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A Rule of Persons, Not Machines: The Limits of Legal Automation

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*Frank Pasquale**

ABSTRACT

For many legal futurists, attorneys' work is a prime target for automation. They view the legal practice of most businesses as algorithmic: data (such as facts) are transformed into outputs (agreements or litigation stances) via application of set rules (the law). These technophiles promote substituting computer code for contracts and descriptions of facts now written by humans. They point to early successes in legal automation as proof of concept. For example, TurboTax has helped millions of Americans file taxes, and algorithms have taken over certain aspects of stock trading. Corporate efforts to "formalize legal code" may bring new efficiencies in areas of practice characterized by both legal and factual clarity.

Legal automation, however, can also elide or exclude important human values, necessary improvisations, and irreducibly deliberative governance. Due process depends on narratively intelligible communication from persons and for persons that are not reducible to software. Language is constitutive of these aspects of law. To preserve accountability and a humane legal order, these reasons must be expressed in language by a responsible person. This basic requirement for legitimacy limits legal automation in several contexts, including corporate compliance, property recordation, and contracting. A robust and ethical legal profession respects the flexibility and subtlety of legal language as a prerequisite for a just and accountable social order. It ensures a rule of persons, not machines.

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INTRODUCTION

Will law become a subdivision of computer science? The idea might seem far-fetched now, given attorneys' distinctive professional role as crafters and maintainers of social order. The history of the professions, however, is one of jurisdictional turf battles, as rival elites claim the right to solve certain problems or fill certain social roles.¹ More recently, the spread of automation to white-collar work has prompted futurists to predict that artificial intelligence will complete many tasks now performed by lawyers—or replace them entirely.²

There are some realms of legal practice where algorithms, a building block of artificial intelligence, have already displaced legal workers. Automated document review is a staple of discovery now. Additionally, a worker is far more likely to use TurboTax than to visit a lawyer or accountant to prepare annual returns for the Internal Revenue Service (“IRS”). Lawmakers could eventually draft tax statutes in the form of computer code, eliminating the interpretative step that TurboTax’s lawyers and engineers must take as they translate statutory requirements into their software.³

¹ See generally ANDREW ABBOTT, *THE SYSTEM OF PROFESSIONS* (1988).

² See, e.g., Frank Pasquale & Glyn Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*, 68 U. TORONTO L.J. 63, 80 (2018) [hereinafter Pasquale & Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*]; Frank Pasquale & Glyn Cashwell, *Four Futures of Legal Automation*, 63 UCLA L. REV. DISCOURSE 26, 28 (2015).

³ See Sarah B. Lawsky, *Formalizing the Code*, 70 TAX L. REV. 377, 379 (2017).

However, both lawmakers and regulators should be cautious as they attempt to code legal obligations into software. While computer code and human language both enable forms of communication, the affordances offered by each are distinct and, in many respects, mutually exclusive. Code seeks to eliminate the forms of ambiguity and flexibility characteristic of much language, including legal language.⁴ Just as quests to replace all standards with rules have failed, so too will most efforts to rewrite legal rules as code.

To be sure, technology is already assisting civil lawyers in their traditional roles as advocates and advisors and will continue to do so in the future.⁵ However, can it replace them entirely? For many futurists who project industrial trends onto the profession of law, the answer is a resounding yes.⁶ Legal futurists predict that software will not only help lawyers find the cases relevant to their briefs but will write documents themselves.⁷ Some predict a “legal singularity,” which “will arrive when the accumulation of a massive amount of data and dramatically improved methods of inference make legal uncertainty obsolete.”⁸ For many journalists, the arguments are compelling and support a surfeit of stories on the “end of lawyers” and the “death of Big Law.”⁹

Legal futurists build on the work of legal software vendors who tend to dismiss ordinary practice as riddled with inefficiency, often in order to market their wares as far better by comparison.¹⁰ Both groups

⁴ See DAVID GOLUMBIA, *THE CULTURAL LOGIC OF COMPUTATION* 78 (2009).

⁵ This Article focuses on the role of technology in civil legal practice. Calls for the technological displacement of legal work in the criminal context have been far more muted than they have been in the civil space. For critical perspectives on substitutive automation of criminal-law-enforcement personnel, see Andrew Guthrie Ferguson, *Big Data and Predictive Reasonable Suspicion*, 163 U. PA. L. REV. 327, 350–51 (2015), and Elizabeth E. Joh, *Policing Police Robots*, 64 UCLA L. REV. DISCOURSE 516, 519 (2016).

⁶ See, e.g., 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, 3041–42 (2013).

⁷ See RICHARD SUSSKIND & DANIEL SUSSKIND, *THE FUTURE OF THE PROFESSIONS* 202 (2015) (describing computerized drafting of legal and other documents).

⁸ Benjamin Alarie, *The Path of the Law: Towards Legal Singularity*, 66 U. TORONTO L.J. 443, 445 (2016); see also Benjamin Alarie et al., *Law in the Future*, 66 U. TORONTO L.J. 423, 427–28 (2016).

⁹ See, e.g., Tom Meltzer, *Robot Doctors, Online Lawyers and Automated Architects: the Future of the Professions?*, GUARDIAN (June 15, 2014, 2:00 PM), <https://www.theguardian.com/technology/2014/jun/15/robot-doctors-online-lawyers-automated-architects-future-professions-jobs-technology> [<https://perma.cc/73Q4-WVZA>].

¹⁰ See Bruce H. Kobayashi & Larry E. Ribstein, *Law’s Information Revolution*, 53 ARIZ. L. REV. 1169, 1171 (2011) (promoting disruption of so-called “legacy providers” of legal services by information technology-intensive corporations).

prescribe the automation of legal services as a way to advance access to justice, reduce legal costs, and promote the rule of law.¹¹ Legal futurists characterize these developments as a democratization of law and an empowerment of ordinary individuals.¹² They tap into both conservative promarket rhetoric against the professions and left-wing distrust of elites.¹³ Legal futurism is presented as more than merely a dictate of an increasingly competitive market for professional services. Rather, it is praised as normatively desirable, a “new form of law” that “will emerge to provide all of the benefits of both rules and standards without the costs of either.”¹⁴

Legal futurists tend to present the reduction of legal obligations to computer code as a positive evolutionary step toward the realization of the rule of law.¹⁵ Human attorneys can err about facts or misrepresent precedent; human judges may be influenced by extraneous factors or bias.¹⁶ Automators of law thus tend to see their work as one more step toward elevating the legal system above the fallibility of any particular person within it.¹⁷ One literal way of achieving the oft-quoted ideal, “a rule of law, not of men,” is to dispense altogether with persons implementing or interpreting law.¹⁸ For example, an unappealable fine imposed by a red-light camera and automatically de-

11 See SUSSKIND & SUSSKIND, *supra* note 7, at 66–67.

12 See, e.g., 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, 939–41 (2013) (discussing predictive technologies used in patent litigation).

13 For conservative rhetoric, see John O. McGinnis, *Machines v. Lawyers*, CITY J. (2014), <https://www.city-journal.org/html/machines-v-lawyers-13639.html> [<https://perma.cc/KZL9-SCPE>] (claiming that the “innovators driving our computational revolution . . . [are] likely to shape a politics more friendly to markets”). For left-wing suspicion of professionals as elites, see MAGALI SARFATTI LARSON, *THE RISE OF PROFESSIONALISM* 3 (1977) (claiming that legal services are “almost exclusively reserved to the small literate elites on whom the specialists depend for their existence”).

14 Anthony J. Casey & Anthony Niblett, *The Death of Rules and Standards*, 92 IND. L.J. 1401, 1403 (2017).

15 See Anthony D’Amato, *Can/Should Computers Replace Judges?*, 11 GA. L. REV. 1277, 1300–01 (1977) (presenting computerization as a path to a more “determinable legal system”).

16 See, e.g., Ozkan Eren & Naci Mocan, Abstract, *Emotional Judges and Unlucky Juveniles* (Nat’l Bureau of Econ. Research, Working Paper No. 22611, 2016), <http://www.nber.org/papers/w22611.pdf> [<https://perma.cc/S9F6-BPWB>] (finding that unexpected losses in “football games played by a prominent college team in the state . . . increase disposition (sentence) lengths assigned by judges during the week following the game”). This Article discusses how sophisticated legal systems should address these kinds of biases. See *infra* Part III.B.

17 See J.C. Smith, *Machine Intelligence and Legal Reasoning*, 73 CHI.-KENT L. REV. 277, 278 (1998) (“From the perspective of the lawyer, we have the concept of *the rule of law*, as contrasted with *the rule of persons*; thus, in some sense separating the legal conceptual process from the human.”).

18 Margaret Jane Radin, *Reconsidering the Rule of Law*, 69 B.U. L. REV. 781, 781 (1989)

ducted from a motorist's bank account would amount to pure automation of law, unaffected by any particular decisionmaker's bias.

Of course, this approach merely shifts personal responsibility from attorneys, regulators, and judges to those coding their would-be replacements. Until some "master algorithm" can code its own progeny, human beings will always be responsible for legal determinations.¹⁹ In order for legal automation to truly respect rule of law principles, the adage "a rule of law, not of men" must be complemented by a new commitment—to a "rule of persons, not machines."²⁰ Without attributing algorithmic judgments and interpretations to particular persons and holding them responsible for explaining those judgments, legal automation will undermine basic principles of accountability.

This Article describes how language is often constitutive of law and legal judgments. Language does not merely represent one of many forms the law can take but is the only form capable of realizing foundational rule of law principles. Recognition of this power of language should guide the future of legal automation. This recognition also balances the emerging discourse of legal futurists by articulating what is lost when society cedes more aspects of the authoritative articulation of rights and duties to computational processes.

Substitutive legal automation is designed to replace, rather than merely aid, attorneys.²¹ Part I explores three areas where substitutive legal automation has become widespread: software that now prepares millions of Americans' taxes, firms like LegalZoom that draft wills and contracts based on computerized interactions with customers, and chatbots like DoNotPay that guide users through challenges to park-

(explaining that "[t]he ideal of 'the rule of law, not of men' calls upon us to strive to ensure that our law itself will rule (govern) us, not the wishes of powerful individuals" (footnote omitted)).

¹⁹ The leading academic treatment of the possibility of such automation is found in PEDRO DOMINGOS, *THE MASTER ALGORITHM* 12–20 (2015) (discussing how integration of five schools of machine learning may lead to rapid advances in computing).

²⁰ The shift from "men" to "persons" reflects Radin's rationale for making a similar move in her classic article on the rule of law:

For obvious reasons, because I am considering the Rule of Law in today's context, I shall rephrase the ideal as 'the rule of law, not of individuals.' Yet we must not forget that when the ideal developed, and during most of its long history, it was inconceivable that any individuals who were not 'men' could be a part of political life.

Radin, *supra* note 18, at 781 n.1.

²¹ In contrast, complementary legal automation, like search engines or word processing software, merely assists attorneys. Cf. WILLIAM J. BAUMOL & ALAN S. BLINDER, *ECONOMICS* 120 (13th ed. 2016) (describing complements and substitutes as fundamental economic categories to indicate the effect of one good or service on the value of others).

ing tickets. Each of these legal technologies democratizes access to information. They can, however, also mislead users about their rights and duties while foreclosing opportunities for compensation for this harm via restrictive terms of service. The language of law is both richer and more treacherous than these simple programs present.

Despite these and similar problems with current, modest efforts to substitute technology for attorneys, both computer scientists and legal scholars have promoted even more ambitious programs of substitutive automation. Part II describes three of these initiatives and their shortcomings. In each case, legal problems that appear at first merely to require a simple translation of language into computer code turn out to hinge on far more complex social and political relationships. The flexibility and openness of language enables the type of improvisation necessary to maintain those relationships. Nevertheless, many legal futurists still promote a vision of self-executing law embedded in code as the ultimate goal of legal technology.

Part III proposes an alternate approach: technology as a tool to complement attorneys' skills, rather than substitute for them. Drawing on the distinction between artificial intelligence and intelligence augmentation common in research on human-computer interaction, it promotes principles for complementary (rather than substitutive) legal automation. A complementary approach not only promises to serve clients better, but also to realize rule-of-law values more fully.

Law is a complex and variegated domain that includes services ranging from the humblest administrative processes to the highest stakes of imprisonment and freedom. So, it should come as no surprise that the use of software and robots to draft, interpret, and enforce laws has varying degrees of acceptability, depending on the context. Obtaining a fishing license with a chatbot makes sense, and we should expect to see more and better examples of such "civic tech" in coming years.²² On the other hand, even the most enthusiastic boosters of legal automation do not want to see prison sentences handed down by robot judges or juries. More difficult questions arise between these two extremes, discussed in the next Part.

These apps fill a gap in the legal-services market. In general, the worse a human performs a job presently, the better a robot looks in

²² Civic tech can be defined as the use of technology by governments to promote positive interactions among citizens themselves, and between citizens and their state. MAYUR PATEL ET AL., *THE EMERGENCE OF CIVIC TECH* 6–7 (2013); see also Michael Halberstam, *Beyond Transparency: Rethinking Election Reform from an Open Government Perspective*, 38 SEATTLE U. L. REV. 1007, 1009–10 (2015) (discussing Open Government movement to increase transparency).

comparison. For the average American citizen, quotidian interactions with legal authorities can range from the annoying to the cringe-inducing. Car registration, income tax calculation, application for financial aid—each can easily descend into confusing labyrinths of texts, punctuated with unsatisfactory interactions with rude and overworked bureaucrats. Software and app makers are now trying to ease that burden with innovative approaches to serving customers. Each of these interventions, however, has unexpected consequences which limit their value.

I. CURRENT APPLICATIONS OF SUBSTITUTIVE LEGAL TECHNOLOGY

The most promising versions of legal automation are targeted at people who need and deserve—but cannot afford—an attorney. For example, in many low-income neighborhoods, thousands of children have juvenile records for crimes like selling marijuana or vandalism.²³ States recognize that the resulting records should not haunt persons after they become adults, and almost all have adopted some version of a process called expungement to seal such records.²⁴ Attorneys can usually arrange for an expungement relatively quickly, but not everyone has access to a lawyer. Therefore, public interest attorneys and technologists have developed apps like ExpungeMaryland (designed for Maryland residents) to automate much of the process of seeking a simple expungement.²⁵

Unfortunately, once legal questions become more complex than resolving whether and when a criminal record eligible for expungement exists, software-based approaches can easily falter. This Section explores the complexity of using computer code to translate requirements of legal code in ways understandable to laymen.

²³ See Michael Pinard, *Criminal Records, Race and Redemption*, 16 N.Y.U. J. LEGIS. & PUB. POL'Y 963, 967–68 (2013).

²⁴ See Amy Shlosberg et al., *Expungement and Post-Exoneration Offending*, 104 J. CRIM. L. & CRIMINOLOGY 353, 356 (2014).

²⁵ See Tyler Waldman, *Why ExpungeMaryland.org is Helping People Erase Their Criminal Records*, TECHNICALLY BALTIMORE (July 25, 2014, 8:29 AM), <http://technical.ly/baltimore/2014/07/25/expungemaryland-expunge-erase-criminal-records-baltimore/> [https://perma.cc/84HX-746Y]. On its website, the service is currently billed as a “free online tool” and provides next steps, which may include working with a lawyer. EXPUNGEMARYLAND, <http://www.expungemaryland.org/> [https://perma.cc/XUB5-KBPT].

A. Automating Tax Preparation

At tax time, Americans have long used software programs to calculate their income tax liability. TurboTax was established in the 1980s and has become ever more dominant in the past few decades.²⁶ The U.S. Internal Revenue Code is over 72,000 words; the IRS can generate hundreds or thousands of words of instructions for filling out single lines of return forms.²⁷ TurboTax translates the welter of tax law into a series of questions. For users with simple returns, the software is strikingly easy to use. For those with more complex ones, it can be more trying—but is almost certainly easier to use than trying to figure out one's liability alone.

For its customers, the days of filling out tax forms with paper and pencil are over.²⁸ TurboTax has saved U.S. taxpayers countless hours in tax preparation time. The company's success, however, is not an entirely positive story. It provides some early warning signs as other forms of legal automation enter the limelight.

First, for most citizens, tax returns are simple. One of America's leading tax experts, William Gale, has estimated that the government could easily calculate the tax due from "non-itemizers," that is, people who take a standard deduction rather than specifically claiming expenditures like a mortgage-interest deduction or moving expenses.²⁹ The IRS could base its annual bill on information already provided to

²⁶ See Richard P. Weber, *TurboTax*, 86 J. AM. TAX'N ASS'N 86, 86 (1986) (reviewing the software); Meg Miller, *How TurboTax Used Design to Win the Tax Wars*, FAST COMPANY (Mar. 30, 2016), <https://www.fastcompany.com/3056784/how-turbotax-used-design-to-win-the-tax-wars> [<https://perma.cc/5C8Y-MEJE>] (comparing TurboTax's sixty-percent market share to nine percent for the next competitor).

²⁷ See JEFFREY A. WINTERS, OLIGARCHY 223 (2011) (describing the complexity of the code as an outgrowth of interest-group politics).

²⁸ See IRS, FILING SEASON STATISTICS FOR WEEK ENDING DEC. 25, 2015, <https://www.irs.gov/uac/newsroom/filing-season-statistics-for-week-ending-december-25-2015> [<https://perma.cc/XPQ7-FCX9>]. IRS statistics only show the breakdown for e-filed returns, which constitute 85.5% of all returns. *Id.* Of those, in 2015, 39% were self-prepared and 61% prepared by tax professionals. *Id.* Of the paper returns submitted, there is no information about how many of those were generated by software.

²⁹ See William G. Gale, *Remove the Return*, in TOWARD TAX REFORM: RECOMMENDATIONS FOR PRESIDENT OBAMA'S TASK FORCE 41–42 (2009) (estimating that 60 million filers are non-itemizers); Liz Day, *How the Maker of TurboTax Fought Free, Simple Tax Filing*, PROPUBLICA (Apr. 14, 2016), <https://www.propublica.org/article/how-the-maker-of-turbotax-fought-free-simple-tax-filing> [<https://perma.cc/VUQ5-S7JV>] ("Advocates say tens of millions of taxpayers could use such a system each year, saving them a collective \$2 billion and 225 million hours in prep costs and time, according to one estimate."); Austan Goolsbee, *The Simple Return: Reducing America's Tax Burden Through Return-Free Filing*, BROOKINGS INSTITUTION (2006), <http://www.brookings.edu/research/papers/2006/07/useconomics-goosbee> [<https://perma.cc/BWM7-LS88>] (proposing a "Simple Return" for those who take standard deductions).

it by employers and give individuals the choice to either accept that tax or try filing their own returns.³⁰ Gale and other advocates pressed the IRS to offer this option to non-itemizers.³¹ Sensing a threat to its business model, TurboTax fought back.³² It spent millions of dollars lobbying against the proposal, even stirring up so-called “grassroots” opposition via a public relations firm.³³ The legal automatons beat back the proposal, demonstrating that high-technology firms can have a vested interest in keeping things complicated enough to assure steady demand for their services.

The mere availability of software like TurboTax may have other troubling effects on legislators. According to Lawrence Zelenak, when tax returns were primarily done on paper, “Congress did not impose income tax provisions of great computational complexity on large numbers of taxpayers, in the belief that it was unreasonable to require average taxpayers (or their paid preparers) to struggle with” such details.³⁴ Zelenak argues that tax-return-preparation software eliminated that “complexity constraint,” freeing legislators to impose ever more baroque provisions.³⁵ Interacting provisions governing credits, deductions, exclusions, and the alternative minimum tax make the resulting income tax a “black box” for many of those using software—and nearly impossible to figure out for those who want to continue with manual preparation.³⁶ That evolution might be a positive one if legal complexity clearly served positive social goals. But for Zelenak, the opposite is the case; he believes the computationally complex provisions of the tax code “generally constitute bad tax policy.”³⁷

Both TurboTax’s lobbying and the rise of computational complexity in the tax code embody an enduring problem in automation. Technologists cannot assume that computational solutions to one problem

³⁰ See Gale, *supra* note 29, at 41–42.

³¹ See, e.g., Internal Revenue Service Restructuring and Reform Act of 1998, Pub. L. No. 105-206, § 2004, 112 Stat. 685, 726 (requiring the Secretary of the Treasury to “develop procedures for the implementation of a return-free tax system” by 2008); Gale, *supra* note 29, at 42–43.

³² See Day, *supra* note 29.

³³ Liz Day, *TurboTax Maker Linked to ‘Grassroots’ Campaign Against Free, Simple Tax Filing*, PROPUBLICA (Apr. 14, 2014), <https://www.propublica.org/article/turbotax-maker-linked-to-grassroots-campaign-against-free-simple-tax-filing> [<https://perma.cc/6X4L-3VH9>].

³⁴ Lawrence Zelenak, *Complex Tax Legislation in the TurboTax Era*, 1 COLUM. J. TAX L. 91, 91 (2010).

³⁵ *Id.* at 93.

³⁶ *Id.* at 91, 102, 118 (“As return preparation software gradually replaced the pencil, the complexity constraint weakened and eventually disappeared. Congress has responded by imposing unprecedented computational complexity on large numbers of taxpayers.”).

³⁷ *Id.* at 91, 118.

will not affect the scope and nature of that problem. Instead, as technology enters fields, problems change as various parties seek to either entrench or disrupt aspects of the present situation for their own advantage. In the above example, the legal automation firm (TurboTax) helped entrench unnecessary returns, while the government made already-complex tax preparation even more difficult. While TurboTax portrays itself as the taxpayer's inexpensive, efficient, robotic advocate, it is also serving those in government who wish to complicate the tax code.

B. *Providing Forms*

Founded in 2001, LegalZoom leads the field in providing personalized legal forms.³⁸ By 2011, LegalZoom claimed to have served over two million individuals with downloadable forms and internet-mediated walk-throughs of questionnaires and flow charts related to their legal problems.³⁹ LegalZoom does not claim to be offering a lawyer to its users; rather, it claims to be offering "legal information" as a sophisticated series of forms and queries.⁴⁰

The firm has been popular, particularly for those looking to set up companies. Paperwork can be complex, and LegalZoom condenses what could be a lengthy series of meetings with attorneys into a three-step process.⁴¹ In many cases, there is a two-step process. First, the program asks users to answer a series of questions.⁴² Then, LegalZoom employees review answers for "consistency and completeness."⁴³ Once these workers have reviewed the answers given, the program prints the form and sends it to the user, along with instructions

³⁸ LEGALZOOM.COM, INC., AMENDMENT NO. 1 TO REGISTRATION STATEMENT (FORM S-1) 1 (June 4, 2012), <https://www.sec.gov/Archives/edgar/data/1286139/000104746912006446/a2209713zs-1a.htm> [<http://perma.cc/XAL5-WUVS>].

³⁹ Lauren Moxley, Note, *Zooming Past the Monopoly: A Consumer Rights Approach to Reforming the Lawyer's Monopoly and Improving Access to Justice*, 9 HARV. L. & POL'Y REV. 553, 557-58 (2015); see also Catherine J. Lanctot, *Does Legalzoom Have First Amendment Rights?: Some Thoughts About Freedom of Speech and the Unauthorized Practice of Law*, 20 TEMP. POL. & C.R. L. REV. 255, 257 (2011); LEGALZOOM, <https://www.legalzoom.com/> [<http://perma.cc/FZJ7-DV53>].

⁴⁰ See Moxley, *supra* note 39, at 554 ("LegalZoom is able to keep costs low by producing much of its work through automated generation and review by non-lawyers. . . . [I]t characterizes its services as the dissemination of 'legal information,' which non-lawyers are permitted to do, as opposed to the dispensation of 'legal advice,' which would constitute the unauthorized practice of law" (footnotes omitted)).

⁴¹ See *id.* at 557.

⁴² *Id.*

⁴³ *Id.* (citation omitted).

on how to execute the necessary formalities for the document to have legal effect.⁴⁴

Whatever the qualifications of these employees, the questionnaire process itself can be partial or problematic.⁴⁵ As of 2015, one could go through the estate-planning-questionnaire process without any prompting about the special complexities raised by the savings vehicle where many Americans' non-home assets are—employer-sponsored retirement savings accounts.⁴⁶ In many cases, a will does not control the distribution of those assets at their owner's death; rather, that is the job of a document memorializing the account owner's designation of beneficiaries.⁴⁷ This is not merely a speculative concern. As the *Wall Street Journal* has reported, some family members are surprised by the ultimate disposition of assets from 401(k) plans and individual retirement accounts (“IRAs”).⁴⁸ “That’s where most of the wealth in America ends up,” said a certified public accountant, “[b]ut what most people don’t realize is it’s surrounded by this complex labyrinth of rules.”⁴⁹ Thus, “key questions are not asked, people make mistakes, and many times it involves their life savings.”⁵⁰

⁴⁴ *Id.*

⁴⁵ There is also widespread concern that LegalZoom, a leading form provider, engages in the unauthorized practice of law. *See, e.g.,* *Janson v. LegalZoom.com, Inc.*, 802 F. Supp. 2d 1053, 1055 (W.D. Mo. 2011) (finding that LegalZoom prepares legal documents and “takes over” after customers “answer a few simple online questions”); *LegalZoom.com, Inc. v. N.C. State Bar*, No. 11 CVS 15111, 2014 WL 1213242, at *10 (N.C. Super. Ct. Mar. 24, 2014) (allowing case alleging LegalZoom engages in the unauthorized practice of law); *Assurance of Discontinuance, In re LegalZoom.com, Inc.*, No. 10-2-02053-2 (Wash. Super. Ct. Sept. 15, 2010) (mandating “assurance of discontinuance” of suspect activities); Wendy S. Goffe & Rochelle L. Haller, *From Zoom to Doom? Risks of Do-it-Yourself Estate Planning*, 38 *EST. PLAN.*, Apr. 2011, at 27–28 (discussing the risks of missing particular local law requirements); Pierce G. Hunter, Note, *Constitutional Law—Unauthorized Practice of Law: Driving Legal Business Without a License, LegalZoom, Inc., and Campbell v. Asbury Automotive, Inc.*, 2011 *Ark. 157*, 381 *S.W.3d 21*, 36 *U. ARK. LITTLE ROCK L. REV.* 201, 202 (2014) (discussing that a fiduciary duty, and thus liability, attaches to common business practice of charging a fee for completing standard legal documents). *But see* *Medlock v. LegalZoom.Com, Inc.*, No. 2012-208067, 2013 S.C. LEXIS 362, at *13 (Oct. 18, 2013) (finding that LegalZoom’s services “do not constitute the practice of law”).

⁴⁶ Screenshots of the questionnaire are on file with the author. For documentation of prevalence of retirement accounts, see Carolyn T. Geer, *Investing in Funds: A Monthly Analysis—Family Feuds: The Battles over Retirement Accounts—Who’s in Line to Get Your Account or That of a Parent or Spouse—In Case of Death? You Could Be Surprised*, *WALL ST. J.*, Sept. 7, 2011, at C9 (“IRAs and 401(k)s now account for roughly 60% of the assets of U.S. households with at least \$100,000 to invest.”).

⁴⁷ *Id.*

⁴⁸ *See id.*

⁴⁹ *Id.*

⁵⁰ *Id.*

Presumably, once this issue is brought to the attention of a bureaucrat at a high enough level within LegalZoom, the software will be amended to reflect the important role of beneficiary forums. The firm cultivates user forums to ventilate such concerns. The work of these forums is controversial. Internet boosters like Clay Shirky characterize them as a form of charity or a new form of community building.⁵¹ Others call forum commenting a form of “shadow work” creeping in to the experience of those who answer questions, and a degradation of quality of service for those who, lacking real experience of a qualified accountant or tax lawyer, may have no sense of what they are missing.⁵²

Business experts offer plans on how to psychologically reward contributors (since investors are wary of any fixed labor costs). “Gamification” is one easy answer—offering answerers points and publicly posting their ranking relative to other would-be helpers.⁵³ For Amazon’s top reviewers, the system has brought microcelebrity status.⁵⁴ For others, the rewards are less clear.⁵⁵ But what should be obvious is the shifting role of artificial intelligence (“AI”) in these scenarios. TurboTax or LegalZoom forums are very often not answering tough legal questions. Rather, the key automation technology here is a form of management which uses marketing and other tactics to draw individuals to offer their “expertise” for free—and to encourage users to rely on such “expertise” with no assurance it is correct.

C. *Contesting Parking Tickets*

Red-light cameras are one version of robotic law enforcement. All that is necessary for the robot to enforce traffic law is a simple set of rules declaring that any person who owns a car that passes under a light when it is red shall be fined a certain amount and possibly lose his or her license to operate the car.⁵⁶ What if the owner wasn’t the

⁵¹ See CLAY SHIRKY, *COGNITIVE SURPLUS* 143–44, 155–59 (2010).

⁵² See, e.g., CRAIG LAMBERT, *SHADOW WORK* 201–50 (2016) (discussing shadow work on the internet, such as offering free information through customer reviews that may be monetized through, for example, Zagat guides).

⁵³ KEVIN WERBACH & DAN HUNTER, *FOR THE WIN: HOW GAME THINKING CAN REVOLUTIONIZE YOUR BUSINESS 2* (2012).

⁵⁴ See, e.g., JOSEPH M. REAGLE, JR., *READING THE COMMENTS* 54 (2015) (describing super-reviewer Grady Harp).

⁵⁵ See *id.* (describing the going rate for reviews as \$5 to \$20).

⁵⁶ See Andrea M. Franklin, *Police Powers for Sale: Red-Light Enforcement Sold to the Foreign Bidder*, 8 FLA. INT’L U. L. REV. 137, 172–73 (2012); Jeffrey A. Parness, *Beyond Red Light Enforcement Against the Guilty but Innocent: Local Regulations of Secondary Culprits*, 47 WILLAMETTE L. REV. 259, 262 (2011); see also William D. Mercer, *At the Intersection of Sover-*

person driving? Add in a facial-recognition subroutine and higher-resolution video cameras connected to the red-light camera. Advocates of robotic law enforcement envision even finer-grained systems of social control embedded, ambiently, into roads, sidewalks, and other features of daily life.⁵⁷

Nevertheless, these steps toward the automation of traffic law merit some skepticism. Consider, for example, the verification of medical emergencies in the case of the parking-ticket-appeal app. If the city simply accepts any appeal, bad actors may take advantage of the app eventually. Parking authorities can order audits. In some areas, like healthcare fraud, big data and predictive analytics have made it much easier to expose cheaters.⁵⁸ But the auditing process seems to rely upon some form of human interaction and expertise.

For hardcore legal futurists, though, even audits could be automated. It is all a matter of piggybacking new technical systems on old patterns of monitoring and data exchange. Many states already require versions of computerized physician order entry (“CPOE”); digital health records have become widespread.⁵⁹ Any given visit to a doctor may generate a unique visit identifier or time-stamped barcode that could, in turn, be deployed as verification in any number of scenarios: an excuse from work, a parking emergency, or a claim for insurance. The scope and intensity of automation crucially depends on coordination among healthcare providers, employers, insurers, and many other entities in developing machine-readable, verifiable records of behavior that have some legal import.

Moreover, even a technical innovation as pedestrian as the red-light camera has sparked both constitutional and legal challenges. For example, one author has argued that the cameras violate fundamental constitutional principles of due process and the right of defendants to confront their accusers.⁶⁰ These challenges have, so far, largely failed in courts that are eager to accelerate the resolution of what they per-

eignty and Contract: Traffic Cameras and the Privatization of Law Enforcement Power, 43 U. MEM. L. REV. 379, 403–08 (2012) (describing traffic-camera contracts and sovereignty of the state).

⁵⁷ Mireille Hildebrandt, *A Vision of Ambient Law*, in REGULATING TECHNOLOGIES 175, 187 (Roger Brownsword & Karen Yeung eds., 2008) (describing pervasive monitoring and regulation via landscapes and buildings saturated with sensors, processors, and actuators).

⁵⁸ See FRANK PASQUALE, *THE BLACK BOX SOCIETY* 150–53 (2015); Frank A. Pasquale, *Private Certifiers and Deputies in American Health Care*, 92 N.C. L. REV. 1661, 1676–77 (2014).

⁵⁹ See Pasquale, *Private Certifiers and Deputies in American Health Care*, *supra* note 58, at 1670–72 (discussing the use of electronic health records).

⁶⁰ Joel O. Christensen, Note, *Wrong on Red: The Constitutional Case Against Red-Light Cameras*, 32 WASH. U. J.L. & POL'Y 443, 446 (2010).

ceive to be relatively minor disputes.⁶¹ Nevertheless, public outrage about red-light cameras has reversed their advance; there are fewer red-light cameras in use today than there were in 2010.⁶²

Is this outrage justifiable? For some civil rights advocates, the answer is a resounding no.⁶³ Camera-driven enforcement can be less likely to be racially biased than traffic stops by police officers.⁶⁴ But there is also ample evidence that algorithmic processes of sentencing and risk assessment can be racially biased.⁶⁵

Another set of problems arises in terms of the power dynamics of this technology adoption. Automation like red-light cameras has been characterized as a troubling form of state power—an unstoppable machine arrayed against ordinary citizens.⁶⁶ For many believers in the power of technology, however, the answer to problems caused by technology is simple: more technology. If the city automates traffic enforcement, then give citizens an application (“app”) for their smartphones to empower a quick and effective challenge when they have been unfairly fined.

A chatbot developer claims that his DoNotPay app has successfully appealed 160,000 parking tickets (out of about 250,000 cases where the app was used).⁶⁷ The DoNotPay app guides individuals

⁶¹ See, e.g., *Jimenez v. State*, 246 So. 3d 219, 230–31 (Fla. 2018) (upholding statute allowing state to contract with third-party vendor to provide red-light cameras).

⁶² See Charles Lane, *Red Light Camera Use Declines After Public Outrage*, NPR (May 23, 2016, 4:28 PM), <http://www.npr.org/2016/05/23/479207945/red-light-camera-use-declines-after-public-outrage> [https://perma.cc/QUB6-M4MY].

⁶³ But see, e.g., Marty Katz, *Frown, You're on Red-Light Camera!*, N.Y. TIMES (Oct. 11, 2000), <https://www.nytimes.com/2000/10/11/automobiles/frown-you-re-on-red-light-camera.html> [https://perma.cc/LD6G-3TM5] (describing the American Civil Liberties Union concern with “mission creep” and use of data collected).

⁶⁴ See Anupam Chander, *The Racist Algorithm?*, 115 MICH. L. REV. 1023, 1027 (2017) (discussing how automation can reduce discrimination). See generally Robert J. Eger III et al., *The Policy of Enforcement: Red Light Cameras and Racial Profiling*, 18 POLICE Q. 397 (2015).

⁶⁵ See, e.g., Sonja B. Starr, *Evidence-Based Sentencing and the Scientific Rationalization of Discrimination*, 66 STAN. L. REV. 803, 838 (2014) (describing the racial consequences of automatically calculated sentencing risk scores having disparate impacts on minorities); Julia Angwin et al., *Machine Bias*, PROPUBLICA (May 23, 2016), <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing> [https://perma.cc/3ZU9-Q84D] (describing flawed results of risk assessment algorithm).

⁶⁶ See Frank Pasquale, *Paradoxes of Privacy in an Era of Asymmetrical Social Control*, in *BIG DATA, CRIME, AND SOCIAL CONTROL* 32, 32–35 (Aleš Završnik ed., 2018); Jathan Sadowski & Frank Pasquale, *The Spectrum of Control: A Social Theory of the Smart City*, 20 FIRST MONDAY 1, 6–8 (2015).

⁶⁷ Samuel Gibbs, *Chatbot Lawyer Overturns 160,000 Parking Tickets in London and New York*, GUARDIAN (June 28, 2016, 6:07 AM), <https://www.theguardian.com/technology/2016/jun/28/chatbot-ai-lawyer-donotpay-parking-tickets-london-new-york> [https://perma.cc/Z5WT-R8BK]; see also Kelly Phillips Erb, *Are We Ready for Robot Lawyers?*, PA. LAW. (May/June

through potential appeals of parking tickets.⁶⁸ For drivers in New York, the app suggests that a medical emergency can exempt a car owner from a parking ticket.⁶⁹ If a similar exemption governs red lights, when there are no other automobiles in sight, we can envision not merely the robotization of aspects of traffic and parking law but also the complementary automation of appeals against violations.

The automation of such appeals is still in its early stages. It could lead to the same dynamics now afflicting tax: a technology-enabled turn toward complexity and micro-enforcement. The more apps like DoNotPay become widely known, the more bad actors are likely to misuse them and lie about the actual circumstances of their ticketing. That will, in turn, motivate even more pervasive surveillance of city streets to monitor the exact situation that led to the ticket in any given case. Municipalities are already automating many other services; they have replaced so-called “meter maids” with robotics and internet-of-things (“IoT”) sensors that tend toward perfect enforcement of the law.⁷⁰

Citizens may be lulled into accepting such a state of affairs by assuming that the same technological advances that aid law enforcement will also help them combat unfair or unwise applications of laws. Technologists are now beginning to claim that there is *no* difference between their software and personal legal expertise. Journalists push the DoNotPay app as a “chatbot lawyer,”⁷¹ and the DoNotPay first page stated in 2016, “DoNotPay has launched the UK’s first robot lawyer as an experiment. It can talk to you, generate documents and

2016), http://bt.e-ditionsbyfry.com/article/Legal_Tech/2461447/298785/article.html [https://perma.cc/8R8U-W5B6]. Often citizens who meticulously filled out the forms generated by the chatbot were the ones who did the bulk of the work to reverse the tickets, but media accounts tend to give credit to coders alone. See, e.g., *id.*

⁶⁸ See Tim Cushing, *Chatbot Helps Drivers Appeal over \$4 Million in Bogus Parking Tickets*, TECHDIRT (July 1, 2016, 2:09 PM), <https://www.techdirt.com/articles/20160628/17163834853/chatbot-helps-drivers-appeal-over-4-million-bogus-parking-tickets.shtml?threaded=true> [https://perma.cc/W8MH-VVET]; Danielle Furfaro, *College Kid’s Website Can Get You Out of Parking Tickets*, N.Y. POST (June 28, 2016, 6:17 PM), <https://nypost.com/2016/06/28/college-kids-website-can-get-you-out-of-parking-tickets/> [https://perma.cc/645B-9CCJ].

⁶⁹ See DoNotPAY, <https://www.donotpay.com/viewbot/596597cbe4dcd1001117e161> [https://perma.cc/A3P4-Q4CA].

⁷⁰ For approaches to improving law enforcement via new technologies of monitoring, see STEPHEN GOLDSMITH & SUSAN CRAWFORD, *THE RESPONSIVE CITY: ENGAGING COMMUNITIES THROUGH DATA-SMART GOVERNANCE* 122–24 (2014) (financial crime); cf. BETH SIMONE NOVECK, *SMART CITIZENS, SMARTER STATE* 209–26 (2015) (discussing big data and crowdsourcing of expertise for smarter governance).

⁷¹ Tim Eigo, *Robots and the Lawyers Who Love Them*, 52 ARIZ. ATT’Y, July/Aug. 2016, at 4.

answer questions. It is just like a real lawyer, but is completely free and doesn't charge any commission."⁷² But a lawyer is obliged to offer the best advice she can and to take responsibility for falling below a certain standard of care.⁷³ Unlike an ethically practicing attorney, DoNotPay has shifted the risk of error to its ostensible clients.⁷⁴ Indeed, DoNotPay goes further; its users "agree to indemnify, defend and hold harmless DoNotPay from any liability, loss, claim and expense, including attorney's fees, related to [their] violation of [its terms of use] or [their] use of the service and information provided at the site."⁷⁵ The magnanimity of DoNotPay's public relations campaign ends here. Unlike a human professional who accepts consequences when things go badly wrong, this "robot lawyer" does not merely refuse to take responsibility, but holds the "client" responsible when its proprietor is harmed by their interaction. App-driven legaltech that eschews such basic duties is not a lawyer, robot or otherwise, no matter how much hype it attracts.⁷⁶

The prevalence of A/B testing in technology firms also militates against the development of ethical-substitutive technology. Just as a physician has a fiduciary duty to conscientiously divide treatment between clinical care and medical experimentation (with a very different set of rules and obligations governing each), a lawyer cannot abide by

⁷² Julie Olmsted, *A Teenager Wants to Replace Lawyers with Robots*, LAWYERIST.COM (Jan. 19, 2016) (citation omitted), <https://lawyerist.com/a-teenager-wants-to-replace-lawyer-with-robots/> [<https://perma.cc/G8SB-S37F>].

⁷³ The American Bar Association's Rules of Professional Conduct provide that lawyers cannot prospectively limit their liability with clients in fear of a malpractice action. In order to make such a contract, the client must be represented by independent counsel and informed about the consequences of such a contract. See MODEL RULES OF PROF'L CONDUCT, r. 1.8(h) (AM. BAR ASS'N 2016) ("A lawyer shall not: (1) make an agreement prospectively limiting the lawyer's liability to a client for malpractice unless the client is independently represented in making the agreement; or (2) settle a claim or potential claim for such liability with an unrepresented client or former client unless that person is advised in writing of the desirability of seeking and is given a reasonable opportunity to seek the advice of independent legal counsel in connection therewith."); see also N.Y. RULES OF PROF'L CONDUCT: RULES AND COMMENTARY r. 1.8(h) (NYCLA Ethics Inst. ed., 2011); *Swift v. Choe*, 674 N.Y.S.2d 17, 18 (App. Div. 1998).

⁷⁴ See *Terms of Service and Privacy Policy*, DONOTPAY, <https://www.donotpay.com/terms/> [<https://perma.cc/35MV-NN87>] ("DoNotPay assumes no liability for any errors or omissions in the information contained in the Service and expressly disclaims any responsibility to update this information.").

⁷⁵ *Id.*

⁷⁶ One also wonders exactly how much DoNotPay adds to existing efforts to expand access to law by firms when entities like Nolo have provided forms for years. See Dashka Slater, *Sue Yourself*, LEGAL AFF. (Sept./Oct. 2003), http://www.legalaffairs.org/issues/September-October-2003/scene_slater_sepoct03.msp [<https://perma.cc/95XP-C7YP>]. DoNotPay has provided forms, while relying on users to apply rules (stated or implied in the forms) to the facts.

rules of professional ethics if she (or software she has written) is testing various legal strategies on clients without letting them know the nature of the experimentation. These principles of human-subjects research, while often primarily associated with the medical field, have wider application.⁷⁷

II. PLANS FOR FUTURE SUBSTITUTIVE LEGAL AUTOMATION

The most widespread examples of substitutive legal automation exist in the consumer sphere, in fields like tax, will preparation, and traffic disputes. Even in these relatively sedate areas of practice, they have raised serious ethical concerns about unintended consequences and consumer protection. But on balance, substitutive legal automation in these fields may be a laudable phenomenon when the stakes of a matter are low, and when the chances of mobilization of better alternatives are also minimal. Numerous studies document unmet legal needs among those of low-to-middle socioeconomic status in the United States.⁷⁸ Software may be the only form of advice available to many citizens and even many small businesses.

Early successes in consumer services have inspired a new generation of legal automators to push for businesses and governments to standardize and computerize work once done by attorneys (or other personnel who interpret and apply law).⁷⁹ The promise here is less

⁷⁷ See James Grimmelman, *The Law and Ethics of Experiments on Social Media Users*, 13 COLO. TECH. L.J. 219, 262 (2015); Paul Litton & Franklin G. Miller, *A Normative Justification for Distinguishing the Ethics of Clinical Research from the Ethics of Medical Care*, 33 J.L. MED. & ETHICS 566, 568 (2005); Julian J.Z. Polaris, *Principles over Principals? How Innovation Affects the Agency Relationship in Medical and Legal Practice*, 14 YALE J. HEALTH POL'Y L. & ETHICS 296, 300 (2014).

⁷⁸ See, e.g., Dion Chu, Matthew R. Greenfield & Peter Zuckerman, *Measuring the Justice Gap: Flaws in the Interstate Allocation of Civil Legal Services Funding and a Proposed Remedy*, 33 PACE L. REV. 965, 965–66 (2013) (“Underscoring the extent of this ‘justice gap,’ the [Legal Services Corporation (“LSC”)] concluded in 2009 that: (i) ‘for every client served by an LSC-funded program,’ one had to be turned away because of inadequate resources; (ii) fewer than twenty percent . . . of legal problems encountered by low-income people were addressed by a lawyer; (iii) only one legal aid attorney was available for every 6415 low-income individuals (in contrast, one private attorney was available for every 429 individuals above the LSC-eligible income threshold); and, (iv) state courts were experiencing large increases in the number of unrepresented litigants unable to afford a lawyer.”) (quoting LEGAL SERVS. CORP., DOCUMENTING THE JUSTICE GAP IN AMERICA: THE CURRENT UNMET CIVIL LEGAL NEEDS OF LOW-INCOME AMERICANS 1, 1–2 (2009), https://www.americanbar.org/content/dam/aba/migrated/mar_ketresearch/PublicDocuments/JusticeGaInAmerica2009.authcheckdam.pdf [<https://perma.cc/46PB-ZYEN>]).

⁷⁹ See, e.g., *How the Legal Industry Is Evolving*, STEELCASE (June 2010), <https://www.steelcase.com/research/articles/topics/collaboration/a-new-legal-brief/> [<https://perma.cc/Q8J5-92SF>].

“access to justice” than “reducing legal spending.”⁸⁰ Cost savings are a powerful argument in an era of increasing global competition and declining state revenues. But in many cases, the automation of legal services hides the externalization of cost and risk to customers, citizens, and business rivals. The immediate savings in personnel costs are obvious; the long-term risks are probabilistic, but real. Already documented in extant legal-automation projects, these costs are also foreseeable in idealistic proposals to accelerate the robotization of law.

A. *Requirements Extraction as Privacy Compliance*

For legal futurists, legal processes are essentially algorithmic in nature: data (the facts) are transformed into outputs (a judgment or result) via application of set rules (the law).⁸¹ This model is easiest to imagine in the realm of financial contracts. For example, a contract may require someone to buy 100 shares of stock at \$10 a share from a counterparty if the price of gold falls below \$800 an ounce. If both parties can agree to an authoritative source of data on the price of gold, a way to escrow the shares and the money needed to buy them, and an automated way of enabling the transfer of ownership of the shares once the gold price condition is triggered, the contract is effectively automated.

Dividing transactions into dozens or hundreds of component parts like this may seem like a tempting target for efficiency mavens. The legal world, however, can become intractable once a bit more complexity (such as jurisdictional or constitutional concerns, preemption doctrines, or statutory carve-outs) enters the picture. That is one reason why so much energy is now directed toward legal technology for business-to-business transactions.

For example, teams of programmers and attorneys led by Travis Breaux at the computer science department of Carnegie Mellon University have modeled the problem of compliance with privacy law as one of inputs (data) and outputs (certain restrictions on the scope and extent of data sharing permissible).⁸² Under federal health-privacy

⁸⁰ See, e.g., *Boosting Procurement Efficiency Through Automation*, SYNERGIST.IO (June 29, 2018), <https://synergist.io/procurement-automation/> [<https://perma.cc/97MX-HZJ9>] (automating procurement led to “reduc[ing] legal spending in this area by 75%”).

⁸¹ See David Howarth, *Is Law a Humanity (or Is it More Like Engineering)?*, 3 ARTS & HUMAN. HIGHER EDUC. 9, 11–12 (2004). See generally DAVID HOWARTH, *LAW AS ENGINEERING* 61–73 (2014).

⁸² See Travis D. Breaux et al., *Towards Regulatory Compliance: Extracting Rights and Obligations to Align Requirements with Regulations*, 14 IEEE INT’L REQUIREMENTS ENGINEERING CONF. 49 (2006).

law, a large hospital may enter into over five hundred business-associate agreements with firms ranging from credit card companies to cloud vendors.⁸³ These contracts are designed to specify restrictions on the extent to which personal health information may be transferred from the hospital, as a covered entity, to other entities.⁸⁴

Breaux and his coauthors analyzed regulations and policies, breaking them into constituent semantics (the meaning of particular terms) and syntax (the legally prescribed relations among terms).⁸⁵ They program computers to generate compliance outputs for particular scenarios.⁸⁶ For example, a patient's health record at her primary care physician's office may indicate that the patient has diabetes. Once that data about diabetes is in the relevant database, certain restrictions may be superimposed on it. The data may always be accessible to the patient herself or to other physicians seeking to treat the patient.⁸⁷ This data may only be used for marketing purposes if the patient gives specific consent.⁸⁸

To convert contracts and statutes into computer code, Breaux and affiliated researchers have deployed semantic parameterization, "in which rights and obligations from regulation texts are restated into restricted natural language statements (RNLS), to describe discrete activities."⁸⁹ For example, a regulatory provision requiring that a health care provider must "post the notice for an individual to read" is divided into the subject of the requirement (the health care provider), the action (post), the object (a notice specifying data policies), and a

⁸³ See Frank Pasquale & Tara Adams Ragone, *Protecting Health Privacy in an Era of Big Data Processing and Cloud Computing*, 17 STAN. TECH. L. REV. 595, 618 (2014) ("[L]arge health systems . . . can have as many as 20,000 business associates.").

⁸⁴ See 45 C.F.R. § 160.103 (2017) ("Protected health information means individually identifiable health information: (1) Except as provided in paragraph (2) of this definition, that is: (i) Transmitted by electronic media; (ii) Maintained in electronic media; or (iii) Transmitted or maintained in any other form or medium. (2) Protected health information excludes individually identifiable health information: (i) In education records covered by the Family Educational Rights and Privacy Act, as amended, 20 U.S.C. 1232g; (ii) In records described at 20 U.S.C. 1232g(a)(4)(B)(iv); (iii) In employment records held by a covered entity in its role as employer; and (iv) Regarding a person who has been deceased for more than 50 years." (emphasis omitted)).

⁸⁵ See Breaux et al., *supra* note 82, at 51.

⁸⁶ See Travis D. Breaux & Calvin Powers, *Early Studies in Acquiring Evidentiary, Reusable Business Process Models for Legal Compliance*, 6 IEEE INT'L CONF. ON INFO. TECH. 272,276 (2009).

⁸⁷ See 45 C.F.R. § 164.524 (2017); 45 C.F.R. § 164.506 (2017).

⁸⁸ See 45 C.F.R. § 164.508(a)(3) (2017); 45 C.F.R. § 164.501 (2017).

⁸⁹ Breaux et al., *supra* note 82, at 51. They used this method on three datasets to include their work on the privacy rules in HIPAA. *Id.*

purpose (getting an individual to read the notice).⁹⁰ That purpose has a new set of atomic building blocks: the subject (an individual patient), an action (read), and an object (the notice).⁹¹

Such decomposition of legal requirements into their component parts, coupled with rigorous definitions of the parts, is a valuable pedagogical and research tool. It promotes a careful parsing of legal terms and raises interesting questions about the meaning of terms like “read” and “notice” in a wide variety of settings. It is a helpful way of structuring questions about what a regulation or statute states propositionally. Even a regulation as simple as this posting requirement, however, raises further ambiguities about the meaning of the terms involved. What exactly must be in the notice? When the law specifies that the notice is “for an individual to read,” does that create any obligation on the provider to ensure reading actually occurs? How would that be validated?

To be sure, questions like this do not paralyze the average compliance staff at a hospital or ambulatory surgical center. Notices are drafted, patients sign to indicate that they have read them, and medical care is delivered. But these notices are also tailored to different settings. A notice in a setting with many English-as-a-second-language speakers may only ideally reflect that community’s concerns if it is designed and presented in a way distinct from that dispensed in a place without those demographic characteristics.⁹² A patient may refuse to sign—what then? May the notice requirement be met by an email sent before the patient’s visit, or after? An algorithmic response to each of these eventualities is imaginable and could be programmed into a robotic registration kiosk.⁹³ There is also a fair chance, however, that a person who may resist signing will simply stand before an automated registration kiosk, helpless, before a person at the health care provider assists them. What then?

⁹⁰ *Id.* at 53; 45 C.F.R. § 164.520(c)(2)(iii) (2017) (“If the covered health care provider maintains a physical service delivery site: . . . (B) [it must] [p]ost the notice in a clear and prominent location where it is reasonable to expect individuals seeking service from the covered health care provider to be able to read the notice . . .”).

⁹¹ *Cf.* Breau et al., *supra* note 82, at 54.

⁹² *See* Ari Ezra Waldman, *Privacy, Notice, and Design*, 21 *STAN. TECH. L. REV.* 74, 78 (2018) (discussing the importance of context in understanding and drafting privacy notices).

⁹³ *See* Chia-Fang Chung et al., *Implementation of a New Kiosk Technology for Blood Pressure Management in a Family Medicine Clinic: From the WWAMI Region Practice and Research Network*, 29 *J. AM. BD. FAM. MED.* 620, 629 (2016); Bill Hartlove, *Patient Check-in Kiosk Goes Live at the Johns Hopkins Medical Laboratory @ White Marsh*, *JOHNS HOPKINS MED.: PATHOLOGY BLOG* (Apr. 18, 2014), <http://apps.pathology.jhu.edu/blogs/pathology/patient-check-in-kiosk-goes-live-at-the-johns-hopkins-medical-laboratory-white-marsh> [<https://perma.cc/P9EE-QR4Q>].

The Health Insurance Portability and Accountability Act (“HIPAA”) is complicated enough that it is difficult to imagine how to reduce all of it to software coding.⁹⁴ But HIPAA is only one face of health-privacy law, which also includes state-based common and statutory law. Health-sector businesses now aspire to a multijurisdictional analysis of legal requirements to ensure business compliance for privacy generally.⁹⁵ That would require incorporating, at a minimum, the privacy restrictions of American states, the federal government, and those of other governments where a firm may wish to transfer data.⁹⁶

Breaux’s team also addressed datasets, including “the 100 most frequently occurring semistructured goals mined from over 100 privacy policies.”⁹⁷ The research trajectory is ambitious: Breaux and another coauthor “plan to further validate this methodology, heuristics and patterns within the context of financial regulations and aviation standards to determine its applicability beyond healthcare.”⁹⁸ Privacy and cybersecurity requirements are a key target for such automation.⁹⁹

However, before cost-containing general counsel become too excited about the automation of compliance, they should recognize the limits of this research. Breaux et al. concede that “[w]ithout further validation, it is premature to automate that which is currently performed manually.”¹⁰⁰ Even more troublingly, they concede that “[t]he role of constraints in identifying conflicts between rights and obligations must still be considered. Herein, we only identify trivial conflicts by observing negation and type-similar values in semantic models.”¹⁰¹

⁹⁴ Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191, 110 Stat. 1936 (codified as amended in scattered sections of U.S.C.).

⁹⁵ See, e.g., *Global Health Care Compliance*, ROPES & GRAY, <https://www.ropesgray.com/en/Global-Health-Care-Compliance> [<https://perma.cc/7JVJ-JUSJ>].

⁹⁶ See generally David G. Gordon & Travis D. Breaux, *Reconciling Multi-Jurisdictional Legal Requirements: A Case Study in Requirements Water Marking*, IEEE INT’L REQUIREMENTS ENGINEERING CONF. (2012).

⁹⁷ Breaux et al., *supra* note 82, at 51; see also Jaspreet Bhatia et al., *Mining Privacy Goals from Privacy Policies Using Hybridized Task Recomposition*, 25 ACM TRANSACTIONS ON SOFTWARE ENGINEERING & METHODOLOGY 22:1 (2016).

⁹⁸ Breaux et al., *supra* note 82, at 57.

⁹⁹ A 2012 study shows a framework called “requirements water marking” which is meant for business analysts to “align and reconcile requirements from multiple jurisdictions (municipalities, provinces, nations).” Gordon & Breaux, *supra* note 96, at 1, 5; see also Travis Breaux & Ashwini Rao, *Formal Analysis of Privacy Requirements Specifications for Multi-Tier Applications*, 21 IEEE INT’L REQUIREMENTS ENGINEERING CONF. 14 (2013) (providing methods for analyzing multiple privacy regulations to assist in identifying and resolving conflicts).

¹⁰⁰ Breaux et al., *supra* note 82, at 57.

¹⁰¹ *Id.* Only minor progress has been made on this problem. See, e.g., Travis D. Breaux et al., *Eddy, a Formal Language for Specifying and Analyzing Data Flow Specifications for Conflicting Privacy Requirements*, 19 REQUIREMENTS ENGINEERING J. 281, 281 (2014) (describing

Such conflicts are common in information law. For example, the same firm may be under duties of nonspoliation and preservation (which require data to be maintained) and duties of data minimization (which may include the need to respect customers' or business partners' demands to delete data).¹⁰² Careful management of such conflicts is bread-and-butter work for attorneys, and requires human judgment about the balance of risks involved in any data-retention strategy.¹⁰³

B. *Smart Contracts as Linguistic Robots*

A DVD may only be licensed for play in the United States and Europe, and then be "coded" so it can only play in those regions and not others.¹⁰⁴ Were a person playing the DVD for the user, he might demand a copy of the DVD's terms of use and receipt to see if it was authorized for playing in a given area. Computers need such a term translated into a language they can "understand," or, in another characterization, the legal terms embedded in the DVD (and the environment of the program that runs it) must trigger predictable reactions from the technology that encounters them.¹⁰⁵

These programs lead to predictable frustrations for users. Reactions to digital rights management software range from annoyance to outrage; online forums are full of advice on how to defeat the DVD-

methodology to "detect conflicting privacy requirements within a policy and enable the tracing of data flows within these policies").

¹⁰² See Tania Abbas, Note, *U.S. Preservation Requirements and EU Data Protection: Headed for Collision?*, 36 HASTINGS INT'L & COMP. L. REV. 257, 261–62 (2013); see also Kenneth J. Withers, *Risk Aversion, Risk Management, and the "Overpreservation" Problem in Electronic Discovery*, 64 S.C. L. REV. 537, 538 (2013).

¹⁰³ To be sure, there will continue to be advances in document management and transfer. See, e.g., NAVEX GLOBAL, CEDARS-SINAI HEALTH SYSTEM CURES THE POLICY MANAGEMENT ILLS (2016), <http://www.navexglobal.com/en-us/resources/case-studies/cedars-sinai-health-system-cures-policy-management-ills> [<https://perma.cc/WBP5-HCJ6>] (describing sophisticated document and record management system). Even when document and record management systems advance, however, attorneys and compliance experts are still reviewing and analyzing them. *Id.* at 2 (describing "[a]utomated notification to users with reading, reviewing and approval responsibilities").

¹⁰⁴ See Peter K. Yu, *Region Codes and the Territorial Mess*, 30 CARDOZO ARTS & ENT. L.J. 187, 191 (2012) ("Designed as technological protection measures, DVD region codes direct machines to allow access to the protected content only if the product was coded to be played in the authorized geographic region. The playback control mechanism initiated by these region codes can be found on both DVD players and computers containing DVD-ROM drives.").

¹⁰⁵ See Hiram Meléndez-Juarbe, *DRM Interoperability*, 15 B.U. J. SCI. & TECH. L. 181, 197–98 (2009) (assessing the challenges of creating a DRM system that could encode the complexity of fair use doctrine); Harry Surden, *Computable Contracts*, 46 U.C. DAVIS L. REV. 629, 632 (2012) (describing automatic implementation of contracts); Harry Surden, *Machine Learning and Law*, 89 WASH. L. REV. 87, 106 (2014) (describing limits of automatic or even "learned" responses by computational compliance systems).

zoning software.¹⁰⁶ But to the extent laws articulate simple binaries of easily programmable desiderata, this automation may still have a bright future. For example, if the copyright law of a given country suddenly forbids the playing of certain media in computers, a Legal Requirements Specification Language (“LRSL”) may be hard coded into devices, enabling a centralized authority to simply flip a switch to automate compliance.¹⁰⁷ Such tools can also reformulate certain laws and present them as compliance requirements to a layperson.¹⁰⁸

Parties may also be more willing to enter into contracts if they can be assured of some degree of “automatic,” code-based enforcement.¹⁰⁹ When it comes to simple supply chain management, there is some real promise for smart contracts.¹¹⁰ Imagine, for instance, a ship coming into port with fifty tons of sugar in containers. Assuming that sensors capable of identifying sugar and assaying its weight and quality are deployed, an automated exchange could be devised. In some sense, virtually anyone who shops on Amazon experiences a similarly

¹⁰⁶ See, e.g., Tony Smith, *How to Hack Tesco's DVD Player—Register Readers Write*, REGISTER (Feb. 22, 2000, 2:15 PM), https://www.theregister.co.uk/2000/02/22/how_to_hack_tescos_dvd/ [<https://perma.cc/Q8Q2-TUKM>].

¹⁰⁷ Another one of Breaux's studies promotes the LRSL to cross-reference regulations in different jurisdictions or to cross-reference within a regulation. See Gordon & Breaux, *supra* note 96, at 4. This work is supposed to serve as proof of concept for flexible and evolving coding of legal requirements to ensure that if a given regulation changes, products are accordingly updated to maintain legal compliance.

¹⁰⁸ A 2007 study provided information on Breaux's CERNO tool, which similarly relied on phrase heuristics for analyzing policy and regulations to generate legal compliance outputs. See Nadzeya Kiyavitskaya Nicola Zeni et al., *Extracting Rights and Obligations from Regulations: Toward a Tool-Supported Process*, 22 IEEE/ACM INT'L CONF. ON AUTOMATED SOFTWARE ENGINEERING 429–30 (2007), <https://www.cs.cmu.edu/~breaux/publications/nkiyavitskaya-ase07.pdf> [<https://perma.cc/HPA6-SPRW>]. Another study discusses using the Frame-Based Requirements Analysis Method (“FBRAM”) for analyzing federal regulations to ensure software legal compliance, evidence due diligence, and good faith to comply. See Travis D. Breaux, *Exercising Due Diligence in Legal Requirements Acquisition: A Tool-Supported, Frame-Based Approach*, 17 IEEE INT'L REQUIREMENTS ENGINEERING CONF. 225 (2009), <https://www.cs.cmu.edu/~breaux/publications/tdbreaux-re09.pdf> [<https://perma.cc/V6QN-6NZ3>].

¹⁰⁹ See Joshua A.T. Fairfield, *Smart Contracts, Bitcoin Bots, and Consumer Protection*, 71 WASH. & LEE L. REV. ONLINE 35, 38–39 (2014) (“Smart contracts—automated programs that transfer digital assets within the block-chain upon certain triggering conditions—represent a new and interesting form of organizing contractual activity.” (footnotes omitted)). The concept of a “smart contract” is widely believed to have originated in the work of Nick Szabo. See Nick Szabo, *Formalizing and Securing Relationships on Public Networks*, 2 FIRST MONDAY (1997); Paul Andrew, *Who is Nick Szabo?*, COINCENTRAL (Apr. 15, 2018), <https://coincentral.com/who-is-nick-szabo/> [<https://perma.cc/H4TF-RX8D>].

¹¹⁰ See, e.g., Due.com, *Blockchain Technology Set to Revolutionize the Supply Chain*, NASDAQ (May 4, 2017, 10:23 AM), <https://www.nasdaq.com/article/blockchain-technology-set-to-revolutionize-the-supply-chain-cm784187> [<https://perma.cc/5VWB-DPU2>].

automatic exchange after a “1-click” transaction.¹¹¹ As a former commissioner of the Commodity Futures Trading Commission recently observed, “Where a smart contract’s conditions depend upon real-world data (e.g., the price of a commodity future at a given time), agreed-upon outside systems, called oracles, can be developed to monitor and verify prices, performance, or other real-world events.”¹¹²

When it comes to more complex products, automation of an exchange can run into difficulties. Chickens, for example, might be a more difficult product to assess, or even weigh, than a standardized commodity like sugar. In a classic court case, *Frigalment Importing Co. v. B.N.S. International Sales Corp.*,¹¹³ the litigants disagreed vehemently on what the meaning of the word “chicken” was in a contract. Robotic assessments of physical reality are still delayed and corroded by a lack of data or by the messy complexity of discordant human meanings.¹¹⁴

Therefore, legal automators have focused most of their energy on contracts related to online activity. For example, Oliver Goodenough of Vermont Law School and Mark Flood of the Office of Financial Research have developed the idea of smart contracts as “automatons” for executing deals once financial agreements have been represented computationally.¹¹⁵ Goodenough and Flood argue that “the fundamental legal structure of a well-written financial contract follows a state-transition logic that can be formalized mathematically as a finite-state machine (also known as a finite-state automaton)” where the

¹¹¹ *About 1-Click Ordering*, AMAZON, <https://www.amazon.com/gp/help/customer/display.html?nodeId=201889620> [<https://perma.cc/YB6P-QAAW>].

¹¹² Nicolette Kost De Sevres, Bart Chilton & Bradley Cohen, *The Blockchain Revolution, Smart Contracts and Financial Transactions*, CYBERSPACE LAW., June 2016, at 3, 3. A smart contract is created by encoding the terms of a traditional contract and uploading the smart contract to the blockchain. “Contractual clauses are automatically executed when pre-programmed conditions are satisfied,” and because the transactions are monitored, validated, and enforced by the blockchain, there is no need for a trusted third party, such as an escrow agent. *Id.*

¹¹³ 190 F. Supp. 116, 117 (S.D.N.Y. 1960). See generally Aaron D. Goldstein, *The Public Meaning Rule: Reconciling Meaning, Intent, and Contract Interpretation*, 53 SANTA CLARA L. REV. 73 (2013) (analyzing the problems posed by the traditional rules of contract interpretation).

¹¹⁴ See Karen E. C. Levy, *Book-Smart, Not Street-Smart: Blockchain-Based Smart Contracts and the Social Workings of Law*, 3 ENGAGING SCI., TECH., & SOC’Y 1 (2017). See generally concessions made in *ADVANCES IN KNOWLEDGE REPRESENTATION, LOGIC PROGRAMMING, AND ABSTRACT ARGUMENTATION* (Thomas Eiter, Hannes Strass, Mirosław Truszczyński & Stefan Woltran eds., 2015); *KNOWLEDGE REPRESENTATION FOR HEALTH CARE* (Silvia Miksch, David Riaño & Annette ten Teije eds., 2014).

¹¹⁵ See Mark D. Flood & Oliver R. Goodenough, *Contract as Automaton: The Computational Representation of Financial Agreements 4* (Office of Fin. Research Working Paper No. 15-04, 2015).

“automaton defines the *states* that a financial relationship can be in, such as ‘default,’ ‘delinquency,’ ‘performing,’ etc., and it defines an ‘alphabet’ of events that can trigger state transitions, such as ‘payment arrives,’ ‘due date passes,’” and many more.¹¹⁶

For Goodenough and Flood, a sufficiently automated system could increase both trust and efficiency among contracting parties.¹¹⁷ For example, an airline may promise an insurer that it will pay \$10,000 on the first day of each month in order to purchase an insurance policy that pays out \$100,000 each month the average price of oil is above \$90 a barrel. A contract like this, often called a “derivative,” helps airlines hedge against rises in fuel prices. Goodenough and Flood believe that an automaton could effectively robotize the relationship between the parties.¹¹⁸ The insurer could agree to an automatic transfer of \$100,000 once another computer program indicated that it had calculated the average price of oil that month and confirmed it was below \$90 a barrel. The airline could enable automatic debiting of its bank account when that event occurs. Programmers could also implement rules if, for some reason, the \$10,000 did not come in by midnight of the first day of the month.

The question of consequences for failure to meet the terms of the contract is a difficult one that has major implications for the future of automation in many legal fields. There are always potential excuses—for example, the bank may have failed to transmit the funds, a new employee may have changed the accounts, or the insurer may have altered its own accounts in a way that made it difficult to pay. We all have some intuitive sense of what we would decide to be a fair resolution of any of these situations—or, more to the point, where a contract or statute might refer the dispute.¹¹⁹ But it is a far more formidable task to program that type of insight—let alone the ability to verify the factual predicates of each situation—into a single computer, or even into a network system capable of surveillance of all the parties involved.

That is one reason why a wise programmer may decide simply to kick the dispute over to a panel of human mediators, who could be charged with quickly deciding whether the airline’s excuse for the delayed payment was sufficient to permit it to continue the contract or

¹¹⁶ *Id.* at 2.

¹¹⁷ *See id.* at 14.

¹¹⁸ *See id.* at 3–4.

¹¹⁹ *See generally* Arthur D. Hellman, *Deciding Who Decides: Understanding the Realities of Judicial Reform*, 15 L. & Soc. INQUIRY 343 (1990).

whether the excuse enabled the insurer to terminate it. In other words, humans complementing the automated legal system would likely be the optimal result for all parties involved. We see this pattern repeatedly in the history of automation. For example, a computer first beat a chess grandmaster in the 1990s;¹²⁰ by the mid-2000s, no grandmaster could defeat the best programs.¹²¹ However, a combination of human and machine can defeat the best chess playing machines to this day.¹²² Similar cooperative modes are likely to prove optimal in legal contexts, particularly when the stakes of a dispute are high.¹²³

Nevertheless, regulators have urged (and in some cases required) financial institutions to express their contractual arrangements as code. The U.S. Commodity Futures Trading Commission (“CFTC”) and U.S. Securities and Exchange Commission (“SEC”) staff concluded in a report “that current technology is capable of representing derivatives using a common set of computer-readable descriptions[, which] are precise enough to use both for the calculation of net exposures and to serve as part or all of a binding legal contract.”¹²⁴ That optimism was also reflected in the agencies’ treatment of other securities. For example, the SEC recently finalized a rule requiring providers of some asset-backed securities (“ABSs”) to file “downloadable source code in Python” to reflect the contractual arrangements embedded in the securities.¹²⁵

¹²⁰ See Marina Koren, *When Computers Started Beating Chess Champions*, ATLANTIC (Feb. 10, 2016), <https://www.theatlantic.com/technology/archive/2016/02/when-computers-started-beating-chess-champions/462216/> [<https://perma.cc/3NLJ-7WEQ>].

¹²¹ See Rich Haridy, *2017: The Year AI Beat Us at All Our Own Games*, NEW ATLAS (Dec. 26, 2017), <https://newatlas.com/ai-2017-beating-humans-games/52741/> [<https://perma.cc/S23Y-V5AZ>].

¹²² DIEGO RASSKIN-GUTMAN, *CHESS METAPHORS* 154–62 (Deborah Klonsky trans., 2009).

¹²³ See, e.g., Anthony Sills, *ROSS and Watson Tackle the Law*, IBM (Jan. 14, 2016), <https://www.ibm.com/blogs/watson/2016/01/ross-and-watson-tackle-the-law/> [<https://perma.cc/VF7Q-S5E4>]; Karen Turner, *Meet ‘Ross,’ the Newly Hired Legal Robot*, WASH. POST (May 16, 2016), https://www.washingtonpost.com/news/innovations/wp/2016/05/16/meet-ross-the-newly-hired-legal-robot/?utm_term=.7417ebfe0937 [<https://perma.cc/ZR98-S4AG>].

¹²⁴ SEC. EXCH. COMM’N & COMMODITY FUTURES TRADING COMM’N, *JOINT STUDY ON THE FEASIBILITY OF MANDATING ALGORITHMIC DESCRIPTIONS FOR DERIVATIVES 1* (2011), <http://www.sec.gov/news/studies/2011/719b-study.pdf> [<https://perma.cc/DRY2-VZQK>]. Unfortunately, after considering the vagaries of accounting, securitization, and credit rating described above, it is difficult to credit the SEC’s optimism here. Just as the FDIC’s hypothetical resolution of Lehman “amused many by its naiveté,” the staff appears to be promoting an aspiration as a likely achievement. Stephen J. Lubben, *Resolution, Orderly and Otherwise: B of A in OLA*, 81 U. CIN. L. REV. 485, 485–86 (2012).

¹²⁵ Asset-Backed Securities, 75 Fed. Reg. 23,328 (proposed May 3, 2010), <https://www.sec.gov/rules/proposed/2010/33-9117.pdf> [<https://perma.cc/5YCP-9YVN>]. This rule was finalized

Despite that regulatory advance, requiring “filing of a waterfall computer program of the contractual cash flow provisions of the securities” remains an “outstanding” proposal for the SEC.¹²⁶ On first glance, this forbearance is puzzling—uncertainties about cash flows in ABS’s helped spark the financial crisis of 2008, one of the main motivations behind the Dodd-Frank Act, which required the SEC to better monitor the ABS market.¹²⁷ The agency’s reticence, however, reflected valid concerns among commenters representing financial institutions. For example, J.P. Morgan complained that “[e]ach ABS transaction has its own distinct characteristics” and it would be expensive and of questionable utility to reduce each new one to Python code.¹²⁸ AmeriCredit bluntly stated that it “should not be forced to predict and therefore program every possible slight iteration of all waterfall payments” because its firm “runs a business that purchases and services automobile loans, not a software development business.”¹²⁹ UBmatrix expressed the view that programming obligations were not superior, in either accuracy or transparency, to simply writing them in text.¹³⁰

A common theme animated comments on the proposal for the automation of cash flows in asset-backed securities. The SEC was promoting a one-size-fits-all requirement of translating legal agreements into software, while market realities precluded such standardization—or made it too expensive to be practicable.¹³¹ The ensuing barriers to

June 22, 2016. Asset-Backed Securities Disclosure and Registration, 17 C.F.R. §§ 229–230, 239, 249 (2018).

¹²⁶ Asset-Backed Securities Disclosure and Registration, 79 Fed. Reg. 57,184, 57,190 (Sept. 24, 2014) (codified at 17 C.F.R. pts. 229, 230, 232, 239, 240, 243, and 249); *see also* Asset-Backed Securities, 75 Fed. Reg. at 23,328 (the rule as previously proposed in 2010).

¹²⁷ *See* 15 U.S.C. § 78o-7 (2012); 17 C.F.R. § 230.190 (2017); 17 C.F.R. § 230.193 (2017).

¹²⁸ J.P. Morgan Chase & Co., Comment Letter on Proposed Rule on Asset-Backed Securities (Oct. 4, 2011), <https://www.sec.gov/comments/s7-08-10/s70810-213.pdf> [<https://perma.cc/ZD93-2GAK>].

¹²⁹ AmeriCredit Corp., Comment Letter on Proposed Rule on Asset-Backed Securities (Aug. 2, 2010), <https://www.sec.gov/comments/s7-08-10/s70810-128.pdf> [<https://perma.cc/3NVJ-LSKL>].

¹³⁰ *See* UBmatrix, Inc., Comment Letter on Proposed Rule for Asset-Backed Securities (Jul. 31, 2010), <https://www.sec.gov/comments/s7-08-10/s70810-61.pdf> [<https://perma.cc/55LZ-N4A6>] (“[R]eading a prospectus in text is easier and more efficient than deciphering code, particularly if no standards exist around how that code has been developed, or how self-documented that code must be.”).

¹³¹ *See, e.g.*, Committee on Federal Regulation of Securities and Committee on Securitization and Structured Finance of the Section of Business Law of the American Bar Association, Comment Letter on Proposed Rules for Asset-Backed Securities (Aug. 17, 2010), <https://www.sec.gov/comments/s7-08-10/s70810-150.pdf> [<https://perma.cc/9D82-K48Z>] (“[B]ecause ABS transactions frequently are structured during the marketing process to respond to feedback from

computerization here should be a cautionary tale for advocates of legal-process automation who berate the legal profession for providing “bespoke” services when, they say, mass production would do.¹³²

The “bespoke” metaphor does a great deal of rhetorical work that is rarely unpacked by those touting it. A bespoke suit is a luxury, unneeded by most. The very wealthy may get their clothing personally tailored, but the rest of society makes do with ready-to-wear outfits. The simile between clothing manufacture and legal services breaks down in any moderately complex dispute. Anyone can look in the mirror and figure out whether his clothing fits or not. Legal advice is a credence service—it is very hard for the average person to know if he has been well advised.¹³³ Thus we should be cautious when the startup Deftr rolls out its services with the motto, “law is not a Rolex,” and implies that democratized law should be as accessible as personalized time is now—from “a glance at my phone.”¹³⁴ The statements are more reflective of business aspirations and antiworker ideology than a solid read of the legal market.

In both the 1930s and the 1960s, leading economic commentators in the United States predicted permanent mass unemployment thanks to the rise of machine substitutes for workers—exactly the type of

investors as to their specific needs for a security with a particular feature, each new issuance is likely to have unique considerations that will require additional design, programming and maintenance costs associated with software development, as well as a unique asset data file that will have to interface with the program.”).

¹³² See, e.g., RICHARD SUSSKIND, *THE END OF LAWYERS?* 33–36 (2008).

¹³³ See George A. Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488, 488 (1970) (discussing economic models involving trust and uncertain quality); Michael R. Darby & Edi Karni, *Free Competition and the Optimal Amount of Fraud*, 16 J.L. & ECON. 67, 68–72 (1973) (exploring credence goods where quality cannot be evaluated through normal use but only at additional cost); Frank Pasquale, *Beyond Innovation and Competition: The Need for Qualified Transparency in Internet Intermediaries*, 104 Nw. U. L. REV. 105, 154–55 (2010) (“Both search for and carriage of information tend to be ‘credence goods,’ whose value a consumer will have difficulty evaluating even after consuming it.”).

¹³⁴ The Deftr mission statement reads, in part:

The law is not a Rolex.

....

Some Rolexes are meticulously crafted over a period of a year or more. The complexity of mechanism, design and material make up their extraordinary expense, an expense that is well beyond the means of most. . . .

Today this precision and accuracy is available in any boilerplate ten-buck wrist-watch or from a glance at my phone. . . .

We believe that understanding legal rules, properly drafted and interpreted, will not require the approach of a craftsman.

We believe technology will drive that change.

What We Believe, DEFTR, (July 7, 2016), <https://web.archive.org/web/20160831230904/http://thedeftr.com:80/blog/2016/07/07/what-we-believe> [<https://perma.cc/LVP3-Z9E3>].

commoditization some futurists predict and celebrate for attorneys.¹³⁵ Like popular and trade-press articles on “the end of lawyers,” their narrative is a simple one: (1) software programs are getting better at recognizing patterns and even meaning in texts; (2) most of legal practice is primarily about applying rules to factual situations or predicting how the relevant authorities would apply the rules to a situation; (3) computer programmers also apply rules to facts, and as the profession of coding advances, it will take over more and more rule-application scenarios. But even simple scenarios may disclose layers of complexity and uncertainty impossible to properly code into software or forms.¹³⁶

Consider, first, the question of meaning. Legal processes are concerned with explanation and judgment—a very different set of concerns than the predictive modeling and pattern recognition common in most legal automation.¹³⁷ A legal decisionmaker is not simply trying to ensure that some result (liable or not liable, guilty or innocent) matches the results generated by the case documents including patterns of words most similar to the patterns of words in the case documents before the decisionmaker.¹³⁸ Rather, the decisionmaker is assessing the meaning of the facts and the meaning of the law in the

¹³⁵ See AMY SUE BIX, *INVENTING OURSELVES OUT OF JOBS?* 1–3 (2000); DAVID F. NOBLE, *FORCE OF PRODUCTION*, at xii (1984). These concerns focused on manufacturing and some simple service-sector jobs. By the 1980s, advances in artificial intelligence at the time led to a flurry of concern within the legal profession about the substitutability of machine for human judgment. See, e.g., Steve Lohr, *A.I. Is Doing Legal Work. But It Won't Replace Lawyers, Yet.*, N.Y. TIMES (Mar. 19, 2017), <https://www.nytimes.com/2017/03/19/technology/lawyers-artificial-intelligence.html> [<https://perma.cc/D43P-SNJD>]. These concerns subsided for about two decades but are now expressed almost daily on legal blogs.

¹³⁶ See *Bates v. State Bar of Arizona*, 433 U.S. 350, 392 (1977) (Powell, J., concurring in part and dissenting in part) (“Even the briefest reflection on the tasks for which lawyers are trained and the variation among the services they perform should caution against facile assumptions that legal services can be classified into the routine and the unique. In most situations it is impossible—both for the client and the lawyer—to identify with reasonable accuracy in advance the nature and scope of problems that may be encountered even when handling a matter that at the outset seems routine. Neither quantitative nor qualitative measurement of the service actually needed is likely to be feasible in advance.”).

¹³⁷ See generally Kiel Brennan-Marquez, “*Plausible Cause*”: *Explanatory Standards in the Age of Powerful Machines*, 70 VAND. L. REV. 1249 (2017) (distinguishing between intuitively plausible chains of causation and big data pattern recognition in the Fourth Amendment context).

¹³⁸ Pasquale & Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*, *supra* note 2, at 79 (“[There are] potential flaws in many [machine learning]-driven research programs using [natural language processing (“NLP”)] to predict outcomes in legal systems. When such research programs ignore meaning—the foundation of legal reasoning—their utility and social value is greatly diminished. We also believe that such predictive tools are, at present, largely irrelevant to debates in jurisprudence. If they continue to gloss over the question of social

situation. Legal functions that seem routine to a nonlawyer may create scenarios that require policy judgment, wisdom, and a responsibility akin to legislation or governance.¹³⁹

Consider, for instance, a very common problem in the United States chronicled in David Dayen's book, *Chain of Title*.¹⁴⁰ After the financial crisis of 2008, banks were foreclosing on millions of homeowners.¹⁴¹ Many homeowners tried to negotiate for restructuring of their debt, but debt services turned them away.¹⁴² Some homeowners noticed that the entities on the paperwork filed for the foreclosure did not seem to match the paperwork they were sent when their mortgage was sold to a trust in order to complete a mortgage-backed security.¹⁴³ As Dayen chronicles, many of the banks and the trusts holding mortgage-backed securities did not in fact fill out the correct paperwork in order to verify their claim to ownership of the property they were suing for.¹⁴⁴

This was a genuinely difficult dilemma for property law. Lawyers had to rapidly analyze the relevant law and make a novel case for their clients. Moreover, in many states, this was not a situation where homeowners could wait for an app to develop to parse their problems. For example, in New York, foreclosure notices often contained a warning that those served with them had to dispute the ownership of the property by the mortgagee (if they wished to do so) within twenty days of receiving the notice.¹⁴⁵ A minimally competent lawyer working

and human meaning in legal systems, NLP researchers should expect justified neglect of their work by governments, law firms, businesses, and the legal academy.”).

¹³⁹ See JEFFREY LIPSHAW, *BEYOND LEGAL REASONING* 158–62 (2017) (discussing the role of wisdom in law).

¹⁴⁰ DAVID DAYEN, *CHAIN OF TITLE: HOW THREE ORDINARY AMERICANS UNCOVERED WALL STREET'S GREAT FORECLOSURE FRAUD* (2016).

¹⁴¹ See *id.* at 3.

¹⁴² See *id.* at 100.

¹⁴³ This was unsurprising given the rise of “robo-signing” as a fraudulent method of rapidly disposing of foreclosure cases. See Jeff Harrington, *2010 Adds Its Own Terminology to Business Lexicon*, TAMPA BAY TIMES (Dec. 23, 2010, 4:39 PM), <https://web.archive.org/web/20150421073909/http://www.tampabay.com/news/business/2010-adds-its-own-terminology-to-business-lexicon/1141681> [<https://perma.cc/NA2L-WK8V>] (“Robo-sign[ing involves] . . . a back-office system of quickly signing off on foreclosure documents like affidavits without actually doing what the affidavits say was done.”).

¹⁴⁴ See DAYEN, *supra* note 140, at viii–ix.

¹⁴⁵ See N.Y. REAL PROP. LAW § 265-a.8(b) (McKinney 2018) (“The equity purchaser and his or her successor in interest if the successor is not a bona fide purchaser or encumbrancer for value as set forth in paragraph (c) of this subdivision, shall have twenty days after the delivery of the notice in which to reconvey title to the property free and clear of encumbrances created subsequent to the rescinded transaction and which are due to the actions of the equity purchaser.”).

in this field would know that the status of a defense as either jurisdictional or waivable would be a matter of utmost urgency to the client.¹⁴⁶ Sadly, basic terms like these are either unknown or unappreciated by many of the coders now aspiring to computerize legal advice.

Of course, few outside the foreclosure industry would endorse the severity of the twenty-day rule or similar inflexibilities in legal systems. They are noted here to mark the extreme inappropriateness of many aspects of the Silicon Valley–startup mentality in contemporary legal practice.¹⁴⁷ The legal trade press—often funded by advertising dollars from legaltech firms—tends toward blanket characterizations of disruptive firms as a breath of fresh air for a stodgy legal profession.¹⁴⁸ They gloss over the fact that good legal practice is built upon care, meticulousness, and proofreading because mistakes can be irreversible—filings have page limits,¹⁴⁹ many issues not raised at trial cannot be raised on appeal,¹⁵⁰ and in some situations, even “actual innocence” is not enough to spare a wrongfully convicted inmate from the death penalty.¹⁵¹

¹⁴⁶ See Scott C. Idleman, *The Emergence of Jurisdictional Resequencing in the Federal Courts*, 87 CORNELL L. REV. 1, 36 (2011) (“The distinction between subject-matter jurisdiction and waivable defenses is not a mere nicety of legal metaphysics. It rests instead on the central principle of a free society that courts have finite bounds of authority, some of constitutional origin, which exist to protect citizens from . . . the excessive use of judicial power.” (quoting U.S. Catholic Conference v. Abortion Rights Mobilization, Inc., 487 U.S. 72, 77 (1988))).

¹⁴⁷ See KATHERINE LOSSE, *THE BOY KINGS* 38 (2012) (“The hacker’s capacity to surprise—or in Silicon Valley parlance, *disrupt*—is fetishized in the valley as a source of power and profit for tech companies, Facebook among them, which considers its stated ability to ‘move fast and break things’ a core company value.”).

¹⁴⁸ See Sarah Reed, *Lawyer, Disrupt Thyself*, TECHCRUNCH (Mar. 22, 2014), <https://techcrunch.com/2014/03/21/lawyer-disrupt-thyself/> [<https://perma.cc/59Y2-FPYM>]; Michael Skapinker, *Technology: Breaking the Law*, FIN. TIMES (Apr. 11, 2016), <https://www.ft.com/content/c3a9347e-fdb4-11e5-b5f5-070dca6d0a0d> [<https://perma.cc/ZT6R-Q7MX>]; *Who’s a Legal Rebel?*, A.B.A. J., <http://www.abajournal.com/legalrebels/about/> [<https://perma.cc/S4YG-MXDG>]; *Why Legal Disruption is Working*, LINKILAW (Dec. 29, 2015), <http://linkilaw.com/blog/why-legal-disruption-is-working/> [<https://perma.cc/K2HB-9C5C>].

¹⁴⁹ See, e.g., *Westinghouse Elec. Corp. v. NLRB*, 809 F.2d 419, 424–25 (7th Cir. 1987) (fining lawyers personally for exceeding page limits).

¹⁵⁰ See, e.g., *State v. Brown*, 853 P.2d 851, 853 (Utah 1992) (stating that where a trial court makes an error that affects the “substantial rights” of a party and said error is not brought to the attention of the court, the Utah Supreme Court may take notice of the error under Utah Rules of Evidence).

¹⁵¹ See *Herrera v. Collins*, 506 U.S. 390, 417 (1993) (acknowledging that where a persuasive demonstration of actual innocence made after trial would render execution of a defendant unconstitutional, the disruptive effect on the judicial system for entertaining such claims of actual innocence would require overcoming a high threshold to show a right to such a demonstration exists).

C. *Blockchain as a Substitute for Property Recordation*

Bespoke contracts (and regulatory responses to them) are likely to persist in the realm of high finance. Contracts are often too complex and variable, and require too much human judgment, to be reliably coded into software. Code may reflect and in large part implement what the parties intended, but it cannot *itself* serve as the contract or business agreement among them.

Still, some technologists and lawyers aspire to that subsumption, echoing older movements for financial deregulation.¹⁵² The rise of Bitcoin as an alternative currency has sparked an interest in automation of transactions and recordation.¹⁵³ Software can allow distributed computers to transfer information *en masse* and monitor one another.¹⁵⁴ Bitcoin is a particular case of using blockchain technology to ensure a durable record of ownership that is intended to be regulated by code.¹⁵⁵ Blockchain enthusiasts envision it scaling to serve as a distributed ledger of all manner of transactions.¹⁵⁶

Consider a simple transaction: the transfer of title of a car. At present, this type of transfer may take a trip, in person, to the Department of Motor Vehicles (“DMV”), and filling out paperwork is a prerequisite for a valid transfer. In the case of car titles, we can think of the DMV as a kind of bank: just as banks monitor when money has been deposited or spent, the DMV maintains a record of when, for any given person or legal entity, the ownership of a car begins or ends. Blockchain software could store, on distributed computers, a complete list of who owns which car, just as peer-to-peer file sharing software maintains a list of locations of where given (parts of) files are located.¹⁵⁷ Anyone can instantly transmit to all the other computers

¹⁵² See DAVID GOLUMBIA, *THE POLITICS OF BITCOIN: SOFTWARE AS RIGHT-WING EXTREMISM* 2–4 (2016) (describing parallels between cryptocurrency movement, crypto-anarchist beliefs, and older movements to discredit or dismantle financial regulation and central banking).

¹⁵³ See Joshua A.T. Fairfield, *Bitproperty*, 88 S. CAL. L. REV. 805, 805–06 (2015) (“Increased interest in cryptocurrencies has driven the development of a series of technologies for creating public, cryptographically secure ledgers of property interests that do not rely on trust in a specific entity to curate the list.”).

¹⁵⁴ See Michael J. Madison, *Social Software, Groups, and Governance*, 2006 MICH. ST. L. REV. 153, 156–60.

¹⁵⁵ See De Sevres, Chilton & Cohen, *supra* note 112 at 3. A blockchain is a peer-to-peer network where each computer in the network verifies and records every transaction on the network, where transactions are only recorded on the ledger once the network confirms the validity of the transaction, thus preventing third-party manipulation and streamlining the record. See *id.*

¹⁵⁶ See Fairfield, *supra* note 153, at 808–09.

¹⁵⁷ See ARVIND NARAYANAN ET AL., *BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES* 43–45 (2016) (explaining cryptocurrencies in depth and how “mining” works); DON TAPSCOTT & ALEX TAPSCOTT, *BLOCKCHAIN REVOLUTION* 6–8 (paperback ed. 2018) (explaining how

his desire to transfer ownership of his car to a willing buyer.¹⁵⁸ The same system could also be programmed to coordinate the transmission of the seller's "I've sold my car" signal with the seller's "I've just deposited \$5,000 in the buyer's bank account" signal. Blockchain enthusiasts aim to render not just DMVs, but banks and other institutions of trust, obsolete.¹⁵⁹

While the computational processes here may be complex, their recordation function is relatively simple. Each transaction is modeled as a link in a chain, and the public ledgers at any given time reflect a "block" of all past transactions.¹⁶⁰ Thus the name "blockchain" boils down to a physical metaphor (a chain of blocks) for socio-technical arrangement. There are glimmers of this kind of distributed trust already in software like Venmo, which runs on top of Facebook and allows instantaneous monetary transfers among friends.¹⁶¹ Finance

blockchain technology creates a ledger of transactions); PAUL VIGNA & MICHAEL J. CASEY, *THE AGE OF CRYPTOCURRENCY* 5 (2015) ("At their core, cryptocurrencies are built around the principle of a universal, inviolable ledger, one that is made fully public and is constantly being verified by these high-powered computers, each essentially acting independently of the others. . . . The network-based ledger—which in the case of most cryptocurrencies is called a blockchain—works as a stand-in for the middlemen since it can just as effectively tell us whether the counterparty to a transaction is good for his or her money."); Kariappa Bheemaiah, *Blockchain 2.0: The Renaissance of Money*, WIRED (Jan. 2015), <http://www.wired.com/insights/2015/01/block-chain-2-0/> [<https://perma.cc/4SC2-QLSS>] ("The miner uses the computational power of his computer to assure all members of the network that each transaction is between 2 parties only and that there is no problem of double spending.").

¹⁵⁸ See James Grimmelman & Arvind Narayanan, *The Blockchain Gang*, SLATE (Feb. 16, 2016), http://www.slate.com/articles/technology/future_tense/2016/02/bitcoin_s_blockchain_technology_won_t_change_everything.html [<https://perma.cc/Q3PM-C8WC>] ("You, and the mechanic, and the thousands of other bitcoin users, all keep track of one another's account balances on your own computers. The 1.09 bitcoins you'd pay . . . is assembled into a 'block' with a few hundred transactions from other users. Every 10 minutes, a new block is added to the 'chain' of all transactions so far. Everyone who wants may keep a copy of the block chain and can easily check it to see who has how many bitcoins. . . . [The goal is] secure anonymous transfers of stocks, cars, houses, or just about any other commodity.").

¹⁵⁹ *The Promise of the Blockchain: The Trust Machine*, ECONOMIST (Oct. 31, 2015), <http://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine> [<https://perma.cc/5TDH-R8ZY>] ("The spread of blockchains is bad for anyone in the 'trust business'—the centralised institutions and bureaucracies, such as banks, clearing houses and government authorities that are deemed sufficiently trustworthy to handle transactions. . . . The notion of shared public ledgers [to replace such firms and governmental entities] may not sound revolutionary or sexy. Neither did double-entry book-keeping or joint-stock companies. Yet, like them, the blockchain is an apparently mundane process that has the potential to transform how people and businesses co-operate.").

¹⁶⁰ NARAYANAN ET AL., *supra* note 157, at 11.

¹⁶¹ See Sylvan Lane, *The Beginner's Guide to Venmo*, MASHABLE (June 30, 2014), <http://mashable.com/2014/06/30/venmo-beginners-guide/#HG2q8DXMrZq3> [<https://perma.cc/JF7Q-SUY3>]; Team Venmo, *Sending & Requesting Money*, VENMO (Dec. 26, 2016), <https://help.venmo.com/hc/en-us/articles/210413477> [<https://perma.cc/L6JP-B6PK>]; Ethan Wolff-Mann,

apps that run on top of China's WeChat messaging system are even more powerful and pervasive.¹⁶²

A blockchain for transferring title could essentially amount to a digital key.¹⁶³ Once the owner is recognized by the system as a whole, that system's assent to his locking or unlocking his car would seem to be more robust than physical keys (which can be lost) or keychain signal transmitters (which break easily). A series of numbers, verified by the public ledger, would be the new "key" to ownership or access.

Given enthusiasm expressed for blockchain at the highest levels of international finance and the federal government,¹⁶⁴ states may soon explore replacing the title transfer function of their DMVs with a blockchain-based public ledger of ownership transactions. Such a digital transition would cut out a fair number of annoying, time-consuming trips. Some state workers would lose their jobs, but most do not seem all that enthusiastic to be pushing paper in windowless warrens. Using technology to modernize transactions would seem to be a huge opportunity for politicians eager to both save personnel costs and reduce inconvenience for constituents.¹⁶⁵

Yet there are also reasons for caution. Blockchain advocates have not fully clarified what happens if someone ignores computational de-

The Scary Thing You Don't Understand About Venmo, TIME (Sept. 21, 2015), <https://time.com/money/4036511/venmo-more-check-than-cash/> [<https://perma.cc/DK5K-CF7H>].

¹⁶² See Connie Chan, *When One App Rules Them All: The Case of WeChat and Mobile in China*, ANDREESSEN HOROWITZ (Aug. 6, 2015), <https://a16z.com/2015/08/06/wechat-china-mobile-first/> [<https://perma.cc/7QYF-WGRB>] (describing the WeChat Wallet menu as a site of "1) built-in trust since designated partners have been vetted and selected by Tencent, as well as 2) automatic authentication of identity and payment, and 3) the ability to offer seamless experiences with third parties while never requiring the user to leave the WeChat app").

¹⁶³ See Michael Abramowicz, *Cryptocurrency-Based Law*, 58 ARIZ. L. REV. 359, 404 (2016); Joshua Fairfield, *Smart Contracts, Bitcoin Bots, and Consumer Protection*, 71 WASH. & LEE L. REV. ONLINE 35, 38–39 (2014) ("If financial transactions can be freed of banks as intermediaries, then contracts can be freed of courts as intermediaries.").

¹⁶⁴ See, e.g., R. JESSE MCWATERS ET AL., WORLD ECON. FORUM, THE FUTURE OF FINANCIAL INFRASTRUCTURE: AN AMBITIOUS LOOK AT HOW BLOCKCHAIN CAN RESHAPE FINANCIAL SERVICES (2016); S. AFRICAN RESERVE BANK, POSITION PAPER ON VIRTUAL CURRENCIES (2014); David Mills et al., *Distributed Ledger Technology in Payments, Clearing, and Settlement* (Fed. Reserve Bd., Working Paper No. 2016-095, 2016), <https://www.federalreserve.gov/econresdata/feds/2016/files/2016095pap.pdf> [<https://perma.cc/8P4X-V3SG>].

¹⁶⁵ See STEPHEN GOLDSMITH & SUSAN CRAWFORD, THE RESPONSIVE CITY 120 (2014) (describing an automated process for collecting city data across agencies that "greatly improved in-house analytic capacity across several agencies, radically changing the city's way of doing business"); BETH SIMONE NOVECK, SMART CITIZENS, SMARTER STATE 106 (2015) ("[T]he processes of matching the supply of expertise to the demand for it within organizations is becoming more automated in the twenty-first century.").

scriptions of legal reality.¹⁶⁶ For example, imagine if the seller above simply fails to deliver the car. Can the buyer call the police to seize the car? Must the buyer file a lien? If the buyer does file suit, is the state of the public ledger conclusive evidence of the transfer?

The lawyer/coder James Grimmelmann and computer scientist Arvind Narayanan (coauthor of one of the leading textbooks on blockchain technology) have raised these questions in a brief but devastating critique of the fragility of distributed ledgers.¹⁶⁷ If a hacker manages to copy the number series used by a car's owner, the hacker might easily transfer both the car and the record of who owns it to someone else.¹⁶⁸ In other words, while legal automation giveth, it also taketh away. The normal car-title recordation system can be tiresomely meticulous and redundant, but it also offers resilience.¹⁶⁹ A state database is a record of ownership distinct from the blockchain. So even if automated title transfer became popular, it would seem necessary to keep some official backup.¹⁷⁰

Despite such problems, there is still enormous enthusiasm for more widespread adoption of legal technology. Part of this enthusiasm stems from investors looking for new sectors to conquer. Venture capitalist Marc Andreessen spoke for many when he hoped for software to “eat the world”—that is, for programs (and robots animated by them) to perform tasks once done by humans.¹⁷¹ A good number of

¹⁶⁶ See Dirk Baur & Niels Van Quaquebeke, *The Blockchain Does Not Eliminate the Need for Trust*, CONVERSATION (Nov. 15, 2017, 8:26 PM), <https://theconversation.com/the-blockchain-does-not-eliminate-the-need-for-trust-86481> [<https://perma.cc/6VER-EMS4>].

¹⁶⁷ See Grimmelmann & Narayanan, *supra* note 158.

¹⁶⁸ See *id.* (“[I]f a hacker gets access to your computer and can read your digital key, he’s home free because he can transfer the car on the block chain to a key that he controls.”).

¹⁶⁹ See *id.* (“There is a trade-off in any system of property law. You can have hard rules: simple, cheap, and clear-cut. Or you can have soft rules: flexible case-by-case responses to unanticipated messes. . . . Block chains are the hardest property technology ever made. They’re impervious to dumb mistakes, like DMV clerks mistyping a vehicle identification number or losing your papers behind the radiator. But they’re so hard they’re brittle.”).

¹⁷⁰ See *id.*

¹⁷¹ Marc Andreessen, *Why Software is Eating the World*, WALL ST. J. (Aug. 20, 2011), <https://www.wsj.com/articles/SB10001424053111903480904576512250915629460> [<https://perma.cc/MD8E-HFD3>]; see Mariano-Florentino Cuéllar, *Deciding Whether Software Will Eat the Bureaucracy*, REG. REV. (Dec. 22, 2016) <https://www.theregreview.org/2016/12/22/cuellar-deciding-software-eat-bureaucracy/> [<https://perma.cc/2YKJ-J596>] (“Lawyers and policymakers will almost certainly need to adjust their approaches to using automation in the administrative state At its core, the administrative state is about reconciling calculations of social welfare with procedural constraints. It is an enterprise that pivots in subtle and profound ways on human institutions, assumptions, and aspirations—however imperfectly fulfilled—for deliberation.”). In both articles, the metaphor of transformation as “eating” business or bureaucracy should spur reflection on what happens to food once it is digested.

lawyers share that enthusiasm. That may seem odd—who wants to be replaced by a machine?¹⁷² One reason is a classic desire of one part of the profession to assert a kind of superiority over the rest.¹⁷³ Some are prone to view the practice of law with detachment and disdain, presuming it to be a rote and formalistic affair easily boiled down to a set of programmable propositions. Combine that condescension with contrived but powerful business imperatives to “reduce legal spend,” and the legaltech revolution always seems near at hand.

Thus, there is a steady drumbeat of articles proposing distributed ledgers for a wide variety of applications in law. Some propose blockchain technology as a way for businesses to maintain a ledger for timekeeping, billing, financial transactions, and other records—a modest step that does not implicate the types of coordination and interoperability problems discussed above.¹⁷⁴ Michael Abramowicz’s *Cryptocurrency-Based Law* outlines an ambitious vision for using blockchain applications to coordinate endeavors now organized via law.¹⁷⁵ Rather than voting shares in meetings, participants in an organization could bid with Bitcoins to promote one course of action over others.¹⁷⁶ One of the great appeals of blockchain, as opposed to other software, is its supposedly immutable character—that is, its resistance to being altered once its parameters have been coded.¹⁷⁷ Automobile lenders have already introduced the basic foundations of such technology: when payments are late, a “starter interrupt device” can disable a debtor’s car.¹⁷⁸ The payment of funds held in escrow can also be “self-executing” once some code-specified trigger is tripped.¹⁷⁹ Trust law

¹⁷² Indeed, at the beginning of legal education in America, Harvard Law School Dean Roscoe Pound lamented what he called “mechanical jurisprudence,” suggesting that only a nuanced view of social science and social reality could legitimate the imposition of regulation. See Roscoe Pound, *Mechanical Jurisprudence*, 8 COLUM. L. REV. 605, 621–22 (1908).

¹⁷³ See, e.g., Daniel Martin Katz, *The MIT School of Law? A Perspective on Legal Education in the 21st Century*, 2014 U. ILL. L. REV. 1431, 1457–63 (attempting to appropriate the prestige of technical education for courses focused on legal technology).

¹⁷⁴ See Victor Li, *Bitcoin’s Useful Backbone*, A.B.A. J., Mar. 2016, at 31.

¹⁷⁵ See Abramowicz, *supra* note 163, at 404.

¹⁷⁶ See *id.* at 391.

¹⁷⁷ See *id.* at 373; TAPSCOTT & TAPSCOTT, *supra* note 157, at 6–8. For skepticism about claims of immutability, see Angela Walch, *The Path of the Blockchain Lexicon (and the Law)*, 36 REV. BANKING & FIN. L. 713, 735–45 (2017).

¹⁷⁸ See Jathan Sadowski & Frank A. Pasquale, *Creditors Use New Devices to Put Squeeze on Debtors*, AL JAZEERA AM. (Nov. 9, 2014, 2:00 AM), <http://america.aljazeera.com/opinions/2014/11/debt-collection-technologystarterinterruptdevicesubprime.html> [<https://perma.cc/E3SU-SF72>] (“There is no escaping debt collectors who can, with the push of a button on their smartphones, disable your car until you cough up payment.”).

¹⁷⁹ See Abramowicz, *supra* note 163, at 405–06.

could also enable peer-to-peer decisionmaking processes to reduce transaction costs for disbursements.¹⁸⁰ Abramowicz even foresees the spread of blockchain to investment firms,¹⁸¹ both for core business purposes and to engage in regulatory arbitrage.¹⁸² He also sees a role for blockchain applications in insurance.¹⁸³

Legal scholars have also prescribed potential blockchain-enabled management of micropayments.¹⁸⁴ In the past, when Congress realized that new technology would lead to widespread copying, it imposed a small fee per copy—a practice known as compulsory licensing.¹⁸⁵ This regime, still in place for many works, separates compensation (for works) from control (over their use).¹⁸⁶ For blockchain advocates, software could take on the role of law—artists could make their work exclusively available via blockchain applications, setting their own rates for downloads or streams of copyrighted works.¹⁸⁷ The ultimate promise here is to set up systems of content distribution that balance commercial imperatives and creative freedoms in a more nimble manner than current law.¹⁸⁸

Framed as parts of an existing legal system, all of these proposals disclose promising applications of social software. However, they are occasionally promoted as a substitute for the legal system itself. That substitution would reflect not merely the algorithmic application of

¹⁸⁰ *Id.* at 408–09; see also Shawn Bayern, *Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC*, 108 Nw. U. L. REV. 257 (2014).

¹⁸¹ See Abramowicz, *supra* note 163, at 411.

¹⁸² See *id.* at 412; see also Danielle Keats Citron & Frank Pasquale, *Network Accountability for the Domestic Intelligence Apparatus*, 62 HASTINGS L.J. 1441, 1484–85 (2011) (stating that regulatory arbitrage is “the shifting of activity to the least stringent regulatory regime,” occurring “when an entity reclassifies, relocates, or slightly alters its activity in order to avoid legal scrutiny traditionally associated with that activity”).

¹⁸³ See Michael Abramowicz, *Cryptoinsurance*, 50 WAKE FOREST L. REV. 671, 705 (2015). Abramowicz believes that insurance companies can sell insurance, using a cryptocurrency, based on smart contracts that authorize transactions based on a third-party or voting process. *Id.* at 705–06. Abramowicz also argues that attempts to regulate cryptoinsurance would be subject to many of the difficulties in regulating cryptocurrency; however, the article does offer possible directions for regulation such as simply banning the practice, or by making cryptoinsurance redundant or unnecessary by mandating other forms of insurance. *Id.* at 706–08.

¹⁸⁴ See, e.g., Fairfield, *supra* note 153, at 831.

¹⁸⁵ See, e.g., 17 U.S.C. § 115 (2012) (compulsory licensing for phonorecords).

¹⁸⁶ See WILLIAM W. FISHER III, *PROMISES TO KEEP: TECHNOLOGY, LAW, AND THE FUTURE OF ENTERTAINMENT* 144–45 (2004). Fisher has offered a detailed and compelling proposal to subsidize culture by lightly taxing the technology that leads to its uncompensated duplication. See *id.* at 199–258. Government could also impose such fees on carriers and search engines and distribute them to creatives.

¹⁸⁷ See Tom W. Bell, *Copyrights, Privacy, and the Blockchain*, 42 OHIO N.U. L. REV. 439, 444 (2016).

¹⁸⁸ FISHER, *supra* note 186, at 203.

rules, but the values of other human beings trusted as participants in governance as more than appliers of technical rules. Engineers with little or no domain expertise in the legal profession should not code software designed to replace that governance, and those with such domain expertise would be wise to decline to do so, as the next Section shows.

D. The Inescapability of Governance

Though sober reports from the World Economic Forum, Deloitte, and governmental entities give a good sense of the incrementalist side of fintech, much of the excitement about the topic of financial technology arises out of a more futuristic perspective.¹⁸⁹ On Twitter, hashtags like #legaltech, #regtech, #insurtech, and #fintech often convene enthusiasts who aspire to revolutionize the financial landscape—or at least to make a good deal of money disrupting existing “trust institutions” (e.g., the intermediaries which help store and transfer financial assets).

For many advocates of cryptocurrencies, the blockchain’s cryptography is celebrated as a democratization of encryption.¹⁹⁰ Given their distributed nature, blockchains are also touted as way to create an alternative legal system beyond the reach of traditional legal authorities.¹⁹¹ Ironically, the same celebrations of the power of blockchain applications also tend to worry that premature regulation could limit the impact of blockchains.¹⁹² They should clarify whether any programs really are “unstoppable,” or whether regulation and force could stifle them.

Immutability is the main characteristic of blockchain that is supposed to set it apart from past social software and enable it to replace, rather than merely operate as an adjunct to, existing legal systems.¹⁹³ Those accepting the terms of the relevant code are supposed to be assured that whatever happens to the rest of the world in the future, their transactions are guaranteed to be valid. But are blockchains really capable of preventing hacking or tampering? Short of a fortified

¹⁸⁹ See, e.g., R. JESSE MCWATERS ET AL., WORLD ECON. FORUM, BEYOND FINTECH: A PRAGMATIC ASSESSMENT OF DISRUPTIVE POTENTIAL IN FINANCIAL SERVICES (2017).

¹⁹⁰ See, e.g., Jerry Brito et al., *Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling*, 16 COLUM. SCI. & TECH. L. REV. 144, 149–50 (2014).

¹⁹¹ *Id.* at 217–18 (discussing the difficult nature of regulating Bitcoin financial transactions).

¹⁹² See, e.g., KYLE BURGESS & JOE COLANGELO, CONSUMERS’ RESEARCH, THE PROMISE OF BITCOIN AND THE BLOCKCHAIN 23–25 (2015), http://consumersresearch.org/wp-content/uploads/2016/01/BW_whitepaper.pdf [<https://perma.cc/7BXJ-YQH7>].

¹⁹³ See *id.* at 13.

HAL 9000 terminating would-be hackers before they could access the relevant blockchains, it is hard to imagine such assurances being verifiable.¹⁹⁴ When billed as a replacement for law or lawyers, code immediately runs into both conceptual and practical difficulties.

Moreover, some early adopters of this ideal of self-executing or coded law have experienced troubling and telling failures.¹⁹⁵ Investors in a “decentralized autonomous organization” (“The DAO”) running on code have already experienced the turbulent and troubling aspects of software-governed legal orders.¹⁹⁶ In early 2016, a hacker managed to take millions of dollars in a fashion unanticipated by the drafters of the code governing the organization.¹⁹⁷ The main organizer of The DAO, Vitalik Buterin, then was able to retaliate because the code only enabled the withdrawal of funds after a twenty-seven-day waiting period.¹⁹⁸ He coded a “hard fork” for the organization, which essentially shifted funds from the hacker’s account to an account where the original investors in the project could withdraw their funds.¹⁹⁹

¹⁹⁴ See Chip Stewart, *Do Androids Dream of Electric Free Speech? Visions of the Future of Copyright, Privacy and the First Amendment in Science Fiction*, 19 COMM. L. & POL’Y 433, 457 (2014) (describing the role of the space ship’s intelligent computer in 2001: A SPACE ODYSSEY (Stanley Kubrick Productions 1968)).

¹⁹⁵ See Nathaniel Popper, *A Hacking of More Than \$50 Million Dashes Hopes in the World of Virtual Currency*, N.Y. TIMES (June 17, 2016), https://www.nytimes.com/2016/06/18/business/dealbook/hacker-may-have-removed-more-than-50-million-from-experimental-cybercurrency-project.html?_r=0 [<https://perma.cc/Z77M-M7CP>] (“The attack most likely puts an end to the project, known as the Decentralized Autonomous Organization, which had raised \$160 million in the form of Ether, an alternative to the digital currency Bitcoin.”).

¹⁹⁶ See *id.*

¹⁹⁷ See Michael del Castillo, *The DAO: Or How a Leaderless Ethereum Project Raised \$50 Million*, COINDESK (July 30, 2017, 4:02 PM), <http://www.coindesk.com/the-dao-just-raised-50-million-but-what-is-it/> [<https://perma.cc/55X3-GJXP>]. Investors purchase DAO tokens using ether, which allows them to vote on which proposals are accepted or rejected. *Id.* Investors who do not agree with the accepted proposal have the option to undergo “splitting,” a process where The DAO smart contract gives back ether to the holder, creating a sub-DAO for the holder. *Id.* There is an approximately twenty-three second window in the “splitting” process, between The DAO smart contract sending ether to the holder and the contract checking to see if the correct amount was sent, upon which the smart contract would not re-send ether if requested. *Id.* The attacker created a recursive function to utilize this twenty-three second window to continuously request the same amount of ether, accumulating the ether in a sub-DAO before the smart contract checked the amount sent. *Id.*

¹⁹⁸ See Vitalik Buterin, *Critical Update Re: DAO Vulnerability*, ETHEREUM BLOG (June 17, 2016), <https://blog.ethereum.org/2016/06/17/critical-update-re-dao-vulnerability/> [<https://perma.cc/F54C-FQR6>].

¹⁹⁹ See Michael del Castillo, *The Hard Fork: What’s About to Happen to Ethereum and The DAO*, COINDESK (updated July 24, 2016), <https://www.coindesk.com/hard-fork-ethereum-dao/> [<https://perma.cc/5CAM-TGKC>]; Rob Price, *Digital Currency Ethereum Is Cratering Because of a \$50 Million Hack*, BUS. INSIDER (June 17, 2016, 5:34 PM), <http://www.businessinsider.com/dao-hacked-ethereum-crashing-in-value-tens-of-millions-allegedly-stolen-2016-6?r=UK&IR=T>

According to Buterin and other organizers of The DAO, this intervention was a success story: it proved the recoverability of their system.²⁰⁰ But for advocates of legal automation, this was a Pyrrhic victory. The post hoc intervention violated the principle of autonomy supposedly at the core of The DAO.²⁰¹ Persons managed the smart contract—not mere code.²⁰² In other words, the only way the supposedly smart, incorruptible, automated, and immutable contract actually protected investors was by *allowing human intervention to change its terms and consequences*. Rather than demonstrating the dispensability of human interventions, The DAO has proved the opposite—the vital necessity of human governance over even extensively coded and computerized forms of human cooperation. And this governance, to the extent it was legitimate, could only be known to be so, thanks to the explanation offered by The DAO’s sponsors—an explanation made in language, not code.²⁰³

Blockchain enthusiasts need to directly address these concerns before promoting further substitutive automation of law. It is tempting to view software as an all-purpose way of dispatching with middlemen like lawyers and banks. But, as James Grimmelmann observed in 2005, “software is vulnerable to failure,” “[software] is hackable,” and “[software] is not robust.”²⁰⁴ No one has yet developed technology that would make the blockchain environment impervious to these problems.²⁰⁵ Indeed, precisely the opposite is true: waves of hacking

[<https://perma.cc/EG7G-SP59>]; see also Vitalik Buterin, *Hard Fork Completed*, ETHEREUM BLOG (July 20, 2016), <https://blog.ethereum.org/2016/07/20/hard-fork-completed/> [<https://perma.cc/WY2U-TQSL>].

²⁰⁰ See Buterin, *supra* note 199.

²⁰¹ See Matt Levine, *Blockchain Company’s Smart Contracts Were Dumb*, BLOOMBERG (June 17, 2016, 5:46 PM), <https://www.bloomberg.com/view/articles/2016-06-17/blockchain-company-s-smart-contracts-were-dumb> [<https://perma.cc/5PP7-PH5B>].

²⁰² See *id.*

²⁰³ See Buterin, *supra* note 199.

²⁰⁴ James Grimmelmann, *Regulation by Software*, 114 YALE L.J. 1719, 1742–44 (2005) (emphasis omitted).

²⁰⁵ See generally, e.g., James Grimmelmann, *Anarchy, Status Updates, and Utopia*, 35 PACE L. REV. 135 (2014) (illustrating the persistence of governance problems in social software).

and illicit intrusions have rocked health care institutions,²⁰⁶ banks,²⁰⁷ and even campaigns²⁰⁸ and governments.²⁰⁹

The question of vulnerabilities is critical to defining the normative core and legal standing of blockchain projects. For example, in The DAO incident mentioned above, some argued that the *hacker* was the one who truly understood the spirit of blockchain, because the hacker's actions were allowed under the coding of The DAO.²¹⁰ If the real core of blockchain is unstoppable automation via code, then the hacker should be allowed to keep the funds taken. Reversing the hacking is a reflection of values outside the smart contract as it existed at the time the hack happened.²¹¹ Those are legal and political values that need to be fully articulated: Who gets to be part of the decision-making cadre? Is it a Wikipedia-style project of collaboration structured by hierarchy?²¹² If so, is there anything to learn from Wikipedia's problems and limits?²¹³ Do Blockchain projects' commit-

²⁰⁶ See, e.g., Jessica Jardine Wilkes, *The Creation of HIPAA Culture: Prioritizing Privacy Paranoia over Patient Care*, 2014 BYU L. REV. 1213, 1228 (2014) ("In 2009, the Office of Civil Rights started recording incidents of [patient health information] breaches and created the 'Wall of Shame,' which publicly exposes breaches affecting 500 people or more.")

²⁰⁷ See, e.g., Paul Merrion, *NY Fed's Role in SWIFT Cyber Heist Prompts House Panel Data Request*, CQ ROLL CALL, June 2, 2016, 2016 WL 3085306 (describing hack of Bangladesh's central bank).

²⁰⁸ See, e.g., Anthony J. Gaughan, *Ramshackle Federalism: America's Archaic and Dysfunctional Presidential Election System*, 85 FORDHAM L. REV. 1021, 1033–34 (2016) (discussing Russian hackers); Melissa Eddy, *After a Cyberattack, Germany Fears Election Disruption*, N.Y. TIMES (Dec. 8, 2016), <https://nyti.ms/2ho3oBQ> [<https://perma.cc/EW6Y-TTDL>].

²⁰⁹ See, e.g., Tim McCormack, *The Sony and OPM Double Whammy: International Law and Cyber "Attacks,"* 18 SMU SCI. & TECH. L. REV. 379, 380 (2015) (discussing the hack of the U.S. Office of Personnel Management ("OPM")).

²¹⁰ Levine, *supra* note 201 ("To true believers in smart contracts, there is no problem here. The system is fine; the failures—writing bad code and not anticipating this attack—were trivial, mere human error. Next time, write better smart contracts and you'll be fine. To those true believers, changing the code after the fact—even to conform it to almost-everyone's reasonable expectations about how The DAO would work—would be a betrayal of the smart-contract ideal." (footnotes omitted)).

²¹¹ See *id.*

²¹² See YOCHAI BENKLER, *THE WEALTH OF NETWORKS* 60–64 (2006); CLAY SHIRKY, *HERE COMES EVERYBODY: THE POWER OF ORGANIZING WITHOUT ORGANIZATIONS* 117–22 (2008).

²¹³ See Philip Mirowski, *Postface: Defining Neoliberalism*, in *THE ROAD FROM MONT PÉLERIN: THE MAKING OF THE NEOLIBERAL THOUGHT COLLECTIVE* 417–48 (Philip Mirowski & Dieter Plehwe eds., 2009) ("Wikipedia in action is not some democratic libertarian paradise in cyberspace, but rather is predicated on a strict hierarchy, in which higher levels exist to frustrate and undo the activities of participants at lower levels. The notion that 'everyone can edit' is simply not true: many controversial pages would not even exist were interventions from those lower down in the hierarchy not blocked." (footnote omitted)). See generally Lior Jacob Strahilevitz, *Wealth Without Markets?*, 116 YALE L.J. 1472 (2007) (reviewing BENKLER, *supra* note 212)) (detailing limits of peer-production model).

ments to decentralization have to yield when certain problems in smart contracts are exposed? If so, how are these “constitutional moments” (to apply Bruce Ackerman’s constitutionalist term of art to digitized law) recognizable?²¹⁴

The problem of “irreversibility” also needs to be clarified as to its technical and legal dimensions. Does it mean that (1) legal rules or contracts will preclude blockchain-connected parties from availing themselves of the legal system? Or (2) is there something *inherent* in the code that makes reversibility much harder? Or (3) is the code, at present, a way of evading or avoiding legal re-examination of the transaction that could eventually be reformed to make the transactions more amenable to legal reversibility?

Possibilities (1) and (3) would be a reassuring message but would also undermine blockchain enthusiasts’ claims about the novelty of blockchain scenarios (since (1) is already a standard part of consumer contracts disclaiming liability and (3) is a problem that has been addressed by regulators for at least a decade).

There is also a basic conflict over the nomenclature of blockchain projects. They can either be public and permissionless, or private and permissioned.²¹⁵ Major banks, government institutions, and global forums tend to promote private and permissioned blockchains.²¹⁶ This distinction is critical because, at present, the private/permissioned and public/permissionless schools of blockchain appear to be trading off one another’s distinctive appeal. For example, high-level banking managers style themselves as tribunes of the people for advancing blockchain, pointing to the idealistic impulses of the public/permissionless school.²¹⁷ Meanwhile, those advocating public/permissionless

²¹⁴ See 2 BRUCE ACKERMAN, *WE THE PEOPLE: TRANSFORMATIONS* 5–11 (1998) (describing the rare times when a populace is so mobilized that it can change fundamental constitutional rules).

²¹⁵ Angela Walch provides concise definitions:

Private (permissioned) blockchains are common ledgers shared amongst a known group of parties with only certain parties having the ability, or permission, to make changes to the ledger. Public (permissionless) blockchains like Bitcoin’s are publicly available common ledgers that allow anyone who runs the Bitcoin software to participate in making changes to the ledger.

Angela Walch, *The Bitcoin Blockchain as Financial Market Infrastructure: A Consideration of Operational Risk*, 18 N.Y.U. J. LEGIS. & PUB. POL’Y 837, 840–41 n.15 (2015) (citing BITFURY GRP. & JEFF GARZIK, *PUBLIC VERSUS PRIVATE BLOCKCHAINS: PART 1: PERMISSIONED BLOCKCHAINS* 10 (2015), <https://bitfury.com/content/downloads/public-vs-private-pt1-1.pdf> [<https://perma.cc/YM9K-7637>]).

²¹⁶ See, e.g., BITFURY GRP. & JEFF GARZIK, *supra* note 215, at 3–4 (describing financial systems building private blockchains).

²¹⁷ See Giulio Prisco, *Blythe Masters and Wall Street Opt for ‘Permissioned’ Non-Bitcoin*

blockchains try to demonstrate just how serious and pragmatic they are by highlighting support for the technology among high-level government officials and business leaders.²¹⁸ The two groups are actually talking about *very different* phenomena—and scholarly work should illuminate that tension, rather than trying to downplay it in the name of preserving unity in the blockchain community.

When De Filippi and Hassan speak of the “incorporation of legal rules into code” and “regulation by code,” culminating in a “reliance on code not only to enforce legal rules, but also to draft and elaborate these rules,” they do not present these phenomena as unalloyed goods.²¹⁹ Rather, they are cautious about the “prospect of automated legal governance” because it may “reduce the freedoms and autonomy of individuals.”²²⁰ The answer to these concerns is not to double down on the translation of legal rules into code. Rather, the preservation of human control over legal systems will require an alternative paradigm—a vision of software as a tool to assist persons, rather than a machine replacing them. Nor should policymakers abandon long-standing principles of financial regulation to make way for forms of financial automation that have yet to be proven. There is little evidence that regulation means their “revolutionary promise” would be lost, as it was probably never there in the first place.²²¹

Blockchains, BITCOIN MAG. (Sept. 2, 2015, 5:03 PM), <https://bitcoinmagazine.com/articles/blythe-masters-wall-street-opt-permissioned-non-bitcoin-blockchains-1441227797> [<https://perma.cc/LWH3-HE4A>] (reporting that permissioned blockchains are attractive to companies because they offer “a completely known universe of transaction processors” and that many financial institutions are working to create private blockchains rather than relying on the Bitcoin blockchain).

²¹⁸ See, e.g., Theo Douglas, *Blockchain a ‘Next Big Transformational Technology’ in Government*, GOVTECH (May 16, 2017), <http://www.govtech.com/security/Blockchain-a-Next-Big-Transformational-Technology-in-Government.html> [<https://perma.cc/SLC6-962M>].

²¹⁹ Primavera De Filippi & Samer Hassan, *Blockchain Technology as a Regulatory Technology: From Code Is Law to Law Is Code*, 21 FIRST MONDAY (Dec. 5, 2016), <http://firstmonday.org/ojs/index.php/fm/article/view/7113/5657#author> [<https://perma.cc/TW3Z-JZH6>]; see also Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia*, SSRN (Mar. 10, 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2580664 [<https://perma.cc/H29H-WQMM>].

²²⁰ See Filippi & Hassan, *supra* note 219, at 11.

²²¹ See ADAM GREENFIELD, *RADICAL TECHNOLOGIES* 303 (2017) (“[T]he inventors of the blockchain overtly intended to erode statism and central administration. Virtually everywhere, decision algorithms are touted to us on the promise that they will permanently displace human subjectivity and bias. And yet in every instance we find that these ambitions are flouted, as the technologies that were supposed to enact them are captured and recuperated by existing concentrations of power.”).

III. PROMOTING COMPLEMENTARY AUTOMATION IN LAW

For many legal futurists, substitutive automation—the rise of robot lawyers to replace current associates and partners—is the long-term goal of legal technology.²²² They see early advances in this direction—such as a chatbot to dispute parking tickets—as part of a general trend toward a “rise of the robots” in the 21st-century political economy.²²³ This technologically determined narrative of progress reflects a larger movement among economists and engineers to cast human labor itself as a thing of the past, ideally replaced by a full automation of present jobs.²²⁴ But this is just one vision of human progress—and not a very attractive one.²²⁵

The legal futurists’ partial vision of economic progress reflects a similarly incomplete normative account of the rule of law—one that asks both too much and too little of legal institutions. Whatever other normative goals judges and regulators pursue, they should adhere to the rule of law. Richard Fallon has observed that there are at least three distinct ideal-typical accounts of the rule of law in contemporary jurisprudence.²²⁶ Legal automators tend to focus on historicist accounts (which associate the rule of law with “rule by norms laid down by legitimate lawmaking authorities prior to their application to particular cases”) and formalism (which defines “the ideal if not necessary form of ‘law’ [as] that of a ‘rule,’ conceived as a clear prescription that exists prior to its application and that determines appropriate conduct or legal outcomes”).²²⁷ Were federal health-privacy regulation really reducible to “requirements extraction” encoded in software, that encoding would amount to a real advance for the rule of law, in

²²² See Paul F. Kirgis, *The Knowledge Guild: The Legal Profession in an Age of Technological Change*, 11 NEV. L.J. 184, 184 (2010) (reviewing SUSSKIND, *supra* note 132) (“Susskind offers no evidence to support his claim that greater automation of legal work will result in less demand for human legal services. In fact, the evidence suggests that productivity increases in knowledge industries increase demand for those knowledge goods.”).

²²³ See MARTIN FORD, *RISE OF THE ROBOTS* 1–27 (2015).

²²⁴ See RAY KURZWEIL, *THE AGE OF SPIRITUAL MACHINES* 2–4 (2000); see also NICK SRNICEK & ALEX WILLIAMS, *INVENTING THE FUTURE: POSTCAPITALISM AND A WORLD WITHOUT WORK* 2–3 (2015).

²²⁵ See Frank Pasquale, *Two Concepts of Immortality: Reframing Public Debate on Stem-Cell Research*, 14 YALE J.L. & HUMAN. 73, 75–76 (2002) (critiquing the “downloading” of memory, intellect, and will onto hardware or software).

²²⁶ Richard H. Fallon, Jr., “*The Rule of Law*” as a Concept in Constitutional Discourse, 97 COLUM. L. REV. 1, 5 (1997) (describing these “ideal types . . . as (i) historicist, (ii) formalist, (iii) Legal Process, and (iv) substantive”). For our purposes, the concrete requirements of the substantive approach are not relevant; the first three suffice to demonstrate the diversity of conceptions of the rule of law, which demonstrate the legal futurists’ partiality.

²²⁷ *Id.* at 11, 14.

its historicist and formalist conceptions. The law would be as executable as a software command. Similarly, the translation of traffic rules into a series of chatbot prompts renders the law into a crystalline form—if not application.

Nevertheless, there is another account of the rule of law, a “Legal Process conception,” which is more expansive, and more recently developed, than either the historicist or formalist accounts.²²⁸ As Fallon explains,

Legal Process conceptions find the requisites of “law” necessary for the Rule of Law to be satisfied by a mixture of (i) procedural fairness in the development and application of legal norms, (ii) an (assumed) internal connection between notions of law and reasonableness, (iii) reasoned elaboration of the connection between recognized, pre-existing sources of legal authority and the determination of rights and responsibilities in particular cases, and (iv) judicial review as a guarantor of procedural fairness and rational deliberation by legislative, executive, and administrative decisionmakers.²²⁹

This elaborate definition may seem awkward in comparison with the relatively compact accounts of the historicist and formalist schools. While those approaches emphasize the “rule” side of the rule of law, the Legal Process approach emphasizes “law” as its core component. Law as a social institution is multifaceted and embedded in particular political systems and traditions, such as rights to appeal and explanations for decisions. To the extent a legal technology like a smart contract reduces a legal relationship to a “clear prescription that exists prior to its application and that determines appropriate conduct or legal outcomes” (exemplifying the formalist conception of the rule of law), it is unlikely to meet the complex standards of review and appeal embodied in the Legal Process conception of the rule of law.²³⁰

When conflicts over interpretation arise, the Legal Process approach to the rule of law demands the clashing parties are offered

²²⁸ *Id.* at 18. The term Legal Process here denotes the approach of a school of jurisprudence that emerged in the mid-20th century United States in order to reconcile realist and formalist approaches to interpretation. See Donald A. Dripps, *Justice Harlan on Criminal Procedure: Two Cheers for the Legal Process School*, 3 OHIO ST. J. CRIM. L. 125, 126 (2005); see also LAURA KALMAN, *THE STRANGE CAREER OF LEGAL LIBERALISM* 20 (1996) (describing emergence of the Legal Process school).

²²⁹ See Fallon, *supra* note 226, at 18 (footnotes omitted). Fallon’s list of aspects of Legal Process conceptions of the rule of law is drawn from the *locus classicus* of the Legal Process approach. *Id.* (citing HENRY M. HART, JR. & ALBERT M. SACKS, *THE LEGAL PROCESS* 4–5, 152–53, 157–58, 695 (William N. Eskridge, Jr. & Philip P. Frickey eds., 1994)).

²³⁰ *Id.* at 14, 18.

“reasoned elaboration of the connection between recognized, pre-existing sources of legal authority and the determination of rights and responsibilities in particular cases”—not simple disposition of their cases via code.²³¹ Nor do ad hoc interventions, like those pursued after The DAO hack discussed above, guarantee the “procedural fairness and rational deliberation” contemplated by a Legal Process conception of the rule of law.²³² One-sided deployments of vastly superior legal-technological resources also undermine the types of dialogue and fair play valued by the Legal Process school.

Fallon has called for the integration of the many strands of meaning in “the Rule of Law” tradition into a robust hybrid theory that reflects the strengths of each.²³³ Inspired by his approach, this Part develops principles to guide the future of legal automation in a way that cultivates and develops, rather than discounts and devalues, attorneys’ skills.

A. *Intelligence Augmentation as Regulative Ideal*

The right tools make a job far easier—and even engaging. For example, a truck driver may find that cruise control frees his foot from the gas pedal for time to stretch and relieve cramps.²³⁴ Automatic transmission makes it easier to shift from high to low gear.²³⁵ Collision avoidance software can warn him about cars in his blind spot.²³⁶ Technology can make the job much easier—until it replaces the driver altogether.²³⁷ There may be a delicate balance between inventions that help a worker, and those which replace the worker altogether. Nevertheless, economists recognize this distinction as fundamental to valuation, calling the former a complement to labor, and the latter a substitute for it.²³⁸

In computing, AI research has focused on technologies that can substitute for human cognition and attention.²³⁹ For example, even in the 1960s, roboticists at the Massachusetts Institute of Technology

²³¹ *Id.* at 18.

²³² *Id.*

²³³ *Id.* at 54–55.

²³⁴ *Cf.* NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP’T OF TRANSP., FEDERAL AUTOMATED VEHICLES POLICY 9 (2016) (describing the Society of Automotive Engineers (“SAE”) International levels of autonomy in driving).

²³⁵ *See id.*

²³⁶ *See id.*

²³⁷ *See id.*

²³⁸ *See, e.g.,* BAUMOL & BLINDER, *supra* note 21, at 120 (describing complements and substitutes).

²³⁹ JOHN MARKOFF, *MACHINES OF LOVING GRACE*, at xii (2015).

were developing mechanical sentries to relieve soldiers of the boring and dangerous duty of standing guard at vulnerable sites.²⁴⁰ But there is another way of thinking of the sentry robot—not as AI replacing troops, but as one more tool to increase their effectiveness. Rather than viewing its infantry or guards as mere drones to be dispatched as quickly as a new tool mimics a critical mass of their functions, a military may invest in its personnel as skilled operators of increasingly sophisticated machines. Sensors and computers may be designed to act as a second set of eyes and ears, rapidly processing threat levels and other data to better inform soldiers' actions. This is a type of intelligence augmentation (“IA”), which has informed far more projects than AI.²⁴¹

The friendly rivalry between AI and IA researchers casts a new light on policy debates over the future of automation in law. Software is frequently unable to provide the full array of services and protections offered by attorneys.²⁴² Nevertheless, federal policymakers have recently menaced states that attempt to enforce clear distinctions between automated legal advice and direct counsel from an attorney. For example, when North Carolina attempted to modernize its regulation of software-based legal services, the Federal Trade Commission (“FTC”) and Department of Justice (“DOJ”) weighed in to criticize the state and threaten antitrust action against it.²⁴³ Framed as an attack on attorney self-protection, the agencies' intervention had flimsy foundations in economic policy and evidenced little to no awareness of literature on the pitfalls of automation.²⁴⁴ They appear committed to promoting software as a substitute for attorneys, even though the

²⁴⁰ *Id.* at 4.

²⁴¹ *Id.* at 23–24.

²⁴² See Brian Sheppard, *Incomplete Innovation and the Premature Disruption of Legal Services*, 2015 MICH. ST. L. REV. 1797, 1826 (2015) (describing how premature disruptions occur when “an industry has experienced a diminution in its capacity or willingness to meet demand for a core function at pre-disruption levels of quality, leading to a reduction in welfare that exceeds the benefits brought by the innovation,” and applying this theory of premature disruption to legal services (footnotes omitted)).

²⁴³ See Letter from Marina Lao, Dir., Office of Policy Planning, Fed. Trade Comm'n & Robert Potter, Chief, Antitrust Div., U.S. Dep't of Justice, to Sen. Bill Cook (June 10, 2016), https://www.ftc.gov/system/files/documents/advocacy_documents/comment-federal-trade-commission-staff-antitrust-division-addressing-north-carolina-house-bill-436/160610commentncbill.pdf [<https://perma.cc/3N8C-PSYQ>].

²⁴⁴ See Sandeep Vaheesan & Frank Pasquale, *The Politics of Professionalism: Reappraising Occupational Licensure and Competition Policy*, 14 ANN. REV. L. & SOC. SCI. 309, 315 (2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2881732 [<https://perma.cc/VYC6-HKEH>] (criticizing the FTC for failing to take into account important consumer protection goals in its complaints about occupational-licensure restrictions).

sellers of such software often foist exculpatory clauses (or other limitations of liability) on end users.²⁴⁵ Such clauses prematurely extinguish litigation over bad outcomes that could help both attorneys and consumers better understand the risks involved in AI approaches to law.²⁴⁶ At the very least, federal antitrust policymakers should promote state bans on such clauses, in order to provide a more level playing field in the legal services market.

Computer science researchers should also be more open to viewing the indeterminacy and flexibility of law as features best handled by human (rather than algorithmic) approaches. In early iterations of expert systems, programmers attempted to translate the rules governing professionals' demonstrations of expertise into pseudocode, and then into software.²⁴⁷ There were some successes in law, but the expert system approach never became widespread. In both transactional and litigation contexts, it was almost impossible for any truly knowledgeable professional to boil down the sum total of their knowledge and judgment into a series of propositions applicable by machine.²⁴⁸ This resistance of human know-how to codification and standardization persists in many contexts far less complex than legal practice is today.²⁴⁹ For example, the economist David Autor argues that even in the next decade or so, it is highly unlikely that the replacement of a windshield on a car could be fully automated, even if driving the car is.²⁵⁰

²⁴⁵ See, e.g., Act of June 30, 2016, 2016 N.C. Sess. Laws 60 (2016 North Carolina law exempting certain website providers from the definition of the "practice of law" and creating additional requirements for website providers).

²⁴⁶ See MARGARET JANE RADIN, *BOILERPLATE* 139–40 (2013) (describing suboptimal social outcomes arising out of exculpatory clauses).

²⁴⁷ See HUBERT L. DREYFUS, STUART E. DREYFUS & TOM ATHANASIOU, *MIND OVER MACHINE* 6 (1986).

²⁴⁸ See *id.* at 11 ("Problems involving deep understanding built up on the basis of vast experience will not yield—as do simple, well-defined problems that exist in isolation from much of human experience—to formal mathematical or computer analysis."); *id.* at 81 ("[T]he sheer number of lawyers in business tells us that it is impossible to banish ambiguity and judgment by specifying a code of law so complete that all situations are specified and prejudged.").

²⁴⁹ David H. Autor, *Why Are There Still So Many Jobs? The History and Future of Workplace Automation*, 29 J. ECON. PERSP. 3, 3 (2015).

²⁵⁰ See David Autor, *Polanyi's Paradox and the Shape of Employment Growth* 31 (Nat'l Bureau of Econ. Research Working Paper No. 20485, Sept. 2014) ("Modern automobile plants, for example, employ industrial robots to install windshields on new vehicles as they move through the assembly line. But aftermarket windshield replacement companies employ technicians, not robots, to install replacement windshields. Why not robots? Because removing a broken windshield, preparing the windshield frame to accept a replacement, and fitting a replacement into that frame demand far more real-time adaptability than any contemporary robot can approach.").

B. *Preserving Articulable Standards in an Age of Rules and Brute-Force Prediction*

The appeal of pervasive legal automation is based on a certain conception of the rule of law and of a legal duty to pursue a type of utility maximization. Many critics of courts complain that judges simply list multiple factors to consider, and then offer some gestalt opinion without properly distinguishing contrary authority or otherwise reasoning from first principles to a decision.²⁵¹ The obvious reform response within the law is to try to develop some kind of rule to make clear what decisions should be based on. So, for instance, after *Community for Creative Non-Violence v. Reid*,²⁵² a leading case on the “independent contractor/employee” distinction in copyright law, many law review articles tried to isolate payment of payroll taxes as the touchstone, despite the multifactor test in the case.²⁵³ More ambitious articles might try to explain variations with elaborate subrules, as treatise writers are prone to typologize cases.²⁵⁴

Despite the ambitions of the systematizers, there are almost always conflicts among the approaches of multiple courts to similar sets of facts, irreconcilable by logic or reason. For partisans of predictive analytics in law, when there is no real rule of decision integrating factors in a reasoned way, the methods of natural language processing may take aspects of past cases (such as the filings), model the effects of various phrases or structures of the documents on the decisionmaker, and then extrapolate those effects in future cases on the basis of their filings.

To the extent it applies these methods as the optimal way of bringing order to a confusing area of law, the best way a firm can

²⁵¹ See, e.g., Robert G. Bone, *Taking the Confusion out of “Likelihood of Confusion”: Toward a More Sensible Approach to Trademark Infringement*, 106 NW. U. L. REV. 1307, 1308 (2012) (“These multifactor tests are deeply flawed. They support an open-ended and relatively subjective approach that generates serious litigation uncertainty, chills beneficial uses of marks, and supports socially problematic expansions of trademark law.”); William McGeveran, *Rethinking Trademark Fair Use*, 94 IOWA L. REV. 49, 67–68 (2008) (“[M]ost trademark infringement cases turn on the application of a complex multifactor test. . . . Unfortunately, this approach is both unpredictable and time-consuming.”); Meredith Hayward, *Reasonable Notice Periods Still Not “One Size Fits All,”* LITIGATOR (Mar. 1, 2011) <http://www.thelitigator.ca/2011/03/reasonable-notice-periods-still-not-one-size-fits-all/> [<https://perma.cc/W3ZT-6VBD>].

²⁵² 490 U.S. 730, 751–52 (1989) (“In determining whether a hired party is an employee under the general common law of agency, we consider [over 10 factors]. No one of these factors is determinative.” (footnotes omitted) (citations omitted)).

²⁵³ See, e.g., Julie Goldscheid, *Copyright Law: Toward an Improved “Works for Hire” Doctrine*, 1990 ANN. SURV. AM. L. 557, 572–76 (1991).

²⁵⁴ See 2 WILLIAM F. PATRY, PATRY ON COPYRIGHT § 5:53 (2016); 1 HOWARD B. ABRAMS, THE LAW OF COPYRIGHT § 4:9 (2017).

advise clients is to have as many fact situations in its database as possible, match their facts to all the extant facts, and perform brute predictions of what the judges will do. This form of prediction is much like weather forecasters using big data (rather than underlying atmospheric dynamics) to predict the movement of storms.²⁵⁵ An algorithmic analysis of a database of, say, 1,000 cold fronts with a given atmospheric pressure sweeping over Michigan may, with proper parameters and algorithms, prove a better predictor of the next cold front's effects than a trained meteorologist without access to such a data trove.²⁵⁶

These methods also mirror advances in translation accomplished by Google over the past decade. Google Translate does not deploy some hierarchical set of rules to convert a word or phrase or sentence from one language to another.²⁵⁷ Rather, it simply tries to match the phrase to be converted to an identical or similar phrase in an instant, translated document, and then find the matching phrase in the translation of that document to use it in the target context.²⁵⁸ Google's translation program is not parsing the meaning of the words it translates. Rather, it is indexing past human translations and matching them to current targets.²⁵⁹ In harder translations, it may well be extrapolating how best to meld divergent translations—but it relies on human responses to determine which are better, or worse, translations.²⁶⁰

Far from being conflicting approaches to automating legal analysis, expert systems and machine learning approaches based on predic-

²⁵⁵ This may either exemplify or solve Bentham's complaints about overcomplexity of law. See FREDERICK SCHAUER, *THE FORCE OF LAW* 11–15 (2015); see also *What's Reasonable?*, BARDAL FACTORS, <http://www.bardalfactors.ca/whats-reasonable/> [<https://perma.cc/FHT8-B6RD>]; cf. Samuel Gibbs, *supra* note 67.

²⁵⁶ See PHAEDRA DAIPHA, *MASTERS OF UNCERTAINTY* 51 (2015) (describing the project of “employing the brute force of computers to mathematically simulate the laws of atmospheric physics”).

²⁵⁷ See Alex Chitu, *How Google Translate Works*, GOOGLE OPERATING SYS. (Aug. 12, 2010, 12:59 AM), <http://googlesystem.blogspot.com/2010/08/how-google-translate-works.html> [<https://perma.cc/7RYC-7M3R>].

²⁵⁸ See *id.*; see also DAVID BELLOS, *IS THAT A FISH IN YOUR EAR?* 255 (2011); Tomas Mikolov et al., *Distributed Representations of Words and Phrases and Their Compositionality*, 2013 *ADVANCES NEURAL INFO. PROCESSING SYS.* 3111–19, <https://papers.nips.cc/paper/5021-distributed-representations-of-words-and-phrases-and-their-compositionality.pdf> [<https://perma.cc/DH9T-GFA5>] (describing the use of language vectors to improve Google Translate).

²⁵⁹ See *Google Translate Community FAQ*, GOOGLE, https://docs.google.com/document/d/1dwS4CZzgZwmvoB9pAx4A6Yytmv7itk_XE968RMiqpMY/pub [<https://perma.cc/3DQ4-YME8>].

²⁶⁰ See *id.* (“While Google Translate is a statistical machine translation tool . . . , we sometimes need help from native speakers to improve our algorithms . . .”).

tive analytics are deeply complementary methods of advancing substitutive automation in law. Once predictive analysts take a distant reading of cases,²⁶¹ treating the decisionmaker as a black box that takes in inputs (fact patterns) and generates outputs (judgments), with little clear sense of how input turned into output, there is pressure to formalize the system.²⁶² Persons rightly demand some sense of why an outcome occurred. But the more formalized law becomes, the easier it is to convert its rules to the types of expert systems deployed in a program like TurboTax.

Thus, legal-automation software may have an advantage over human attorneys in extreme scenarios. If law in an area is utterly indeterminate, algorithmic analyses may find patterns in cases beyond human comprehension and successfully brute force a prediction of likely legal outcomes.²⁶³ If the law, by contrast, is perfectly ordered, an expert system can reduce it to a series of rules to be applied.²⁶⁴ Fortunately for human attorneys, most living areas of law fit neither description—nor should they. Between the crystalline clarity of rules and the chaos of unconstrained discretion, there are articulable standards that help us formulate convincing explanations and justifications of legal decisionmaking, without foreordaining outcomes in advance.

Businesses may complain about courts or agencies failing to articulate a clear rule for applying a statute before a complaint or enforcement action is lodged against them.²⁶⁵ But this battle was lost in the 1940s.²⁶⁶ As the Supreme Court decided in *SEC v. Chenery*

²⁶¹ See FRANCO MORETTI, *DISTANT READING* 32 (2013) (describing an alternative to textual hermeneutics, which relies on the aggregation of data from hundreds or thousands of texts).

²⁶² See Casey & Niblett, *supra* note 14; see also Katz, *supra* note 12, at 936–47.

²⁶³ Even in this scenario, though, hard ethical questions arise about the potential use of such programs. See Pasquale & Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*, *supra* note 2, at 81 (“[T]he pragmatic and the critical uses of predictive algorithms [in law] are in tension. An analyst may reveal biases in judgments, such as legally irrelevant details that somehow seem to be correlated with, and perhaps even driving, decisions. The same analyst may sell the predictive tool to attorneys or courts as a case selection or triage tool. But precisely to the extent that past training data reflect bias, they are likely to reinforce and spread the influence of that bias when they are used by actors outside the judicial system (who may, for example, not even try to advocate for a particular class of meritorious cases since decision makers are systematically biased against them).”).

²⁶⁴ It is also important to acknowledge, however, that the process of articulating a rule may not improve decisionmaking. See Chad M. Oldfather, *Writing, Cognition, and the Nature of the Judicial Function*, 96 GEO. L.J. 1283, 1286 (2008).

²⁶⁵ See Frederick Schauer, *Rules and the Rule-Following Argument*, CAN. J.L. & JURIS., July 1990, at 187–188.

²⁶⁶ *SEC v. Chenery Corp. (Chenery II)*, 332 U.S. 194, 202 (1947) (“Not every principle essential to the effective administration of a statute can or should be cast immediately into the mold of a general rule. Some principles must await their own development, while others must be

Corp.,²⁶⁷ “There is . . . a very definite place for the case-by-case evolution of statutory standards.”²⁶⁸ A humane legal order, flexibly adapting to new realities and political change, demands nothing less.

Even weather forecasting—an exemplar of so much of the predictive modeling that motivates efforts to automate law—has recognized the ineradicable importance of human judgment, as sociologist Phaedra Daipha observes:

The official [National Weather Service (“NWS”)] rhetoric . . . is replete with reductionist language and technocratic buzzwords, while forecasters readily subscribe to a naively positivist vision of science—even when, or precisely because, they keep an ironic distance from it. On the other hand, NWS operational guidelines explicitly and repeatedly leave it to forecasters’ judgment and discretion how numerical prediction models may assist them in their task.²⁶⁹

Even in meteorology, judgment is essential. And unlike judges or regulators, meteorologists have no recognizable duties to understand parties’ interests and arguments, and no worries about potential tensions between doing justice in a particular case and setting optimal precedent for future cases. The case for discretion among human decisionmakers—and, by extension, in the forms of legal practice deployed by those advocating before them—is far stronger in law than it is in meteorology.

Flexibility is especially important for agencies regulating fast-moving fields.²⁷⁰ It will, of necessity, “break” both the brute-force prediction models and the expert systems models of devotees of artificial intelligence in law. That is a feature, not a bug, of judicial and agency

adjusted to meet particular, unforeseeable situations. In performing its important functions in these respects, therefore, an administrative agency must be equipped to act either by general rule or by individual order.”)

²⁶⁷ *Chenery II*, 332 U.S. 194, 202 (1947).

²⁶⁸ *Id.* at 202–03 (“In other words, problems may arise in a case which the administrative agency could not reasonably foresee, problems which must be solved despite the absence of a relevant general rule. Or the agency may not have had sufficient experience with a particular problem to warrant rigidifying its tentative judgment into a hard and fast rule. Or the problem may be so specialized and varying in nature as to be impossible of capture within the boundaries of a general rule. In those situations, the agency must retain power to deal with the problems on a case-to-case basis if the administrative process is to be effective. There is thus a very definite place for the case-by-case evolution of statutory standards. And the choice made between proceeding by general rule or by individual, *ad hoc* litigation is one that lies primarily in the informed discretion of the administrative agency.”).

²⁶⁹ DAIPHA, *supra* note 256, at 52 (citations omitted).

²⁷⁰ See Woodrow Hartzog & Daniel J. Solove, *The Scope and Potential of FTC Data Protection*, 83 GEO. WASH. L. REV. 2230, 2233–34 (2015).

discretion. Many past efforts to rationalize and algorithmatize the law have failed, for good reason: there is no way to fairly extrapolate the thought processes of some body of past decisionmaking to *all* new scenarios. For example, the introduction of a “grid” of preprogrammed factors in social security disability determinations could easily have been understood as a prelude to automation of such decisions.²⁷¹ But very quickly forms of discretion started entering into the grid to do justice to the infinite variety of factual scenarios presented by sick and disabled claimants.²⁷²

This is not to discount entirely the deployment of artificial intelligence in law. Brute-force predictors may help advise clients as crystal-line rules turn into muddy standards, and vice versa.²⁷³ They can also alert decisionmakers when biases begin to emerge.²⁷⁴ For example, a notable study in behavioral economics recently exposed judges accepting more parole requests after lunch than before it.²⁷⁵ Ideally, such studies do not inspire predictive-analytics firms to find other extraneous influences on decisionmaking and to advise clients on how to take advantage of them (by, for example, sending tall attorneys to advocate before judges revealed to be partial to tall advocates). Rather, this disturbing finding is better framed as a prompt to judges to start developing ways of guarding against this hunger bias once they are alerted to it (or, failing that, to snack regularly).²⁷⁶ Other profession-

²⁷¹ See Jack B. Weinstein, *Equality and the Law: Social Security Disability Cases in the Federal Courts*, 35 SYRACUSE L. REV. 897, 906–07 (1984).

²⁷² See BERNARD WIXON & ALEXANDER STRAND, OFFICE OF RESEARCH, EVALUATION, & STATISTICS, SOC. SEC. ADMIN., NO. 2013-01, IDENTIFYING SSA’S SEQUENTIAL DISABILITY DETERMINATION STEPS USING ADMINISTRATIVE DATA 2, 6 (2013), <https://www.ssa.gov/policy/docs/rsnotes/rsn2013-01.html> [<https://perma.cc/Z9ST-G6AB>] (“Beginning in 1999, [the Social Security Administration] implemented modifications to the disability determination procedures in states known as prototype states. One modification was to allow [Disability Determination Service] decision makers the discretion to proceed directly to step 5 when there is insufficient evidence about the claimant’s work history to make the evaluation at step 4.” (footnotes omitted)).

²⁷³ See Carol M. Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577, 578–80 (1988).

²⁷⁴ See Julia Angwin et al., *supra* note 65 (discussing Northpointe recidivism scoring and the biases of judges making decisions without such a system); see also *McCleskey v. Kemp*, 481 U.S. 279, 313 (1987) (using empirical data on bias in peremptory sentencing); Donald G. Gifford & Brian Jones, *Keeping Cases from Black Juries: An Empirical Analysis of How Race, Income Inequality, and Regional History Affect Tort Law*, 73 WASH. & LEE L. REV. 557, 564–65 (2016).

²⁷⁵ Shai Danziger et al., *Extraneous Factors in Judicial Decisions*, 108 PROC. NAT’L ACAD. SCI. U.S. AM. 6889, 6890 (2011) (finding that the “likelihood of a favorable ruling is greater at the very beginning of the work day or after a food break than later in the sequence of cases”).

²⁷⁶ See David Golumbia, *Judging Like a Machine*, in *POSTDIGITAL AESTHETICS* 123, 133–34 (David M. Berry & Michael Dieter eds., 2015) (“As attractive as it may be to allow more and more of our world to be judged by machines, we must take very seriously the idea that human

als, like physicians and pharmacists, routinely utilize automated alarms as “guard rails” to warn against potentially wrong decisions.²⁷⁷ Such decision-support tools are not a replacement of the human with the algorithmic, but rather another step toward improving a socio-technical system of human decisionmakers and machine-aided decision analysis.²⁷⁸

CONCLUSION

The automation of a field as complex as law can lead to perverse consequences. Billed as a way of streamlining legal services, artificial intelligence can easily distort or subvert the purposes it is meant to support. Standardized legal forms may betray the objectives of the customer they ostensibly serve. Software can radically simplify compliance efforts, but when it does so by downplaying, trivializing, or ignoring important aspects of the language of law, it is a betrayal of the rule of law—not its translation into code.

Despite all these problems, many of which remain either unresolved or inadequately addressed, legal futurists continue to promote the acceleration of automation in law.²⁷⁹ As clients, bar associations, and legislators debate how far to permit software to substitute for legal counsel and advocacy, they should keep several themes of this Article in mind.

Both humble and ambitious versions of substitutive legal automation have stalled or failed to fully realize their announced ambitions.²⁸⁰ The legal profession should pursue an alternative paradigm—a complementary vision of human-machine cooperation. Known as intelligence augmentation, this pragmatic approach motivated far more

judgement, though it be systematically flawed, is nevertheless the only responsible form for human power to take.”).

²⁷⁷ See M. Susan Ridgley & Michael D. Greenberg, *Too Many Alerts, Too Much Liability: Sorting Through the Malpractice Implications of Drug-Drug Interaction Clinical Decision Support*, 5 ST. LOUIS U. J. HEALTH L. & POL'Y 257, 258–61, 279 (2012) (describing promise of decision support systems and the need for judgment in the face of excessive alerts).

²⁷⁸ See Jack M. Balkin, *The Path of Robotics Law*, 6 CALIF. L. REV. CIR. 45, 47–48 (2015).

²⁷⁹ See, e.g., SUSSKIND & SUSSKIND, *supra* note 7, at 68; John O. McGinnis, *Accelerating AI*, 104 NW. L. REV. 366, 368 (2010). *But see* Frank Pasquale, *Automating the Professions: Utopian Pipe Dream or Dystopian Nightmare?*, L.A. REV. BOOKS, (Mar. 15, 2016) (reviewing SUSSKIND & SUSSKIND, *supra* note 7), <https://lareviewofbooks.org/article/automating-the-professions-utopian-pipe-dream-or-dystopian-nightmare/> [<https://perma.cc/6DRC-AQLK>].

²⁸⁰ This problem is not limited to law. Concerns over “fake news” in the 2016 U.S. presidential election showed the pervasiveness of the problem. See, e.g., Frank A. Pasquale, *The Automated Public Sphere*, in THE POLITICS AND POLICIES OF BIG DATA (Ann Rudinow Sætman, Ingrid Schneider & Nicola Green eds., 2018) (describing the pervasiveness and effect of fake news in automated environments).

advances in computing over the past half-century than dreams of general artificial intelligence.²⁸¹ Complementary automation enables human attorneys, and other workers in the legal profession, to do justice to the complexity and subtlety of language.

Those working in the field of legal technology should be careful to avoid conflating attorneys' professional role with the delivery of expertise. The rule of law entails a system of social relationships and legitimate governance, not simply the transfer and evaluation of information about behavior. There is necessarily some degree of self-governance among professionals, which gives them an occupational identity distinct from other workers. Their primary fiduciary duty is to clients, not managers or shareholders. The main reason they enjoy this autonomy is because they must handle intractable conflicts of values that repeatedly require thoughtful discretion and negotiation. A robust and ethical legal profession respects that discretion, founded on the flexibility and subtlety of legal language, as a prerequisite for a just and accountable social order. It ensures a rule of persons, not machines.

²⁸¹ See JOHN MARKOFF, *MACHINES OF LOVING GRACE* 1–20 (2015) (describing history of computer science research); DANIEL CREVIER, *AI 209* (1993) (describing the AI winter of the 1980s and the failures of substitutive expert systems).