 256, at 330-35 (defending work product for witness statements based on fear that discovery would lead to inaccurate recording).

²⁵⁸ *Hickman*, 329 U.S. at 516 (Jackson, J., concurring).

²⁵⁹ See Jeff A. Anderson et. al., *supra* note 256, at 785; Cooper, *supra* note 257, at 1279 (calling this the "bad facts" model); Leland L. Tolman, *Developments in the Law—Discovery*, 74 HARV. L. REV. 940, 1029 (1961); see also Cal. Civ.Proc. Code § 2016(g) (West 1983) (observing work product purpose is to encourage attorneys to prepare thoroughly and investigate favorable and unfavorable aspects of cases); Ohio R. Civ. P. 26(A) (same).

merely restate the notion that key information will remain unwritten or that lawyers will over-memorialize case strengths and under-memorialize weaknesses. The choice of language is deliberate and embodies a second, and deeper, rationale: The work product doctrine creates the conditions necessary for a well-functioning adversarial system by safeguarding returns on, and thus investment in, legal talent. Viewed this way, free-rider constraints, lawyer privacy zones, and even the maintenance of a market for legal talent are not ends unto themselves. Rather, they are means to an ultimate and more normatively satisfying end: a legal profession with the skill and the professional authority necessary to counsel compliance, and accurately determine non-compliance, in an increasingly dense legal and regulatory system.²⁶⁰ The work product rule, then, is the cornerstone of a deeply adversarial model of law rooted in a set of assumptions about the self-perpetuating virtues of competition—for the maintenance of lawyers' skill and professional authority, for the system's truth-seeking capacity, and for optimizing law compliance in a complicated world.

As with any foundational framework, the work product doctrine has not been immune from criticism. Some contend that incentives for preparation that lawyers face are so strong, and the risks of non-preparation so grave, that they will prepare regardless.²⁶¹ An edgier criticism holds that maximal preparation may not be socially optimal in the first place, and so abolishing work product might just free up resources that could be better put toward social projects other than adjudicating disputes.²⁶² Sitting atop these assorted concerns, however, is a deeper critique of the work product doctrine—or, perhaps better put, a compromise baked into its terms from the start. Put simply, some litigants can afford better lawyers than others. Some litigants, it follows, will enjoy better counsel in understanding their legal obligations and their optimal level of compliance in a growing regulatory state. And, in turn, some litigants will enjoy a decided edge in their courthouse struggles with other litigants. The New Deal Justices and Rule 26(b)(3)'s framers were not ignorant of these concerns.²⁶³ But the work product rule's distributive concerns were nonetheless bracketed—a necessary casualty in the service of maintaining a properly functioning adversarial scheme and safeguarding the competitive virtues that flow from it.

Only once *Hickman* and the work product rule it inscribed in American civil procedure is framed in these terms and placed on its proper footing can one see the challenge that legal tech will pose for the adversarial system's continued legitimacy and operation. In the near to medium-term, if some litigants have access to legal tech's fruits but others do not, the burning question courts will increasingly face is, to invoke the pun one last time, whether the civil procedure rules should treat "borrowed bits" the same way it treats "borrowed wits."

²⁶⁰ See *Hickman*, 329 U.S. at 514-15 (Jackson, J., concurring) ("[I]t to often is overlooked that the lawyer and the law office are indispensable parts of our administration of justice. Law-abiding people can go nowhere else to learn the ever changing and constantly multiplying rules by which they must behave and to obtain redress for their wrongs. The welfare and tone of the legal profession is therefore of prime consequence to society . . .")

²⁶¹ Kathleen Waits, *Opinion Work Product: A Critical Analysis of Current Law and a New Analytical Framework*, 73 OR. L. REV. 385, 450 (1994); Ronald J. Allen, *Work Product Revisited: A Comment on Rethinking Work Product*, 78 VA. L. REV. 949, 951-55 (1992); Elizabeth G. Thornburg, *Work Product Rejected: A Reply to Professor Allen*, 78 VA. L. REV. 957, 966 (1992); Easterbrook, *supra* note 256, at 359-60; Elizabeth Thornburg, *Rethinking Work Product*, 77 Va. L. Rev. 1515, 1528 (1991) [hereinafter Thornburg, *Rethinking*].

²⁶² Easterbrook, *supra* note 256, at 359-60; Thornburg, *Rethinking*, *supra* note 261, at 1550-51.

²⁶³ [CITES]

3. Work Product for a Digital Age

Return to our two core examples: discovery battles around predictive coding, and use of legal analytics tools to inform settlement and litigation strategy. How does, or should, the work product rule apply? Can a litigant, particularly a resource-strapped one who lacks access to the full legal tech toolkit, successfully demand the other side's machine outputs?

One possibility is that the work product rule does not apply by its own terms to algorithmic outputs. Take as an example whether a party can or should be made to share a seed set used to train a predictive coding tool—a question, we noted previously, that has divided federal courts, typically on grounds other than work product.²⁶⁴ Such a request might aim to allow a requesting party to gauge the comprehensiveness of the responding party's production. Or, as discussed previously, it might come at the direction of a judge to permit the requesting party to apply her own labels and thus perform some or all of the work of training the model.

On a first pass through the work product rule, one might conclude that the seed set is off-limits because it is generated through counsel's judgment and skill and, more damningly, it may reflect counsel's views about litigation strategy. At least one court has decided as much in the context of an *in camera* letter demanded by the court and then sought by the other side.²⁶⁵ A smattering of other courts have rejected work product claims.²⁶⁶ As work product claims mount, operational details and the analogies they inspire will matter. Some courts are apt to liken seed sets to the finite lists of key documents and witnesses in cases like *Sporck* and extend full protection.²⁶⁷ This might be especially true of "judgmental" seed sets constructed by counsel and keyed to particular issues or custodians, but not fully random seed sets drawn from the full universe of discoverable materials.²⁶⁸ Others, however, could see seed sets as closer to the instruction manuals used to guide document review teams to ensure a form of inter-coder reliability, where the answer is less clear,²⁶⁹ or liken seed sets to a large cache of documents taken during a document inspection, which some courts have held do not, because of the sheer amount of material, pose a risk of conveying counsel's mental impressions or revealing other strategically valuable information.²⁷⁰

²⁶⁴ See notes ___, *supra*, and accompanying text.

²⁶⁵ *Winfield v. City of New York*, No. 15CV05236LTSKHP, 2017 WL 5664852 (S.D.N.Y. Nov. 27, 2017).

²⁶⁶ See *Hinterberger v. Catholic Health Systems, Inc.*, No. 08-CV-380S F, 2013 WL 2250591, at *22 (W.D.N.Y. May 21, 2013) ("[N]either the scanning nor objective coding work required any access or need for such confidential information, including attorney work product.") Meanwhile, a trio of West Virginia courts found that search terms used within a predictive coding scheme did not constitute work product. See *Burd v. Ford Motor Co.*, No. 3:13-CV-20976, 2015 WL 4137915, at *10 (S.D. W. Va. July 8, 2015); *Burnett v. Ford Motor Co.*, No. 3:13-CV-14207, 2015 WL 4137847, at *10 (S.D. W. Va. July 8, 2015); *Johnson v. Ford Motor Co.*, No. 3:13-CV-06529, 2015 WL 4137707, at *10 (S.D. W. Va. July 8, 2015), objections sustained in part and overruled in part, No. CV 3:13-6529, 2015 WL 6758234 (S.D. W. Va. Nov. 5, 2015).

²⁶⁷ See *Sporck v. Peil*, 759 F.2d 312 (3rd Cir. 1985) (holding counsel's selection of documents for deposition protected work product); see also *Shelton v. American Motors Corp.*, 805 F.2d 1323, 1328 (8th Cir. 1986) (holding document selection protected work product because counsel "identified, selected, and compiled documents that were significant to her client's defenses in this case"); *In re Allen*, 106 F.3d 582, 608 (4th Cir. 1997) (concluding that counsel's choice of materials constituted opinion work product). For law review discussion, see Kitzer, *supra* note 108, at 210; Sean Gammel, Note, *Protecting Search Terms as Opinion Work Product: Applying the Work Product Doctrine to Electronic Discovery*, 161 U. PA. L. REV. 2063 (2013).

²⁶⁸ See Facciola & Favro, *supra* note 255, at 9.

²⁶⁹ See Kitzer, *supra* note 108, at 211.

²⁷⁰ See *Disability Rights Council of Greater Wash. V. Wash. Metro. Transit Auth.* 242 F.R.D. 139 141-44 (D.D.C. 2007); *In re Shell Oil Refinery*, 125 F.R.D. 132, 134 (E.D. La. 1989).

Nor is it obvious that the work product rule applies to higher-automation legal tech tools. For instance, a legal analytics tool that requires no more than that counsel feed in the pleadings and papers to date, or a tool that must only be primed by inputting a set of rote facts about a case, does not involve substantial lawyerly judgment or effort. At best, these higher-automation tools may qualify for Rule 26(b)(3)(A)'s lower, qualified protection reserved for fact work product. More strikingly, it is possible that highly automated legal analytics tools will not qualify for protection at all, particularly in jurisdictions with a more demanding test for when an output can be deemed to have been created "in anticipation of litigation."²⁷¹ Legal analytics tools that generate case outcome predictions might involve substantial attorney effort during their development—including months or even years of intense, lawyerly effort to manually construct computationally useable legal ontologies and labeling data—but little to no effort in subsequent deployment beyond inputting pleadings and papers and a keystroke. Even a bespoke legal analytics tool that leverages data uniquely held by a law firm and was developed for no other purpose than to counsel clients in litigation will have been developed not in anticipation of a particular litigation, but for use in litigation in general.

Judicial willingness to narrow the work product rule's ambit may also come because legal tech tools fit awkwardly with several of the rule's key normative underpinnings. For instance, legal tech tools pose little risk that compelled disclosure will cause counsel to shade outputs—that is, over-emphasizing the positive, or underemphasizing the negative—that is core to the "zone of privacy" view. Similarly, concerns about free-riding, "borrowed wits," and the need to maintain a market for legal talent hold little purchase when it comes to software investments. Indeed, one could argue just the opposite: a rule that rewards technological investments does as much to shrink the market for legal talent, at least of the human variety, as it does to bolster it. Finally, there is the fact that legal tech tools do not principally perform, at least for the moment, higher-order legal cognitions. Many legal tech tools are about jockeying for advantage in ways that sit outside the conventional core of litigation judgment, attorney-client communication, and law compliance. A purely machine output that compares the likelihood of prevailing in forum X as opposed to forum Y based mostly on "external" factors—including docket loads, but also the political and ideological predispositions of judges and juries—is not as likely to strike judges as the kind of information production that the work product rule is designed to promote. Commentators have long called for pruning of the work product doctrine—removing business advice²⁷² or compliance²⁷³ from its ambit. As distributive concerns mount, legal tech will apply similar pressure.

None of this, of course, is a given. Among the three case studies offered herein, the future of the work product doctrine is the wildcard, both because of interpretive uncertainties around Rule 26(b)(3), and also because of its capacity to reshape large swathes of the adversarial system. Bending the work product doctrine in a world pervaded by legal tech will also yield significant costs that commentators have only begun to identify. Judicially compelled cooperation in the use of predictive coding tools might blunt adversarialism's inequities, but, in so doing, it may

²⁷¹ *Compare* *In re Sealed Case*, 676 F.2d 793 (D.C. Cir. 1982) (requiring only an "actual subjective and objectively reasonable belief that litigation was 'an even real possibility'"), *with* *U.S. v. Davis*, 636 F.2d 1028 (5th Cir. 1981) (applying work product protection only where material "is tailored to particular litigation").

²⁷² Michele DeStefano Beardslee, *Taking the Business Out of Work Product*, 79 *FORDHAM L. REV.* 1869, 1874 (2011).

²⁷³ Christine Parker, *Lawyer Deregulation via Business Deregulation: Compliance Professionalism and Legal Professionalism*, 6 *INT'L J. LEGAL PROF.* 175 (1999).

also “disable[] lawyers from providing strong and effective client representation” and thus potentially weaken the many protections adversarialism affords.²⁷⁴

The challenge for courts—and, in time, rulemakers and legislators—will be how to balance these concerns and to do so under a set of procedural rules crafted and elaborated in a very different, analog era. In Part III, we step back from the case studies and, working across them, ask some wider-aperture questions that judges and policymakers will need to ask as they oversee that process and help chart the future course of American adversarialism.

III. LEGAL TECH AND “OUR ADVERSARIALISM

Among the legal systems of the world, the American system has long been thought exceptional in its commitment to a lawyer-dominated, adversarial process. Indeed, a rich academic literature details the ways American adversarialism departs from the judge-centered approach that prevails in much of the world,²⁷⁵ debates why and when the American commitment to adversary over judicial control took root,²⁷⁶ and tallies adversarialism’s virtues and vices.²⁷⁷ But the overwhelming focus of those inquiries has been the past and present of American litigation. Legal tech’s advance provides an occasion to ask different, future-looking questions: How, if at all, will American adversarialism bend in a newly digitized civil justice system? And what role will judges—and, in time, rulemakers and legislators—play in that process? In this concluding Part, we work outward from Part II’s more bounded case studies and, ranging across them, offer some concluding thoughts on these vital questions.

As before, it is important to acknowledge the limits of our inquiry. Our observations about legal tech and the future of American litigation are subject to the same caveats, noted previously, about the contingency of technological innovation. Predicting legal tech’s technical trajectory is hard. Predicting its effects on a sprawling litigation system verges on foolhardy. Moreover, our focus on higher-tech and litigation-focused legal tech applications plainly excludes potentially important tools, among them lower-tech ones that value recurrent types of claims (*e.g.*, personal injury torts) or online legal advice and DIY dispute resolution tools that empower litigants to go it alone or avoid formal adjudication entirely. As already noted, these applications are both important in their own right and can also shape the formal litigation system by shrinking its domain and creating pressure to adapt in response. We leave it to others to speculate about legal tech’s effects beyond the formal court settings that have been the focus of our inquiry.²⁷⁸

With that established, we highlight two synthetic insights that emerge from Part II’s case studies about legal tech’s incorporation into the civil justice system. The first insight concerns what we think will be increasing entwinement of intellectual property and civil procedure. Part III.A engages the very different analytical foundations of IP and civil procedure, offering

²⁷⁴ Remus, *Uncertain Promise*, *supra* note 36, at 1715, 1717-18; *see also* Endo, *Technological Opacity*, *supra* note 126, at 859.

²⁷⁵ *See* John H. Langbein, *The German Advantage in Civil Procedure*, 52 U. CHI. L. REV. 823 (1985).

²⁷⁶ *See* AMALIA KESSLER, *INVENTING AMERICAN EXCEPTIONALISM: THE ORIGINS OF AMERICAN ADVERSARIAL LEGAL CULTURE*, 1800-1877 (2017).

²⁷⁷ *See* KAGAN, *supra* note 252.

²⁷⁸ For an overview of the burgeoning field of computer science and access to justice, *see* Computing, Data Science and Access to Justice, National Science Foundation, <https://docs.google.com/document/d/1m8G-0lqZiTfdurDHkYxYp2GYUOZ9LA5oBJFAIP7Fa4A/edit>.

our rough guess at how the tensions between them will shape and be shaped by procedural innovation in a digitized litigation system. The second insight engages the competing arguments for adversarial and inquisitorial procedural models. Part III.B thus provides a brief—surely too-brief—reassessment of the German advantage John Langbein famously found in civil procedure.²⁷⁹ These insights can help frame the thinking of judges, policymakers, and academics as they help pilot that process.

A. An IP for Civil Procedure

An initial insight is that, as legal tech moves to the center of the litigation system, it will increasingly draw together civil procedure and intellectual property. Indeed, civil procedure's gatekeepers, including judges and, in time, rulemakers and legislators, will preside over what amounts to a shadow innovation policy that is adjacent to, but separate from, IP.

This innovation-and-IP framing is hardly obvious at first. After all, civil procedure and IP are vastly different. Civil procedure aims to organize the litigation process by balancing a set of meta-values, among them efficiency, accuracy, fairness, and access. It is resolutely, if imperfectly, focused on regulating conduct within the confines of formal adjudication rather than primary conduct out in the world. IP, by contrast, seeks to reward creators of knowledge goods with temporary exclusive rights to their creations. It focuses on regulating the upstream, primary conduct of creators by balancing incentives to innovate against the cost of exclusivity. Aside from a generic focus on crafting optimal incentives, civil procedure and IP could not sit further apart from one another.

The coming revolution in legal tech, however, will bring increasing overlap between the two. An example that is easy to see is the optimal discoverability of algorithmic and other software tools in litigation.²⁸⁰ Exhibit A comes in the criminal context: use of the trade secret evidentiary privilege to block disclosure of the technical guts of criminal risk assessment tools used to make bail, sentencing, and parole decisions.²⁸¹ But judges hearing civil cases will face quite similar questions—when, for instance, a litigant embroiled in a discovery dispute demands the source code of an adversary's proprietary predictive coding tool. Beyond trade secrets, courts will also surely entertain suits by producers of legal tech tools asserting infringement of patent or copyright rights—and will thus grapple with the uncertainty about software's protectability that afflicts American IP law more generally.²⁸² In both ways, IP law will help shape legal tech's cost structure and its distribution within the system.²⁸³

²⁷⁹ Langbein, *supra* note 275.

²⁸⁰ See, e.g., Sonia K. Katyal, *The Paradox of Source Code Secrecy*, 104 CORNELL L. REV. 101 (2019).

²⁸¹ See Rebecca Wexler, *Life, Liberty, and Trade Secrets: Intellectual Property in the Criminal Justice System*, 70 STAN. L. REV. 1343 (2018); Natalie Ram, *Innovating Criminal Justice*, 112 NW. U. L. REV. 659 (2018).

²⁸² Uncertainty about the patentability of software arises from the distinction between laws of nature, ideas, and applications. See *Gottschalk v. Benson*, 409 U.S. 63 (1972); *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576 (2013); *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014). In particular, the Court held that mathematical processes are too abstract unless the invention includes an "inventive concept" via its incorporation into a real-world application. See *Mayo Collab. Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 72-73 (2012); see also *Alice*, 124 S.Ct. at __. It follows that computer algorithms may not be patentable. Importantly, software's imperfect protectability fuels resort to the trade secrets evidentiary privilege. See Ram, *supra* note __, at __.

²⁸³ See Remus, *Uncertain Promise*, *supra* note 36, at 1712 ("[P]atent protection threatens to increase unequal access to predictive-coding technologies, which will entrench existing disparities in resources and power.").

But these disputes, while drawing civil procedure and IP closer, will not be the sole, or even the most important, point of intersection. Indeed, Part II's case studies suggest that an equally and perhaps more important collision will center on disputes over disclosure of the *outputs* of legal tech tools, not their technical details. This fact is significant. It means that many disputes around legal tech will not sound in trade secrets or other IP-based protections at all. Rather, it is civil procedure that will serve as the front-line regulator of legal tech in the critical early years of its incorporation into the civil justice system, critically shaping its use by litigants and the market for its production and distribution. This is particularly so because legal tech tools derive much of their value from their exclusivity—*i.e.*, the fact that one litigant has them and the other does not—and civil procedure rules can either bolster or undermine that exclusivity. As a result, in making procedural choices, judges and policymakers will preside over what amounts to a shadow innovation policy, weighing the benefits of exclusivity against its costs.

Concrete examples abound—and were sprinkled throughout Part II's case studies. When a litigant embroiled in a discovery dispute demands disclosure of an adversary's seed set in order to contest the completeness of a document production, a trial judge must determine whether to compel sharing of the entire seed set, only positively flagged documents (which, as noted previously, are the only "relevant" ones within the meaning of Rule 26(b)(2)), or none at all. As Part II.A showed, courts are all over the map on which level of disclosure they require and in what circumstances.²⁸⁴ But it is not hard to see how an accretion of rulings on the issue will determine the value of predictive coding tools to litigants and, by extension, the incentives for further innovation. Compelled sharing of predictive coding inputs could depress the technology's development—or convince litigants not to use it at all, either because it confers little advantage or, worse, risks putting non-responsive and privileged documents into an adversary's hands. Conversely, judicial decisions on motions to compel permitting requested discovery conditional on use of predictive coding, as judges have begun to do, will spur use of predictive coding and, with it, grow the market that produces it. Wise decisions on these questions must, whether explicitly or implicitly, weigh predictive coding's utility (*e.g.*, its potential to reduce litigation costs) against its costs (*e.g.*, adversarial inequities, discovery abuse).

Similar questions will condition the development and use of other parts of the legal tech toolkit. As explored in Part II.B, judicial demands for the outputs of outcome prediction engines—whether in connection with motions practice around choice-of-forum or choice-of-law disputes, such as a party's request to transfer venue, or even dispositive motions seeking summary judgment—will depress the value of those tools to litigants, potentially limiting their use and retarding their development.²⁸⁵ Similarly, if judges compel adversaries to share machine outputs—for instance, by compelling party responses to contention interrogatories requesting them—the value and use of those tools, and the market for their production, could contract substantially. As legal tech tools advance in sophistication, these and other conflicts will sharpen the tension between civil procedure values and the incentives to produce and use the tools in the first place.

In resolving these tensions, IP has much to offer civil procedure because it provides a ready-made vocabulary and a familiar set of conceptual frameworks for formalizing and weighing the

²⁸⁴ See notes __-__, *supra*, and accompanying text.

²⁸⁵ See notes __-__, *supra*, and accompanying text.

trade-offs between legal tech's benefits (efficiency, accuracy) and the distributive and other costs that derive from its exclusivity. The benefits are substantial, for the many procedural doctrines implicated by legal tech do not expressly sound in trade-offs between innovation incentives and the social costs of exclusive rights that are the fundamental analytic building blocks of IP. The work product doctrine, or any other part of civil procedure for that matter, was simply not built for that wider, innovation-focused inquiry.

The IP frame also helps us to imagine innovation-centered interventions other than a judge-led process of muddling through with procedural tools built for other tasks. As a growing literature in IP makes clear, trade secrecy and conventional IP protection are but two levers in a wide portfolio of innovation policies that also includes prizes, grants, and tax incentives, which can be coupled with disclosure requirements or other conditions.²⁸⁶ If proliferating legal tech opens up distributive divides by allowing the “haves” to systematically win out over the “have nots,” one could imagine a wide range of policies that could help maintain a robust market for legal tech while blunting its distributive costs. Indeed, it is precisely where innovations yield significant benefits for society but limited profits in the marketplace that patents, prizes, and public subsidies may be preferred to conventional IP rights.²⁸⁷ Among the possibilities are a government-funded open-source legal tech platform designed to provide litigation's “have nots” with a baseline set of tools, or even a courthouse discovery arm, with technologist magistrates or law clerks, that oversees or even performs e-discovery.

Of course, there are limits to the IP analogy. IP is primarily focused on the *production* of innovation, not its use.²⁸⁸ But in the legal tech context, work product and other rules confer exclusivity on the user, not the inventor. IP's critics have also long groused that IP under-incentivizes production of social benefits—*e.g.*, environmental benefits²⁸⁹—or is too solicitous of inventions that lack any objective social value, as one might say of a legal tech tool that promotes pure rent-seeking behavior by litigants who uniquely possess it.²⁹⁰

In short, many details of the IP-and-innovation analogy remain to be worked out. But the potential implications are substantial: The coming revolution in legal tech will require judges and policymakers to incorporate a new covering value into the traditional pantheon of efficiency, accuracy, fairness, and access. Innovation incentives, not just these traditional procedural values, will become a central feature of the meta-level procedural calculus.

B. Legal Tech, Information, and the German (Dis)Advantage

If marrying civil procedure and IP was all that was needed to oversee legal tech's incorporation into the litigation system, then the process, and the analytics required, might seem manageable. For instance, in the e-discovery context, determining when to compel party collaboration or

²⁸⁶ See, *e.g.*, Daniel J. Hemel & Lisa Larrimore Ouellette, *Innovation Policy Pluralism*, 128 YALE L.J. 544 (2019); Ram, *supra* note __, at 700-701.

²⁸⁷ See, *e.g.*, Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 376, 381 (2013).

²⁸⁸ [CITES]

²⁸⁹ [CITES]

²⁹⁰ An older doctrinal line held that an invention lacked utility if it could be said to be solely detrimental. See *Juicy Whip, Inc. v. Orange Bang, Inc.*, 292 F.3d 728 (Fed. Cir. 2002). The more modern trend is that an invention has utility so long as there is a market for it. [CITES]

sharing of machine outputs will turn on a tractable inquiry weighing litigation cost-savings, the equity costs of gaming and discovery abuse, and litigant incentives to use predictive coding in the first place.

But Part II's case studies suggest a second broad framing, and a second challenge, that is further-ranging and more complex. In particular, legal tech's integration into the civil justice system will also entail explicit or implicit judgments about the optimal distribution of information within the system, both horizontally, between litigants and litigants, and also vertically, between judges and litigants. In determining the distribution of information along these two axes, judges and policymakers will help set the balance of adversary and judicial control within the system and, in so doing, shape the future course of American adversarialism.

While there are many ways to conceptualize this framing, a good way to start is to consider, as students of American procedure long have, the contrast between American adversarialism and the more judge-centered approach that prevails in much of the rest of the world, particularly Continental Europe.²⁹¹ The so-called "German advantage" in civil procedure, coined in Langbein's iconic 1985 study, has many rich facets. But its core claim is that the judge-centered, "inquisitorial" approach, in which judges oversee the pace, phasing, and substantive direction of fact- and issue-development in cases, offers a superior alternative to an American system defined by adversary control.²⁹² This comparison has become a central organizing framework for thinking about the optimal mix of adversary and judicial control in litigation systems. It is the dominant lens, to cite just one example, for weighing the virtues and vices of the much-debated trend in American civil procedure toward "managerial judging," whereby American judges have steadily adopted a more intrusive approach, particularly in complex litigations, by directing the pace, content, and character of litigation.²⁹³

The German comparison takes on new relevance in a litigation world infused with legal tech because it lays bare a core bet that underpins the design of any litigation system about the salience of litigant-litigant as against judge-litigant information asymmetries. The judge-centered, inquisitorial approach is premised on an intuition that judge-litigant information asymmetries will not be as significant, or as consequential, as litigant-litigant information asymmetries.²⁹⁴ Judges might not know as much as the parties, but they can nonetheless oversee litigation's conduct, steering the phased and targeted acquisition of evidence and witness examination, all the while searching for the "jugular" issue that permits an early and definitive end to a case.²⁹⁵ By implication, the inquisitorial approach is founded on the further view that litigant-litigant asymmetries *are* significant—and that an unregulated adversarial process in which litigants fend for themselves, and some can afford better counsel, will yield

²⁹¹ Langbein, *supra* note 275.

²⁹² *Id.*

²⁹³ Resnik, *supra* note __. See also Nora Freeman Engstrom, *The Lessons of Lone Pine*, 129 YALE L.J. 2, 60 (2019) (reviewing the literature and noting managerial judging's durability). For the traditional judicial role, see Abram Chayes, *The Role of the Judge in Public Law Litigation*, 89 HARV. L. REV. 1281, 1286 (1976).

²⁹⁴ Langbein, *supra* note __, at 843 (noting that the "active role of the judge places major limits on the extent of the injury that bad lawyering can work on a litigant").

²⁹⁵ *Id.* at 830-31 (noting "jugular" idea and fact that a German court "functions without sequence rules" and, in particular, without any distinction between pre-trial and trial); *id.* at 846 (noting that "judicial control of sequence works to confine the scope of fact-gathering to those avenues of inquiry deemed most likely to resolve the case").

significant costs in efficiency and equity.²⁹⁶ Judge control of the proceedings, on this view, is a hedge against adversarialism's excesses.

In stark contrast, the American system is built upon the notion that judge-litigant asymmetries are apt to be substantial, and that judicial control over the proceedings will yield too many inefficiencies and errors. Litigants know their case better than judges, and so it is only partisan fact-gathering, which aligns responsibility and incentive, that can consistently achieve a full ventilation of facts.²⁹⁷ One need not deny the costs of partisan control in order to hold this view. Rather, the costs of a blindered judge running the show outweigh of social costs of the inequities created in a world in which some litigants can afford more and better counsel than others.

Framing litigation design in these terms powerfully captures the stakes of legal tech's advance. A key question going forward will be whether legal tech's proliferation throughout the civil justice system will shift the core bargain that undergirds the American commitment to adversary control, whether across the board or for particular tools or litigation types. It also allows us to imagine a set of possible futures as legal tech proliferates. Table 2 makes this concrete by representing, in stylized form, four different combinations of litigant-litigant and judge-litigant information asymmetries that might emerge over time as the market for legal tech takes shape. For each combination, one can then ask how, or if, procedure should adjust in response.

²⁹⁶ *Id.* See also William W. Schwarzer, *Managing Civil Litigation: The Trial Judge's Role*, 61 JUDICATURE 400, 405-06 (1978) (offering another classic statement). A further claim is that inquisitorialism protects lawyers from their own counsel, mitigating lawyer-client agency costs. See E. Donald Elliott, *Managerial Judging and the Evolution of Procedure*, 53 U. CHI. L. REV. 306, 330-32 (1986).

²⁹⁷ See, e.g., Robert G. Bone, *Who Decides? A Critical Look at Procedural Discretion*, 28 CARDOZO L. REV. 1961, 1986 (2007).

TABLE 2. LEGAL TECH AND INFORMATION ASYMMETRIES: FOUR FUTURES

| | Narrower judge-litigant information asymmetries | Wider judge-litigant information asymmetries |
|--|--|---|
| Narrower litigant- litigant information asymmetries | <p><u>Democratization:</u></p> <p>Litigants and judge alike enjoy full access to legal tech outputs; system steadily approaches full and fully distributed information; significant transparency, potential uptick in pre-trial settlements.</p> | <p><u>Bilateral Litigant Supremacy:</u></p> <p>Litigants enjoy full and equal access to legal tech outputs; judges do not— and will (should?) recede from view.</p> |
| Wider litigant- litigant information asymmetries | <p><u>Power Sharing by Judges and Litigant “Haves”:</u></p> <p>Concentration of information in hands of “haves,” but judges have tech, too, and may protect have-nots</p> | <p><u>Unilateral Litigant Supremacy:</u></p> <p>Information concentrated in hands of “haves,” who lord over adversaries and judges alike; a litigation dystopia</p> |

Consider first Table 2’s northwest quadrant—a fully democratized system in which litigants and judges alike have access to the complete legal tech toolkit. In this scenario, there are few distributive concerns, and the choice between adversary and judicial control becomes less salient, as all sides have the same degree of transparency into the pool of evidence, probabilities over case outcomes across different fora, and even the assigned judge’s own (latent) predispositions in similar past cases. To be sure, this future is not unproblematic. As noted in Part I.C, some might worry that such a system will suffer from creeping automation bias—undue reliance by actors within the system on machine outputs—and drain the system of its capacity to adapt to social change or apply equitable principles in hard cases.²⁹⁸ Others might further worry about an uptick in settlements driven by a leveling of information, which would stymie the public elaboration of legal norms,²⁹⁹ or reduce litigant conduct of socially valuable but privately costly discovery.³⁰⁰ Compared to other options, however, the northwest future may provide an ideal baseline.

Now move to Table 2’s northeast quadrant, in which litigants on both sides of the “v” pervasively use legal tech tools but judges do not. This system features wide information

²⁹⁸ See notes __-__ *supra* and accompanying text.

²⁹⁹ See, e.g., Owen M. Fiss, *Against Settlement*, 93 YALE L.J. 1073, 1075 (1984). For a full airing of the debate, see Symposium: *Against Settlement: Twenty-Five Years Later*, 78 FORDHAM L. REV. 1117 (2009).

³⁰⁰ See Diego Zambrano, *Discovery as Regulation*, 118 MICH. L. REV. (forthcoming 2020) (reviewing literature).

asymmetries of the vertical (judge-litigant) sort but not the horizontal (litigant-litigant) sort. As with the first scenario, we have few concerns about distributive effects resulting from an unequal distribution of technological capacity across parties. As a result, there is little warrant for a procedural response along the lines of compelled sharing of legal tech's inputs or outputs. Indeed, the system will have achieved something close to the *Hickman* ideal: "mutual knowledge of all the relevant facts."³⁰¹

Note, however, that this does not necessarily mean preservation of the status quo as a procedural matter. In a world defined by bilateral litigant control of legal tech, there is a strong case to be made that judicial control—including the "managerial judging" that has increasingly characterized the American system—will and, indeed, *should* erode. For some, level legal tech playing field would provide a welcome opportunity to pare back an overweening judicial presence that, as Judith Resnik cogently noted long ago, often plays out "beyond the public view, off the record, with no obligation to provide written, reasoned opinions, and out of the reach of appellate review."³⁰² Whatever one's view of the merits of that debate, democratized but litigant-centered legal tech will likely move the American system further away from a proto-German, inquisitorial model.

Turning southward, Table 2's southwest quadrant captures a system characterized by wide horizontal but narrow vertical information asymmetries. As a practical matter, this future is harder to glimpse, and it seems the least likely to unfold in reality. In particular, it would require a legal tech toolkit that is available to and adopted by budget-strapped courts but not large classes of litigants. Still, consideration of the southwest future's contours is instructive. One possibility is that such a system might generate fewer distributional concerns, since the judge will be well-positioned to level the litigant playing field, at least where a dominant litigant deploys legal tech tools for pure rent-seeking purposes. Note that the case for managerial judging here is strong. In stark contrast to the prior scenario, the answer here might be *more* managerial judging, and *more* judicial control over the conduct of the proceedings.

The most concerning of all the scenarios—a kind of litigation dystopia—is the southeast quadrant, a system characterized by wide asymmetries along *both* dimensions (litigant-litigant, judge-litigant). A relatively narrow set of litigants—likely well-heeled ones—would exercise something like unilateral control over legal tech's informational advantages and could thus engage in litigation rent-seeking, using its privileged command of case outcomes to choose the most advantageous forum, game the discovery process to ensure that the most damaging evidence remains under wraps, and craft winning legal arguments that reflect the latent predilections of particular judges. Legal tech's "haves" would systematically win out over its "have nots," whether at trial or in the capture of settlement surplus.³⁰³

³⁰¹ See *Hickman*, 329 U.S., at 507.

³⁰² Resnik, *supra* note __, at 378, 380; see also Langbein (noting rise of managerial judging "has not been accompanied by Continental-style attention to safeguarding litigants against the dangers inherent in the greatly augmented judicial role"); Todd D. Peterson, *Restoring Structural Checks on Judicial Power in the Era of Managerial Judging*, 29 U.C. DAVIS L. REV. 41, 47 (1995) (making a similar argument and emphasizing the threat to party "autonomy"). See generally Engstrom, *supra* note __, at __ (summarizing the literature).

³⁰³ See notes __-__ *supra* and accompanying text.

Here, the case is strongest for a procedural response, via compelled sharing of legal tech tools, judicial demands for litigants' machine outputs, or both. But note that it is here that the incentives to innovate may be at their most powerful—and one might expect a hyper-sophisticated technological trajectory, or substantial effort by litigation actors with privileged access to data to develop a suite of advantage-conferring proprietary tools. Here, the IP-and-innovation framing helps to mark out the trade-offs: Procedural interventions can level the playing field but only while also blunting litigant incentives to use legal tech in the first place, thus depriving the system of its potential accuracy-enhancing and cost-reducing virtues. On the other hand, the right policy decision *is* to stifle innovation if its perceived social inequity costs outweigh the benefits rooted in improved efficiency and accuracy.

Of course, these four futures are unlikely to hold across the board, for all kinds of litigation, at all levels of the judicial system. A key challenge for judges and policymakers, and a key pressure given civil procedure's facial commitment to trans-substantivity, will be how to craft a variegated response across litigation types to ameliorate concerns where they arise most acutely.

* * *

Looking across Part II's case studies helps us to see a larger landscape, and a wider-angle frame for thinking about legal tech's incorporation into the civil justice system. That said, neither the IP-and-innovation nor the information-asymmetry frame is comprehensively treated here. Nor do these frames exhaust the ways one could conceptualize legal tech's incorporation into the civil justice system. Neither says anything about the allocation of power as between judge and jury, another front in the procedural battles fought in recent decades, particularly around summary judgment. But taken together, they capture some of the essential puzzles that will face judges and policymakers going forward. As these actors remodel civil procedure in the years to come, they will make a wide range of judgments—about how much innovation is a good or bad thing, how much exclusivity to permit, and which asymmetries to tolerate—that will help set the balance of adversary and nonadversary values within the system and, in the process, chart the future course of American litigation. The two frames thus provide a rough roadmap for the kind of work that lies ahead as the details of a newly digitized litigation system come into focus.

CONCLUSION

This Article has argued that legal tech is likely to reshape the American system of litigation not merely or even primarily by changing how lawyers do their work, but by resetting several of the system's procedural cornerstones. Along the way we have raised, but only partially answered, numerous questions, empirical and otherwise, that will repay research as the next era of American litigation comes into focus. We nonetheless hope that the insights offered in this Article—from our sober accounting of legal tech's likely trajectory to our case studies of tools and rules to our more synthetic thoughts on system design—can aid the thinking of judges, policymakers, and scholars as they oversee legal tech's continued move to the center of the civil justice system.