

Boston College Law Review

Volume 59 | Issue 3

Article 2


3-26-2018

Technological Opacity & Procedural Injustice

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Recommended Citation

Seth K. Endo, *Technological Opacity & Procedural Injustice*, 59 B.C.L. Rev. 821 (2018), <http://lawdigitalcommons.bc.edu/bclr/vol59/iss3/2>

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TECHNOLOGICAL OPACITY & PROCEDURAL INJUSTICE

SETH KATSUYA ENDO

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SETH KATSUYA ENDO*

Abstract: From Google’s auto-correction of spelling errors to Netflix’s movie suggestions, machine-learning systems are a part of our everyday life. Both private and state actors increasingly employ such systems to make decisions that implicate individuals’ substantive rights, such as with credit scoring, government-benefit eligibility decisions, national security screening, and criminal sentencing. In turn, the rising use of machine-learning systems has led to questioning about whether they are sufficiently accurate, fair, and transparent. This Article builds on that work, focusing on how opaque technologies can subtly erode the due process norm of participation. To illuminate this issue, this Article examines the use of predictive coding—a form of technology-assisted review in which supervised machine-learning software is taught to predict the relevance of collected documents for discovery productions. The use of predictive coding in civil discovery highlights the new challenge to the participation norm because the processes generally do not provide any explanations for the outputs, much less non-technological accounts that are tied to the underlying substantive legal issues. Thus, even if predictive coding results in reasonably complete, accurate, and cost-efficient productions, the “black-box” nature of the process may harm the legitimacy that comes from litigants understanding and being able to more fully participate in judicial processes. This harm, however, has not been addressed by the developing jurisprudence, probably because most of the early cases involved high-stakes litigation between sophisticated parties who could afford computer experts. But the participation issue—and related equality con-

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* Acting Assistant Professor, NYU School of Law. Many thanks to Steven Baicker-McKee, Jodi Balsam, Stephen Burbank, Brooke Coleman, Russell Gold, Helen Hershkoff, Roger Michalski, Melissa Mortazavi, Josh Sellers, and Tony Thompson for their input and guidance. I also benefited greatly from presenting an earlier draft to NYU School of Law’s Lawyering Scholarship Colloquium with special thanks to Angie Gius, Tal Kastner, Will Moon, Shanda Sibley, Scott Skinner-Thompson, and Naomi Sunshine. Audiences at the University of Kansas School of Law, Sturm College of Law of the University of Denver, and the Maurice A. Deane School of Law at Hofstra University also offered helpful comments and suggestions. Scott Reents, Lead Attorney, Data Analytics and E-Discovery, Litigation at Cravath, Swaine & Moore LLP, and Daniel S. Stromberg, e-discovery counsel at Outten & Golden, provided valuable insight into both the theoretical and practice-oriented aspects of the issue. And I received essential research assistance from Christina Elizabeth Kata and administrative support from Adrienne Slater and Piper Meikle. The outstanding editorial work of Daniel Cahill, Caitlin Toto, Antonio Fraone, and Michael O’Loughlin, of the *Boston College Law Review* is also deeply appreciated.

cerns—will become increasing problematic as the technology’s use expands beyond this privileged posture. In response to these issues, this Article proposes a reinvented *Mathews* framework that explicitly weighs predictive coding’s impact on the participation norm to better futureproof the doctrine.

INTRODUCTION

From Google’s auto-correction of spelling errors to Netflix’s movie suggestions, machine-learning systems are a part of our everyday life. These systems typically use software to “detect patterns in data[] and then use the uncovered patterns to predict future data[] or to perform other kinds of decision making under uncertainty.”¹ Both private and state actors increasingly employ machine-learning systems to make decisions that implicate individuals’ substantive rights, such as with credit scoring, government-benefit eligibility decisions, national security screening, probable cause determinations, and criminal sentencing.² In turn, the rising use of machine-learning systems has led to questioning about whether they are sufficiently accurate, fair, and transparent.³ This Article builds on that work, focusing on how opaque technologies can subtly erode the due process norm of participation.

This Article specifically examines the use of predictive coding—a form of technology-assisted review in which supervised machine-learning software

¹ Mikella Hurley & Julius Adebayo, *Credit Scoring in the Era of Big Data*, 18 YALE J.L. & TECH. 148, 160–61 (2016) (quoting KEVIN P. MURPHY, MACHINE LEARNING: A PROBABILISTIC PERSPECTIVE (2012)).

² See, e.g., Kiel Brennan-Marquez, “Plausible Cause”: *Explanatory Standards in the Age of Powerful Machines*, 70 VAND. L. REV. 1249, 1251–53 (2017); Danielle Keats Citron & Frank Pasquale, *The Scored Society: Due Process for Automated Predictions*, 89 WASH. L. REV. 1, 2–3 (2014); Danielle Keats Citron, *Technological Due Process*, 85 WASH. U. L. REV. 1249, 1284 (2008) (noting the invocation of balancing tests when substantive rights are at stake); Nizan Geslevich Packin & Yafit Lev-Aretz, *On Social Credit and the Right to Be Unnetworked*, 2016 COLUM. BUS. L. REV. 339, 350; Michael L. Rich, *Machine Learning, Automated Suspicion Algorithms, and the Fourth Amendment*, 164 U. PA. L. REV. 871, 886–91 (2016); Daniel J. Solove, *Data Mining and the Security-Liberty Debate*, 75 U. CHI. L. REV. 343, 344–45 (2008); Katherine Freeman, Recent Development, *Algorithmic Injustice: How the Wisconsin Supreme Court Failed to Protect Due Process Rights in State v. Loomis*, 18 N.C. J.L. & TECH. ONLINE 75, 76 (2016), http://ncjolt.org/wp-content/uploads/2016/10/Terra_Final.pdf [<https://perma.cc/VB24-AFYT>].

³ See, e.g., Julia Angwin et al., *Machine Bias: There’s Software Used Across the Country to Predict Future Criminals. And It’s Biased Against Blacks.*, PROPUBLICA (May 23, 2016), <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing> [<https://perma.cc/7RKG-CSJV>] (discussing lack of algorithm reliability in predicting violent crime); Mitch Smith, *A Case Is Putting the Use of Data to Predict Defendants’ Futures on Trial*, N.Y. TIMES, June 23, 2016, at A18 (discussing the implications of predictive coding in *State v. Loomis*). Compare Alison Gopnik, Review, *The Curious Incident of the Baby in the Lab*, WALL ST. J., Aug. 15, 2015, at C2 (describing a study exploring human predictive capability), with CATHY O’NEIL, WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY 8 (2016) (examining the lack of explanation for the outputs of complex algorithms).

is taught to predict the relevance of collected documents for discovery productions. The use of predictive coding in civil discovery highlights the new challenge to the participation norm particularly clearly because the processes generally do not provide any explanations for the outputs, much less non-technological accounts that are tied to the underlying substantive legal issues.

Furthermore, the emphasis on predictive coding in civil discovery is warranted because several factors suggest it will be used with increasing frequency. As computers—from desktops to smartphones—become ever more omnipresent, the amount of electronically stored information (ESI) continues to rise, creating significant logistical and cost challenges for civil litigants.⁴ In response to these complications, the 2015 amendments to Federal Rule of Civil Procedure 26(b) integrated a requirement that discovery be “proportional to the needs of the case” directly into the definition of its scope.⁵ Together, these developments present a risk that essential discovery in cases involving individual small-value claims against large defendants will be stifled, raising the need for a technological fix like predictive coding.⁶

To make this more concrete, one might see the issues presented by the rise in ESI and the proportionality command arise in an employment discrimination suit brought by an individual against a multinational company. In such a case, the employee’s claim is worth comparatively little and the information about both the employee and his or her comparators that would potentially show discriminatory patterns may be contained in a large number of emails and human resources documents that are dispersed across a broad swathe of the company.⁷ The average corporate worker sends or receives more than one hundred emails per day.⁸ To exceed one hundred thousand documents, a case

⁴ See Andrew Jay Peck, *Foreword*, 26 REGENT U. L. REV. 1, 3 (2013–2014) (discussing the growing volume of ESI and growing discovery costs for litigants).

⁵ FED. R. CIV. P. 26(b)(2)(1) advisory committee’s note to 2015 amendment; see also Christina T. Nasuti, Comment, *Shaping the Technology of the Future: Predictive Coding in Discovery Case Law and Regulatory Disclosure Requirements*, 93 N.C. L. REV. 222, 234–36 (2014) (referencing predictive coding’s relationship to the scope of discovery).

⁶ Stephen B. Burbank & Sean Farhang, *Federal Court Rulemaking and Litigation Reform: An Institutional Approach*, 15 NEV. L.J. 1559, 1593 (2015) (describing evolution of rulemaking); Patricia W. Hatamyar Moore, *The Anti-Plaintiff Pending Amendments to the Federal Rules of Civil Procedure and the Pro-Defendant Composition of the Federal Rulemaking Committees*, 83 U. CIN. L. REV. 1083, 1112–13 (2015) (explaining how an aggressive proportionality command may lead to less discovery that harms plaintiffs because of information asymmetries).

⁷ See Kevin E. Davis & Helen Hershkoff, *Contracting for Procedure*, 53 WM. & MARY L. REV. 507, 545 (2011) (emphasizing the need for robust discovery in employment discrimination cases); see also Bruce L. Hay, *Civil Discovery: Its Effects and Optimal Scope*, 23 J. LEGAL STUD. 481, 483–84 (1994) (illuminating the twin purposes of discovery through the example of an employment discrimination suit).

⁸ Harrison M. Brown, Comment, *Searching for an Answer: Defensible E-Discovery Search Techniques in the Absence of Judicial Voice*, 16 CHAP. L. REV. 407, 411 (2012).

would only need to involve three supervisors emailing over a twelve-month period. Thus, one can imagine predictive coding being offered as a cost-effective answer to the proportionality inquiry in a challenge to the scope of discovery.⁹ In other words, predictive coding is a technological fix that might make the low-value employment discrimination claim viable.

Additionally, the use of predictive coding in legal processes is a particularly timely issue. In its various forms, predictive coding has received a great deal of attention from practitioners, the academy, and the public at large.¹⁰ At the same time, the use of predictive coding is still in its early stages and the jurisprudence remains mutable.¹¹

The existing academic literature and case law on the use of predictive coding in civil discovery have focused on its practical implementation, addressing (1) its accuracy and economic efficiency in culling voluminous ESI for responsive materials;¹² (2) the application of Federal Rule of Evidence 702 and the U.S. Supreme Court's 1993 holding in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*;¹³ and (3) professional responsibility issues such as maintaining technological prowess, preventing unauthorized practice of law, or protecting attorney-work-product.¹⁴ This body of scholarship and law,

⁹ See Ralph C. Losey, *Predictive Coding and the Proportionality Doctrine: A Marriage Made in Big Data*, 26 REGENT U. L. REV. 7, 54–55 (2013–2014) (extolling the benefits of predictive coding in discovery); see also Monica Bay, *Predictions for 2016 and the Changing E-Discovery Landscape*, BLOOMBERG L. (Jan. 7, 2016), <https://bol.bna.com/predictions-for-2016-and-the-changing-e-discovery-landscape> [<https://perma.cc/4LMJ-KP2N>] (suggesting future trends for e-discovery); Samantha Ettari, *Kramer Levin E-Discovery Update: 2015—A Year in Review*, MONDAQ, Jan. 13, 2016, 2016 WLNR 1157330 (forecasting changes to discovery based on 2015 developments).

¹⁰ See, e.g., Dana A. Remus, *The Uncertain Promise of Predictive Coding*, 99 IOWA L. REV. 1691, 1692 (2014); Laura L. Gavioli, *Tax Court Order Indicates That E-Discovery and Predictive Coding Are Here to Stay*, NAT'L L. REV., July 18, 2016, 2016 WLNR 21821542; Catherine Ho, *Law Firm Discovers Cash in E-Discovery*, WASH. POST, July 21, 2014, 2014 WLNR 19857825.

¹¹ In 2012, Magistrate Judge Peck first approved the use of predictive coding. *Moore v. Publicis Groupe*, 287 F.R.D. 182, 189 (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).

¹² E.g., Henry Coke Morgan, Jr., *Predictive Coding: A Trial Court Judge's Perspective*, 26 REGENT U. L. REV. 71, 72 (2013); Remus, *supra* note 10, at 1693; Charles Yablon & Nick Landsman-Roos, *Predictive Coding: Emerging Questions and Concerns*, 64 S.C. L. REV. 633, 665 (2013).

¹³ E.g., Daniel K. Gelb, *The Court as Gatekeeper: Preventing Unreliable Pretrial eDiscovery from Jeopardizing a Reliable Fact-Finding Process*, 83 FORDHAM L. REV. 1287, 1287–88 (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, 207 (2013). See generally FED. R. EVID. 702; *Daubert v. Merrell Dow Pharm., Inc.* 509 U.S. 579 (1993).

¹⁴ E.g., 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, 3 (2015); Monica McCarroll, *Discovery and the Duty of Competence*, 26 REGENT U. L. REV. 81, 85 (2014); Dana Remus & Frank Levy, *Can Robots Be Lawyers? Computers, Lawyers, and the Practice of Law*, 30 GEO. J. LEGAL ETHICS 501, 541–51 (2017); Remus, *supra* note 10, at 1692.

however, has neglected to consider both a key attribute and a following implication of most—if not all—predictive coding processes: they are not designed to provide easily intelligible explanations that rely on the substantive meaning of the materials.¹⁵ This deficit can negatively impact the due process norm of participation for litigants who lack the financial resources for computer experts.

So far, courts have primarily addressed the use of predictive coding in discovery in cases involving sophisticated, well-resourced litigants who were able to employ experts in the technology, sidestepping the intelligibility issue.¹⁶ But, this sort of privileged posture is not the standard in civil litigation as a whole.¹⁷ Thus, the jurisprudence does not necessarily raise all of the issues—whether going to practical implementation or higher normative values—with which the judiciary must ultimately wrestle in its managerial role.

Predictive coding's lack of easy intelligibility implies that the process will require either the expense of experts or trust in a “black-box” process.¹⁸ To the former, regardless as to whether the procedural protections for the use of experts apply, the expense of experts could destroy the economic value of many small-value individual claims.¹⁹ To the latter, even if predictive coding results in more accurate and cost-effective productions,²⁰ the “black-box” nature of the process may harm the element of legitimacy that comes from litigants understanding and being able to more fully participate in judicial

¹⁵ See *infra* notes 62–249, 292–370, and accompanying text.

¹⁶ See generally *Rio Tinto PLC v. Vale S.A.*, 306 F.R.D. 125 (S.D.N.Y. 2015) (mining companies with market caps in excess of twenty-five billion dollars each used predictive coding). Company profiles for Rio Tinto PLC and Vale S.A. are available online. See *Rio Tinto PLC*, YAHOO FIN., <https://finance.yahoo.com/quote/RIO> [<https://perma.cc/LPG7-CFVX>] (last visited Feb. 3, 2018); *Vale S.A.*, YAHOO FIN., <https://finance.yahoo.com/quote/VALE> [<https://perma.cc/D9FV-P9WF>] (last visited Feb. 3, 2018).

¹⁷ Brooke D. Coleman, *One Percent Procedure*, 91 WASH. L. REV. 1005, 1007 (2016).

¹⁸ Remus, *supra* note 10, at 1705.

¹⁹ Theodore J. Greeley, *The Plight of Indigent Defendants in a Computer-Based Age: Maintaining the Adversarial System by Granting Indigent Defendants Access to Computer Experts*, 16 VA. J.L. & TECH. 400, 403 (2011); see also David Medine, *The Constitutional Right to Expert Assistance for Indigents in Civil Cases*, 41 HASTINGS L.J. 281, 285–91 (1990) (describing the negative impact the absence of experts may have on cases brought by indigent parties); Hannah Jacobs Wiseman, *Pro Bono Publico: The Growing Need for Expert Aid*, 60 S.C. L. REV. 493, 528–35 (2008) (discussing the limited number of experts or expert associations providing pro bono testimony).

²⁰ 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. 11, 52 (2011).

processes—dimensions of efficacy wholly different than the accuracy and cost efficiency of a discovery production.²¹

Courts, however, have focused nearly exclusively on economic efficiency in their proportionality inquiries.²² If this doctrine calcifies, the resulting law will disadvantage plaintiffs with small-value claims and undermine the due process norm of participation. To rectify this and better futureproof this jurisprudence, courts should explicitly include the non-financial values of the parties' understanding and participation in the courts' *Mathews*-style assessments of predictive coding's cost and benefits in civil discovery.²³

Part I of this Article briefly describes the relevant federal rules regulating civil discovery, their normative goals, and the standard doctrinal framework for discovery disputes. Part II provides a brief description of how predictive coding in civil discovery actually works, the reasons it is coming to the fore, and the jurisprudential landscape. Part III examines the dual-edged nature of predictive coding with a focus on the normative trade-off between accuracy and cost efficiency on one hand and knowledgeable participation on the other. The intervention it argues for is making courts explicitly include this trade-off in the cost-benefit weighing undertaken in their management of predictive coding. It also includes a short discussion of possible non-doctrinal solutions that could reduce the problematic elements of the trade-off such as technological or professional development advances that increase the transparency of the predictive coding processes. The Article concludes with a summary of the foregoing points and the broader lesson that can be drawn.

I. THE NORMATIVE GOALS, AND INCREASING SUBSTANTIVE RIGHT, OF CIVIL DISCOVERY

The first step in evaluating the evolving jurisprudence of predictive coding in civil discovery is to identify the normative goals that the relevant procedural rules are designed to achieve.²⁴ Describing these goals provides the

²¹ Rebecca Hollander-Blumoff, *The Psychology of Procedural Justice in the Federal Courts*, 63 HASTINGS L.J. 127, 154–55 (2011); Martin H. Redish, *Electronic Discovery and the Litigation Matrix*, 51 DUKE L.J. 561, 600 (2001).

²² See *infra* notes 166–201 (describing cases discussing proportionality); see also Coleman, *supra* note 17, at 1007.

²³ See Brooke D. Coleman, *The Efficiency Norm*, 56 B.C. L. REV. 1777, 1824 (2015) (noting the value in considering the litigants' acceptance of the result); see also *Mathews v. Eldridge*, 424 U.S. 319, 323–49 (1976) (establishing the well-known balancing test for weighing due process interests); *supra* notes 55–61 and accompanying text.

²⁴ See Robert G. Bone, *Improving Rule 1: A Master Rule for the Federal Rules*, 87 DENV. U. L. REV. 287, 302 (2010) (proposing revised language for Rule 1 based on the normative goals of the Federal Rules); Redish, *supra* note 21, at 600 (considering discovery in the context of the broader goals of litigation).

measure by which a court—or other observer—should gauge the success of the emerging doctrine.²⁵ Additionally, as applied in civil discovery, the underlying goals give the rules something approaching a constitutional dimension.²⁶ And, at a high level, the existing doctrinal framework already attempts to balance a set of interests that include, at least, some of these goals.²⁷

Rules 26 through 37 of the Federal Rules of Civil Procedure all speak to discovery and disclosure.²⁸ Most disputes involving the use of predictive coding in civil discovery turn on the issue of scope.²⁹ Accordingly, Rule 26(b)(1) is the most relevant provision. It states:

Unless otherwise limited by court order, the scope of discovery is as follows: Parties may obtain 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. Information within this scope of discovery need not be admissible in evidence to be discoverable.³⁰

The text demonstrates the main objective highlighted in Rule 26 is proportionality, which is grounded in the listed constituent factors. This tends to turn into a question of economic efficiency with its subparts of accuracy and cost effectiveness.³¹ But the text of Rule 26 alone does not provide any interpretative guidance as to the weighting of these factors, much less as to any

²⁵ Implicitly, this assumes a variant of Hart and Sacks' Legal Process approach, wherein judges engage in reasoned elaboration that tie their decisions to democratically decided goals. See William L. Reynolds & Spencer Weber Waller, *Legal Process and the Past of Antitrust*, 48 SMU L. REV. 1811, 1815 (1995).

²⁶ Vivian Grosswald Curran, *United States Discovery and Foreign Blocking Statutes*, 76 LA. L. REV. 1141, 1141 (2016); Arthur R. Miller, *Confidentiality, Protective Orders, and Public Access to the Courts*, 105 HARV. L. REV. 427, 464 (1991); Imre Stephen Szalai, *A Constitutional Right to Discovery? Creating and Reinforcing Due Process Norms Through the Procedural Laboratory of Arbitration*, 15 PEPP. DISP. RESOL. L.J. 337, 374–75 (2015).

²⁷ See, e.g., *Moore*, 287 F.R.D. at 189 (balancing the accuracy and comprehensiveness of a given discovery review method against its costs to determine its value relative to other review methods).

²⁸ FED. R. CIV. P. 26–37.

²⁹ See *infra* notes 292–370 and accompanying text.

³⁰ FED. R. CIV. P. 26.

³¹ See *infra* notes 292–370 and accompanying text; see also Henry H. Perritt, Jr., *The Electronic Agency and the Traditional Paradigms of Administrative Law*, 44 ADMIN. L. REV. 79, 89 (1992) (discussing the constituent sub-goals of efficiency).

other overarching norms that may apply.³² And, when considering both the structural role and institutional competence of the federal courts, it is not obvious that courts are the collective body best situated to generate the social objectives to be served by the procedural rules.³³

The Federal Rules of Civil Procedure, however, are not completely silent about the norms they aim to serve. Rule 1 describes the code's broad purpose as being "to secure the just, speedy, and inexpensive determination of every action and proceeding."³⁴ This provides some statutory guidance as to the higher aspirations of civil procedure, which must inform the interpretations of the other rules.³⁵

As applied to discovery more specifically, Rule 1 has been understood as prohibiting unfair surprises, promoting an exchange of information sufficient for each side to assert their claims or defenses, and to avoid unnecessarily prolonged litigation.³⁶ Notwithstanding these common formulations that focus on these fairly tactical objectives,³⁷ the primary placement of the term "just" in Rule 1 suggests an emphasis on higher-level norms that extend beyond simply ensuring parties have material that might help them win their cases.³⁸ This is in keeping with the history of the discovery rules, which were originally designed to permit liberal discovery with an eye towards providing parties with important information necessary to ultimately pursue a disposi-

³² See Bernadette Bollas Genetin, "Just a Bit Outside!": Proportionality in Federal Discovery and the Institutional Capacity of the Federal Courts, 34 REV. LITIG. 655, 661 (2015) (suggesting an absence of normative guides in the procedural rules). As to the other goals, even the proportionality inquiry itself implicates a wider set of normative goals than just cost-efficiency. See *infra* notes 292–370 and accompanying text.

³³ See Genetin, *supra* note 32, at 661 (concluding the social implications for bounding discovery may fall outside the scope of judicial expertise).

³⁴ FED. R. CIV. P. 1.

³⁵ See Steven S. Gensler & Lee H. Rosenthal, *Managing Summary Judgment*, 43 LOY. U. CHI. L.J. 517, 520 (2012) (highlighting the central role of proportionality in discovery). See generally Bone, *supra* note 24 (suggesting amendments to Rule 1 to better serve the purposes of the Federal Rules).

³⁶ See Stephen N. Subrin, *Fishing Expeditions Allowed: The Historical Background of the 1938 Federal Discovery Rules*, 39 B.C. L. REV. 691, 716 (1998).

³⁷ See, e.g., *Herbert v. Lando*, 441 U.S. 153, 177 (1979) (describing the goal as "adequately informing the litigants in civil trials"); JAY E. GREINIG & JEFFREY S. KINSLER, *HANDBOOK OF FEDERAL CIVIL DISCOVERY AND DISCLOSURE* § 9:2, at 510–11 (3d ed. 2010); John S. Beckerman, *Confronting Civil Discovery's Fatal Flaws*, 84 MINN. L. REV. 505, 534–35 (2000) (discussing the relationship between discovery and pleadings); Morgan, *supra* note 12, at 76 (examining the speed of predictive coding).

³⁸ FED. R. CIV. P. 1. This is, of course, not to imply that these pragmatic goals are unimportant or unrelated to the participation norm that is the focus of this Article. Nor is it meant to imply that these scholars and courts are not mindful of the normative questions.

tion on the merits of the case—that is, to give the parties a chance to be heard.³⁹

Elaborating on these themes, scholars have articulated additional discovery-specific norms. For example, some scholars have described a truth-seeking function.⁴⁰ Professor Martin Redish argues that the procedural rules regulating discovery should promote the following high-level goals: “(1) decisionmaking accuracy; (2) adjudicatory efficiency; (3) political legitimacy; (4) maintenance of the substantive-procedural balance; (5) predictability; and (6) fundamental fairness.”⁴¹ This articulation by Professor Redish echoes the concerns outlined in Professor Lawrence Solum’s seminal work on procedural justice, which identified participation and accuracy as the two main principles.⁴²

According to Professor Solum, the participation principle encompasses the benefits of process that are not reducible to either accuracy or cost.⁴³ To ground these benefits, he posits that adjudicative processes are only legitimate if they afford an opportunity for participation from those who are bound to the decisions.⁴⁴ Less abstractly, Professor Solum writes, “The right of participation is the right to observe, to make arguments, to present evidence, and to be informed of the reasons for a decision.”⁴⁵

³⁹ See Subrin, *supra* note 36, at 710, 716 (describing the development of procedural rules over time); see also Colman, *supra* note 23, at 1811–12; Brooke D. Coleman, *Recovering Access: Rethinking the Structure of Federal Civil Rulemaking*, 39 N.M. L. REV. 261, 282 (2009); Edson R. Sunderland, *An Inquiry Concerning the Functions of Procedure in Legal Education*, 21 MICH. L. REV. 372, 381–82 (1923).

⁴⁰ E.g., Yitshak Cohen, *The Issue of Document Disclosure in General Courts and in Family Courts: A New Model*, 37 HOUS. J. INT’L L. 43, 60 (2015).

⁴¹ Redish, *supra* note 21, at 593.

⁴² Lawrence B. Solum, *Procedural Justice*, 78 S. CAL. L. REV. 181, 305–07 (2004). Professor Laurence Tribe’s divisions between instrumentalist and intrinsic due process values reach much the same concepts. See LAURENCE H. TRIBE, *AMERICAN CONSTITUTIONAL LAW* 666 (2d ed. 1988); see also Gensler & Rosenthal, *supra* note 35, at 524; Lani Guinier, *No Two Seats: The Elusive Quest for Political Equality*, 77 VA. L. REV. 1413, 1489 (1991); Frank I. Michelman, *The Supreme Court and Litigation Access Fees: The Right to Protect One’s Rights—Part II*, 1974 DUKE L.J. 527, 543; Martin H. Redish & Lawrence C. Marshall, *Adjudicatory Independence and the Values of Procedural Due Process*, 95 YALE L.J. 455, 487 (1986) (discussing Michelman’s *Formal and Associational Aims in Procedural Due Process*); Solum, *supra* note 42, at 277–82. Professor Michelman locates the source of this general right to participate primarily in the metatext of the Constitution, analogizing to the right-to-vote jurisprudence. Michelman, *supra* note 42, at 543.

⁴³ Solum, *supra* note 42, at 275. At the same time, Professor Solum asserts that the participation principle does not rely on dignity, equality, or autonomy grounds. *Id.* at 286–90. But, even if one accepts this proposition, these values are still linked to participation. *Id.*; see also Robert G. Bone, *Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity*, 46 VAND. L. REV. 561 *passim* (1993).

⁴⁴ Solum, *supra* note 42 at 279–80.

⁴⁵ *Id.* at 280.

When thinking about how the participation norm plays out in ordinary discovery, the exchange of facts is both an expression of and a prerequisite for voice and information gathering.⁴⁶ And typically, the sorting processes used in discovery—such as the use of keywords for screening documents—are causatively tied to the substantive law. This clear, intelligible link to the substance adds to the voice and information-gathering aspects of participation. Additionally, it contributes to the overall transparency of the reasoning involved in the court-supervised party decisions.

The accuracy principle conjectures that process choices should enhance the likelihood that the ultimate outcome of an adjudicative proceeding will be substantively correct.⁴⁷ This applies to discovery because the information-exchange processes are meant to aid this instrumentalist purpose by giving each party—and, ultimately, the court—the information necessary to judge the case.⁴⁸

Current accounts of procedural justice continue to expound upon Professor Solum's two principles of participation and accuracy while also explicitly elevating cost efficiency.⁴⁹ Cost efficiency is effectively embedded in the text of Rule 26, so, unsurprisingly, it has a central place in the new jurisprudence around predictive coding in civil discovery.⁵⁰ But, the participation principle is going under-examined and under-emphasized—in contrast to accuracy and cost efficiency.

No matter which articulation of the elements of procedural due process one applies to discovery, all normative goals flow from a conception of procedural due process that is at the heart of the Federal Rules of Civil Procedure. Accordingly, to the extent that the discovery rules aid the ability of a party to present their claim in a manner that is fundamentally fair, they are imbued with an almost-constitutional weight.⁵¹

⁴⁶ See Hollander-Blumoff, *supra* note 21, at 154; Redish, *supra* note 21, at 600; Solum, *supra* note 42, at 268.

⁴⁷ See Solum, *supra* note 42, at 306.

⁴⁸ See *supra* notes 36–39 and accompanying text.

⁴⁹ See Solum, *supra* note 42, at 275; see also Paul Stancil, *Substantive Equality and Procedural Justice*, 102 IOWA L. REV. 1633, 1649–51 (2017). Note also how these norms can be either reinforcing or in tension with each other. See, e.g., Geoffrey P. Miller, *On the Costs of Civil Justice*, 80 TEX. L. REV. 2115, 2118 (2002).

⁵⁰ See *supra* notes 30–31 and accompanying text.

⁵¹ Curran, *supra* note 26, at 1141. In its operation, the discovery rules also might implicate individual constitutional rights. Miller, *supra* note 26, at 464. For example, Professor Arthur Miller has identified how the judiciary's management of discovery processes can infringe on both privacy and property rights. *Id.* Additionally, the modern tradition of liberal, trans-substantive discovery should ultimately lead to the privileging of the goals of the underlying substantive law, which might involve constitutional rights. See Curran, *supra* note 26, at 1141. Finally, some scholars have argued that there is a more general constitutional root of civil procedure in the due

Scholars are not the only ones to identify the quasi-constitutional dimensions of civil discovery.⁵² For example, the United States Court of Appeals for the Third Circuit held that fundamental fairness was violated when a district court's denials of letter rogatory requests under Rule 28 meant that the plaintiff had no ability to prove her case.⁵³ Writing for the court, Judge A. Leon Higginbotham explained, "Due process mandates that a judicial proceeding give all parties an opportunity to be heard on the critical and decisive allegations which go to the core of the parties' claim or defense and to present evidence on the contested facts."⁵⁴

Ultimately, in assessing whether procedural rules—like those governing civil discovery—comply with the constitutional command of procedural due process, courts typically use the balancing test that was set forth in 1975 in *Mathews v. Eldridge*.⁵⁵ In *Mathews*, the U.S. Supreme Court balanced the extent to which additional or alternative processes would prevent the erroneous deprivation of the private interest at stake against the costs to the government and adverse parties of adopting the proposed procedural safeguards.⁵⁶ This test has been applied to processes available to private litigants in civil litigation.⁵⁷

Although a court might not explicitly identify its balancing of the interests at play in discovery disputes as a *Mathews*-style test, functionally, that is what happens in the predictive coding cases.⁵⁸ Further illustrating both the pervasiveness and importance of this particular balancing inquiry in questions of civil procedure, the concerns about whether additional, potentially costly discovery processes were warranted can be seen underlying the U.S. Supreme

process clauses of the Fifth and Fourteenth Amendments. See, e.g., John Leubsdorf, *Constitutional Civil Procedure*, 63 TEX. L. REV. 579, 588 (1984).

⁵² See, e.g., *In re Extradition of Singh*, 123 F.R.D. 108, 126 (D.N.J. 1987) (holding that "although a litigant has no *general* constitutional right to discovery, there may be circumstances under which *specific* discovery must be afforded as a matter of due process[.]"); *Vaughn v. Vaughn*, 56 So. 3d 1283, 1287–88 (Miss. Ct. App. 2011) (discussing the conceptual link between discovery and the non-arbitrary and non-capricious decision making of a court); *Jimenez v. Brooks*, No. LLICV146011314S, 2016 WL 1443594, at *4 (Conn. Super. Ct. Mar. 15, 2016); cf. *Wardius v. Oregon*, 412 U.S. 470, 473–74 (1973) (suggesting justice is better served by liberal discovery, reducing surprise at trial, and enhancing fairness).

⁵³ *In re Complaint of Bankers Tr. Co.*, 752 F.2d 874, 889 (3d Cir. 1984).

⁵⁴ *Id.* at 890 (emphasis omitted).

⁵⁵ *Mathews*, 424 U.S. at 334; see also *In re Complaint of Bankers Trust Co.*, 752 F.2d at 890; Andrew Blair-Stanek, Twombly Is the Logical Extension of the *Mathews v. Eldridge* Test to Discovery, 62 FLA. L. REV. 1, 11 (2010) (describing the significance and wide applicability of the *Mathews* balancing test).

⁵⁶ Blair-Stanek, *supra* note 55, at 11.

⁵⁷ See, e.g., *Connecticut v. Doe*, 501 U.S. 1, 11 (1991).

⁵⁸ See *infra* notes 166–201; see also Citron, *supra* note 2, at 1284.

Court's 2007 and 2009 decisions in *Bell Atlantic Corp. v. Twombly* and *Ashcroft v. Iqbal*.⁵⁹

The balancing test, as applied in *Mathews*, included all three elements of procedural justice described above: accuracy, cost-efficiency, and participation.⁶⁰ Thus, the critical problem in the existing jurisprudence of predictive coding in civil discovery is not the general framework. Instead, the issue is that courts have effectively ignored the procedural justice requirement of meaningful participation.

In civil discovery, courts have primarily focused on whether the use of predictive coding is accurate and efficient. But the new wrinkle of predictive coding in civil discovery is that the processes frequently cannot provide explanations for their results that are tied to the underlying legal substance, if they can give an explanation at all. Explanations are a necessary component of the due process norm of participation.⁶¹ Taken together, this leads to the conclusion that courts should explicitly assess the damage done to the participation norm in their *Mathews*-style assessments of predictive coding's cost and benefits in civil discovery.

II. OVERVIEW OF PREDICTIVE CODING IN CIVIL DISCOVERY

A. How Predictive Coding in Civil Discovery Actually Works

A basic understanding of the mechanics of how predictive coding in civil discovery actually works is vital to evaluating the jurisprudential ramifications of its use.⁶² This section provides a short primer on this, focusing on the technologies that are used in civil litigation.⁶³ As part of this, it discusses how

⁵⁹ *Ashcroft v. Iqbal*, 556 U.S. 662, 685 (2009); *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544, 558 (2007); Blair-Stanek, *supra* note 55, at 11; Szalai, *supra* note 26, at 372; 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, 2285 (2012); see also Samuel Issacharoff & Geoffrey Miller, *An Information-Forcing Approach to the Motion to Dismiss*, 5 J. LEGAL ANALYSIS 437, 438 (2013); cf. Subrin, *supra* note 36, at 745 (noting the Advisory Committee suggestion that automatic discovery should mirror the fact particularity in an opponent's pleading).

⁶⁰ See *Mathews*, 424 U.S. at 339, 345 (noting existence of evidentiary hearing, albeit after termination, and contrasting the procedure with those in *Goldberg v. Kelly*, 397 U.S. 254 (1970)); Solum, *supra* note 42, at 309–10 (noting *Mathews*' consistency with the participation principle).

⁶¹ See Martha I. Morgan, *The Constitutional Right to Know Why*, 17 HARV. C.R.-C.L. L. REV. 297, 299 (1982) (linking the reasons requirement and individual participation); Solum, *supra* note 42, at 280.

⁶² Remus & Levy, *supra* note 14, at 503–04.

⁶³ The invaluable and authoritative Grossman-Cormack Glossary is a helpful resource for additional vocabulary and, thus, there is no need to replicate that here. See generally *The Grossman-Cormack Glossary of Technology-Assisted Review with Foreword by John M. Facciola*, U.S. Magistrate Judge, 7 FED. CTS. L. REV. 1 (2013) [hereinafter *Grossman-Cormack Glossary*].

predictive coding processes are both less transparent and less tied to the underlying substantive meaning of the documents than earlier search techniques.

Although the term “predictive coding” appears frequently in the case law, academic literature, and vendor promotional material, its meaning must still be pinned down.⁶⁴ Myriad discovery vendors—including some prominent legal-industry players such as FTI, kCura (Relativity), Recommind, and Symantec—provide predictive coding processes.⁶⁵ But the offerings vary significantly.⁶⁶ For the purposes of this Article, the term “predictive coding” refers to review processes that use supervised machine-learning algorithms to categorize material based on experts’ coding of training sets of documents.

More concretely, a typical predictive coding process would generally entail the following steps.⁶⁷ First, an initial training set of documents (referred to as a “seed set”) is either randomly or deliberately selected. Next, a subject-matter expert codes the documents for a particular attribute or set of attributes (in civil discovery, relevance is the typical category). Computer software uses the coded seed set to generate a model that is designed to predict the likelihood that other documents have the sought attributes based on shared fea-

⁶⁴ See *Grossman-Cormack Glossary*, *supra* note 63, at 6; see also Shannon Brown, *Peeking Inside the Black Box: A Preliminary Survey of Technology Assisted Review (TAR) and Predictive Coding Algorithms for eDiscovery*, 21 SUFFOLK J. TRIAL & APP. ADVOC. 221, 239 (2016). The *Grossman-Cormack Glossary* defines “predictive coding” as: “An industry-specific term generally used to describe a Technology-Assisted Review process involving the use of a Machine Learning Algorithm to distinguish Relevant from Non-Relevant Documents, based on Subject Matter Expert(s) Coding of a Training Set of Documents.” *Grossman-Cormack Glossary*, *supra* note 63, at 26. This definition, however, has been criticized for being too specific in restricting the sorting to relevant and non-relevant. Brown, *supra* note 64, at 262. Conversely, others have suggested additional elements, asserting that “predictive coding” must meet all of the following: (1) “Integrated, keyword-agnostic analytics to quickly generate accurate seed sets”; (2) “Language and keyword-agnostic machine-learning technology to accurately find relevant documents during the ‘training’ process”; (3) “A sound and well-documented workflow”; (4) “Integrated sampling to verify results to a statistical certainty before, during and after review”; and (5) “A completely integrated, purpose-built system to ensure results are consistent throughout the entire process, every time.” Sharon D. Nelson & John W. Simek, *Predictive Coding: A Rose by Any Other Name*, L. PRAC., July–Aug. 2012, at 22.

⁶⁵ See Peter J. Corcoran, III, *Strategies to Save Resources and Reduce E-Discovery Costs in Patent Litigation*, 21 TEX. INTELL. PROP. L.J. 103, 105–06 (2013).

⁶⁶ Nelson & Simek, *supra* note 64, at 24; Nicholas Barry, Note, *Man Versus Machine Review: The Showdown Between Hordes of Discovery Lawyers and a Computer-Utilizing Predictive-Coding Technology*, 15 VAND. J. ENT. & TECH. L. 343, 355 (2013).

⁶⁷ The description of the general process comes from discussions with e-discovery experts, vendor promotional material, and descriptions in many of the academic sources cited throughout this Article. See, e.g., Remus, *supra* note 10, at 1701–02; see also EDISCOVERY INST., EDISCOVERY INSTITUTE SURVEY ON PREDICTIVE CODING (2010), http://www.discovia.com/wp-content/uploads/2012/07/2010_EDI_PredictiveCodingSurvey.pdf [<https://perma.cc/2MRN-DUAY>].

tures.⁶⁸ The model is then applied to uncoded documents, scoring each one. Next, a subject-matter expert reviews these results and the model is revised based on the new input. A final human review or statistical validation is frequently the final step before production.

Functionally, all of the models' methods are ways to find similarities that allow for categorization and scoring based on various inputs such as keywords or custodians.⁶⁹ At this level of abstraction, they do not appear so different than human legal reasoning, which generally takes the form of analogizing.⁷⁰ And, implicitly assuming this similarity, the general rules of discovery have been imported to this new context.⁷¹ In this vein, the Sedona Conference has argued that courts should not impose greater transparency and validation requirements on predictive coding discovery processes (as compared to traditional methods) because the new technologies have generally demonstrated their reliability in the end productions.⁷² But a key difference is that even sophisticated legal entities likely require expert assistance in interpreting how the new technologies work in predictive coding.⁷³

For the more sophisticated predictive coding products (and more generally in the wider universe of similar machine-learning algorithms), the machine-generated correlations do not privilege intelligible explanations that explain the relationship to the substantive legal issues.⁷⁴ To the contrary, the tendency is for effective models to become so complex that even the original

⁶⁸ The methods used to develop the models—and the models themselves—can take many forms. Barry, *supra* note 66, at 355; 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, 946 (2013). For example, some predictive coding processes use logistic regression, which finds a best-fit line to separate different classes of points. Brown, *supra* note 64, at 266. Others might employ support vector machines, which draw a separating hyperplane with margins that provide a buffer. *Id.* at 270–71; *Grossman-Cormack Glossary*, *supra* note 63, at 31. Also used are Bayesian algorithms, which estimate statistical probabilities that are based on observed prior outcomes. Brown, *supra* note 64, at 274–76; *Grossman-Cormack Glossary*, *supra* note 63, at 9. While the preceding methods do not comprise an exhaustive list, they illustrate some of the mechanisms that underlie more robust predictive coding processes.

⁶⁹ Katz, *supra* note 68, at 955.

⁷⁰ *Id.* at 954–55.

⁷¹ See Redish, *supra* note 21, at 571–74.

⁷² SEDONA CONF., COMMENTARY ON DEFENSE OF PROCESS: PRINCIPLES AND GUIDELINES FOR DEVELOPING AND IMPLEMENTING A SOUND E-DISCOVERY PROCESS 31–34 (2016).

⁷³ See Redish, *supra* note 21, at 591; see also Moore v. Publicis Groupe, 287 F.R.D. 182, 191 (S.D.N.Y. 2012) (describing value of expert testimony in decision); L. Casey Auttonberry, *Predictive Coding: Taking the Devil Out of the Details*, 74 LA. L. REV. 613, 622–23 (2014) (discussing the need for counsel to consult with experts when engaging predictive coding services).

⁷⁴ Katz, *supra* note 68, at 950 & n.198. This issue—that is, the lack of a substantive tie—has been examined in other contexts, such as credit scoring. See, e.g., Hurley & Adebayo, *supra* note 1, at 151 (discussing a credit card company's unwillingness to explain their rationale for slashing a consumer's credit limit).

programmers may not be able to explain the mechanics that led to the output.⁷⁵ And enhancing intelligibility can require a reduction in the complexity—and accuracy—of these processes.⁷⁶ But, as Professor Daniel Martin Katz puts it, the operative question has simply been, “Can your model predict better than the leading existing approach?”⁷⁷

This Article posits the importance of an additional question: *Does your model provide intelligible, non-technical explanations that are tied to the underlying legal issues?* In an exhaustive manual review, at least theoretically, a requesting party could seek explanations from the producing attorneys that would presumably be justified by a causative relationship to the legal issues in the case.⁷⁸ And the attorneys are able to draw on their perspectives and understanding that might extend beyond the case contours and previously reviewed documents.⁷⁹ In this way, humans are probably better at dealing with unique or novel issues.⁸⁰ Likewise, Boolean and keyword searches generally involve—and, certainly, permit—negotiations in which the review instructions are tied to the legal issues.⁸¹

But, once the training sets have been coded, predictive coding models lack these characteristics—that is, the ability to discuss how the mechanisms are tied to the substance of the case, particularly if the connections present a novel relationship.⁸² Instead, the models rely on complex mechanisms that require technical expertise to unpack.⁸³ This expertise will likely not be available to litigants who lack significant resources.⁸⁴ The most explanation one

⁷⁵ Rich, *supra* note 2, at 886; *see also* Andrea Roth, *Trial by Machine*, 104 GEO. L.J. 1245, 1271 (2016) (discussing “black box” concerns in the criminal context); Zeynep Tufekci, *Algorithmic Harms Beyond Facebook and Google: Emergent Challenges of Computational Agency*, 13 COLO. TECH. L.J. 203, 208–09 (2015) (contrasting presentation of information from traditional print media with Facebook news feed algorithms).

⁷⁶ Tal Z. Zarsky, *Transparent Predictions*, 2013 U. ILL. L. REV. 1503, 1520.

⁷⁷ Katz, *supra* note 68, at 949–50; *see also* Yablon & Landsman-Roos, *supra* note 12, at 652.

⁷⁸ *See* George M. Cohen, *The Multilayered Problems of Professional Responsibility*, 2003 U. ILL. L. REV. 1409, 1442 (discussing vicarious liability between lawyers, which creates a chain of responsibility that links a client to the attorneys doing the work even, for example, in a context in which contract attorneys are engaged in voluminous discovery tasks); Cassandra Burke Robertson, *A Collaborative Model of Offshore Legal Outsourcing*, 43 ARIZ. ST. L.J. 125, 174–76 (2011) (describing methods for promoting client accountability even when legal work is outsourced).

⁷⁹ *See* Rich, *supra* note 2, at 897.

⁸⁰ *Id.*

⁸¹ Yablon & Landsman-Roos, *supra* note 12, at 663.

⁸² *See supra* notes 67–74 and accompanying text; *see also* Benjamin H. Barton, *The Lawyer’s Monopoly—What Goes and What Stays*, 82 FORDHAM L. REV. 3067, 3072 (2014) (suggesting rapid, accurate outputs, rather than discernible methods, are the principle virtue of technology in law).

⁸³ Remus, *supra* note 10, at 1715.

⁸⁴ *Id.* This, of course, is not a problem that only arises in the context of predictive coding—but the financial inequities are exacerbated with this sort of opaque, highly complex technology.

would expect to see from predictive coding software would be the weight table—that is, the correlative value of specific document features—that the model identified and employed.⁸⁵ Accordingly, even though predictive coding should not be held to a higher standard than other review processes as to output, it raises different questions about how the process itself is developed and managed.⁸⁶

B. Factors Contributing to the Increasing Prevalence of Predictive Coding in Civil Discovery

Since its first court approval five years ago, the use of predictive coding in civil discovery has rapidly grown. The factors contributing to this growth suggest the prevalence will continue to increase, spreading to cases involving less sophisticated parties than those who have used it to date. This section first describes the rise of predictive coding in case mentions and survey results. It then discusses the interrelated factors leading to the increase: the growth of ESI, lawyers' gamesmanship in civil discovery, the proportionality amendment to the Federal Rules of Civil Procedure, and technological innovation.

In February 2012, Magistrate Judge Andrew Peck was the first federal judge to approve the use of predictive coding in a written decision, bringing attention to the practice and ushering in its use.⁸⁷ Three more orders addressing predictive coding appear in Westlaw's 2012 case database.⁸⁸ Six orders show up in the 2013 case database.⁸⁹ Eleven orders are found in the 2014 da-

See generally Richard H. Agins, *An Argument for Expanding the Application of Rule 53(b) to Facilitate Reference of the Special Master in Electronic Data Discovery*, 23 PACE L. REV. 689 (2003) (suggesting special masters could better balance competing interests in electronic discovery); Marc Galanter, *Why the "Haves" Come Out Ahead: Speculations on the Limits of Legal Change*, 9 L. & SOC'Y REV. 95 (1974) (theorizing remedies for resource imbalance in litigation generally).

⁸⁵ See Joseph H. Looby, *E-discovery—Taking Predictive Coding Out of the Black Box*, FTI J. (Nov. 2012), <http://ftijournal.com/uploads/pdf/FTI%20Journal%20-%20E-discovery%20-%20Taking%20Predictive%20Coding%20Out%20of%20the%20Black%20Box.pdf> [https://perma.cc/Z6P5-SJL7].

⁸⁶ SEDONA CONF., *supra* note 72, at 31–34; *cf.* Moore, 287 F.R.D. at 191 (discussing development and management of the keyword search process).

⁸⁷ Moore, 287 F.R.D. at 192.

⁸⁸ Kleen Prods. LLC v. Packaging Corp. of Am., No. 10 C 5711, 2012 WL 4498465, at *5 (N.D. Ill. Sept. 28, 2012), *objections overruled by*, No. 10 C 5711, 2013 WL 120240 (N.D. Ill. Jan. 9, 2013); *In re Actos (Pioglitazone) Prods. Liab. Litig.*, No. 6:11-MD-2299, 2012 WL 7861249, at *3 (W.D. La. July 27, 2012); *Nat'l Day Laborer Org. Network v. U.S. Immigration & Customs Enf't Agency*, 877 F. Supp. 2d 87, 109–10 (S.D.N.Y. 2012).

⁸⁹ *Hinterberger v. Catholic Health Sys., Inc.*, No. 08-CV-380S(F), 2013 WL 2250591, at *1 (W.D.N.Y. May 21, 2013); *Gordon v. Kaleida Health*, No. 08-CV-378S(F), 2013 WL 2250506, at *27 (W.D.N.Y. May 21, 2013); *In re Biomet M2a Magnum Hip Implant Prods. Liab. Litig.*, Cause

tabase.⁹⁰ There was a slight dip in discovery orders in the 2015 database back to the 2013 level.⁹¹ But this might be due to a decline in the need for judicial discussion, which might follow from the growing pervasiveness of predictive coding's use in practice.⁹²

Surveys of legal practitioners confirm the increasing use of predictive coding in civil discovery. For example, in a 2013 survey of large American law firms, 62% reported using predictive coding and 71% increased their use in the prior year.⁹³ Demand was even stronger with 81% of responding firms reporting client requests for the tool.⁹⁴

A 2015 survey of federal agency attorneys, paralegals, records managers and IT professionals showed similar trends.⁹⁵ The survey found that 27% of

No. 3:12-MD-2391, 2013 WL 1729682, at *2 (N.D. Ind. Apr. 18, 2013); *Chevron Corp. v. Donziger*, No. 11 Civ. 0691(LAK), 2013 WL 1087236, at *32 (S.D.N.Y. Mar. 15, 2013), *adhered to on reconsideration*, No. 11 Civ. 0691(LAK), 2013 WL 1975439 (S.D.N.Y. May 14, 2013); *Harris v. Subcontracting Concepts, LLC*, Civ. No. 1:12-MC-82 (DNH/RFT), 2013 WL 951336, at *5 (N.D.N.Y. Mar. 11, 2013); *EORHB, Inc. v. HOA Holdings LLC*, No. C.A. 7409-VCL, 2013 WL 1960621, at *1 (Del. Ch. May 6, 2013).

⁹⁰ *In re Cellular Tels.*, No. 14-MJ-8017-DJW, 2014 WL 7793690, at *9 (D. Kan. Dec. 30, 2014); *Arnett v. Bank of Am.*, No. 3:11-cv-1372-SI, 2014 WL 4672458, at *9 (D. Or. Sept. 18, 2014); *United States v. Univ. of Neb. at Kearney*, No. 4:11CV3209, 2014 WL 4215381, at *3 (D. Neb. Aug. 25, 2014); *In re Bridgepoint Educ., Inc.*, No. 12cv1737 JM (JLB), 2014 WL 3867495, at *2 (S.D. Cal. Aug. 6, 2014); *Bridgestone Ams., Inc. v. Int'l Bus. Machs. Corp.*, No. 3:13-1196, 2014 WL 4923014, at *1 (M.D. Tenn. July 22, 2014); *Progressive Cas. Ins. Co. v. Delaney*, No. 2:11-cv-00678-LRH-PAL, 2014 WL 3563467, at *11 (D. Nev. July 18, 2014); *United States v. ExxonMobil Pipeline Co.*, No. 4:13-CV-00355 KGB, 2014 WL 2593781, at *2 (E.D. Ark. June 10, 2014); *F.D.I.C. v. Bowden*, No. CV413-245, 2014 WL 2548137, at *13 (S.D. Ga. June 6, 2014); *In re Domestic Drywall Antitrust Litig.*, 300 F.R.D. 228, 233 (E.D. Pa. 2014); *Fed. Hous. Fin. Agency v. HSBC N. Am. Holdings Inc.*, No. 11 Civ. 6189(DLC), 2014 WL 584300, at *3 (S.D.N.Y. Feb. 14, 2014); *Dynamo Holdings Ltd. P'ship v. Comm'r*, 143 T.C. 183, 184 (2014).

⁹¹ *Knauf Insulation, LLC v. Johns Manville Corp.*, No. 1:15-cv-00111-WTL-MJD, 2015 WL 7089725, at *3 (S.D. Ind. Nov. 13, 2015); *Johnson v. Ford Motor Co.*, No. 3:13-cv-06529, 2015 WL 4137707, at *11 (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); *Malone v. Kantner Ingredients, Inc.*, No. 4:12CV3190, 2015 WL 1470334, at *3 (D. Neb. Mar. 31, 2015); *Rio Tinto PLC v. Vale S.A.*, 306 F.R.D. 125, 130-31 (S.D.N.Y. 2015); *In re Lithium Ion Batteries Antitrust Litig.*, No. 13-MD-02420 YGR (DMR), 2015 WL 833681, at *3 (N.D. Cal. Feb. 24, 2015); *Aurora Coop. Elevator Co. v. Aventine Renewable Energy-Aurora W., LLC*, No. 4:12CV230, 2015 WL 10550240, at *2 (D. Neb. Jan. 6, 2015).

⁹² A PACER docket search for the term "predictive coding" returned forty-five appearances in thirty-three cases from the same year.

⁹³ COWEN GRP., Q2, 2013 QUARTERLY CRITICAL TRENDS REPORT (2013), <https://www.cowengroup.com/wp-content/uploads/2014/11/qtrend.2013.q2.pdf> [<https://perma.cc/8JWE-GFV3>].

⁹⁴ *Id.*

⁹⁵ *Ninth Annual Benchmarking Study of Electronic Discovery Practices for Government Agencies*, DELOITTE (2015), <http://www2.deloitte.com/content/dam/Deloitte/us/Documents/finance/us-fas-ediscovery-survey-infographic.pdf> [<https://perma.cc/BPU8-WWVG>]; *Deloitte Survey Reveals Government Officials Confident About E-Discovery Skills*, INFO. MGMT. J., Sept. 1, 2015, 2015 WLNR 37521579.

respondents used predictive coding in 2015. This was a slight increase from 23% in 2014, 17% in 2013, and 6% in 2012.⁹⁶

More survey data showed 55% of responding legal practitioners identifying predictive coding as a strategy that they will use to “manage eDiscovery volume, cost, and risk in the next six to twelve months.”⁹⁷ Only 10% of respondents said that they did not ever use predictive coding in civil discovery.⁹⁸ The majority of respondents (52%) used predictive coding in up to 20% of their cases.⁹⁹ At the high end, 6% of respondents used predictive coding in over 80% of their cases.¹⁰⁰

Although this Article focuses on domestic federal practice, predictive coding is part of a global trend. For example, in February 2016, the High Court of England and Wales approved the use of predictive coding for the first time, highlighting its potential accuracy and efficiency benefits.¹⁰¹ Vendors are even adapting predictive coding software to deal with logographic languages.¹⁰²

1. Growth of Electronically Stored Information

The increased use of predictive coding is driven, in significant part, by the growth of ESI.¹⁰³ More digital information has been created in just the past few years than existed in all human history before.¹⁰⁴ The growth rate is

⁹⁶ *Deloitte Survey Reveals Government Officials Confident About E-Discovery Skills*, *supra* note 95.

⁹⁷ COWEN GRP., Q2, 2016 CRITICAL TRENDS SURVEY SNAPSHOT (2016), <https://www.cowengroup.com/wp-content/uploads/2016/07/Breakfast-Pamphlet-CD11-1.pdf> [<https://perma.cc/BR5T-T535>].

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *Pyrrho Invs. Ltd. v. MWB Prop. Ltd.* [2016] EWHC 256 (Ch) (Eng.); Ryan C. Thomas et al., *Embracing E-Discovery in Antitrust Matters: Slow but Steady Progress Toward Convergence Between the U.S. and the U.K.*?, JONES DAY (Mar. 2016), <http://www.jonesday.com/files/Publication/489cc7ed-874e-4c03-8717-014e894c0208/Presentation/PublicationAttachment/1d2bd9ca-4e2d-400b-ae7-0b7e6038618e/Embracing%20e-Discovery%20in%20Antitrust.pdf> [<https://perma.cc/GL4Z-879S>]; *High Court Approves Tool to Search Quinn Family Documents*, IRISH TIMES (Mar. 5, 2015), <https://www.irishtimes.com/business/financial-services/high-court-approves-tool-to-search-quinn-family-documents-1.2126405> [<https://perma.cc/8GZ3-2WFG>] (describing use in Ireland).

¹⁰² John Tredennick, *Using TAR in International Litigation: Does Predictive Coding Work for Non-English Languages?*, CATALYST (Mar. 24, 2014), <http://www.catalystsecure.com/blog/2014/03/using-tar-in-international-litigation-does-predictive-coding-work-for-non-english-languages/> [<https://perma.cc/WM6N-NDBL>].

¹⁰³ Peck, *supra* note 4, at 3.

¹⁰⁴ Natalie M. Banta, *Death and Privacy in the Digital Age*, 94 N.C. L. REV. 927, 928 (2016).

estimated at about forty percent per year.¹⁰⁵ This means the amount of digital information is virtually doubling every two years.¹⁰⁶

By 2020, the amount of digital data in the world is expected to reach forty-four zettabytes of data.¹⁰⁷ To provide context for these numbers, this is more than six hundred times the amount of data in every published book in history.¹⁰⁸ Perhaps less abstractly, each gigabyte (one trillionth of a zettabyte) could equal tens of thousands of printed pages.¹⁰⁹ As Magistrate Judge Peck put it, “[t]he amount of digital information that is created everyday is staggering, and many companies preserve almost everything.”¹¹⁰

This dramatic increase in ESI has had a profound impact on civil discovery practices. The sheer volume has obsoleted the traditional methods of discovery, which were effective for dealing with paper documents.¹¹¹ Instead, new technological solutions—such as predictive coding—have been brought to the fore.¹¹²

This growth in ESI has made discovery commensurately more expensive.¹¹³ A 2012 study found that production costs on a per gigabyte basis averaged around \$18,000.¹¹⁴ Of particular relevance to a discussion of predictive coding, review costs contributed 70% or more to the total amount in more than half of the cases.¹¹⁵ To do this review, client companies reported using attorneys whose rates ranged from \$40 to \$70 for temporary contract

¹⁰⁵ COWEN GRP., *supra* note 93.

¹⁰⁶ *Id.*; see also Banta, *supra* note 104, at 928.

¹⁰⁷ See Kari Kraus, Opinion, *When Data Disappears*, N.Y. TIMES (Aug. 7, 2011), <http://www.nytimes.com/2011/08/07/opinion/sunday/when-data-disappears.html>.

¹⁰⁸ Joshua M. Hummel, *What's in the Future for E-Discovery? New Federal Rules and Big Data Will Require Consideration in the Face of Continued Uncertainty*, L. PRAC., Mar.–Apr. 2015, at 56; *The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things*, IDC (Apr. 2014), <http://www.emc.com/leadership/digital-universe/2014iview/executive-summary.htm> [<https://perma.cc/AZ7Y-YCCS>].

¹⁰⁹ Hummel, *supra* note 108, at 56.

¹¹⁰ Peck, *supra* note 4, at 3.

¹¹¹ ERNST & YOUNG LLP, INSIDERS' GUIDE TO TECHNOLOGY-ASSISTED REVIEW (TAR) 1 (2015); Peck, *supra* note 4, at 3.

¹¹² ERNST & YOUNG LLP, *supra* note 111, at 1.

¹¹³ Amii N. Castle, *Ready, Set . . . Proportionality! Preservation of Electronically Stored Information Under the Proposed Amended Federal Rules of Civil Procedure*, J. KAN. B. ASS'N, June 2015, at 16, 17–18. Though the cost of discovery is noted as a concern throughout this Article, there are ways in which the scope and cost of discovery also have salutary side effects, such as creating a greater potential settlement zone and creating a cross-party investment in a pool of mutually shared information. See Samuel Issacharoff, *The Content of Our Casebooks: Why Do Cases Get Litigated?*, 29 FLA. ST. U. L. REV. 1265, 1271–72 (2002).

¹¹⁴ NICHOLAS M. PACE & LAURA ZAKARAS, RAND INSTITUTE FOR CIVIL JUSTICE, WHERE THE MONEY GOES: UNDERSTANDING LITIGANT EXPENDITURES FOR PRODUCING ELECTRONIC DISCOVERY 20 (2012), http://www.rand.org/content/dam/rand/pubs/monographs/2012/RAND_MG1208.pdf [<https://perma.cc/Z22Y-KP88>].

¹¹⁵ *Id.* at 25.

attorneys and up to \$300 for a higher-priced firm that might only do a second-pass review.¹¹⁶

As the surge in ESI has increased the costs of discovery, it has increased the opportunity for lawyers to strategically use discovery tactics as an exercise of gamesmanship.¹¹⁷ And this development, in turn, contributes to the rising prevalence of predictive coding.

2. Lawyers' Gamesmanship

In addition to directly encouraging the use of predictive coding, the growth in ESI has aggravated the issue of gamesmanship in civil discovery.¹¹⁸ Although the extent to which abusive discovery practices are common is debated,¹¹⁹ such conduct can contribute to costs and delays in litigation—two of the concerns that predictive coding is meant to address.¹²⁰

The original vision of the drafters of the Federal Rules of Civil Procedure was that discovery would be a self-regulating process.¹²¹ This vision depended on the assumption that a common interest in reciprocal courtesy would lead litigants and their attorneys to cooperate.¹²² And, with this understanding, the original 1938 Rules did not include many provisions for court

¹¹⁶ *Id.* at 26.

¹¹⁷ FED. R. CIV. P. 26(b) advisory committee's note to 2015 amendment ("The 1993 Committee Note further observed that '[t]he information explosion of recent decades has greatly increased both the potential cost of wide-ranging discovery and the potential for discovery to be used as an instrument for delay or oppression.' What seemed an explosion in 1993 has been exacerbated by the advent of e-discovery."); see also Beckerman, *supra* note 37, at 518–20.

¹¹⁸ John H. Beisner, *Discovering a Better Way: The Need for Effective Civil Litigation Reform*, 60 DUKE L.J. 547, 550 (2010); Remus, *supra* note 10, at 1693.

¹¹⁹ See EMERY G. LEE III & THOMAS E. WILLGING, FED. JUSTICE CTR., ATTORNEY SATISFACTION WITH THE FEDERAL RULES OF CIVIL PROCEDURE: REPORT TO THE JUDICIAL CONFERENCE ADVISORY COMMITTEE ON CIVIL RULES 1 (2010), <https://www.fjc.gov/sites/default/files/2012/CostCiv2.pdf> [<https://perma.cc/AZN4-3YVD>] ("The statement, 'Discovery is abused in almost every case,' elicited more disagreement than agreement from the ACTL fellows and ABA Section plaintiff attorneys, and more agreement than disagreement from NELA members and other ABA Section members."). Compare Beckerman, *supra* note 37, at 507 (discussing a report that asserted, "[e]mpirical research has not produced evidence of widespread abuse of discovery."), with Victor Marrero, *The Cost of Rules, the Rule of Costs*, 37 CARDOZO L. REV. 1599, 1692 & n.120 (2016) (describing the general agreement that law firm business practices add to unnecessary expense in discovery).

¹²⁰ Remus, *supra* note 10, at 1693; see also *ACF Indus., Inc., Carter Carburetor Div. v. E.E.O.C.*, 439 U.S. 1081, 1086 (1979) (Powell, J., dissenting) ("The decision of the Court of Appeals in this case not only appears to be inconsistent with our recent decisions, but also could discourage efforts to curb the widespread abuse of discovery that is a prime cause of delay and expense in civil litigation.").

¹²¹ Beckerman, *supra* note 37, at 513.

¹²² *Id.* at 515–16.

management of the discovery process, anticipating that it would only be required in very exceptional cases.¹²³

A number of factors, however, have made discovery more adversarial and, ultimately, costly than anticipated by the drafters of the original rules. For example, the general nature of litigation is adversarial with a consistent perception that client loyalty and combativeness are linked.¹²⁴ And, as Professor Arthur Miller pithily explained, “The vision that adversarial tigers would behave like accommodating pussycats throughout the discovery period, saving their combative energies for trial, has not materialized.”¹²⁵ To the contrary, “[p]arties hotly contest discovery and pre-trial practice at least in part because everyone knows that reaching a jury depends on the success of fact-gathering and procedural maneuvers.”¹²⁶ Moreover, the processes for adjudicating disputes and potential penalties also do not provide efficient disincentives for bad behavior.¹²⁷ This is exacerbated by judges’ general antipathy for policing such disputes.¹²⁸ At the same time, the growth of the legal profession has decreased the likelihood of repeat interactions between lawyers, which reduces the game-theory incentives for cooperation.¹²⁹ And this all happens in a world of increasingly large and complex federal cases.¹³⁰

The incentives for litigants skew towards seeking too much material because of the interaction of information asymmetries and cost placement—i.e., the requesting party does not know what a request will turn up and the burden for production falls on the producing party.¹³¹ Judges take an especially critical view of this practice, identifying as the chief form of discovery abuse.¹³²

¹²³ Steven S. Gensler, *Some Thoughts on the Lawyer’s E-volving Duties in Discovery*, 36 N. KY. L. REV. 521, 540–41 (2009).

¹²⁴ Beckerman, *supra* note 37, at 517; *see also* Wayne D. Brazil, *The Adversary Character of Civil Discovery: A Critique and Proposals for Change*, 31 VAND. L. REV. 1295, 1303 (1978) (noting the failure to predict the tenacity with which modern discovery is undertaken); Robert L. Nelson, *The Discovery Process as a Circle of Blame: Institutional, Professional, and Socio-Economic Factors That Contribute to Unreasonable, Inefficient, and Amoral Behavior in Corporate Litigation*, 67 FORDHAM L. REV. 773, 779 (1998) (describing anecdotally the value firms place on combative discovery posture).

¹²⁵ Arthur R. Miller, *The Adversary System: Dinosaur or Phoenix*, 69 MINN. L. REV. 1, 15 (1984); *see also* *Herbert v. Lando*, 441 U.S. 153, 179 (1979) (Powell, J., concurring) (“As the years have passed, discovery techniques and tactics have become a highly developed litigation art—one not infrequently exploited to the disadvantage of justice.”).

¹²⁶ Norman W. Spaulding, *The Rule of Law in Action: A Defense of Adversary System Values*, 93 CORNELL L. REV. 1377, 1406 (2008).

¹²⁷ Beckerman, *supra* note 37, at 518.

¹²⁸ *Id.*; *see also* Nelson, *supra* note 124, at 797.

¹²⁹ Beckerman, *supra* note 37 at 520.

¹³⁰ *Id.* at 519–20.

¹³¹ *Id.* at 543–59; Frank H. Easterbrook, *Discovery as Abuse*, 69 B.U. L. REV. 635, 641 (1989); Hollander-Blumoff, *supra* note 21, at 155–56; Thomas C. Tew, *Electronic Discovery*

Additionally, litigants can use discovery requests to force settlement when a producing party's costs of complying with its discovery obligations are greater than the requested relief.¹³³ Illustrating these distorted incentives, "e-discovery trolls" have appeared.¹³⁴

The producing party might also engage in gamesmanship that results in over production. For example, a litigant might engage in a "data dump" in which it seeks to overwhelm the requesting party with material.¹³⁵ Despite the general information asymmetries and financial elements of litigation, which mean the defendant is more frequently the party who has more discoverable material and resources,¹³⁶ plaintiffs can also engage in this sort of discovery abuse.¹³⁷

Additionally, parties might engage in discovery that is designed to embarrass their opponents. For example, a party might pose personal, intrusive questions to their adversary.¹³⁸

Regardless of form,¹³⁹ abusive discovery tactics lead to disputes, which make the litigation process more expensive for litigants.¹⁴⁰ And the increase in costs is one of the main factors driving the adoption of predictive cod-

Misconduct in Litigation: Letting the Punishment Fit the Crime, 61 U. MIAMI L. REV. 289, 295–97 (2007).

¹³² Symposium, *Judges' Opinions on Procedural Issues: A Survey of State and Federal Trial Judges Who Spend at Least Half Their Time on General Civil Cases*, 69 B.U. L. REV. 731, 733 (1989).

¹³³ Karel Mazanec, Note, *Capping E-Discovery Costs: A Hybrid Solution to E-Discovery Abuse*, 56 WM. & MARY L. REV. 631, 645 (2014); cf. *Chrysler Corp. v. Miller*, 450 So. 2d 330, 331 (Fla. Dist. Ct. App. 1984) (discussing the court's discomfort in cases where the value of the suit is eclipsed by the cost of discovery).

¹³⁴ See KAREN A. SCHULER, E-DISCOVERY: CREATING AND MANAGING AN ENTERPRISE PROGRAM—A TECHNICAL GUIDE TO DIGITAL INVESTIGATION AND LITIGATION SUPPORT 4–5 (2008) (discussing the rise of "e-discovery trolls"); Eric Rogers & Young Jeon, *Inhibiting Patent Trolling: A New Approach for Applying Rule 11*, 12 NW. J. TECH. & INTELL. PROP. 291, 300 n.34 (2014) (describing "patent trolls" in the discovery landscape).

¹³⁵ Hollander-Blumoff, *supra* note 21, at 155–56; Losey, *supra* note 9, at 54–55 & n.192.

¹³⁶ FED. R. CIV. P. 26(b) advisory committee's note to 2015 amendment; Emily Chiang, *Institutional Reform Shaming*, 120 PA. ST. L. REV. 53, 105–06 (2015); Moore, *supra* note 6, at 1132.

¹³⁷ See, e.g., *Branhaven, LLC v. BeefTek, Inc.*, 288 F.R.D. 386, 392–93 (D. Md. 2013) (noting plaintiff's data dump allegedly cost defendant \$51,122 in legal fees and expenses).

¹³⁸ Gensler & Rosenthal, *supra* note 35, at 524; Hollander-Blumoff, *supra* note 21, at 155–56; see also Angela M. Gius, *Dignifying Participation*, N.Y.U. REV. L. & SOC. CHANGE (forthcoming 2018) (draft on file with author); Marc Therrien, Note, *Talkin' 'Bout a Revolution?: Utah Overhauls Its Rules of Civil Discovery*, 2011 UTAH L. REV. 669, 672.

¹³⁹ Judge Victor Marrero and Judge Jack Weinstein, New York Federal District Court Judges, provide nice taxonomies of abusive discovery tactics and their etiologies that draw from a combined judicial and academic perspective. See Marrero, *supra* note 119, at 1658; Jack B. Weinstein, *What Discovery Abuse? A Comment on John Setear's the Barrister and the Bomb*, 69 B.U. L. REV. 649, 654–55 (1989).

¹⁴⁰ Beckerman, *supra* note 37, at 517; *Judges' Opinions on Procedural Issues*, *supra* note 132, at 733.

ing.¹⁴¹ Moreover, court interventions bring in the issue of judicial legitimacy.¹⁴²

In response to the challenges raised by the increase in discoverable material, lawyers' gamesmanship, and the interaction between the two, there has been a procedural shift towards more judicial management as reflected in amendments to the Federal Rules of Civil Procedure.¹⁴³

For example, in 1980, subdivision (f) was added to Federal Rule of Civil Procedure 26, entitling counsel to the assistance of the court in discovery planning.¹⁴⁴ Three years later, judges were given additional powers to both proactively manage the discovery process and to sanction attorneys.¹⁴⁵ In 1993, the Federal Rules of Civil Procedure were amended to introduce affirmative initial disclosures that must be made even without a formal discovery request.¹⁴⁶ And, in the same year, pre-discovery planning conferences also

¹⁴¹ Sara Metzler, Current Development, *Moving Discovery Forward in the Technology Age*, 29 GEO. J. LEGAL ETHICS 1153, 1159 (2016).

¹⁴² Remus, *supra* note 10, at 1693; *see also* Matthew Young, Comment, *To Cure the E-Discovery Headache, Revamp the Rule 26(f) Discovery Conference*, 12 NW. J. TECH. & INTELL. PROP. 355, 363–67 (2014).

¹⁴³ *See e.g.*, Facciola & Favro, *supra* note 14, at 3–4 (“That was certainly the case after the amendment cycles that ended in 1993 and 2006. In each instance, the sheer growth of electronically stored information (‘ESI’), among many other things, threatened to overwhelm the legal system with potentially discoverable materials.”). *See generally* FED. R. CIV. P. 26(b) advisory committee’s note to 2015 amendment (“The present amendment again reflects the need for continuing and close judicial involvement in the cases that do not yield readily to the ideal of effective party management.”); Kenneth J. Withers, *E-Discovery and Combative Legal Culture: Finding a Way out of Purgatory*, 2009 ANN. AM. ASS’N JUST. PAPERS 5 (2008). These movements for change and reform are not new. For example, in 1976, Chief Justice Warren Burger convened a national conference to examine whether Dean Roscoe Pound’s criticisms about judicial process at the start of the century had been answered by the development of the federal procedural rules, resulting in a new round of proposed reforms. William H. Erickson, *The Pound Conference Recommendations: A Blueprint for the Justice System in the Twenty-First Century*, 76 F.R.D. 277, 279 (1978); *see also* Brazil, *supra* note 124, at 1298–303 (noting the original intent of the procedural rules was to reduce adversarial posturing in the pre-trial phase); Subrin, *supra* note 36, at 743 (discussing solutions to the challenge of the judicial role in discovery). And, more generally, the move to a more managerial role for judges has been widely discussed in the academic literature. *See, e.g.*, Steven S. Gensler, *Judicial Case Management: Caught in the Crossfire*, 60 DUKE L.J. 669, 670–71 (2010); Robert F. Peckham, *The Federal Judge as a Case Manager: The New Role in Guiding a Case from Filing to Disposition*, 69 CAL. L. REV. 770, 770 (1981); Judith Resnik, *Managerial Judges*, 96 HARV. L. REV. 374, 380 (1982).

¹⁴⁴ FED. R. CIV. P. 26(b) advisory committee’s note to 1980 amendment; Hiro N. Aragaki, *Constructions of Arbitration’s Informalism: Autonomy, Efficiency, and Justice*, 2016 J. DISP. RESOL. 141, 169 n.112.

¹⁴⁵ FED. R. CIV. P. 26(b), (f) advisory committee’s note to 1983 amendment.

¹⁴⁶ FED. R. CIV. P. 26(a) advisory committee’s note to 1993 amendment; Withers, *supra* note 143, at 5; *see also* Remus, *supra* note 10, at 1724 n.21; William W. Schwarzer, *The Federal Rules, the Adversary Process, and Discovery Reform*, 50 U. PITT. L. REV. 703, 721 (1989).

were added.¹⁴⁷ In 2000, both of these amendments were made uniform throughout the federal system.¹⁴⁸ The 2000 amendments also modified the limits of discovery, absent a showing of good cause, from any matter “relevant to the subject matter involved in the action” to those “relevant to any party’s claim or defense.”¹⁴⁹ In 2006, the term “electronically stored information” was added to Federal Rule of Civil Procedure 26 to make clear that this sort of material was encompassed by the rules and that the courts would enforce this understanding.¹⁵⁰ Most significantly for the purposes of this Article, in 2015, a direct proportionality limitation to discovery was added to Federal Rule of Civil Procedure 26.¹⁵¹

3. Proportionality Amendment to the Federal Rules of Civil Procedure

In 2015, the definition of the scope of discovery permitted under Federal Rule of Civil Procedure 26(b) was amended to require that the sought material be “proportional to the needs of the case.”¹⁵² Although the Advisory Committee notes to the rule disclaim any substantive change to the scope of discovery, they acknowledge that the amendment is meant to bring the issue of costs more to the fore.¹⁵³ This marks a move away from the previous dominant discovery goal of comprehensiveness.¹⁵⁴ Additionally, this has raised concerns that necessary discovery will be stifled in cases involving small-value claims.¹⁵⁵ Explaining these elements, some scholars have hypothesized that the effect of the proportionality amendment will be to focus the courts on costs and, perhaps, shift the burden to the requesting party.¹⁵⁶

¹⁴⁷ FED. R. CIV. P. 26(a), (f) advisory committee’s note to 1993 amendment; Withers, *supra* note 143, at 5; *see also* Remus, *supra* note 10, at 1724 n.21; Schwarzer, *supra* note 146, at 721.

¹⁴⁸ FED. R. CIV. P. 26(a), (f) advisory committee’s note to 2000 amendment; FED. R. CIV. P. 26(a), (f) advisory committee’s note to 1993 amendment; Withers, *supra* note 143, at 5; *see also* Remus, *supra* note 10, at 1724 n.21; Schwarzer, *supra* note 146, at 721.

¹⁴⁹ FED. R. CIV. P. 26(b) advisory committee’s note to 2000 amendment; Aragaki, *supra* note, 144 at 169 n.112.

¹⁵⁰ FED. R. CIV. P. 26(a) advisory committee’s note to 2006 amendment.

¹⁵¹ FED. R. CIV. P. 26(b) advisory committee’s note to 2015 amendment.

¹⁵² *Id.*; FED. R. CIV. P. 26(b)(1).

¹⁵³ FED. R. CIV. P. 26(b) advisory committee’s note to 2015 amendment (“The present amendment restores the proportionality factors to their original place in defining the scope of discovery. This change reinforces the Rule 26(g) obligation of the parties to consider these factors in making discovery requests, responses, or objections.”).

¹⁵⁴ Remus, *supra* note 10, at 1717–18.

¹⁵⁵ *See* Burbank & Farhang, *supra* note 6, at 1593; *see also* Moore, *supra* note 6, at 1112–13; Sarah Staszak, *Procedural Change in the First Ten Years of the Roberts Court*, 38 CARDOZO L. REV. 691, 696–97 (2016) (noting the disadvantage of individual plaintiffs).

¹⁵⁶ *E.g.*, Moore, *supra* note 6, at 1116.

In response, many commentators—including judges, practitioners, and academics—have suggested that predictive coding might ameliorate that potential harm.¹⁵⁷ The relationship follows from predictive coding’s ability to reduce review costs.¹⁵⁸ Additionally, the non-binary scoring component allows parties to scale and stage their review and production.¹⁵⁹ The upshot is that predictive coding can be a highly effective tool for enabling “the producing party to provide the requesting party with the most bang for the buck.”¹⁶⁰

4. Technological Innovation

It is easy to forget how much technology has changed the world and the legal profession in a fairly short time.¹⁶¹ But the increased use of predictive coding in civil discovery naturally is also driven by the general advances in technology, which are altering how lawyers practice.¹⁶² This is part of a broader trend of similar developments such as the use of keyword searches and de-duplication.¹⁶³ Decreased computing costs, which make the use of computer technology—including predictive coding—more economically efficient and spur uptake, contribute too.¹⁶⁴ And the growth in use of predictive

¹⁵⁷ See, e.g., Theodore C. Hirt, *The Quest for “Proportionality” in Electronic Discovery: Moving from Theory to Reality in Civil Litigation*, 5 FED. CTS. L. REV. 171, 176–77 (2011) (noting the Sedona Conference principles state, “[t]echnologies to reduce cost and burden should be considered in the proportionality analysis”); Losey, *supra* note 9, at 54–55; Peck, *supra* note 4, at 3 (“While new technologies and ESI sources have added to the volume and cost of discovery, technology also offers solutions.”); Bay, *supra* note 9.

¹⁵⁸ Losey, *supra* note 9, at 54 (“The use of the latest AI-based review technologies can significantly reduce these costs as shown, and for this reason alone predictive coding is the best tool we have for proportionality.”).

¹⁵⁹ *Id.* at 55.

¹⁶⁰ *Id.* at 54 (emphasis omitted).

¹⁶¹ See, e.g., Patricia E. Salkin, *From Bricks and Mortar to Mega-Bytes and Mega-Pixels: The Changing Landscape of the Impact of Technology and Innovation on Urban Development*, 42 URB. LAW. 11, 11 (2011) (providing examples of technological advancement between 1963 and 2010).

¹⁶² See Katz, *supra* note 68, at 909; 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, 3045–46 (2014); Nasuti, *supra* note 5, at 223; *The Sedona Conference Commentary on Information Governance*, 15 SEDONA CONF. J. 125 (2014).

¹⁶³ Remus, *supra* note 10, at 1698.

¹⁶⁴ See A. Michael Froomkin, *Regulating Mass Surveillance as Privacy Pollution: Learning from Environmental Impact Statements*, 2015 U. ILL. L. REV. 1713, 1719; Brendan R. McDonald et al., *The Attorney-Client Working Relationship: A Comparison of in-Person Versus Videoconferencing Modalities*, 22 PSYCHOL. PUB. POL’Y & L. 200, 200 (2016); cf. S.J. Liebowitz & Stephen E. Margolis, *Should Technology Choice Be a Concern of Antitrust Policy?*, 9 HARV. J.L. & TECH. 283, 293 (1996) (cautioning that greater production and lower cost associated with technological innovation should not be mistaken for economies of scale in production).

coding itself adds to economies of scale, improved service quality, and increased user comfort.¹⁶⁵

C. Court Implementation of Predictive Coding in Civil Discovery

1. Timeline of Significant Cases

Having examined the structural factors driving the increasing use of predictive coding, this Article now turns to the existing case law. The section begins with a chronology of cases that contain more robust discussions of transparency and participation. It then synthesizes the holdings to identify the nascent doctrine.¹⁶⁶

In 2011, Magistrate Judge Peck of United States District Court of the Southern District of New York outlined the benefits of predictive coding in an article, implicitly inviting a court to approve its use in civil discovery.¹⁶⁷ Several months later, he accepted his own invitation.¹⁶⁸ In *Moore v. Publicis Groupe*, five female employees brought an employment discrimination suit against Publicis Groupe and its subsidiary, MSL Group, under federal and state statutes.¹⁶⁹ The parties could not agree on how to use predictive coding to “cull down” the approximately three million electronic documents” from the designated custodians.¹⁷⁰

In its order on the issue, the district court covered a number of issues that helped define the emerging doctrine. First, it rejected the plaintiffs’ argument that Federal Rule of Civil Procedure 26(g) prohibited the defendants’ from certifying that the production as “complete” if it was not definitively exhaustive, noting that the subsection incorporates a proportionality requirement.¹⁷¹ Second, the district court held that neither Federal Rule of Evidence 702 nor the *Daubert* expert-qualification framework applied to discovery search methods, limiting those procedural protections to evidence submitted to a jury at trial.¹⁷² Third, the district court deferred ruling on the plaintiffs’

¹⁶⁵ See Mitchell London, *Resolving the Civil Litigant’s Discovery Dilemma*, 26 GEO. J. LEGAL ETHICS 837, 856 (2013) (suggesting that as more courts facilitate the use of TAR, costs will decrease as quality increases).

¹⁶⁶ For other predictive coding case chronologies, see Julia L. Brickell & Peter J. Pizzi, *Towards a Synthesis of Judicial Perspectives on Technology-Assisted Review*, 82 DEF. COUNS. J. 309, 313–19 (2015); Paul E. Burns & Mindy M. Morton, *Technology-Assisted Review: The Judicial Pioneers*, 15 SEDONA CONF. J. 35, *passim* (2014).

¹⁶⁷ Andrew Peck, *Search, Forward*, LEGAL TECH. NEWS (Oct. 1 2011), <https://www.law.com/legaltechnews/almID/1202516530534/Search-Forward/> [<https://perma.cc/NT5Q-VRJ7>].

¹⁶⁸ *Moore*, 287 F.R.D. at 182–83.

¹⁶⁹ *Id.* at 183.

¹⁷⁰ *Id.* at 184.

¹⁷¹ *Id.* at 188.

¹⁷² *Id.* at 188–89.

objection that the defendants' methods did not provide confidence that the results would be accurate, opting to wait until more information was available about the actual results.¹⁷³

The district court in *Moore* then offered "further analysis and lessons for the future" on issues that were not directly raised by the parties' dispute.¹⁷⁴ Starting with the proposition that the objective of e-discovery is "identify as many relevant documents as possible, while reviewing as few non-relevant documents as possible," the court discussed predictive coding's relative accuracy, finding that it performed better—and at lower relative costs—than alternative methods such as keyword searches.¹⁷⁵ It also stated that the defendants' willingness to share the full seed set—including all non-privileged documents regardless as to whether they were coded relevant—to the plaintiffs contributed to the court's approval of the process because it allayed concerns about the potential black-box aspect of the technology.¹⁷⁶ Additionally, the district court discussed the benefits of staging discovery.¹⁷⁷ Finally, it noted that the parties' e-discovery vendors attended and participated in the hearings, which assisted the decision by providing additional technical insight into the process.¹⁷⁸

In the following months, several other courts dealt with predictive coding issues in orders.¹⁷⁹ Of particular relevance, in *In re Actos (Pioglitazone) Products Liability Litigation*, the district court judge approved the parties' agreement to use predictive coding where the plaintiffs were provided with technical training for the predictive coding software and the parties worked together to code the seed sets.¹⁸⁰

In 2013, in *Gordon v. Kaleida Health*, the district court examined the roles of experts in predictive coding, distinguishing between ministerial and

¹⁷³ *Id.* at 189.

¹⁷⁴ *Id.* at 189–93.

¹⁷⁵ *Id.* at 189–92.

¹⁷⁶ *Id.* at 192.

¹⁷⁷ *Id.*

¹⁷⁸ *Id.* at 193.

¹⁷⁹ *E.g.*, *Kleen*, 2012 WL 4498465, at *5 (describing how the court guided the parties towards a compromise where the plaintiffs had sought to compel the defendants to redo discovery searches using predictive coding instead of keyword searches because their experts disagreed on the accuracy of the techniques); *EORHB*, 2013 WL 1960621, at *1 (withdrawing its October 2012 *sua sponte* order that the parties use predictive coding—and the same vendor—after the parties agreed that the cost was too high given the number of documents); *Glob. Aerospace Inc. v. Landow Aviation*, No. CL 61040, 2012 WL 1431215, at *1–2 (Va. Cir. Ct. Apr. 23, 2012) (permitting, for the first time, a defendant to use predictive coding over the objections of the plaintiff).

¹⁸⁰ *Actos*, 2012 WL 7861249, at *4.

advisory functions.¹⁸¹ The court also noted the importance of party cooperation.¹⁸²

In 2014, other courts more directly addressed how cooperation and transparency impact their decisions. For example, in *Bridgestone Americas, Inc. v. International Business Machines Corp.*, the district court permitted the plaintiff to use predictive coding because the full seed set was offered to the defendant, which had technical expertise with “big data.”¹⁸³ Likewise, in 2014 in *Progressive Casualty Insurance Co. v. Delaney*, the district court rejected a party’s unilateral use of predictive coding because it violated an earlier court-approved agreement and the protocols did not provide the appropriate levels of cooperation and transparency.¹⁸⁴

Continuing this discussion (albeit coming out in the opposite direction), in *In re Biomet M2a Magnum Hip Implant Products Liability Litigation*, the district court determined that the non-responsiveness documents from the seed set fell outside of the scope of discovery because, by their defining characteristic, they were not responsive.¹⁸⁵ Even still, the *Biomet* court urged Biomet to rethink its refusal.¹⁸⁶

In 2014, in *Dynamo Holdings Ltd. Partnership v. Commissioner*, the tax court approved the petitioners’ request to predictive coding, in part, because they promised to retain e-discovery experts to meet with the respondent’s counsel or his experts.¹⁸⁷ On the other hand, the *Dynamo* court also articulated a view that judges typically should leave the manner of review to the responding party unless the requesting party was able to show a deficiency.¹⁸⁸ This implies a limited role for courts to manage discovery for the participation norm.

In early 2015, Magistrate Judge Peck returned with a second major order involving predictive coding.¹⁸⁹ In *Rio Tinto PLC v. Vale S.A.*, the district court asserted, “[T]he case law has developed to the point that it is now black letter law that where the producing party wants to utilize TAR for document review, courts will permit it.”¹⁹⁰ But the district court acknowledged that the required level of transparency and cooperation with respect to the training sets re-

¹⁸¹ *Gordon*, 2013 WL 2250506, *passim*.

¹⁸² *Id.* at *18.

¹⁸³ *Bridgestone*, 2014 WL 4923014, at *1.

¹⁸⁴ *Delaney*, 2014 WL 3563467, at *9, *11.

¹⁸⁵ *In re Biomet M2a Magnum Hip Implant Prods. Liab. Litig.*, No. 3:12-MD-2391, 2013 WL 6405156, at *2 (N.D. Ind. Aug. 21, 2013); *see also Aurora*, 2015 WL 10550240, at *2.

¹⁸⁶ *Id.* at *18.

¹⁸⁷ *Dynamo*, 143 T.C. at 192.

¹⁸⁸ *Id.* at 188–89.

¹⁸⁹ *Rio Tinto*, 306 F.R.D. at 125.

¹⁹⁰ *Id.* at 127.

mained an open question.¹⁹¹ And the district court ultimately concluded that other methods—such as statistical estimations—could validate the results and obviate the need for greater process transparency.¹⁹²

2. Lessons Drawn from the Case Law

The seminal case on predictive coding, *Moore*, set out the basic elements of the emerging doctrine. The central inquiry primarily focuses on proportionality.¹⁹³ It evaluates the “appropriateness” of predictive coding in an individual case by balancing its accuracy against its costs to determine its value relative to other review methods.¹⁹⁴

The superintendence of the productions has also come out in the case law. For example, courts also have considered the efficiency of staging predictive coding review and production, trending against setting predetermined raw numerical goals.¹⁹⁵ Additionally, courts have shown concern about accountability regarding the end production, with some courts promoting cooperative transparency and others permitting statistical estimation or other validation methods.¹⁹⁶ Still, courts have shown a fair amount of the deference that is traditionally given to the choices of the producing party.¹⁹⁷

Courts also have considered how predictive coding fits within the existing evidentiary and professional responsibility obligations. To the former, the application of Federal Rule of Evidence 702 or *Daubert* to the expert testimony that is often necessary to evaluate the proposed protocols has been considered.¹⁹⁸ To the latter, courts are mindful of issues such as the protection of

¹⁹¹ *Id.* at 128.

¹⁹² *Id.* at 128–29.

¹⁹³ *Moore*, 287 F.R.D. at 191.

¹⁹⁴ *E.g.*, *Donziger*, 2013 WL 1087236, at *32; *Kleen*, 2012 WL 4498465, at *5; *Moore*, 287 F.R.D. at 191–92.

¹⁹⁵ *Compare Moore*, 287 F.R.D. at 185, 192 (implementing staging by record custodian, beginning with most relevant sources), *with* *Indep. Living Ctr. of S. Cal. v. City of Los Angeles*, No. CV 12-55155-FMO (PJWx) (C.D. Cal. June 26, 2014) (ordering production of the 10,000 most relevant documents found by a predictive coding protocol).

¹⁹⁶ *E.g.*, *Rio Tinto*, 306 F.R.D. at 128–29; *Gordon*, 2013 WL 2250506, at *18; *Moore*, 287 F.R.D. at 182–83.

¹⁹⁷ *See, e.g.*, *Hyles v. New York City*, No. 10 Civ. 3119 (AT)(AJP), 2016 WL 4077114, at *1 (S.D.N.Y. Aug. 1, 2016) (denying, in an order by Judge Peck, a request to use predictive coding where one of the litigants objected); *Bridgestone*, 2014 WL 4923014, at *1 (allowing parties’ request to utilize predictive coding in review of over two million documents); *Delaney*, 2014 WL 3563467, at *9, *11 (compelling ESI production, but permitting parties’ latitude to determine method of production); *EORHB*, 2013 WL 1960621, at *1 (allowing parties to forego predictive coding where litigants agreed predictive coding was prohibitively costly); *Landow*, 2012 WL 1431215 (allowing use of predictive coding at request of the parties).

¹⁹⁸ *E.g.*, *Moore*, 287 F.R.D. at 189.

attorney-work-product and the potential tension between cooperation and zealous advocacy.¹⁹⁹

Finally, a trend has been for predictive coding to be used in cases involving relatively sophisticated parties in high-stakes litigation. For example, the plaintiffs in *Moore* sought damages “in excess of \$100 million.”²⁰⁰ Other major cases also involved class actions or multidistrict litigation.²⁰¹

III. EXAMINING THE TRADE-OFFS

When considering whether to order the use of predictive coding in civil discovery, courts weigh the costs and benefits. In these *Mathews*-style assessments, courts have focused on pragmatic implementation issues such as the relative efficacy and efficiency of predictive coding processes. But this emerging jurisprudence fails to include the stress that the opacity of predictive coding processes can place on the norm of knowledgeable participation by parties without significant resources.

This Part starts by describing the existing debates about the use of predictive coding in civil discovery that appear in the case law and academic literature. It then surfaces and analyzes the under-examined normative trade-off between accuracy and cost-efficiency on the one hand and participation on the other that is latent in the emerging doctrine.

A. Accuracy and Economic Efficiency Considerations

Most evaluations of predictive coding include some discussion of the baseline practical aspects of discovery in civil litigation.²⁰² In 2013 in *Moore v. Publicis Groupe*, Magistrate Judge Peck explained, “The goal is for the review method to result in higher recall and higher precision than another review method, at a cost proportionate to the ‘value’ of the case.”²⁰³

Embedded within Magistrate Judge Peck’s statement are the twin concerns of discovery’s general proportionality inquiry: accuracy and cost-efficiency. These are two of the three principle concepts of procedural justice.²⁰⁴ Thus, it is necessary but not sufficient that these instrumentalist norms

¹⁹⁹ *E.g.*, *Kleen*, 2012 WL 4498465, at *1, *19.

²⁰⁰ Amended Class Action Complaint at 63, *Moore v. Publicis Groupe SA*, 287 F.R.D. 182 (S.D.N.Y. Apr. 14, 2011) (No. 1:11-cv-01279-ALC-AJP).

²⁰¹ *E.g.*, *Delaney*, 2014 WL 3563467; *Biomet*, 2013 WL 1729682; *Kleen*, 2012 WL 4498465; *Actos*, 2012 WL 7861249.

²⁰² *See, e.g.*, *Moore v. Publicis Groupe*, 287 F.R.D. 182, 189–90 (S.D.N.Y. 2012); Nasuti, *supra* note 5, at 241.

²⁰³ *Moore*, 287 F.R.D. at 190.

²⁰⁴ *See supra* notes 45–52 and accompanying text (describing tenets of procedural justice).

are present in the jurisprudence, even as courts and scholars still wrestle with their practical components, as described below.

1. Accuracy

Virtually every order on predictive coding discusses its ability to ensure a reasonably complete and accurate production.²⁰⁵ And, as Magistrate Judge Peck's statement in the introduction to this subsection illustrates, measures of predictive coding's efficacy have largely focused on their recall and precision.²⁰⁶ In this context, "recall" is the percentage of documents that are identified as relevant by a predictive coding search process.²⁰⁷ "Precision" is the fraction of the recall pool of documents that actually are relevant.²⁰⁸

But these measures should not be treated as the ends themselves.²⁰⁹ Instead, the goal is about ensuring a reasonably complete production.²¹⁰ And scores for relevance are not the same as measurements of importance.²¹¹ For example, a unique document might score poorly for potential relevance (because there are no good comparators from the seed set) but be very important because of its particular content.²¹²

Even the superior recall and precision of predictive coding is subject to debate. Many scholars and academics take the view that manual review is no longer the "gold standard."²¹³ Two studies published in 2010 helped drive this view.²¹⁴ These studies showed that predictive coding's recall and precision

²⁰⁵ *E.g.*, *Malone v. Kantner Ingredients, Inc.*, No. 4:12CV3190, 2015 WL 1470334, at *3 (D. Neb. Mar. 31, 2015); *Dynamo Holdings Ltd. P'ship v. Comm'r*, 143 T.C. 183, 184 (2014).

²⁰⁶ *Kantner*, 2015 WL 1470334, at *3; *Dynamo*, 143 T.C. at 192; *see also* Karl Schieneman & Thomas C. Gricks III, *The Implications of Rule 26(g) on the Use of Technology-Assisted Review*, 7 FED. CTS. L. REV. 239, 250 (2013).

²⁰⁷ *Grossman-Cormack Glossary*, *supra* note 63, at 27.

²⁰⁸ *Id.* at 25.

²⁰⁹ Compare Maura R. Grossman & Gordon V. Cormack, *Comments on "The Implications of Rule 26(g) on the Use of Technology-Assisted Review"*, 7 FED. CTS. L. REV. 285, 286–87 (2014) (distinguishing between e-discovery's goal of efficiently providing necessary information with measures like precision and recall), with Schieneman & Gricks III, *supra* note 155, at 248–50 (focusing on the technical measures rather than the end use).

²¹⁰ Grossman & Cormack, *supra* note 209, at 286.

²¹¹ Yablon & Landsman-Roos, *supra* note 12, at 669.

²¹² See Charles Vaccaro, *Look Before You Leap into Predictive Coding: An Argument for a Cautious Approach to Utilizing Predictive Coding*, 41 RUTGERS COMPUTER & TECH. L.J. 298, 330–31 (2015) (identifying predictive coding's relative inability to find very specific documents, or to recognize the significance of images, graphs, or other feature of a document not using words).

²¹³ *E.g.*, *Moore*, 287 F.R.D. at 190; Grossman & Cormack, *supra* note 20, at *3.

²¹⁴ Remus, *supra* note 10, at 1702–03 (discussing the Grossman & Cormack study, *supra* note 20, and a study by Herbert Roitblat, *infra* note 215).

could exceed that of manual review.²¹⁵ But even these studies contained caveats. For example, one study warned that the variability of human judgment made it difficult to find a baseline from which to assess the relevance determinations.²¹⁶ And others have argued that more research is required.²¹⁷ Illuminating the validity of the latter point, a Sedona Conference Working Group in 2016 still cited to studies that are older than five years, which is a fairly significant period of time given the rate of technological change.²¹⁸

Additionally, the recall and precision of any given predictive coding process will hinge on input variations. For example, predictive coding can struggle with certain types of electronic files, such as spreadsheets or graphics.²¹⁹ And any mistakes in the initial coding can taint the model training—and, thus, the final results—unless it is caught and corrected.²²⁰

Another disputed input issue is whether the initial training set is selected through either random or judgmental sampling.²²¹ With the former, the selection draws randomly from the total population.²²² For the latter, a subject-matter expert selects previously identified documents that are good exemplars of important categories.²²³ The downside to random sampling is that it requires a larger sample set or longer time to train the system because the num-

²¹⁵ Grossman & Cormack, *supra* note 20, at 3; Herbert L. Roitblat et al., *Document Categorization in Legal Electronic Discovery: Computer Classification vs. Manual Review*, 61 J. AM. SOC'Y FOR INFO. SCI. & TECH. 70, 70, 74–75 (2010).

²¹⁶ Roitblat, *supra* note 215, at 76.

²¹⁷ E.g., Brown, *supra* note 64, at 287 n.229 (referencing Gordon V. Cormack & Maura R. Grossman, *Evaluation of Machine-Learning Protocols for Technology-Assisted Review in Electronic Discovery*, ACM SIGIR CONF. 153–61 (2014), <http://plg2.cs.uwaterloo.ca/~gvcormac/calstudy/study/sigir2014-cormackgrossman.pdf> [<https://perma.cc/7EPA-AGKY>]); Tonia Hap Murphy, *Mandating Use of Predictive Coding in Electronic Discovery: An Ill-Advised Judicial Intrusion*, 50 AM. BUS. L.J. 609, 622–24 (2013); Remus, *supra* note 10, at 1721.

²¹⁸ See *The Sedona Canada Principles Addressing Electronic Discovery, Second Edition*, 17 SEDONA CONF. J. 205, 333 (2016) (citing studies from 2009 and 2011).

²¹⁹ Minnesota E-Discovery Working Group 5, *Using Technology to Facilitate Production of E-Discovery*, 40 WM. MITCHELL L. REV. 588, 616 (2014); see also Oral Pottinger, *Do You Have Your Second Request Playbook?*, CORP. COUNS. (Sept. 3, 2015), <https://www.law.com/insidecounsel/2015/09/03/do-you-have-your-second-request-playbook/> [<https://perma.cc/R2D7-6QAW>].

²²⁰ Plaintiff's Statement in Opposition to J.P. Morgan's Proposed Protocol Governing Its Use of Predictive Coding at 6, *Cambridge Place Inv. Mgmt., Inc. v. Morgan Stanley & Co.*, No. SUCV201002741, 2013 WL 3422672, at *6 (Mass. Dist. Ct. Mar. 19, 2013) (quoting an expert who explained, "[i]n contrast to a traditional manual review, where a mistake in coding a document affects only whether that document is produced, a mistake in labeling a Seed Set document can affect whether thousands of other documents are reviewed and produced").

²²¹ Yablon & Landsman-Roos, *supra* note 12, at 642 (describing disagreements in the literature and between leading practitioners).

²²² *Id.*

²²³ *Id.* A variation on the judgmental sampling involves the creation of a "perfect" document. *Id.* at 639.

ber of relevant documents will likely be lower.²²⁴ On the other hand, judgmental sampling can introduce skew based on the subject-matter expert's selection of the documents.²²⁵

An additional set of unsettled implementation questions goes to quality control. At the front end, this includes the setting of confidence levels, confidence intervals, and prediction score thresholds.²²⁶ The first two measures go to the likelihood that the sample is representative.²²⁷ The third describes the cutoff score for determining whether material is deemed responsive.²²⁸ During the processes, quality can be verified through sampling.²²⁹ And, post-coding, lawyers might manually review the responsive documents or use statistical validation techniques to confirm the reasonable completeness of the production.²³⁰ Although there has been limited academic or judicial debate about these issues,²³¹ litigants have contested the appropriate levels for the various measures, the extent to which sampling is necessary, and the need for post-coding validation of the results.²³²

2. Cost Efficiency

In addition to examining whether predictive coding processes are accurate, courts and scholars have looked at its cost efficiency.²³³ And scholars have gone further, discussing how efficiency should be normatively defined and to whom its benefits should accrue.

²²⁴ *Id.* at 643.

²²⁵ *Id.*

²²⁶ Losey, *supra* note 9, at 57; Yablon & Landsman-Roos, *supra* note 12, at 645.

²²⁷ *Grossman-Cormack Glossary*, *supra* note 63, at 12.

²²⁸ Yablon & Landsman-Roos, *supra* note 12, at 645.

²²⁹ Losey, *supra* note 9, at 33.

²³⁰ Schieneman & Gricks, *supra* note 206, at 265, 269; Yablon & Landsman-Roos, *supra* note 12, at 642.

²³¹ Schieneman and Gricks argue that Federal Rule of Civil Procedure 26(g) requires such validation methods, which potentially clashes with Magistrate Judge Peck's *Moore* decision, but this has not been explicitly debated. Schieneman & Gricks, *supra* note 206, at 265, 269. The *Rio Tinto* decision appears to clear up any lingering tension. See *Rio Tinto PLC v. Vale S.A.*, 306 F.R.D. 125, *passim* (S.D.N.Y. 2015).

²³² See e.g., *In re Actos (Pioglitazone) Prods. Liab. Litig.*, No. 6:11-MD-2299, 2012 WL 7861249, at *6 (W.D. La. July 27, 2012); *Moore*, 287 F.R.D. at 187; *Dynamo*, 143 T.C. at 189.

²³³ See, e.g., *Moore*, 287 F.R.D. at 189–90. This focus on monetary costs, of course, is part of a more general trend in civil procedure. See Coleman, *supra* note 23, *passim*. And the costs are not unrelated to the accuracy. See Bruce H. Kobayashi, *Law's Information Revolution as Procedural Reform: Predictive Search as a Solution to the in Terrorem Effect of Externalized Discovery Costs*, 2014 U. ILL. L. REV. 1473, 1502.

Efficiency has primarily been defined by its ability to deliver a higher number of relevant documents at lower monetary cost than other methods.²³⁴ Some scholars have questioned whether the potential losses in comprehensiveness are problematic, even while acknowledging the necessity of addressing proportionality concerns.²³⁵

This emphasis on costs can be hard to concretely evaluate because vendors are reluctant to publicly disclose their pricing.²³⁶ But there is widespread agreement that even expensive predictive coding processes can reduce discovery costs for cases involving large amounts of text-based electronic documents because of the low incremental costs of applying the process to each additional document.²³⁷ This, however, is not undisputed, with some arguing that predictive coding is appropriate in smaller cases and some arguing that it can be fiscally inefficient even in larger cases.²³⁸ Also, discovery disputes likely are more expensive when they involve experts.²³⁹

Even assuming that predictive coding provides more accurate and comprehensive results at a lower cost, it is not settled how the gains should be distributed between the parties.²⁴⁰ A court might allocate the benefit to the requesting party, increasing the amount of material that must be produced.²⁴¹ Alternatively, the court might permit the requesting party to produce only as much it would have under conventional methods and saving further ex-

²³⁴ This, of course, is part of a more general trend in civil procedure. *See* Coleman, *supra* note 23, *passim*.

²³⁵ *E.g.*, Remus, *supra* note 10, at 1718.

²³⁶ *See* Nelson & Simek, *supra* note 23, at 20–24. *But see* Yablon & Landsman-Roos, *supra* note 12, at 671.

²³⁷ *See* Nelson & Simek, *supra* note 23, at 20–24; *see also* Kobayashi, *supra* note 233, at 1501; Vaccaro, *supra* note 212, at 329 (“To set a bright line rule, some suggest, and this note endorses, that there should be at least 100,000 documents needed to be reviewed, and a case value of at least \$200,000.”). *But see* Yablon & Landsman-Roos, *supra* note 12, at 671.

²³⁸ *See also* EORHB, Inc. v. HOA Holdings LLC, No. C.A. 7409-VCL, 2013 WL 1960621, at *1 (Del. Ch. May 6, 2013); Morgan, *supra* note 12, at 75. *Compare* Pangea3 & Recommend Align to Provide Industry-Leading Predictive Coding Offering, THOMSON REUTERS (Oct. 15, 2013), <https://www.thomsonreuters.com/en/press-releases/2013/pangea3-and-recommend-align-to-provide-industry-leading-predictive-coding-offering.html> [<https://perma.cc/27RW-DN33>] (quoting a vendor who stated, “Pangea3s Predictive Review Services deliver the full range of Recommend’s advanced analytics and patented predictive coding workflow, giving law firms and enterprises the flexibility to meet budgetary constraints and impending deadlines no matter the size or complexity of the case.”), *with* Remus, *supra* note 10, at 1707 (suggesting there is no certainty of reduced discovery expense even when embracing predictive coding).

²³⁹ Auttonberry, *supra* note 73, at 634–35; Waxse & Yoakum-Kriz, *supra* note 13, at 221.

²⁴⁰ Yablon & Landsman-Roos, *supra* note 12, at 664.

²⁴¹ *Id.*

pense.²⁴² The ability to scale and stage review has also led to innovative cost-shifting and cost-sharing proposals.²⁴³

The courts' focus on *cost* efficiency also comes under fire as a normative matter. Professor Brooke Coleman provides a comprehensive and forceful critique of the narrow way in which efficiency has been defined in civil procedure.²⁴⁴ Professor Coleman explains how the incomplete understanding of efficiency excludes vitally important, but difficult to measure, non-pecuniary costs such as the filtering of meritorious claims.²⁴⁵ She also notes that the predominance of cost sensitivity has led towards non-trial adjudications and plaintiff skepticism by the courts.²⁴⁶ This voice joins the chorus of scholars and legal authorities who also have challenged the sole focus on costs, noting its problematic limits on other important norms.²⁴⁷ And some of this criticism has noted how proportionality—that is, the primary mechanism of the conventional efficiency norm—can become a deregulatory tool that especially harms plaintiffs with small-value claims.²⁴⁸ Finally, the empirical basis for the focus on costs also is questionable, undermining its putative basis.²⁴⁹

²⁴² *Id.*

²⁴³ Losey, *supra* note 9, at 54.

²⁴⁴ Coleman, *supra* note 23, *passim*.

²⁴⁵ *Id.* at 1795–802; see also Erica Gorga & Michael Halberstam, *Litigation Discovery and Corporate Governance: The Missing Story About the “Genius of American Corporate Law,”* 63 EMORY L.J. 1383, 1494 (2014) (describing undervalued non-financial aspects of discovery in shareholder actions).

²⁴⁶ Coleman, *supra* note 23, at 1805–20.

²⁴⁷ See, e.g., FED. R. CIV. P. 26(b) advisory committee's note to 2015 amendment (“It also is important to repeat the caution that the monetary stakes are only one factor, to be balanced against other factors. The 1983 Committee Note recognized ‘the significance of the substantive issues, as measured in philosophic, social, or institutional terms. Thus the rule recognizes that many cases in public policy spheres, such as employment practices, free speech, and other matters, may have importance far beyond the monetary amount involved.’ Many other substantive areas also may involve litigation that seeks relatively small amounts of money, or no money at all, but that seeks to vindicate vitally important personal or public values.”); Stephen B. Burbank, *Proportionality and the Social Benefits of Discovery: Out of Sight and Out of Mind?*, 34 REV. LITIG. 647, 651–53 (2015); see also Beckerman, *supra* note 37, at 549; Edward Brunet, *The Triumph of Efficiency and Discretion Over Competing Complex Litigation Policies*, 10 REV. LITIG. 273, 280 (1991); Gensler & Rosenthal, *supra* note 35, at 524; Eric K. Yamamoto, *Efficiency's Threat to the Value of Accessible Courts for Minorities*, 25 HARV. C.R.-C.L. L. REV. 341, 393 (1990).

²⁴⁸ See John L. Carroll, *Proportionality in Discovery: A Cautionary Tale*, 32 CAMPBELL L. REV. 455, 465–66 (2010); Moore, *supra* note 6, at 1116.

²⁴⁹ Moore, *supra* note 6, at 1113; Arthur Miller, Testimony at Public Hearing on Proposed Amendments to the Federal Rules of Civil Procedure: Transcript of Proceedings, Judicial Conference Advisory Committee on Civil Rules 37 (Jan. 9, 2014) <http://www.uscourts.gov/sites/default/files/civil-rules-public-hearing-transcript-phoenix-az.pdf>, [https://perma.cc/Q486-B93M] (“I don’t think it befits the American civil justice system to have this preoccupation with cost, abuse, extortion, clichés that have been thrown out by the defense bar that sadly in my judgment have been picked up in judicial opinions without any empiric demonstration whatsoever.”).

B. Expert Reliability and Professional Responsibility Implications

The increased use of predictive coding also has raised new questions about the role of experts and certain professional responsibilities in civil discovery. These concerns seem to arise after the courts and parties have satisfied their concerns, at least to some extent, with the accuracy and cost efficiency of the processes.

1. Expert Evidentiary Issues

In *Moore*, the plaintiffs argued that the procedural protections of Federal Rule of Evidence 702²⁵⁰ and the *Daubert* framework²⁵¹ applied to the expert testimony offered in support of the predictive coding processes.²⁵² This echoed the concerns raised by the district court in *United States v. O'Keefe*, which had reasoned that the technical issues implicated by the discovery processes were beyond a layperson's understanding and, thus, required reassurances as to their reliability.²⁵³ But the *Moore* district court rejected the plaintiffs' arguments, interpreting the procedural protections as only applying to evidence offered to a jury.²⁵⁴

Although it is unclear whether any courts have or will heed their advice, the majority of commentators express doubt about the *Moore* decision on the applicability of the expert-reliability protections.²⁵⁵ Some scholars have challenged the statutory interpretation, noting that Federal Rule of Evidence 702 is silent as to whether it is limited to trial and questioning how much weight

²⁵⁰ Federal Rule of Evidence 702 permits a witness to present expert opinion testimony if: "(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert has reliably applied the principles and methods to the facts of the case." FED. R. EVID. 702.

²⁵¹ In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court interpreted Federal Rule of Evidence 702 and concluded that the "trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." 509 U.S. 579, 589 (1993). The Court then outlined factors that trial judges are to consider in making this assessment. *Id.* at 593–94.

²⁵² *Moore*, 287 F.R.D. at 188.

²⁵³ *United States v. O'Keefe*, 537 F. Supp. 2d 14, 24 (D.D.C. 2008) ("Given this complexity, for lawyers and judges to dare opine that a certain search term or terms would be more likely to produce information than the terms that were used is truly to go where angels fear to tread. This topic is clearly beyond the ken of a layman and requires that any such conclusion be based on evidence that, for example, meets the criteria of Rule 702 of the Federal Rules of Evidence."); see also *Victor Stanley, Inc. v. Creative Pipe, Inc.*, 250 F.R.D. 251, 260 n.10 (D. Md. 2008); *Equity Analytics, LLC v. Lundin*, 248 F.R.D. 331, 333 (D.D.C. 2008).

²⁵⁴ *Moore*, 287 F.R.D. at 188–89.

²⁵⁵ Gelb, *supra* note 13, at 1293–97; Waxse & Yoakum-Kriz, *supra* note 13, at 219–21.

the term “help the trier of fact” can bear.²⁵⁶ Additionally, the skeptics argue that, with the growth in ESI, the importance of discovery and its management has grown because of the potential case development and cost issues.²⁵⁷ The protections also help educate the courts and inspire more confidence in their ability to evaluate the reliability of the testimony.²⁵⁸ These commentators further contend that the costs of the expert-reliability protections would not necessarily be a significant burden because the specter will encourage cooperation, the utilization of the technology will offset some of the dispute costs, and judges can sequence hearings while scaling productions.²⁵⁹ Finally, these protections might be necessary in that some experts have suggested that some protocols would not survive a *Daubert* challenge, which speaks to their potential lack of reliability.²⁶⁰

On the other hand, Professor Dana Remus offered some thoughtful insights in support of forgoing the use of *Daubert* hearings.²⁶¹ She argued that vendors would end up testifying about their own products because of the lack of broader comparative data on the technologies.²⁶² Professor Remus also raised the concern that applying *Daubert* would entrench predictive coding in the realm of technology experts, not lawyers.²⁶³

At a normative level, these concerns about the reliability of expert testimony primarily seem to go to the issue of accuracy. But, regardless as to whether *Daubert* applies, this dialogue in the jurisprudence also, at minimum, gestures towards the importance of explanations.

2. Professional Responsibility Implications

A new technology like predictive coding can introduce wrinkles to virtually all of the myriad discovery practices an attorney might undertake when dealing with ESI.²⁶⁴ This subsection discusses the four professional responsibility implications that have already come to the fore.

²⁵⁶ Gelb, *supra* note 13, at 1293; Waxse & Yoakum-Kriz, *supra* note 13, at 219–21; Panel Discussion, *Symposium on the Challenges of Electronic Evidence*, 83 *FORDHAM L. REV.* 1163, 1237 (2014) [hereinafter *Symposium on the Challenges of Electronic Evidence*].

²⁵⁷ Gelb, *supra* note 13, at 1296–97.

²⁵⁸ Waxse & Yoakum-Kriz, *supra* note 13, at 220.

²⁵⁹ *Id.*; *Symposium on the Challenges of Electronic Evidence*, *supra* note 256, at 1239–40.

²⁶⁰ Nelson & Simek, *supra* note 64, at 24.

²⁶¹ *E.g.*, Remus, *supra* note 10, at 1712.

²⁶² *Id.*

²⁶³ *Id.*

²⁶⁴ See John M. Barkett, More on the Ethics of E-Discovery: Predictive Coding and Other Forms of Computer-Assisted Review 42 (2012) (on file with Duke University School of Law) https://law.duke.edu/sites/default/files/centers/judicialstudies/TAR_conference/Panel_5-Original_Paper.pdf [<https://perma.cc/2927-X9PD>] (providing thoughtful commentary on a host of extant and potential

First, the predictive coding doctrine largely privileges cooperation.²⁶⁵ The potential tension between cooperation and zealous representation was recognized and addressed early in the case law.²⁶⁶ In 2012, in *Kleen Products LLC v. Packaging Corp. of America*, Magistrate Judge Nolan began by quoting the Sedona Conference Cooperation proclamation:

Lawyers have twin duties of loyalty: While they are retained to be zealous advocates for their clients, they bear a professional obligation to conduct discovery in a diligent and candid manner. Their combined duty is to strive in the best interests of their clients to achieve the best results at a reasonable cost, with integrity and candor as officers of the court. Cooperation does not conflict with the advancement of their clients' interests—it enhances it. Only when lawyers confuse advocacy with adversarial conduct are these twin duties in conflict.²⁶⁷

Along these same lines, the district court in *Martinelli v. Johnson & Johnson* approved an order in which the parties agreed “that their counsel’s zealous representation of them is not compromised by conducting discovery in a cooperative manner.”²⁶⁸ And, in its explanation for taking the same position, the Seventh Circuit Committee’s pilot program on electronic discovery explained that a failure to cooperate could lead to increased litigation costs.²⁶⁹ Once again though, Professor Remus offers a reminder to undertake a critical assessment, noting that the move towards cooperation is happening at the same time the goal of comprehensiveness is losing its primacy, leading to a potential break with the adversary system that is designed to protect clients and lead to just results.²⁷⁰

The particular form of cooperation urged by the courts²⁷¹—that is, sharing the seed sets—also has raised concerns about the protection of attorney-

issues, including whether Model Rule 3.4(a), which prohibits an attorney from obstructing an opponent’s access to information, could be used to require the use of predictive coding).

²⁶⁵ See *supra* note 196 and accompanying text.

²⁶⁶ See *Kleen Prods. LLC v. Packaging Corp. of Am.*, No. 10 C 5711, 2012 WL 4498465, at *1 (N.D. Ill. Sept. 28, 2012).

²⁶⁷ *Id.* (quoting *The Sedona Conference Cooperation Proclamation*, 10 SEDONA CONF. J. 331, 331 (2009) (emphasis omitted)); see also Morgan, *supra* note 12, at 71.

²⁶⁸ *Martinelli v. Johnson & Johnson*, No. 2:15-cv-01733-MCE-EFB, 2016 WL 1458109, at *1 (E.D. Cal. Apr. 13, 2016).

²⁶⁹ SEVENTH CIRCUIT ELECTRONIC DISCOVERY PILOT PROGRAM, INTERIM REPORT ON PHASE THREE 6 (2013), http://www.discoverypilot.com/sites/default/files/phase_three_interim_report.pdf [<https://perma.cc/R9AE-KCHE>].

²⁷⁰ Remus, *supra* note 10, at 1717–18.

²⁷¹ *E.g.*, *Kleen*, 2012 WL 4498465, at *5; *Moore*, 287 F.R.D. at 192.

work-product.²⁷² The concerns are that the seed set might divulge the mental impressions of the attorney.²⁷³ Additionally, some of the non-responsive documents might have information that reveals embarrassing or even incriminating conduct that is unrelated to the instant case.²⁷⁴ Some courts and scholars have suggested that such concerns are lessened when the seed set is randomly selected, the coding is not included, or a continuous active process is used.²⁷⁵ In its application, although not entirely uniform, courts generally have not found that discovery on technologically complex discovery processes implicates attorney-work-product.²⁷⁶

Second, the rapid technological changes associated with predictive coding also raise the issue of competence. A comment to the American Bar Association Model Rule of Professional Conduct on competence only demands that a lawyer to have an understanding of “the benefits and risks associated with relevant technology.”²⁷⁷ Likewise, the model rule on a lawyer’s responsibility regarding non-lawyer assistance creates a low bar, requiring only that the lawyer remain aware of how the non-lawyer services are being performed.²⁷⁸ But there is a common understanding that lawyers will have to develop greater technical expertise—from better understanding the technology to enhancing their statistical knowledge—to competently serve their client.²⁷⁹ And, in the meantime, there might be an element of caution that has inhibited more rapid adoption of predictive coding.²⁸⁰ In partial explanation,

²⁷² *E.g.*, Facciola & Favro, *supra* note 14, *passim*; Remus, *supra* note 10, at 1716–17.

²⁷³ *E.g.*, Facciola & Favro, *supra* note 14, *passim*; Remus, *supra* note 10, at 1716–17.

²⁷⁴ *E.g.*, Facciola & Favro, *supra* note 14, *passim*; Remus, *supra* note 10, at 1716–17.

²⁷⁵ *Rio Tinto*, 306 F.R.D. at 128; Yablon & Landsman-Roos, *supra* note 12, at 644–45.

²⁷⁶ *See, e.g.*, *FormFactor, Inc v. Micro-Probe, Inc.*, No. C-10-03095 PJH (JCS), 2012 WL 1575093, at *7 (N.D. Cal. May 3, 2012) (ordering discovery on search terms); *Romero v. Allstate Ins. Co.*, 271 F.R.D. 96, 109–10 (E.D. Pa. 2010) (ordering discovery on search terms); *cf.* *Miller v. Holzmann*, 238 F.R.D. 30, 32 (D.D.C. 2006) (noting the limits of the decision in *Sporck v. Peil*, 759 F.2d 312 (3d Cir. 1985)). *But see* *Koninklijke Philips N.V. v. Hunt Control Sys., Inc.*, Civil Action No. 11-3684 DMC, 2014 WL 1494517, at *4 (D.N.J. Apr. 16, 2014) (granting a protective order to prevent a deposition about the producing party’s discovery processes related to its production of its ESI because it would open the door to more discovery with no limiting principle).

²⁷⁷ MODEL RULES OF PROF’L CONDUCT r. 1.1 cmt.8 (AM. BAR ASS’N 2016).

²⁷⁸ Remus, *supra* note 10, at 1710 (discussing Model Rule 5.3 and its comments).

²⁷⁹ Joy Flowers Conti & Richard N. Lettieri, *E-Discovery Ethics: Emerging Standards of Technological Competence*, FED. LAW., Oct.–Nov. 2015, *passim* (2015); Randy L. Dryer, *Litigation, Technology & Ethics: Teaching Old Dogs New Tricks or Legal Luddites Are No Longer Welcome in Utah*, UTAH B.J., May–June 2015, at 12, 16; Darla W. Jackson, *Lawyers Can’t Be Luddites Anymore: Do Law Librarians Have a Role in Helping Lawyers Adjust to the New Ethics Rules Involving Technology?*, 105 LAW LIBR. J. 395, 398 (2013); Remus, *supra* note 10, at 1719; Vaccaro, *supra* note 212, at 319 (“Experts say lawyers must be prepared to use a quantitative approach and should also have an understanding of statistics.”). Various methods for doing so include revamping law school curriculum. *See* Katz, *supra* note 68, at 965.

²⁸⁰ *See* Metzler, *supra* note 141, at 1164.

Rule 26(g) requires that lawyers certify their results, which implies that the lawyers will develop the appropriate competence before using the new technologies—that is, their use will be *knowledgeable*.²⁸¹

In addition to flagging the changing set of competencies, some commentators have asked whether the use of predictive coding might negatively impact traditional areas of attorney competence. For example, one large law firm partner asked, “More often than not, you’re trying to learn your case through the documents, and how will we substitute that function of learning from the documents when you’re using predictive coding?”²⁸² Although predictive coding protocols do not eliminate human reviewers completely (if only for the coding of the training sets), the point remains that the potential efficiency gain might have an unintended downside.

Third, related to the issue of technical competence, some commentators have questioned whether the use of predictive coding might veer towards the unauthorized practice of law.²⁸³ Given its technical complexity, predictive coding generally will require the involvement of non-lawyer technicians who might have a primary role in the process.²⁸⁴ But the concerns about unauthorized practice of law might be mitigated because predictive coding primarily operates as a tool of the attorney, not the client.²⁸⁵ And, in this way, the processes might resemble the outsourcing of document review, which is not unauthorized practice of law so long as licensed attorneys oversee it.²⁸⁶ If an attorney lacks the technical expertise to understand the predictive coding processes, however, the attorney will not be able to adequately superintend the review.²⁸⁷ One additional challenge is that courts’ analyses have often employed analogies to human tasks, which does not always appreciate the

²⁸¹ See generally Peter Segrist, *How the Rise of Big Data and Predictive Analytics Are Changing the Attorney’s Duty of Competence*, 16 N.C. J.L. & TECH. 527, 603 (2015).

²⁸² Joe Palazzolo, *Software: The Attorney Who Is Always on the Job*, WALL ST. J., May 6, 2013, at B1; see also Frank Pasquale & Glyn Cashwell, *Four Futures of Legal Automation*, 63 UCLA L. REV. DISCOURSE 26, 45 (2015), <https://www.uclalawreview.org/wp-content/uploads/2015/06/Final-ALL.pdf> [<https://perma.cc/V3J4-JZE9>].

²⁸³ E.g., Remus, *supra* note 10, at 1709–11.

²⁸⁴ See John S. Dzienkowski, *The Future of Big Law: Alternative Legal Service Providers to Corporate Clients*, 82 FORDHAM L. REV. 2995, 3001 (2014) (discussing the expansion of legal services to include a broader array of disciplines, particularly with large corporate clients).

²⁸⁵ E.g., Remus, *supra* note 10, at 1709–11. Accordingly, there is potential disagreement about the strength of the client-protection interest that animates much of the unauthorized practice of law jurisprudence. *Id.*; see also Remus & Levy, *supra* note 14, at 538–42; Deborah L. Rhode & Lucy Buford Ricca, *Protecting the Profession or the Public? Rethinking Unauthorized-Practice Enforcement*, 82 FORDHAM L. REV. 2587, 2595 (2014).

²⁸⁶ Remus, *supra* note 10, at 1709.

²⁸⁷ *Id.*; see also Matt Hassett et al., *Managing Outsourcing and E-Discovery*, COUNSEL, Feb. 2014, at 15, 17.

unique elements of the technology.²⁸⁸ The final complication that arises around the potential unauthorized practice of law is when (or whether) even *human* document review consists of the practice of law.²⁸⁹

One last issue—the inadvertent production of protected material—brings together the concerns about cooperation, protection of attorney-work-product, and competence. Given the volume of ESI, perfect review for material protected under either the attorney-client privilege or attorney-work-product doctrine is unrealistic. Commentators, however, differ as to the likelihoods that courts would find either that the privilege was waived by using an outside vendor or that the attorney failed to take reasonable steps to prevent disclosure by using the technology.²⁹⁰ And while Federal Rule of Evidence 502 was designed to address these concerns and encourage the use of review technology, inadvertent disclosure still means that an opposing party has seen material it should not have.²⁹¹

While these discussions are important to the development of the doctrine and the regulation of the profession, the larger question—and the focus of this Article—is not about lawyers’ formal compliance with their basic professional responsibility obligations in a new context but, instead, about the consideration of legal norms that should inform how all litigation players—from parties to lawyers to judges—approach how opaque technologies are used in civil discovery. And, so far, the jurisprudence and scholarship has not placed an emphasis on the role that explanations play in serving the participation norm.

C. Under-Examined Normative Trade-Off Between Economic Efficiency and Participation

1. Defects of the Existing Approach

The significant, under-examined aspect of predictive coding in civil discovery is the trade-off between accuracy and cost-efficiency on one hand and the norm of participation on the other, particularly as it would apply to liti-

²⁸⁸ Remus & Levy, *supra* note 14, at 540–41.

²⁸⁹ *Id.*; James A. Sherer et al., *Merger and Acquisition Due Diligence Part II—The Devil in the Details*, 22 RICH. J.L. & TECH. 4, 4, 17 (2016); see also *Lola v. Skadden, Arps, Slate, Meagher & Flom LLP*, No. 14-3845-cv, 2015 WL 4476828, at *2 (2d Cir. July 23, 2015).

²⁹⁰ Compare Murphy, *supra* note 217, at 645–46 (discussing the reasonability of computer-based analytic methods), and Remus, *supra* note 10, at 1722 (suggesting the utility of claw-back agreements in cases involving predictive coding), with Vaccaro, *supra* note 212, at 322–23 (suggesting courts may not allow claw-back of privileged documents absent a showing of reasonable precautions to prevent disclosure, and recommending the use of a privilege log).

²⁹¹ See FED. R. EVID. 502; Murphy, *supra* note 217, at 646; Liesa L. Richter, *Making Horses Drink: Conceptual Change Theory and Federal Rule of Evidence 502*, 81 FORDHAM L. REV. 1669, 1670–73 (2013).

gants without significant financial resources. As described in Part II, these are the primary elements of modern procedural justice.²⁹² Courts and scholars have primarily focused only on the accuracy and cost efficiency aspects.²⁹³ But the larger issue of the jurisprudence's comportment with procedural justice norms is not as significantly implicated by these two norms because both can be confirmed through statistical validation, obviating the concerns about predictive coding's intelligibility.²⁹⁴ In contrast, the participation norm hinges on explanations, starkly illuminating the intelligibility challenge of predictive coding.²⁹⁵

The participation norm, however, has not been entirely overlooked. For example, Professor Remus questioned how poorer litigants would be able to challenge predictive coding processes and argued that lawyers have an ethical duty to ensure that such parties have access to the technology.²⁹⁶ And, at a more general level, some of the push to encourage transparency and cooperation about search protocols can be understood as an attempt to mitigate the potential "black-box" quality of predictive coding for the less sophisticated litigant.²⁹⁷ But, other than these gestures to the issue, the trade-off has neither been prioritized nor been explicitly discussed as a normative compromise. Instead, accuracy and cost efficiency have largely been assumed to be the predominant norms at play.²⁹⁸

The normative trade-off warrants more discussion because, although not directly discussed, it is present—if latent—in the burgeoning doctrine.

To be sure, courts frequently "muddle through" new or complicated legal questions.²⁹⁹ But a failure to acknowledge underlying *sub silentio* judg-

²⁹² See *supra* note 49 and accompanying text.

²⁹³ See *supra* notes 202–249 and accompanying text.

²⁹⁴ See *supra* notes 192, 196 and accompanying text.

²⁹⁵ See Morgan, *supra* note 61, at 299; Solum, *supra* note 42, at 280.

²⁹⁶ Remus, *supra* note 10, at 1715. Professor Remus's forthcoming work also briefly identifies that "access to reasons" is a vital component of the legal system and is an area in which new legal technologies might particularly lag. Remus & Levy, *supra* note 14, at 550–53 (using tax guidance software as an example).

²⁹⁷ E.g., Moore, 287 F.R.D. at 192.

²⁹⁸ *Id.* at 190; *supra* notes 202–249 and accompanying text. Much of this conversation though appears to focus on ensuring good results. See also Craig B. Shaffer, "Defensible" by What Standard?, 13 SEDONA CONF. J. 217, 218–19 (2012); Symposium on the Challenges of Electronic Evidence, *supra* note 256, at 1236 ("Practice Point Number 7 from the Sedona Search and Information Retrieval[] [states,] 'Parties should expect that their choice of search methodology will need to be explained, either formally or informally, in subsequent legal contexts, including in depositions, evidentiary proceedings and trials.'").

²⁹⁹ See, e.g., Heather K. Gerken, *Lost in the Political Thicket: The Court, Election Law, and the Doctrinal Interregnum*, 153 U. PA. L. REV. 503, 517 (2004); see also Thomas L. Fowler, *Law Between the Lines*, 25 CAMPBELL L. REV. 151, 155 (2003).

ments results in future parties (and courts) lacking appropriately clear and coherent guidance.³⁰⁰

The participation norm—and its implication for the judicial management of discovery—is also reflected in the broader case law.³⁰¹ For example, in a decision that resolved a dispute over a protective order, the United States Court of Appeals for the District of Columbia stated:

This public interest is reinforced by the value we place on the right of every litigant to participate in the process whereby justice is done—to understand and become involved in the proceeding, not to be compelled passively to await its outcome. Regardless of whether these considerations are deemed to be inherent in the principle of due process, they must be accorded considerable weight by a trial judge when considering the propriety of issuing a protective order under Fed. R. Civ. P. 26(c).³⁰²

Earlier, this Article rhetorically asked whether a discovery review process provides for intelligible explanations of its choices beyond a showing that the process resulted in a reasonably accurate and complete production.³⁰³ This notion is contested—particularly by practitioners—because it raises pragmatic concerns about both the protection of attorney-work-product and costs.³⁰⁴ But recall that courts already are generally permitting discovery on discovery when the requests go to understanding the production processes.³⁰⁵ And, in keeping with this judicial practice, an empirical study has shown that attorneys generally do not favor privileging only speed and expense.³⁰⁶ Moreover, the Supreme Court has acknowledged that there are instances

³⁰⁰ Fowler, *supra* note 299, at 155.

³⁰¹ See *Marshall v. Jerrico, Inc.*, 446 U.S. 238, 242 (1980) (describing the “promotion of participation and dialogue by affected individuals in the decisionmaking process” as one of the central elements of procedural due process).

³⁰² *Doe v. District of Columbia*, 697 F.2d 1115, 1119–20 (D.C. Cir. 1983); see also Remus, *supra* note 10, at 1691.

³⁰³ See *supra* notes 202–249 and accompanying text.

³⁰⁴ See also Solum, *supra* note 42, at 242. Compare Remus, *supra* note 10, at 1717 (discussing the tension between production comprehensiveness and nonproduction of irrelevant or privileged documents), with Facciola & Favro, *supra* note 14, at 32 (suggesting courts are unlikely to accept an argument that seed sets may be withheld as attorney-work-product). Some scholars have pushed this challenge to the general assumptions about discovery even further, arguing that discovery should be understood as having a judicially-recognizable social information-sharing benefit that extends beyond the particular litigants’ instrumentalist ends. See, e.g., Alexandra D. Lahav, *The Roles of Litigation in American Democracy*, 65 EMORY L.J. 1657, 1689 (2016).

³⁰⁵ See *supra* note 276 and accompanying text.

³⁰⁶ See Roger Michalski, *The Clash of Procedural Values*, 22 LEWIS & CLARK L. REV. (forthcoming 2018) (manuscript at 35), <http://www.michalski.ch/Michalski.ProceduralValues.pdf> [<https://perma.cc/4B7V-5ZFL>].

when the participation element of the procedural due process requires explanations—implicitly elevating this aspect of the participation norm to a constitutional principle.³⁰⁷

Furthermore, this Article’s ultimate recommendation is not that courts must privilege participation—as it flows from intelligibility—above all else. Rather, the claim is only that courts should acknowledge the new role of opaque algorithms and the stress that might place on the participation norm.³⁰⁸ And a closer look at the norm’s dignity, satisfaction, and legitimacy components illuminates the grounding of this call for intelligibility.³⁰⁹

The dignity aspect of the participation norm “is grounded in the social contract implicit in American constitutional democracy, whereby government agrees to treat its citizens with dignity and respect.”³¹⁰ In the context of legal process, this means litigants are entitled to processes that enable them to comprehend what is happening and, armed with this understanding, make a case that the decisionmaker treats seriously.³¹¹ In other words, the dignity aspect of the participation norm has subcomponents—understanding, voice, and intelligibility—that extend beyond mere accuracy of outcome.³¹² But how can a less sophisticated litigant be treated with this sort of dignity if the party cannot afford an expert and is facing complex technology whose processes are not tied to the substance of the case? From this flows the premise

³⁰⁷ See, e.g., *Wolff v. McDonnell*, 418 U.S. 539, 558 (1974) (“The touchstone of due process is protection of the individual against arbitrary action of government . . .”); *Morrissey v. Brewer*, 408 U.S. 471, 489 (1972) (listing due process requirements in parole revocation hearings, including the board’s *reasons* for revoking parole); cf. *Harris v. Rivera*, 454 U.S. 339, 344 (1981) (“Although there are occasions when an explanation of the reasons for a decision may be required by the demands of due process, such occasions are the exception rather than the rule.”).

³⁰⁸ See Coleman, *supra* note 23, at 1824; see also Richard Marcus, “Looking Backward” to 1938, 162 U. PA. L. REV. 1691, 1725 (2014).

³⁰⁹ See Solum, *supra* note 42, at 260. While I argue that the participation norm is the primary one, intelligibility itself has also been identified as an element of procedural justice. See, e.g., Peter W. Billings, *A Comparative Analysis of Administrative and Adjudicative Systems for Determining Asylum Claims*, 52 ADMIN. L. REV. 253, 256 (2000).

³¹⁰ Redish, *supra* note 21, at 600; see Solum, *supra* note 42, at 260 (noting that the participation norm “emphasizes dignity and autonomy as a function of the actual participation of litigants in procedures that affect them”).

³¹¹ See Jeremy Waldron, U.C. Berkeley, Tanner Lectures: Dignity, Rank and Rights (Apr. 2009), http://www.law.nyu.edu/sites/default/files/ECM_PRO_061884.pdf [<https://perma.cc/GN86-YHDB>]; see also Jerry L. Mashaw, *Administrative Due Process: The Quest for a Dignitary Theory*, 61 B.U. L. REV. 885, 896 (1981); Michelman, *supra* note 42, at 543; Redish, *supra* note 21, at 487; Solum, *supra* note 42, at 273–304.

³¹² Allison Morse, *Good Science, Bad Law: A “Multiple Balancing” Approach to Adjudication*, 46 S.D. L. REV. 410, 448 (2001); Redish, *supra* note 21, at 567; Tom R. Tyler, *Does the American Public Accept the Rule of Law? The Findings of Psychological Research on Deference to Authority*, 56 DEPAUL L. REV. 661, 664, 693 (2007).

that a litigant may ask another to explain an opaque technology that is being used within a judicially managed process.³¹³

The satisfaction element of the participation norm explains the value of those dignity concerns. A number of studies confirm the relationship between a perception of procedural fairness—with the features described above—and satisfaction with the legal decision.³¹⁴ This is so even when the process might be less accurate or more expensive than one that permitted less participation.³¹⁵ And the sense that justice has been done that follows from the ability to participate is a fundamental aspect of popular government.³¹⁶

This Article's claim that litigants have a legitimate interest in intelligible explanations is further buttressed by the increased managerial role of the courts in the discovery process.³¹⁷ Discovery issues can effectively decide cases.³¹⁸ Reasoned decision making tied to the substantive legal issues in a case is the essence of procedurally just judicial action.³¹⁹ This sort of articulation reassures parties that their arguments have been heard and understood.³²⁰ And this serves both the dignity and satisfaction elements, as well as going to a more fundamental conception of political legitimacy that posits a right to meaningfully engage with adjudicative processes that may be binding.³²¹

³¹³ For the component of the due process norm of participation that is the focus of this Article—that is, intelligibility—one might make a parallel analogy to the right to hear in campaign finance literature. See Burt Neuborne, *Ending Lochner Lite*, 50 HARV. C.R.-C.L. L. REV. 183, 209 (2015) (explaining how the First Amendment is embedded in state-mandated resolution proceedings); Burt Neuborne, *Taking Hearers Seriously*, 91 TEX. L. REV. 1425, 1435–36 (2013) (laying out the dignity and instrumentalist benefits of being able to hear).

³¹⁴ See, e.g., William M. O'Barr & John M. Conley, *Lay Expectations of the Civil Justice System*, 22 L. & SOC'Y REV. 137, 137–38 (1988); Donna Shestowsky, *The Psychology of Procedural Preference: How Litigants Evaluate Legal Procedures Ex Ante*, 99 IOWA L. REV. 637 *passim* (2014) (evaluating participant satisfaction with an array of procedural alternatives).

³¹⁵ Solum, *supra* note 42, at 264.

³¹⁶ *Joint Anti-Fascist Refugee Comm. v. McGrath*, 341 U.S. 123, 172 (1951) (Frankfurter, J., concurring) (explaining that legitimate judicial processes “generat[e] the feeling, so important to a popular government, that justice has been done”).

³¹⁷ Recall the earlier discussion of how discovery issues played a role in *Ashcroft v. Iqbal* and *Bell Atlantic Corporation v. Twombly*. See *supra* note 59 and accompanying text; see also *Ashcroft v. Iqbal*, 556 U.S. 662, 685 (2009); *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544, 558 (2007).

³¹⁸ See *supra* notes 55–59 and accompanying text.

³¹⁹ Maureen N. Armour, *Practice Makes Perfect: Judicial Discretion and the 1993 Amendments to Rule 11*, 24 HOFSTRA L. REV. 677, 707 (1996); Lon L. Fuller, *The Forms and Limits of Adjudication*, 92 HARV. L. REV. 353, 366–67 (1978); Lahav, *supra* note 304, at 1677–78; Richard Warner, Note, *Three Theories of Legal Reasoning*, 62 S. CAL. L. REV. 1523, 1523–24 (1989).

³²⁰ Fuller, *supra* note 319, at 369.

³²¹ See *supra* notes 42–49 and accompanying text. For the component of the due process norm of participation that is the focus of this Article—that is, intelligibility—one might make a parallel analogy to the right to hear that one sees in the campaign finance literature.

Solicitude for the norm of participation matters even more for litigants without financial resources.³²² When discovery is stifled, parties might feel disempowered and this feeling of injustice is likely to be enhanced when a plaintiff is facing a defendant who has the more resources such that he or she is able to muster all the necessary facts and arguments without affirmative court interventions.³²³ This dynamic is aggravated by predictive coding because poorer litigants probably will not understand the technology and will not have the resources to hire experts, leaving them unable to effectively contest the approaches chosen by their richer adversaries.³²⁴ In this context, this barrier to equitable, knowledgeable participation is a function of the general opacity of predictive coding processes that results from the technological compromise between interpretability and efficacy.³²⁵ But this is not just a natural state that must be accepted; rather, the judiciary has a role to play in managing the impact of the wealth disparities and their ostensibly neutral choices about procedural norms can ultimately determine who benefits.³²⁶

On the other hand, the use of predictive coding in civil discovery does not cut in just one direction—even as to the participation norm. Militating for its use, there are several ways in which predictive coding can improve the opportunities for meaningful participation by parties with fewer financial resources. For example, the iterative and content-removed nature of most predictive coding processes removes the asymmetric-information issues that otherwise follow from charging the requesting party to generate key words.³²⁷

³²² Joshua M. Koppel, Comment, *Tailoring Discovery: Using Nontranssubstantive Rules to Reduce Waste and Abuse*, 161 U. PA. L. REV. 243, 277–78 (2012); see also Frank Pasquale, *Restoring Transparency to Automated Authority*, 9 J. TELECOMM. & HIGH TECH. L. 235, 237 (2011). See generally Solon Barocas & Andrew D. Selbst, *Big Data's Disparate Impact*, 104 CALIF. L. REV. 671 (2016).

³²³ Koppel, *supra* note 322, at 277. Additionally, while the focus of this Article is the normative trade-off, it has some potentially significant practical implications. For example, one can see how these dynamics mirror those that undergirded Professor Owen Fiss's argument about how disparities in resources could lead to less just settlements. See Owen M. Fiss, *Against Settlement*, 93 YALE L.J. 1073, 1076 (1984).

³²⁴ Remus, *supra* note 10, at 1715.

³²⁵ Michalski, *supra* note 306 (manuscript at 35–36); Rich, *supra* note 2, at 886; Zarsky, *supra* note 76, at 1520. In the context of credit scoring, one proposal went further, suggesting that “[t]he FTC should be given access to credit-scoring systems and other scoring systems that unfairly harm consumers,” including “not only the datasets mined by scoring systems but also the source code and programmers’ notes describing the variables, correlations, and inferences embedded in the scoring systems’ algorithms.” Citron & Pasquale, *supra* note 2, at 24–25. And Professor Roth identified a case in which litigants were given access to a breath machine's source code. Roth, *supra* note 75, at 1272 (discussing *In re* Source Code Evidentiary Hearings in Implied Consent Matters, 816 N.W.2d 525, 529 (Minn. 2012)).

³²⁶ Helen Hershkoff, *Poverty Law and Civil Procedure: Rethinking the First-Year Course*, 34 FORDHAM URB. L.J. 1325, 1326, 1329 (2007); Lahav, *supra* note 304, at 1677–78.

³²⁷ See Kobayashi, *supra* note 233, at 1506.

Instead, the requesting party gets the benefit of scalable access to the full universe of documents. And, although the feature weights used by the algorithms are not necessarily causatively related to the underlying legal issue in the litigation, the human judgments applied to the training sets presumably are. Moreover, notwithstanding the procedural legitimacy issues discussed above, as a descriptive matter, it is certainly possible that correlations can provide insights even without being able to engage in the substance.³²⁸ Additionally, the attenuated mechanical nature potentially reduces the opportunities for intentionally intrusive requests.³²⁹ The dual-edged nature of predictive coding further supports including an assessment of its impact on the norm of participation in the emerging doctrine.

2. Roadblocks to the Normative Inquiry

Although none provide compelling reasons to forgo the normative inquiry, there are several possible explanations for why the judiciary and academy have not yet engaged in deeper examinations of the trade-off. The five main reasons are outlined below.

First, courts frequently have to decide the cases before them without engaging in a more philosophical inquiry about first principles.³³⁰ This is probably especially prevalent in discovery disputes because of the rise in docket-management pressures and the degree to which judicial management of discovery is highly deferential to the trial courts.³³¹ Accordingly, it is unsurprising that few judges have waxed poetic about the first principle issues raised, perhaps only tangentially or hypothetically, by pre-trial procedural disputes.

Second, many analyses have not fully appreciated that predictive coding is a fundamentally different type of tool than earlier ESI search methods.³³²

³²⁸ See Harry Surden, *Machine Learning and Law*, 89 WASH. L. REV. 87, 109–10 (2014).

³²⁹ See *supra* note 138 and accompanying text.

³³⁰ See Yablon & Landsman-Roos, *supra* note 12, at 665–66.

³³¹ See Pauline M. Pelletier, *The Impact of Local Patent Rules on Rate and Timing of Case Resolution Relative to Claim Construction: An Empirical Study of the Past Decade*, 8 J. BUS. & TECH. L. 451, 452 & n.5, 501 (2013) (citing growth described in the 2010 Year-End Report on the Federal Judiciary, which showed “nearly all major areas of the federal judiciary had increasing caseloads, including a two percent increase in the civil docket”); Gwen Stern et al., *Fishing Season Is Over: After Barrick and Amended Pennsylvania Rule of Civil Procedure 4003.5, Pennsylvania Reached the Right Decision Regarding Work Product Protections Between Attorneys and Experts*, 7 DREXEL L. REV. 329, 347 (2015) (noting the empowerment of trial courts to resolve discovery disputes).

³³² Compare Alexander Nourse Gross, Note, *A Safe Harbor from Spoliation Sanctions: Can an Amended Federal Rule of Civil Procedure 37(e) Protect Producing Parties?*, 2015 COLUM. BUS. L. REV. 705, 712 (distinguishing only between paper discovery and general ESI discovery), with *supra* notes 73–86 and accompanying text (distinguishing paper discovery, predictive coding, and Boolean or keyword searches performed in other forms of ESI discovery).

And this mischaracterization, which ignores predictive coding's lack of easily intelligible explanations of the causal relationships between the results and the underlying legal substance, naturally leads away from a new examination of the normative trade-off.³³³

Third, although challenged by scholars in the context of broader discussions about discovery, economic efficiency (as understood to be a focus on reducing the measurable financial costs of litigation) is the ascendant norm.³³⁴ And the proportionality requirement embedded in Rule 26 has been understood to require this sort of economic efficiency inquiry.³³⁵ Thus, it is no surprise that courts have looked at the accuracy and cost-efficiency of predictive coding.

Fourth, there might be a Maslow-like hierarchy of needs specific to jurisprudence in which legal analyses move from the most pragmatic concerns to the more abstract.³³⁶ In the context of predictive coding in civil discovery, the first analyses focused on whether the processes worked at their most basic level, asking whether the results were better than alternative methods at getting the right material in a cost-efficient manner.³³⁷ Next, courts and scholars thought about the second-order implications of how the processes fit more or less easily within the existing case law.³³⁸ And, as this Article begins to do, the third step is examining how the processes either serve or challenge the underlying first principle norms—other than accuracy and cost-efficiency—that animate the jurisprudence as a whole.

Fifth, technology can have a glamour of objectivity and prestige.³³⁹ This is particularly true with automated processes involving machine-learning algorithms.³⁴⁰ One might see the technological element itself acting as a substitute for more substantive legal explanations because it carries with it a different, but still weighty, imprimatur of authority.

³³³ See Redish, *supra* note 21, at 564; see also Paul Ohm, *The Argument Against Technology-Neutral Surveillance Laws*, 88 TEX. L. REV. 1685, 1695 (2010) (“While the law should not treat different technologies differently when doing so would reward happenstance and chance, it is also true that some differences deserve to be treated differently.”).

³³⁴ See Coleman, *supra* note 23, at 1787–93.

³³⁵ See FED. R. CIV. P. 26.

³³⁶ See Matthew J.B. Lawrence, *Procedural Triage*, 84 FORDHAM L. REV. 79, 83 (2015) (applying a similar notion of triage—that is, a strategic allocation of resources to the most pressing problems—to procedural issues); Stephen B. Young, *The Moral Basis of American Law: An Hypothesis*, 82 U. DET. MERCY L. REV. 649, 655, 681 (2005) (describing a “value-hierarchy pyramid for civil procedure” that goes from a fact, case-based level to overarching norms).

³³⁷ See *supra* notes 202–249 and accompanying text.

³³⁸ See *supra* notes 250–291 and accompanying text.

³³⁹ See FRANK PASQUALE, *THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION* 195 (2015).

³⁴⁰ See Citron, *supra* note 2, at 1271–72.

3. Need to Futureproof

Although predictive coding in civil discovery is not typically used in cases involving a poorer party with a small-value claim, now is the time for incorporating participation-norm concerns into the emerging doctrine. The growth of ESI and the focus on proportionality make it likely that predictive coding will spread to new contexts involving parties with fewer financial resources.³⁴¹ And the participation-norms matter even more for such parties, implicating equality issues in addition to the procedural justice elements described above.³⁴² Taken together, this raises important questions about a failure to futureproof the jurisprudence and the risks of calcification.

Futureproofing refers to the practice of developing law to remain relevant despite extrinsic changes over time.³⁴³ With technology that changes faster than lawmakers or courts can respond, futureproofing is necessary to avoid obsolescence.³⁴⁴ And the benefits of such a stable doctrine are the enhancement of uniformity and certainty.³⁴⁵

While stability within the common-law system has its upsides, there also are risks of calcification, which are particularly salient when the formative period is not reflective of the forthcoming context. Legal practices, which might not be theoretically justifiable on their merits, can harden into a long-standing doctrine with unintended effects.³⁴⁶ And these unintended effects can disadvantage vulnerable parties who were never affirmatively considered. For example, the proportionality issue primarily operates in high-value cases but it has, without much in the way of explicit deliberation or justification, migrated to lower-stakes cases.³⁴⁷ And, as discussed above, predictive coding exacerbates the ways in which privileging proportionality can negatively impact the participation norm.³⁴⁸

³⁴¹ See *supra* notes 292–370.

³⁴² See *supra* note 324 and accompanying text; see also Lahav, *supra* note 304, at 1682.

³⁴³ Michael Birnhack, *Reverse Engineering Informational Privacy Law*, 15 YALE J.L. & TECH. 24, 38–39 (2012).

³⁴⁴ *Id.*; see also Orin S. Kerr, *A User's Guide to the Stored Communications Act, and a Legislator's Guide to Amending It*, 72 GEO. WASH. L. REV. 1208, 1214 (2004).

³⁴⁵ See Ohm, *supra* note 333, at 1713. One example where a concern about futureproofing has already played out was in expert handwriting analyses after *Daubert*, where a judge wrestled with the then-reliability of the expert processes. See D. Michael Risinger, *Appendix: Cases Involving the Reliability of Handwriting Identification Expertise Since the Decision in Daubert*, 43 TULSA L. REV. 477, 526–27 (2007).

³⁴⁶ David Dolinko, *Is There a Rationale for the Privilege Against Self-Incrimination?*, 33 UCLA L. REV. 1063, 1147 (1986); see also Kermit Roosevelt III, *Constitutional Calcification: How the Law Becomes What the Court Does*, 91 VA. L. REV. 1649, 1693 (2005).

³⁴⁷ Coleman, *supra* note 17, at 1050–62.

³⁴⁸ See *supra* notes 303–325 and accompanying text.

The doctrinal upshot is that courts should futureproof the emerging doctrine of predictive coding in civil discovery by including an explicit and fact-informed weighing of the participation norm. As with most discovery issues, a case-by-case *Mathews* assessment will best enhance the efficient and just workings of litigation. But such a balancing test must both include *all* of the important normative considerations *and* account for the practical application modifications that might be necessary to account for differently situated litigants.

4. Potential Non-Doctrinal Ways to Ameliorate Predictive Coding's Impact on the Participation Norm

The doctrinal fix suggested above, however, is not the only possible method for dealing with how predictive coding's opacity might negatively impact the norm of participation for litigants without significant financial resources. There are other available tactics and some of the contextual aspects might change too.

It is possible that some of the pressures leading to the increased use of predictive coding might lessen. While the growth of ESI is unlikely to slow, the Federal Rules of Civil Procedure could be amended to better reflect the normative trade-off, putting a renewed focus on the participation norm.³⁴⁹ Although the 2015 amendments went in the other direction,³⁵⁰ other regulatory proposals show an increased interest in ensuring that legal structures protect people who lack significant financial resources.³⁵¹

Additionally, just as predictive coding has been suggested as a technological fix for the problem of the deluge of ESI, more advanced predictive coding technologies might solve the intelligibility problem.³⁵² Some vendors have already started touting the ability of their software to explain the under-

³⁴⁹ See Coleman, *supra* note 23, at 1826.

³⁵⁰ *Id.* at 1815; see also Moore, *supra* note 6, at 1112–14.

³⁵¹ For example, in May 2016 the Consumer Finance Protection Bureau proposed a prohibition on mandatory arbitration agreements. See 12 C.F.R. pt 1040 (repealed Nov. 1, 2017).

³⁵² A general optimism about the ability of technological advances to solve problems created by earlier technological advances abounds amongst many civil procedure experts. See, e.g., Peck, *supra* note 4, at 3; *Summary of Testimony & Comments*, Advisory Committee on Civil Rules 35 (2013) (statement of Arthur Miller), http://www.uscourts.gov/sites/default/files/fr_import/CV_2014-04.pdf [<https://perma.cc/XV4F-MZ3D>] (“The problems of e-discovery are likely to resolve themselves as information retrieval science and technology prove to reduce costs, accelerate the process, and enhance the accuracy of retrieval through a combination of statistics, linguistics, and computer science.”) And, in other contexts, sophisticated software increasingly is able to show its work. See Kevin D. Ashley, *Teaching Law and Digital Age Legal Practice with an AI and Law Seminar*, 88 CHI.-KENT L. REV. 783, 792–95 (2013).

lying rationales.³⁵³ And lawyers and courts can use their powers over legal processes—that is, their ability to hire vendors and approve processes, respectively—to further accelerate these developments.³⁵⁴

Another solution would be to address how the cost of experts impedes poorer parties from being able to successfully navigate the civil litigation process.³⁵⁵ For example, courts may appoint experts and shift the costs of experts to the losing parties.³⁵⁶ Legislative fixes could expand the universe of cases in which fee-shifting for the cost of experts is permitted.³⁵⁷ Another long-term strategy might be to develop a constitutional right to court-appointed expert assistance under the due process clause.³⁵⁸ This could take the form of a court-appointed special master.³⁵⁹ Some professional organizations encourage their members to volunteer services to people in need—although it can be difficult for indigent parties to connect with these sorts of *pro bono* offerings.³⁶⁰ To the extent access to experts hinges on funding, lawyers can advance these expenses, and the growth of litigation funding might also portend decreased barriers.³⁶¹ Simpler, more elegant solutions geared specifically towards predictive coding access might be for the bar to develop an open-source predictive coding tool, contract for group licenses, or implement a

³⁵³ E.g., David Grant, *Seeing Is Believing: Using Visual Analytics to Take Predictive Coding Out of the Black Box*, FTI CONSULTING TECH. (2013), <http://www.ftitechnology.com/resources/papers/seeing-believing-using-visual-analytics-take-predictive-coding-out-black-box>.

³⁵⁴ Remus, *supra* note 10, at 1723.

³⁵⁵ The right to technological expert assistance is significantly more developed in the criminal context. See, e.g., Theodore J. Greeley, *The Plight of Indigent Defendants in a Computer-Based Age: Maintaining the Adversarial System by Granting Indigent Defendants Access to Computer Experts*, 16 VA. J.L. & TECH. 400, 403 (2011). On the civil side, this is potentially complicated by the longstanding presumption that each party bears its own discovery costs. See *Zubulake v. UBS Warburg LLC*, 217 F.R.D. 309, 317 (S.D.N.Y. 2003) (citing *Oppenheimer Fund, Inc. v. Sanders*, 437 U.S. 340 (1978)). But the illegitimacy of economic costs burdening access to justice has been well established. See Michelman, *supra* note 42, *passim*.

³⁵⁶ FED. R. EVID. 706(a); Medine, *supra* note 19, at 290–91; Wiseman, *supra* note 19, at 512–14; see, e.g., *Gabriel Techs. Corp. v. Qualcomm Inc.*, No. 08cv1992 AJB (MDD), 2013 WL 410103, at *10 (S.D. Cal. Feb. 1, 2013) (awarding \$2,829,349.10 for costs of computer-assisted, algorithm-driven document review), *aff'd*, 560 F. App'x 966 (Fed. Cir. 2014).

³⁵⁷ Additionally, courts might flex their discretion. See Steven Baicker-McKee, *The Award of E-Discovery Costs to the Prevailing Party: An Analog Solution in a Digital World*, 63 CLEV. ST. L. REV. 397, 424 (2015).

³⁵⁸ Medine, *supra* note 19, at 348–49. *But see Kemp v. Dretke*, 86 F. App'x 680, 682 (5th Cir. 2004) (rejecting ineffective assistance of counsel claim based on inability to procure mental health expert).

³⁵⁹ Remus, *supra* note 10, at 1719–20.

³⁶⁰ Wiseman, *supra* note 19, at 528.

³⁶¹ See Courtney R. Barksdale, *All That Glitters Isn't Gold: Analyzing the Costs and Benefits of Litigation Finance*, 26 REV. LITIG. 707, 711 (2007); Monroe H. Freedman, *Caveat Lector: Conflicts of Interest of Ali Members in Drafting the Restatements*, 26 HOFSTRA L. REV. 641, 650 (1998).

compulsory licensing scheme.³⁶² Although increased access does not necessarily go directly to intelligibility, it would give litigants without significant financial resources first-hand exposure to the technology.

Lawyers' gamesmanship was identified as another driver of the rise of predictive coding.³⁶³ Accordingly, changes in professional responsibility norms or rules might reduce the impact of predictive coding on the participation norm. For example, lawyers might cooperate further to reduce discovery disputes. They also could be more transparent about their predictive coding processes, using economic pressure to make their vendors explain some of the mechanisms beyond just the classification decisions in the seed set. This, however, is not meant to suggest that mechanical transparency is equivalent to causative legal explanations. But mechanical transparency as to the algorithms would, at least, be a start.

Even more likely, shifts in technological competence might make generalist lawyers better able to navigate the intricacies of predictive coding. Currently, professional responsibility rules set a very low bar for lawyers' technological competence.³⁶⁴ But this is changing. For example, Magistrate Judge James Francis has said:

E-Discovery is pervasive. It's like understanding civil procedure. You're not going to be a civil litigator without understanding the rules of civil procedure. Similarly, you're no longer going to be able to conduct litigation of any complexity without understanding E-Discovery.³⁶⁵

Some legal practitioners have even argued that the use of predictive coding will itself become an ethical obligation.³⁶⁶ And developing competence will be easier if the protocols become more standardized, resolving the implementation controversies described above in Part III(C).³⁶⁷

³⁶² Remus, *supra* note 10, at 1722.

³⁶³ See *supra* notes 292–370.

³⁶⁴ Remus, *supra* note 10, at 1710.

³⁶⁵ Joe Dysart, *Catch Up with Tech or Lose Your Career, Judges Warn Lawyers*, A.B.A. J. (Apr. 2014), http://www.abajournal.com/magazine/article/catch_up_with_tech_or_lose_your_career_judges_warn_lawyers [<https://perma.cc/SLG5-NK64>]; see also State Bar of Cal. Standing Comm. on Prof'l Responsibility, Formal Op. Interim 11-0004 (2015), http://www.calbar.ca.gov/Portals/0/documents/publicComment/2015/2015_11-0004ESI14-12-05-2dpubcomment.pdf [<https://perma.cc/RZD2-KW6Y>] (“Attorney competence related to litigation generally requires, among other things, and at a minimum, a basic understanding of, and facility with, issues relating to e-discovery On a case-by-case basis, the duty of competence may require a higher level of technical knowledge and ability, depending on the e-discovery issues involved in a matter, and the nature of the ESI.”).

³⁶⁶ Jackson, *supra* note 279, at 395; Barkett, *supra* note 264 (manuscript at 32).

³⁶⁷ Remus, *supra* note 10, at 1722.

Less likely, but no less importantly, litigation actors—be they parties, attorneys, or judges—might more fully integrate an ethical obligation that goes beyond the mere tactical adherence to the rules. Instead, they might better incorporate their responsibility to the underlying norms of procedural justice into their practices.³⁶⁸ Recognition of the shared responsibility for ensuring truly just processes can only serve to enhance the legitimacy of the legal system and, ultimately, the welfare of society.³⁶⁹ And one aspect of this ethical obligation is ensuring that every aspect of the litigation process is intelligibly tied to the underlying legal substance.³⁷⁰

CONCLUSION

Legal doctrines must serve first-principles norms. And, in discovery, the norm of participation is a fundamental principle, ultimately contributing to the legitimacy of judicial processes. In civil discovery, this norm is negatively impacted by predictive coding's opacity, particularly as projected for litigants without the financial resources necessary to hire technological experts. But the trade-off between the norms of accuracy and cost-efficiency on one hand and participation on the other has not been sufficiently interrogated in either the prior academic or judicial evaluations. Now that predictive coding has passed the initial factual and second-order legal thresholds, this higher-level normative discussion should begin. Contributing to this need for examination of the normative trade-off, the continuing growth of ESI and the downward pressure of the proportionality amendment to Federal Rule of Civil Procedure 26(b) mean that predictive coding likely will spread to more cases. And there is a risk that the current doctrine will ossify, leaving out the concerns of the litigants who both lack significant financial resources and are not generally participating in the contemporary cases through which the jurisprudence is developing. Given these factors, courts should include the potential stress on

³⁶⁸ DAVID LUBAN, *LAWYERS AND JUSTICE: AN ETHICAL STUDY* 11, 32, 169 (1988) (obliging lawyers to act with a heightened level of respect for their fellow citizens and suggesting lawyers should be morally active and wrestle with the principles undergirding democracy); Yuzhe Zhao, *Rules, Morality, and Legal Ethics: Searching for the Underlying Principle of Lawyer Regulation*, 25 *GEO. J. LEGAL ETHICS* 857, 860–61 (2012).

³⁶⁹ Robert W. Gordon, *A Collective Failure of Nerve: The Bar's Response to Kaye Scholer*, 23 *L. & SOC. INQUIRY* 315, 321 (1998); see *Hickman v. Taylor*, 329 U.S. 495, 514–15 (1947) (Jackson, J., concurring) (describing discovery as both “one of the working tools of the legal profession” and “a two-edged sword” in a discussion of how it is often overlooked that lawyers play a role in procedural justice); see also Stephen B. Burbank & Linda J. Silberman, *Civil Procedure Reform in Comparative Context: The United States of America*, 45 *AM. J. COMP. L.* 675, 683–85 (1997) (noting the inherent link between due process and broader American values).

³⁷⁰ See Joseph P. Tomain, *A Code of One's Own*, 15 *NOTRE DAME J.L. ETHICS & PUB. POL'Y* 153, 159 (2001) (stating intelligibility is an important component of legal ethics).

the participation norm in their case-by-case *Mathews* analyses when managing discovery disputes involving predictive coding to better futureproof the emerging doctrine.

Predictive coding in civil discovery is not the only area in which rapid technological advances—most saliently, the increased prevalence of big data and artificial intelligence—raise concerns about the ability of legal doctrines to adapt. And, although predictive coding presents issues specific to itself, the general lesson remains the same: procedurally just doctrines must account for technological changes and balance their benefits against the risk that their lay impenetrability might diminish the meaningful participation of less sophisticated litigants in legal processes.

