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

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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. 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. 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.

However, legal automation can also elide or exclude important human values, necessary improvisations, and irreducibly deliberative governance. Due process, appeals, and narratively intelligible explanation from persons, for persons, depend on forms of communication 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. However, the history of the professions 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. 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. 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]

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

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[1] ANDREW ABBOTT, THE SYSTEM OF PROFESSIONS: AN ESSAY ON THE DIVISION OF EXPERT LABOR (2014).

[2] Frank Pasquale and Glyn Cashwell, *Four Futures of Legal Automation*, 63 U.C.L.A. L. REV. DISC. 26, 28 (2015); Frank Pasquale & Glyn Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*, U. TORONTO L. REV. (forthcoming, 2018).

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

[4] DAVID GOLUMBIA, THE CULTURAL LOGIC OF COMPUTATION 78 (2009).

future.[5] But 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 write the briefs themselves.[7] Some predict a "legal singularity," which will "arrive when the accumulation of massively more 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 (in order to market their wares as far better by comparison).[10] Both groups 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, pro-market rhetoric against the professions, and left-wing distrust of elites.[13] Nor is legal futurism

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

[6] 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 (2014).

[7] 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 (2016); Benjamin Alarie et al., *Law in the Future*, 66 U. TORONTO L.J. 423 (2016).

[9] *See, e.g.*, Tom Meltzer, *Robot Doctors, Online Lawyers and Automated Architects: the Future of the Professions?*, THE GUARDIAN (June 15, 2014).

[10] Bruce H. Kobayashi & Larry E. Ribstein, *Law's Information Revolution*, 53 ARIZ. L. REV. 1169, 1170 (2012) (promoting disruption of so-called legacy providers of legal services by information-technology-intensive corporations).

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

[12] Daniel Martin Katz, *Quantitative Legal Prediction*, 62 EMORY L.J. 909, 939–41 (2013).

[13] For conservative rhetoric, *see, e.g.*, John O. McGinnis, *Machines vs. Lawyers*, CITY J., Spring, 2014, http://www.city-journal.org/2014/24_2_machines-vs-lawyers.html (claiming that the "innovators driving our computational revolution . . . [are] likely to shape a politics

presented as merely one more dictate of an increasingly competitive market. 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 past precedent; human judges may be influenced by extraneous factors or bias.[16] Thus automators of law 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 deducted from a motorist's bank account, would amount to pure automation of law, unaffected by any particular policeman's or judge'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,

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more friendly to markets."). For left-wing suspicion of professionals as elites, see MAGALI SARFATTI LARSON, THE RISE OF PROFESSIONALISM: A SOCIOLOGICAL ANALYSIS (1977).

[14] Anthony J. Casey & Anthony Niblett, *The Death of Rules and Standards*, University of Chicago Coase-Sandor Institute for Law & Economics Research Paper No. 738 (2015), at 1, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2693826.

[15] Anthony D'Amato, *Can/Should Computers Replace Judges?*, 11 GA. L. REV. 1277, 1300 (1977) (presenting computerization as a path to a more "determinable legal system.").

[16] *See, e.g.*, Ozkan Eren & Naci Mocan, *Emotional Judges and Unlucky Juveniles* (NBER Working Paper No. 22611, 2016) (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"). I discuss how sophisticated legal systems should address these kinds of biases in Part III.B., *infra.*

[17] J.C. Smith, *Machine Intelligence and Legal Reasoning - The Charles Green Lecture in Law and Technology*, 73 CHI.-KENT. L. REV. 277 (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 explains that "The 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." Radin, *Reconsidering the Rule of Law*, 69 B.U. L. REV. 781, 781 (1989).

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" thus 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 deflect and defeat basic principles of accountability.

This article describes how language is often constitutive of law and legal judgments—not merely one of many forms they can take, but 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 now prepares millions of Americans' taxes, firms like LegalZoom draft wills and contracts based on computerized interactions with customers, and chatbots like DoNotPay guide users through challenges to parking tickets. Each of these legal technologies democratizes access to information. However, they can also mislead users about their rights and duties, while foreclosing opportunities for

[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] My shift from "men" to "persons" here 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] This is to be contrasted with complementary legal automation, like search engines or word processing software, which assists attorneys. WILLIAM J. BAUMOL & ALAN S. BLINDER, ECONOMICS: PRINCIPLES AND POLICY 120 (13th ed. 2015) (describing complements and substitutes as fundamental economic categories to indicate the effect of one good or service on the value of others).

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 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 more fully realize rule of law values.

Law is a complex and variegated domain, including 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 plausibility, depending on the context. Obtaining a fishing license with a chatbot makes sense—and we should 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, to which we shall now turn.

[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. Michael Halberstam, *Beyond Transparency: Rethinking Election Reform from an Open Government Perspective*, 38 SEATTLE U. L. REV. 1007, 1009 (2015); MAYUR PATEL ET AL., THE EMERGENCE OF CIVIC TECH: INVESTMENTS IN A GROWING FIELD (2013).

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 hound persons after they become adults, and 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 Expunge|Maryland (designed for Maryland residents) to automate much of the process of seeking a simple expungement.[25]

These apps fill a gap in the legal services market. In general, the worse a job is done presently, the better a robot looks in 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. However, each of these interventions has unexpected consequences which mitigate their value.

A. Automating Tax Preparation

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[23] Michael Pinard, *Criminal Records, Race and Redemption*, 16 N.Y.U. J. LEGIS. & PUB. POL'Y 963, 968 (2013); Lahny R. Silva, *Clean Slate: Expanding Expungements and Pardons for Non-Violent Federal Offenders*, 79 U. CIN. L. REV. 155 (2010).

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

[25] *See* Tyler Waldman, *Why ExpungeMaryland.org is Helping People Erase Their Criminal Records*, TECHNICAL.LY: BALTIMORE (July 25, 2014), http://technical.ly/baltimore/2014/07/25/expungemaryland-expunge-erase-criminal-records-baltimore/. On its website, the service is currently billed as an "expungement paralegal," not an expungement lawyer.

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 agency administering it (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.

TurboTax has saved U.S. taxpayers countless hours in tax preparation time. For its customers, the days of filling out tax forms with paper and pencil are over.[28] However, the company's success is not an entirely positive story. And it provides some early warning signs as we see other forms of legal automation entering 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

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[26] TurboTax became available in the mid-80s to businesses and individuals. *See* Richard P. Weber, *TurboTax*, J. AM. TAX ASS'N (Spring 1986) (reviewing the software).

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

[28] *Filing Season Statistics for Week Ending*, IRS (Dec. 25, 2015) https://www.irs.gov/uac/newsroom/filing-season-statistics-for-week-ending-december-25-2015 (IRS stats only show the breakdown for e-filed returns, which constitute 85.5% of returns. Of those, in 2015, 39% were self-prepared, 61% prepared by tax professionals. Of the paper returns submitted, there is no information about how many of those were generated by software.).

[29] William G. Gale, *Remove the Return*, *in* TOWARD TAX REFORM: RECOMMENDATIONS FOR PRESIDENT OBAMA'S TASK FORCE 41 (2009) (estimating that 60 million filers could use this method); Austan Goolsbee, *The Simple Return: Reducing America's Tax Burden Through Return-Free Filing*, BROOKINGS INSTITUTION DISCUSSION PAPER (July 2006), http://www.brookings.edu/research/papers/2006/07/useconomics-goolsbee; Liz Day, *How the Maker of TurboTax Fought Simple Free Filing*, PROPUBLICA (updated Apr. 14, 2016), https://www.propublica.org/article/how-the-maker-of-turbotax-fought-free-simple-tax-filing ("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.").

annual bill on information already provided to it by employers—and give individuals the choice to either accept that tax, or try filing their own returns. Gale and other advocates pressed the IRS to offer this option to non-itemizers.[30] Sensing a threat to its business model, TurboTax fought back.[31] It spent millions of dollars to lobby against the proposal, even stirring up so-called "grassroots" opposition via a public relations firm.[32] The legal automators 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.[33] Zelenak argues that tax return preparation software eliminated that "complexity constraint," freeing legislators to impose ever more baroque provisions. 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.[34] That evolution might be a positive one if legal complexity clearly served positive social goals. But for Zelenak, the opposite

[30] *See* Internal Revenue Service Restructuring and Reform Act of 1998, Pub. L. No. 105-206, sec. 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 43.

[31] Day, *supra* note 29.

[32] Liz Day, *TurboTax Maker Linked to 'Grassroots' Campaign Against Simple, Free Tax Filing*, PROPUBLICA (Apr. 14, 2014), https://www.propublica.org/article/turbotax-maker-linked-to-grassroots-campaign-against-free-simple-tax-filing.

[33] Lawrence Zelenak, *Complex Tax Legislation in the TurboTax Era*, 1 COLUM. J. TAX L. 91, 92 (2010).

[34] *Id.* at 93 ("As return preparation software gradually replaced the pencil in recent decades, the complexity constraint weakened and eventually disappeared. Congress has responded by imposing unprecedented computational complexity on large numbers of taxpayers.").

is the case: he believes the computationally complex provisions of the tax code "generally constitute bad tax policy."[35]

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 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 two examples above, 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.[36] By 2011, LegalZoom claimed to have served over 2 million individuals with downloadable forms and internet-mediated walk-throughs of questionnaires and flow charts related to their legal problems.[37] 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.[38]

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[35] *Id.* at 93.

[36] LegalZoom.com, Inc., Amendment No. 1 to Registration Statement (Form S-1) 1 (June 4, 2012), at http://perma.cc/XAL5-WUVS.

[37] Lauren Moxley, *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 (2015); LegalZoom, http://perma.cc/FZJ7-DV53; *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. & CIV. RTS. L. REV. 255, 257 (2011).

[38] *See* Moxley, *supra* note 37, at 554 ("LegalZoom is able to keep costs low by producing much of its work through automated generation and review by nonlawyers….[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 ('UPL')") (footnotes omitted).

The firm has been popular, particularly for those looking to set up companies. The paperwork can be complex, and LegalZoom condenses what could be a lengthy series of meetings with attorneys into a three step process. First, the program asks users to answer a series of questions. Then, LegalZoom employees review answers for "consistency and completeness." Once these workers have approved the answers given, the program prints the form and sends it to the user—along with instructions on how to execute the necessary formalities for the document to have legal effect.

Whatever the qualifications of these scriveners, the questionnaire process itself can be partial or problematic.[39] As of 2015, one could go through the questionnaire process without any prompting about the special complexities raised by the savings vehicle where most middle class Americans' non-home assets are—employer-sponsored retirement savings account.[40] It turns out that, in many cases, a will *does not* control the distribution of those assets at their owner's death; rather, that's the job of a document memorializing the account owner's designation of beneficiaries. 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). "That's where most of the wealth in America ends up," said a certified public accountant, "but what most people don't realize is it's surrounded by this

[39] There is also widespread concern that LegalZoom, a leading form provider, engages in the unauthorized practice of law. Wendy S. Goffe & Rochelle Heller, *From Zoom to Doom? Risks of Do-it-yourself Estate Planning*, ESTATE PLANNING, Aug. 2011, at 27; Pierce G. Hunter, *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 (2014); 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); Janson v. LegalZoom 802 F. Supp. 2d 1053, 1063 (W.D. Mo. 2011); LegalZoom.com, Inc. v. N.C. State Bar, No. 11 CVS 15111, 2014 WL 1213242 (Super. Ct. Mar. 24, 2014); *but see* Medlock v. LegalZoom.Com, Inc., No. 2012-208067, 2013 S.C. LEXIS 362, *16 (S.C. Oct. 18, 2013).

[40] Screenshots on file with author. For documentation of prevalence of retirement accounts, see Carolyn T. Geer, *Family Feuds: The Battles over Retirement Accounts*, WALL ST. J. (Sept. 7, 2011) ("IRAs and 401(k)s now account for roughly 60% of the assets of U.S. households with at least $100,000 to invest.").

complex labyrinth of rules."[41] Thus, "key questions are not asked, people make mistakes, and many times it involves their life savings."[42]

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 forms. The firm cultivates user forums in order 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.[43] 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.[44]

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.[45] For Amazon's top reviewers, the system has brought microcelebrity status.[46] For others, the rewards are less clear. But what should be obvious is the shifting role of 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

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[41] *Id.*
[42] *Id.*
[43] CLAY SHIRKY, COGNITIVE SURPLUS (2010).
[44] CRAIG LAMBERT, SHADOW WORK: THE UNPAID, UNSEEN JOBS THAT FILL YOUR DAY (2016).
[45] KEVIN WERBACH AND DAN HUNTER, FOR THE WIN HOW GAME THINKING CAN REVOLUTIONIZE YOUR BUSINESS 2 (2012).
[46] JOSEPH M. REAGLE, READING THE COMMENTS: LIKERS, HATERS, AND MANIPULATORS AT THE BOTTOM OF THE WEB 57 (2015) (describing "super-reviewer" Grady Harp).

Red light cameras are a widely implemented 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/or lose their license to operate the car.[47] What if the owner wasn't actually driving? Add in a facial recognition subroutine, and better 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.[48]

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 are certain to take advantage of the app eventually. Parking authorities can order audits. In some areas, like health care fraud, big data and predictive analytics has made it much easier to expose cheaters.[49] But the auditing process seems to rely upon some form of human interaction and expertise.

For hard-core 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.[50] Any given visit to a doctor may generate a unique visit

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[47] Andrea M. Franklin, *Police Powers for Sale: Red-Light Enforcement Sold to the Foreign Bidder*, 8 FLA. INT'L U. L. REV. 125 (2012); William D. Mercer, *At the Intersection of Sovereignty and Contract: Traffic Cameras and the Privatization of Law Enforcement Power*, 43 U. MEM. L. REV. 379 (2012); Jeffrey A. Parness, *Beyond Red Light Enforcement Against the Guilty but Innocent: Local Regulations of Secondary Culprits*, 47 WILLAMETTE L. REV. 259 (2011).

[48] Mireille Hildebrandt, *A Vision of Ambient Law*, *in* REGULATING TECHNOLOGIES: LEGAL FUTURES, REGULATORY FRAMES AND TECHNOLOGICAL FIXES 187 (Roger Brownsword & Karen Yeung, eds., 2008) (describing pervasive monitoring and regulation via landscapes and buildings saturated with sensors, processors, and actuators).

[49] FRANK PASQUALE, THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION 150–53 (2015); Frank Pasquale, *Private Deputies and Certifiers in American Health Law*, 92 N.C.L. REV. 1661, 1676 (2014).

[50] Frank Pasquale, *Private Certifiers and Deputies in American Health Care*, 92 N.C. L. REV. 1661, 1665 (2014) (mentioning big data methods at HHS).

identifier or time-stamped barcode that could, in turn, be deployed as verification in any number of scenarios: an excuse from work, or a parking emergency, or a claim for insurance. So 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 has some legal import.

Moreover, even a technical innovation as pedestrian as the red light camera has sparked both constitutional and legal challenges. For example, Joel Christensen has argued that the cameras violate fundamental constitutional principles of due process and the right of defendants to confront their accusers.[51] These challenges have, so far, largely failed in courts that are eager to accelerate the resolution of what they perceive to be relatively minor disputes. Nevertheless, public outrage about red light cameras has reversed their advance; there are now less red light cameras in use today than there were in 2010.[52]

Is this outrage justifiable? For some civil rights advocates, the answer is a resounding no. Studies indicate that camera driven enforcement is less likely to be racially biased than traffic stops by police officers.[53] But there is also ample evidence that algorithmic processes of sentencing and risk-assessment can be racially biased.[54] Automation like red light cameras has been characterized as a troubling form of state power—an unstoppable machine arrayed against ordinary citizens.[55] However, for many believers in

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[51] Joel Christensen, *Wrong on Red: The Constitutional Case Against Red-Light Cameras*, 32 J.L. & POL'Y 443 (2010).

[52] Charles Lane, *Red Light Camera Use Declines After Public Outrage*, ALL THINGS CONSIDERED (NPR, May 23, 2016), http://www.npr.org/2016/05/23/479207945/red-light-camera-use-declines-after-public-outrage.

[53] Robert J. Eger *et al*., *The Policy of Enforcement: Red Light Cameras and Racial Profiling*, 18 POLICE Q. 397 (2015); Anupam Chander, *The Racist Algorithm?*, 115 MICH. L. REV. 1023 (2017).

[54] Sonja Starr, *Evidence-Based Sentencing and the Scientific Rationalization of Discrimination*, 66 STAN. L. REV. 803 (2014); Julia Angwin et al., *Machine Bias*, PROPUBLICA (May 23, 2016), https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing (work on risk assessment algorithm).

[55] *See* Jathan Sadowski & Frank Pasquale, *The Spectrum of Control: A Social Theory of the Smart City*, 20 FIRST MONDAY 5 (July 6, 2015); Frank Pasquale, *Paradoxes of Privacy in an Era of Asymmetrical Social Control*, in BIG DATA, CRIME, AND SOCIAL CONTROL (Aleš Završnik, ed., 2018).

the power of technology, 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 technology has successfully appealed 160,000 parking tickets (out of about 225,000 cases where the app was used).[56] The DoNotPay app guides individuals through potential appeals of parking tickets.[57] For drivers in New York, the app suggests that a medical emergency can exempt a car owner from a parking ticket. 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 them.

The automation of such appeals is 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 widely known apps like DoNotPay become, the more likely bad actors are to deploy it to 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 ticketed in any given case. Municipalities are already automating many services; they may replace so-called "meter maids" with robotics and internet of things (IOT) sensors that tend toward perfect enforcement of the law.[58]

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. Many

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[56] Samuel Gibbs, *Chatbot Lawyer Overturns 160,000 Parking Tickets in London and New York*, THE GUARDIAN (June 28, 2016); *see also* Kelly Phillips Erb, *Are We Ready for Robot Lawyers?* PA. LAW., May/June 2016, at 54. Note that 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 tended to give credit to coders alone.

[57] Tim Cushing, *Chatbot Helps Drivers Appeal over $4 Million in Bogus Parking Tickets*, TECHDIRT (July 1, 2016); Danielle Furfaro, *"Robot" Ticket Nixer*, N.Y. POST (June 29, 2016).

[58] 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 (2014); BETH SIMONE NOVECK, SMART CITIZENS, SMARTER STATE: THE TECHNOLOGIES OF EXPERTISE AND THE FUTURE OF GOVERNING (2015).

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 "robot lawyer."[59] and the DoNotPay first page states "DoNotPay has launched the UK's first robot lawyer as an experiment. It can talk to you, generate documents and answer questions. It is just like a real lawyer, but is completely free and doesn't charge any commission."[60] But attorney-client interactions are *not* experiments. A lawyer is obliged to offer the best advice she can, and to take responsibility for falling below a certain standard of care.[61] Just as a physician has a fiduciary duty do 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 rules of professional ethics if she (or software she has written) is A/B testing various legal strategies on clients without letting them know the nature of the experimentation.[62] App-driven legal tech like DoNotPay is not a lawyer, robot or otherwise, no matter how much hype it attracts.

One also wonders exactly how much DoNotPay adds to existing efforts to expand access to law by firms like Nolo, which have provided forms for years.[63] Browder's chatbot provides forms. It does not fill them out. It relies on users to apply rules to the facts. Moreover, unlike an ethically

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[59] Tim Eigo, *Robots and the Lawyers Who Love Them,* ARIZ. ATT'Y, (July/August 2016)

[60] *See* DoNotPay Website, http://www.donotpay.co.uk/.

[61] 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. ABA Rules of Professional Conduct, 1.8(h) (stating "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 reasonable opportunity to seek the advice of independent legal counsel in connection therewith."). *See also* Rule 1.8(h), New York Rules of Professional Conduct, April 1, 2009; *Swift v. Choe*, 242 A.D.2d 188, 674 N.Y.S.2d 17 (App. Div. 1998).

[62] 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 (2005); James Grimmelmann, *The Law and Ethics of Experiments on Social Media Users*, 13 COLO. TECH. L.J. 219 (2015); 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 (2014).

[63] Dashka Slater, *Sue Yourself,* LEGAL AFFAIRS (September/October 2003).

practicing attorney, it shifts the risk of error to its ostensible client.[64] Indeed, Browder's app goes further; its users "agree to indemnify, defend and hold harmless [DoNotPay and Browder], our directors, officers, employees and licensors from and against any claim, liability, cost, damage or loss we may incur (including reasonable legal fees) as a result of any material that you post, transmit and download on our site or via any other communications systems."[65] The magnanimity of DoNotPay's public relations campaign ends here. A human professional accepts consequences when things go badly wrong. This "robot lawyer," by contrast, does not merely refuse to take responsibility, but holds the "client" responsible when its proprietor is harmed by their interaction.

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 is a laudable phenomenon when the stakes of a matter are low. Numerous studies document unmet legal needs among those of low-to-middle socioeconomic status in the United States.[66] Software may be the only form of advice available to many citizens, and even many small businesses.

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[64] *See DoNotPay Terms of Service*, http://www.donotpay.co.uk/terms.php ("You acknowledge and agree that you bear full responsibility for your own DoNotPay.co.uk research and decisions and that we shall not be liable for any action that you or others take or don't take based on your use of or reliance on information provided by us or other users of our Site.").

[65] *Id*.

[66] 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 (2013) ("Underscoring the extent of this "justice gap," the 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 (20%) 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);

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 interpreted and applied law). The promise here is less "access to justice" than "reducing legal spending." 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 costs are highlighted below. 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.[67] 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. However, the legal world can become intractable for programs once a bit more complexity (such as jurisdictional or constitutional concerns, preemption doctrines, or

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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 Needs of Low Income Americans 1 (2009), https://www.americanbar.org/content/dam/aba/migrated/marketresearch/PublicDocuments/JusticeGaInAmerica2009.authcheckdam.pdf.

[67] DAVID HOWARTH, LAW AS ENGINEERING (2014); *see also* David Howarth, *Is Law a Humanity?*, 3 ARTS & HUMANITIES IN HIGH. EDUC. 9, 11–12 (2004).

statutory carve-outs in a largely common law topic) 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). Under federal health privacy law, a large hospital may enter into over 500 business associate agreements with firms ranging from credit card companies to cloud vendors.[68] 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.[69]

Breaux and his co-authors have analyzed regulations and policies, breaking them into constituent semantics (the meaning of particular terms) and syntax (the legally prescribed relations among terms). They program computers to generate compliance outputs for particular scenarios.[70] For example, a patient's health record at their 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.[71] It may only be used for marketing purposes if a specific consent has been signed.[72]

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[68] 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).

[69] 45 C.F.R. § 160.103 (2014) ("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.").

[70] Travis Breaux & Calvin Powers, *Early Studies in Acquiring Evidentiary, Reusable Business Process Models for Legal Compliance*, 6TH INT'L CONF. ON INFO. TECH.: 5–6 *(*2009).

[71] 45 C.F.R. § 164.524 (2014); 45 C.F.R. §164.506 (2013).

[72] 45 C.F.R. § 164.501, 164.508(a)(3).

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, to describe discrete activities."[73] 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 purpose (getting an individual to read the notice).[74] That purpose has a new set of atomic building blocks: the subject (an individual patient), an action (read), and an object (the notice).[75]

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. However, even a regulation as simple as this posting requirement 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 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

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[73] Travis D. Breaux et al., *Towards Regulatory Compliance*: *Extracting Rights and Obligations to Align Requirements with Regulations*, IEEE 14TH INT'L REQUIREMENTS ENG'G CONF. 3 (2006). They used this method on three datasets, to include their work on the privacy rules in HIPAA. *Id*.

[74] 45 C.F.R.§164.520(c)(2)(iii)(B) (2013) ("If the covered health care provider maintains a physical service delivery site: (B) [it must] post 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 . . . .").

[75] Breaux et al., *supra* note 73, at 6.

that dispensed in, say, a place without those demographic characteristics.[76] 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? A computational response to each of these eventualities is imaginable, and could be programmed into a robotic registration kiosk.[77] However, there is also a fair chance that a person who, say, resists signing, will simply stand before an automated registration kiosk, helpless, before a person at the health care provider assists them.

The Health Insurance Portability and Accountability Act (HIPAA) is complicated enough to computerize.[78] Health sector businesses now aspire to a multi-jurisdictional analysis of legal requirements to ensure business compliance for privacy generally. 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.[79] A CMU-based team has also addressed datasets including "the 100 most frequently occurring semi-structured goals mined from over 100 privacy policies."[80] The research trajectory is ambitious: Breaux and another co-author "plan to further validate this methodology, heuristics and patterns within the context of financial regulations and aviation standards to determine

[76] Ari E. Waldman, *Privacy, Notice, and Design* 3 (2016), https://www.ftc.gov/system/files/documents/public_comments/2016/07/00005-128570.pdf (discussing the importance of context in understanding and drafting privacy notices.).

[77] Bill Hartlove, *Patient Check-in Kiosk Goes Live at the Johns Hopkins Medical Laboratory at White Marsh*, JOHNS HOPKINS MEDICINE (Apr. 18, 2014), http://apps.pathology.jhu.edu/blogs/pathology/patient-check-in-kiosk-goes-live-at-the-johns-hopkins-medical-laboratory-white-marsh; *see also* 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).

[78] 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.).

[79] Travis Breaux & David Gordon, *Reconciling Multi-Jurisdictional Legal Requirements: A Case Study in Requirements Water Marking*, IEEE INT'L REQUIREMENTS ENG'G CONF. (2012).

[80] Breaux et al., *supra* note 73, at 3; *see also* Jaspreet Bhatia et al., *Mining Privacy Goals from Privacy Policies using Hybridized Task Recomposition*, ACM TRANS. SOFTWARE ENG. METH. (2016).

its applicability beyond healthcare."[81] Privacy and cybersecurity requirements are a key target for such automation.[82]

But 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."[83] Even more troublingly, they concede that "the 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."[84] Such conflicts are common in information law: for example, the same firm may be under duties of non-spoliation 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).[85] 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.[86]

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[81] Breaux et al., *supra* note 73, at 9.

[82] 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)." Breaux & Gordon, *supra* note 79, at 6*; see also* Travis Breaux and Ashwini Rao, *Formal Analysis of Privacy Requirements Specifications for Multi-tier Applications*, 21 IEEE INT'L REQUIREMENTS ENG'G CONF. 5 (2013) (providing methods for analyzing multiple privacy regulations to assist in identifying and resolving conflicts).

[83] Breaux et al., *supra* note 73, at 9.

[84] *Id*. at 9. 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 (2014).

[85] *See* Tania Abbas, *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).

[86] To be sure, there will continue to be advances in document management and transfer. *See, e.g.*, Navex-Global, *Cedars-Sinai Health System Case Study* (2014), http://www.navexglobal.com/en-us/resources/case-studies/cedars-sinai-health-system-cures-policy-management-ills (describing sophisticated document and record management system). However, even when document and record management systems advance, attorneys and compliance experts are still reviewing and analyzing them. *Id.* (describing "automated notification to users with reading, reviewing and approval responsibilities").

B. Smart Contracts as Linguistic Robots

A DVD may only be licensed for play in the US and Europe, and then be "coded" so it can only play in those regions and not others.[87] 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 lead to predictable reactions from the hardware that encounters them.[88]

These programs are still in their infancy, leading 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 zoning software. But to the extent laws articulate simple binaries of easily programmable desiderata, this automation may still have a bright future. For example, if the copryright 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.[89] Such

[87] Peter 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.").

[88] 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). *See also* Harry Surden, *Computable Contracts*, 46 U.C. DAVIS L. REV. 629, 631 (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).

[89] Another one of his studies promotes the LRSL to cross-reference regulations in different jurisdictions, or cross-reference within a regulation. *See* Breaux & Gordon, *Reconciling*, *supra* note 79, at 4. This work is supposed to serve as proof of concept for flexible and evolving coding of legal requirements, to ensure that, if given regulation changes, products are accordingly updated to maintain legal compliance.

tools can also reformulate certain laws and present them as compliance requirements to a layperson.[90]

Parties may also be more willing to enter into contracts if they can be assured of some degree of "automatic," code-based enforcement.[91] When it comes to simple supply chain management, there is some real promise for computable contracts. Imagine, for instance, a ship coming into port with 50 tons of sugar in containers. Assuming sensors that are capable of identifying sugar, and assaying its weight and quality, and automated exchange could be devised. In some sense, virtually anyone who shops on Amazon experiences a similarly automatic exchange after a "one-click" transaction. 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."[92]

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[90] A 2007 study provided information on their Cerno tool, which similarly relied on phrase heuristics for analyzing policy and regulations to generate legal compliance outputs. Travis Breaux, et. al., *Extracting Rights and Obligations from Regulations: Toward a Tool-Supported Process*, IEEE/ACM 22nd International Conference Automated Software Engineering (Nov. 2007), at https://www.cs.cmu.edu/~breaux/publications/nkiyavitskaya-ase07.pdf. Another study discusses using the Frame-based Requirements Analysis Method for analyzing federal regulations to ensure software legal compliance, and evidence due diligence and good faith to comply. Travis Breaux, *Exercising Due Diligence in Legal Requirements Acquisition: A Tool-supported, Frame-based Approach*, 17th IEEE International Requirements Engineering Conference (2009), https://www.cs.cmu.edu/~breaux/publications/tdbreaux-re09.pdf.

[91] Joshua 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."). The concept of a "smart contract" is widely believe to have originated in the work of Nick Szabo. Szabo, *Formalizing and Security Relationships on Public Networks*, 2 FIRST MONDAY no. 9 (1997).

[92] Nicolette De Sevres, Bart Chilton & Bradley Cohen, *The Blockchain Revolution, Smart Contracts and Financial Transactions*, 21 NO. 5 CYBERSPACE LAWYER 3, 3 (June 2016). 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.*

When it comes to more complex products, automation of elements of exchange can run into difficulties. Chickens, for example, might be a more difficult product to assess, or even weigh, then a standardized commodity like sugar. In a classic court case, *Frigaliment v. B.N.S. International Sales Corp.*, the litigants disagreed vehemently on what the meaning of the word chicken was in a contract.[93] Robotic assessments of physical reality are still delayed and corroded by a lack of data, or the messy complexity of discordant human meanings.[94]

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. 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 "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.[95]

For Goodenough and Flood, a sufficiently automated system could increase both trust and efficiency among contracting parties. 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, which pays out $100,000

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[93] 190 F. Supp. 116 (S.D.N.Y. 1960); *see* Aaron D. Goldstein, *The Public Meaning Rule: Reconciling Meaning, Intent, and Contract Interpretation*, 53 SANTA CLARA L. REV. 73 (2013).

[94] See concessions made in ADVANCES IN KNOWLEDGE REPRESENTATION, LOGIC PROGRAMMING, AND ABSTRACT ARGUMENTATION (Thomas Eiter, Hannes Strass, Mirosław Truszczyński, & Stefan Woltran eds., 2015); SILVIA MIKSCH, DAVID RIAÑO, & ANNETTE TEN TEIJE, KNOWLEDGE REPRESENTATION FOR HEALTH CARE (2014). *See also* Karen Levy, *Book Smart, Not Street Smart: Blockchain Based Smart Contracts and the Social Workings of Law*, 3 ENGAGING SCIENCE, TECHNOLOGY, AND SOCIETY 1 (2017).

[95] Mark D. Flood & Oliver R. Goodenough, *Contract as Automation: The Computational Representation of Financial Agreements* (Office of Fin. Res. Working Paper No. 15-04, Mar. 26, 2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2648460.

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. 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 it was below $90 a barrel. The airline could enable automatic debiting of its bank account when that event occurs. Programmers could also decide what to do 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, which 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.[96] 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 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; by the mid-2000s, no grandmaster could defeat the best programs. However, a combination of human and

[96] Arthur D. Hellman, *Deciding Who Decides: Understanding the Realities of Judicial Reform*, 15 L. & SOC. INQUIRY 343 (1990).

machine can defeat the best chess playing machines to this day.[97] Similar cooperative modes are likely to prove optimal in legal contexts, particularly when the stakes of a dispute are high.[98]

Nevertheless, regulators have urged (and in some cases required) financial institutions to express their contractual arrangements as code. CFTC and 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."[99] That optimism was also reflected in the agencies' treatment of other securities. For example, the Securities and Exchange Commission "Securities Exchange Commission (SEC) recently finalized a rule requiring providers of some asset-backed securities (ABS's) to file "downloadable source code in Python" to reflect the contractual arrangements embedded in the securities.[100]

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.[101] On first glance, this forbearance is puzzling—uncertainties about cash flows in ABS's helped spark the financial crisis of 2008, which was one of the main motivations

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[97] DIEGO RASSKIN-GUTMAN, CHESS METAPHORS: ARTIFICIAL INTELLIGENCE AND THE HUMAN MIND (2009).

[98] 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/; 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=.5620a08ad892.

[99] U.S. SECURITIES AND EXCHANGE COMMISSION (SEC) AND THE U.S. COMMODITY FUTURES TRADING COMMISSION (CFTC), JOINT STUDY ON THE FEASIBILITY OF MANDATING ALGORITHMIC DESCRIPTIONS FOR DERIVATIVES (Apr. 7, 2011), http://www.sec.gov/ news/studies/2011 /719b -study.pdf. Unfortunately, after considering the vagaries of accounting, securitization, and credit rating described above, it is diffi cult 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, 486 (2012).

[100] Asset-Backed Securities (proposed Apr. 7, 2010) https://www.sec.gov/rules/ proposed/2010/33-9117.pdf. This rule was finalized June 22, 2016. Asset-Backed Securities Disclosure and Registration, 17 C.F.R. §§ 229-230; 239; 249 (2016).

[101] *Id.* at 249.

behind the Dodd-Frank Act (which had required the SEC to better monitor the ABS market).[102] However, the agency's reticence reflected valid concerns among commenters representing financial institutions. For example, JPMorgan complained that "each ABS transaction has its own distinct characteristics," and it would be expensive and of questionable utility to reduce each new one to Python code.[103] 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."[104] UBMatrix expressed the view that programming obligations was not superior, in either accuracy or transparency, to simply writing them in text.[105]

A common theme animated comments on the proposal for the computerization 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.[106] The ensuing barriers to computerization here should be a cautionary tale for advocates of legal process automation

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[102] *See* 15 U.S.C. §78*o*-7; 17 C.F.R. §§ 229-230; 239; 249 (2016).

[103] Letter from JP Morgan Chase & Co. on Proposed Rules for Asset-Backed Securities, Release Nos. 33-9117; 34-61858; File No. S7-08-10 to the Securities and Exchange Commission (Oct. 4, 2011) (on file with the SEC).

[104] Letter from AmerCredit Corp. on Proposed Rules for Asset-Backed Securities, Release Nos. 33-9117; 34-61858; File No. S7-08-10 to the Securities and Exchange Commission (Aug. 2, 2010) (on file with the SEC).

[105] Letter from UBmatrix, Inc. on Proposed Rules for Asset-Backed Securities, Release Nos. 33-9117; 34-61858; File No. S7-08-10 to the Securities and Exchange Commission (July 31, 2010) (on file with the SEC) ("[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.)

[106] Letter from Committee on Federal Regulation of Securities of the American Bar Association's Section of Business Law on Proposed Rules for Asset-Backed Securities, Release Nos. 33-9117; 34-61858; File No. S7-08-10 to the Securities and Exchange Commission (Aug. 17, 2010) (on file with the SEC). ("because ABS transactions frequently are structured during the marketing process to respond to feedback from 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.").

who berate the legal profession for providing "bespoke" services when, they say, mass production would do.[107]

The "bespoke" metaphor does a great deal of rhetorical work which 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.[108] 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."[109] The statements are more reflective of business aspirations and anti-worker ideology than a solid read of the legal market.

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[107] *See, e.g.*, Richard Susskind, *From Bespoke to Commodity*, 1 LEGAL TECH. J. 4 (2006) (criticizing "bespoke" legal services).

[108] Frank Pasquale, *Beyond Innovation and Competition: The Need for Qualified Transparency in Internet Intermediaries*, 104 NW. U. L. REV 105, 154–55 n.263 (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."); *See* George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970) (discussing economic models involving "trust" and uncertain quality); Kenneth J. Arrow, *Uncertainty and the Welfare Economics of Medical Care*, 53 AM. ECON. REV. 941, 947, 965–66 (1963) (discussing behaviors influenced by information inequality in a medical context); 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).

[109] 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 wristwatch 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.

Deftr Mission Statement, http://thedeftr.com/blog/2016/07/07/what-we-believe/ (last visited Aug. 16, 2016).

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 commoditization Deftr both predicts and celebrates for attorneys.[110] Like popular and trade press articles on "the end of lawyers," their narrative is a simple one: a) software programs are getting better at recognizing patterns and even meaning in texts, b) 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, c) 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 be properly coded into software or forms. [111]

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.[112] 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

[110] DAVID F. NOBLE, FORCES OF PRODUCTION (1984); AMY SUE BIX, INVENTING OURSELVES OUT OF JOBS? (2000). 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. These concerns subsided for about two decades, but are now expressed almost daily on legal blogs.

[111] Bates v. State Bar of Arizona, 433 U.S. 350 (1977) (Powell, concurring in part, dissenting in part) ("Even the briefest reflection the tasks for which lawyers are trained and the variation among the services they perform should causation against facile assumptions that legal services can be classified in to the routine and the unique. In most situations it is impossible 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.").

[112] 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).

patterns of words in the case documents before the decisionmaker.[113] Rather, the decisionmaker is assessing the meaning of the facts and the meaning of the law in the situation. Legal functions that seem routine to a non-lawyer may create scenarios that require policy judgment, wisdom, and a responsibility akin to legislation or governance.[114]

Consider, for instance, a very common problem in the United States chronicled in David Dayen's book, *Chain of Title*.[115] After the financial crisis of 2008, banks were foreclosing on millions of homeowners. Many homeowners tried to negotiate for restructuring of their debt, but debt servicers turned them away. 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.[116] 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.

This was a genuinely new situation in 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

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[113] Frank Pasquale and Glyn Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*, 68 U. TOR. L.J. 63, 79 (there are "potential flaws in many ML [machine learning]-driven research programs using NLP [natural language processing] 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 and human meaning in legal systems, NLP researchers should expect justified neglect of their work by governments, law firms, businesses, and the legal academy.").

[114] On the role of wisdom in law, see JEFF LIPSHAW, BEYOND LEGAL REASONING: A CRITIQUE OF PURE LAWYERING 158–62 (2017).

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

[116] This was unsurprising, given the rise of "robo-signing" as a fraudulent method of rapidly disposing of foreclosure cases. Jeff Harrington, *2010 Adds Its Own Terminology to Business Lexicon*, TAMPA BAY TIMES (Dec. 23, 2010), http:// www.tampabay.com/news /business /2010-adds-its-own-terminology-to-business-lexicon/1141681. ("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.").

wait for an app 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.[117] A minimally competent lawyer working 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.[118] 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 start-up mentality in contemporary legal practice.[119] 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.[120] They gloss over the fact that good legal practice is built upon care, meticulousness, and proofreading because

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[117] N.Y. REAL PROP. LAW § 265-a (McKinney) ("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.").

[118] 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…excessive use of judicial power.'") (quoting *United States Catholic Conference v. Abortion Rights Mobilizations, Inc.*, 487 U.S. 72, 77 (1988)).

[119] KATHERINE LOSSE, THE BOY KINGS: A JOURNEY INTO THE HEART OF THE SOCIAL NETWORK 38 (2014) ("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.").

[120] Legal Rebels, *Who's a Legal Rebel?: The Revolution Is in Your Head*, A.B.A. J. (2017), http://www.abajournal.com/legalrebels/about/; *see also* Michael Skapinker, *Technology: Breaking the law*, FIN. TIMES (Apr. 11, 2016), https://www.ft.com/content/c3a9347e-fdb4-11e5-b5f5-070dca6d0a0d; Linkilaw, *Why Legal Disruption is Working* (Dec. 29, 2015), http://linkilaw.com/why-legal-disruption-is-working/; Sarah Reed, *Lawyer, Disrupt Thyself*, TechCrunch (Mar. 21, 2014), https://techcrunch.com/2014/03/21/lawyer-disrupt-thyself/.

mistakes can be irreversible—filings have page limits,[121] many issues not raised at trial cannot be raised on appeal,[122] and in some situations even "actual innocence" is not enough to spare a wrongfully convicted inmate from the death penalty.[123]

C. Blockchain as a Substitute for Property Recordation

The persistence of bespoke contracts (and regulatory responses to them) is likely in the realm of high finance. Contracts are 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.[124] The rise of Bitcoin as an alternative currency has sparked an interest in automation of transactions and recordation.[125] Software can allow distributed computers to transfer information en masse and monitor one another.[126] Bitcoin is a particular case of using blockchain technology to ensure a durable record of ownership,

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[121] *See, e.g.*, Westinghouse Elec. Corp. v. N.L.R.B., 809 F.2d 419 (7th Cir. 1987) (fining lawyers personally for exceeding page limits).

[122] State v. Brown, 853 P.2d 851, 853 (Utah 1992) (stating where a trial court makes an error that substantially affects the 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).

[123] 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.).

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

[125] Joshua Fairfield, *Bitproperty*, 88 S. CAL. L. REV. 805, 805 (May 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.").

[126] Michael J. Madison, *Social Software, Groups, and Governance*, 2006 MICH. ST. L. REV. 153, 156.

which is intended to be regulated by code.[127] Blockchain enthusiasts envision it scaling en masse to serve as a distributed ledger of all manner of transactions.

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. [128] Anyone can instantly transmit to all the other computers his desire to transfer ownership of his car to a willing buyer.[129]

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[127] Nicolette De Sevres, Bart Chilton & Bradley Cohen, *The Blockchain Revolution, Smart Contracts and Financial Transactions*, 21 NO. 5 CYBERSPACE LAWYER NL 3, 3 (June 2016). 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.

[128] *See* PAUL VIGNA & MICHAEL J. CASEY, THE AGE OF CRYPTOCURRENCY: HOW BITCOIN AND DIGITAL MONEY ARE CHALLENGING THE GLOBAL ECONOMIC CENTER 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/ ("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."). *See also* DON TAPSCOTT & ALEX TAPSCOTT, BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN IS CHANGING MONEY, BUSINESS, AND THE WORLD (2016); ARVIND NARAYANAN, JOSEPH BONNEAU, EDWARD FELTEN, ANDREW MILLER & STEVEN GOLDFEDER, BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES: A COMPREHENSIVE INTRODUCTION 43 (2016).

[129] James Grimmelmann & Arvind Narayanan, *The Blockchain Gang*, SLATE (Feb. 16, 2016), http://www.slate.com/articles/technology/future_tense/2016/02/bitcoin_s_blockchain_tech nology_won_t_change_everything.html ("You, and the mechanic, and the thousands of other

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.[130]

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.[131] Thus the name "Blockchain" boils down to a physical metaphor (a chain of blocks) for socio-technical arrangement. And we see 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.[132] Finance apps that run on top of China's WeChat messaging system are even more powerful and pervasive.[133] A blockchain for

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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 blockchain 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.").

[130] *The Promise of the Blockchain: The Trust Machine*, THE ECONOMIST (Oct. 31, 2015) http://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine ("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.").

[131] NARAYANAN ET AL., BITCOIN, *supra* note 128, at 5.

[132] Venmo, *Sending and Requesting Money* (Dec. 26, 2016), https://help.venmo.com/hc/en-us/articles/210413477; Sylvan Lane, *The Beginner's Guide to Venmo*, MASHABLE (June 30, 2014), http://mashable.com/2014/06/30/venmo-beginners-guide/#HG2q8DXMrZq3; Ethan Wolff-Mann, *The Scary Thing You Don't Understand About Venmo*, TIME (Dec. 27, 2016), https://time.com/money/4036511/venmo-more-check-than-cash/.

[133] Connie Chan, *When One App Rules Them All: The Case of WeChat and Mobile in China*, A16Z.COM (Aug. 6, 2015), https://a16z.com/2015/08/06/wechat-china-mobile-first/ (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.").

transferring title could essentially amount to a digital key.[134] Once the owner was 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,[135] 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.[136]

Yet there are also reasons for caution. Blockchain advocates have not fully clarified what happens if someone ignores computational descriptions of legal reality. 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

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[134] 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.").

[135] World Economic Forum, *The Future of Financial Infrastructure: An Ambitious Look at How Blockchain Can Reshape Financial Services* (Aug. 2016), http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf; South African Reserve Bank, *Position Paper on Virtual Currencies* (Dec. 3, 2014), https://www.resbank.co.za/RegulationAndSupervision/NationalPaymentSystem(NPS)/Legal/Documents/Position%20Paper/Virtual%20Currencies%20Position%20Paper%20%20Final_02of2014.pdf; *see also* David Mills et al., *Distributed Ledger Technology in Payments, Clearing and Settlement*, Federal Reserve Board (2016), https://www.federalreserve.gov/econresdata/feds/2016/files/2016095pap.pdf.

[136] STEPHEN GOLDSMITH & SUSAN CRAWFORD, THE RESPONSIVE CITY: ENGAGING COMMUNITIES THROUGH DATA-SMART GOVERNANCE 120 (2014) (describing an automated process for collecting city data across agencies that "greatly improved in-house analytic capacity for several agencies . . . radically changing the city's way of doing business"); BETH 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.").

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 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.[137] 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.[138] 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.[139] 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.[140]

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, in the *Wall Street Journal*, for software to "eat the world"—that is, for programs (and robots animated by them) to perform tasks once done by humans.[141] A good number of lawyers

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[137] Grimmelmann & Nayaranan, *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.

[138] *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 blockchain to a key that he controls.").

[139] *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. . . . Blockchains 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.).

[140] *Id.*

[141] Marc Andreessen, *Why Software is Eating the World*, WALL ST. J., Aug. 20, 2011; Mariano Florentino Cuellar, *Deciding Whether Software Will Eat the Bureaucracy*, REGBLOG (Dec. 22, 2016), http://www.regblog.org/2016/12/22/cuellar-deciding-software-eat-bureaucracy/ ("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 cases, the metaphor

share that enthusiasm. That may seem odd—who wants to be replaced by a machine?[142] One reason is a classic desire of one part of the profession to assert a kind of superiority over the rest.[143] 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.[144] Michael Abramowicz's *Cryptocurrency-Based Law* outlines an ambitious vision for using blockchain applications to coordinate endeavors now organized via law.[145] Rather than voting shares in meetings, participants in an organization could bid with BitCoins to promote one course of action over others.[146] 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.[147] Automobile lenders have already introduced the basic foundations of such technology: when

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of transformation as "eating" business or bureaucracy should spur reflection on what happens to food once it is digested.

[142] 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. Roscoe Pound, *Mechanical Jurisprudence*, 8 COLUM. L. REV. 605 (1908).

[143] *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 (attempting to appropriate the prestige of technical education for courses focused on legal technology).

[144] Victor Li, *Bitcoin's Useful Backbone*, 102 A.B.A. J. 31, 31 (Mar. 2016).

[145] Michael Abramowicz, *Cryptocurrency-Based Law*, 58 ARIZ. L. REV. 359, 404 (2016)

[146] *Id*. at 391.

[147] *Id.* at 373; DON TAPSCOTT & ALEX TAPSCOTT, BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN IS CHANGING MONEY, BUSINESS, AND THE WORLD (2016). For skepticism about claims of immutability, see Angela Walch, *The Path of the Blockchain Lexicon (and the Law)*, 36 REV. BANKING & FIN. L. 713 (2016-2017).

payments are late, a "starter interrupt device" can disable a debtor's car.[148] The payment of funds held in escrow could also be "self-executing," once some code-specified trigger was tripped.[149] Trust law could also enable peer-to-peer decision making processes to reduce transaction costs for disbursements.[150] Abramowicz even foresees the spread of blockchain to investment firms,[151] both for core business purposes, and to engage in regulatory arbitrage.[152] He also sees a role for blockchain applications in insurance.[153]

Legal scholars have also prescribed potential blockchain-enabled management of micropayments.[154] 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.[155] This regime, still in place for many works, separates compensation (for works) from control (over their use).[156] For blockchain advocates, software could take on the role of

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[148] Jathan Sadowski & Frank Pasquale, *Creditors Use New Devices to Put Squeeze on Debtors*, AL JAZEERA AM. (Nov. 9, 2014) ("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.").

[149] Abramowicz, *Cryptocurrency-Based Law*, *supra* note 145, at 405–06.

[150] *Id*. at 408-9; s*ee also* Shawn Bayern, *Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC*, 108 NW. U. L. REV. 257 (2014).

[151] Abramowicz, *Cryptocurrency-Based Law*, *supra* note 145, at 411.

[152] *Id*. at 412; *see also* Danielle 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.").

[153] 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.

[154] *See, e.g.*, Joshua A.T. Fairfield, *Bitproperty*, 88 S. CAL. L. REV. 805, 831 (2015).

[155] Salil Mehra, *The iPod Tax: Why the Digital Copyright System of American Law Professors' Dreams Failed in Japan*, 79 U. COLO. L. REV. 421 (2008).

[156] WILLIAM W. FISHER, PROMISES TO KEEP: TECHNOLOGY, LAW, AND THE FUTURE OF ENTERTAINMENT (2007). Fisher has offered a detailed and compelling proposal to subsidize culture by lightly taxing the technology that leads to its uncompensated duplication.

law—artists could make their work exclusively available via blockchain applications, setting their own rates for downloads or streams of copyrighted works.[157] 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.[158]

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 rules, but the values of other human beings trusted as participants in governance, and not merely as appliers of technical rules. Engineers with little or no domain expertise in the legal profession cannot 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. 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.[159] Given their distributed nature, blockchains are also touted as way to create an alternative

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Government could also impose such fees on carriers and search engines, and distribute them to creatives.

[157] Tom Bell, *Copyrights, Privacy, and the Blockchain*, 42 OHIO N. U. L. REV. 439, 444 (2016).

[158] FISHER, *supra* note 156, at 148–49.

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

legal system, beyond the reach of traditional legal authorities.[160] Ironically, the same celebrations of the power of blockchain applications also tend to worry that premature regulation could limit the impact of blockchains.[161] 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.[162] Those accepting the terms of the relevant code are assured that, whatever happens to the rest of the world in the future, their transactions are guaranteed to be valid.

Are blockchains really capable of preventing hacking or tampering? Short of a fortified HAL 9000 terminating would-be hackers before they could access the relevant blockchains, it is hard to imagine such assurances being verifiable.[163] 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.[164] Investors in a "decentralized autonomous organization" (DAO) run on code have already experienced the turbulent and troubling aspects of software-governed legal orders. In early 2016, a hacker managed to take millions of dollars in a fashion unanticipated by the drafters of the code governing the

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[160] *Id.* at 217–18.

[161] 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.

[162] *Id.* at 13.

[163] 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 ARTHUR C. CLARKE, 2001: A SPACE ODYSSEY (1968)).

[164] 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 ("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.").

organization.[165] The main organizer of the DAO, Vitalik Buterin, then was able to retaliate because the code only enabled the withdrawal of funds after a 27-day waiting period. [166] 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.[167]

According to Buterin and other organizers of the DAO, this intervention was a success story: it proved the recoverability of their system. 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.[168] Persons managed the smart contract—not mere code.[169] 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

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[165] *See* Michael del Castillo, *The DAO: Or How a Leaderless Ethereum Project Raised $50 Million*, COINDESK (May 12, 2016), http://www.coindesk.com/the-dao-just-raised-50-million-but-what-is-it/. 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.*

[166] Vitalik Buterin, *Critical Update Re: DAO Vulnerability*, ETHEREUM BLOG (June 17, 2026), https://blog.ethereum.org/2016/06/17/critical-update-re-dao-vulnerability/.

[167] Michael del Castillo, *The Hard Fork: What's About to Happen to Ethereum and the DAO*, COINDESK (July 18, 2016), http://www.coindesk.com/hard-fork-ethereum-dao/; *see also* Rob Price, *Digital Currency Ethereum Is Cratering Because of a $50 Million Hack.*, BUS. INSIDER (June 17, 2016), http://www.businessinsider.com/dao-hacked-ethereum-crashing-in-value-tens-of-millions-allegedly-stolen-2016-6?r=UK&IR=T. Vitalik Buterin, *Hard Fork Completed*, ETHEREUM BLOG (July 20, 2016), https://blog.ethereum.org/2016/07/20/hard-fork-completed/.

[168] Matt Levine, *Blockchain Company's Smart Contracts Were Dumb*, BLOOMBERG NEWS (June 17, 2016), https://www.bloomberg.com/view/articles/2016-06-17/blockchain-company-s-smart-contracts-were-dumb.

[169] *Id.*

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.

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 sudden failure, software is hackable, and software is not robust."[170] No technology has developed that would make the blockchain environment impervious to these problems.[171] Indeed, precisely the opposite is true: waves of hacking and illicit intrusions have rocked health care institutions,[172] banks,[173] and even campaigns[174] and governments.[175]

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.[176] If the real core of blockchain is

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[170] James Grimmelmann, *Regulation by Software*, 114 YALE L.J. 1719, 1742–44 (2005).

[171] *See, e.g.*, James Grimmelmann, *Anarchy, Status Updates, and Utopia*, 35 PACE L. REV. 135 (2015) (demonstrating the persistence of governance problems in social software).

[172] *See* Jessica Jardine Wilkes, *The Creation of HIPAA Culture: Prioritizing Privacy Paranoia over Patient Care*, 2014 B.Y.U. L. REV. 1213 ("In 2009, the Office of Civil Rights started recording incidents of PHI breaches and created the "Wall of Shame," which publicly exposes breaches affecting 500 people or more").

[173] Paul Merrion, *NY Fed's Role in SWIFT Cyber Heist Prompts House Panel Data Request*, WL 3085306, CQ ROLL CALL 2016 **(**describing hack of Bangladesh's central bank).

[174] Anthony J. Gaughan, *Ramshackle Federalism: America's Archaic and Dysfunctional Presidential Election System*, 85 FORDHAM L. REV. 1021 (2016) (discussing Russian hackers); Melissa Eddy, *After a Cyberattack, Germany Fears Election Disruption*, N.Y. TIMES, Dec. 8, 2016.

[175] Tim McCormack, *The Sony and OPM Double Whammy: International Law and Cyber "Attacks,"* 18 SMU SCI. & TECH. L. REV. 379 (2015).

[176] Levine, *supra* note 168 ("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.").

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. Those are legal and political values that need to be fully articulated: who gets to be part of the decisionmaking cadre? Is it a Wikipedia-style project of collaboration structured by hierarchy?[177] If so, is there anything to learn from Wikipedia's problems and limits?[178] Do Blockchain projects' commitments 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?[179]

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, and 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 faced 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

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[177] YOCHAI BENKLER, THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM 60-64 (2006); *see also* CLAY SHIRKY, HERE COMES EVERYBODY: THE POWER OF ORGANIZING WITHOUT ORGANIZATIONS (2008).

[178] *See, e.g.*, Lior Jacob Strahilevitz, *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, YALE L.J. 1472 (2007) (book review detailing limits of peer production model); PHILIP MIROWSKI & DIETER PLEHWE, THE ROAD FROM MONT PELERIN 417-448 (2009) ("Wikipedia in action is not some democratic paradise in cyberspace, but rather 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 downs in the hierarchy not blocked").

[179] 2 BRUCE ACKERMAN, WE THE PEOPLE 5–11 (2000) (describing the rare times when a populace is so mobilized that it can change fundamental constitutional rules).

permissioned.[180] Major banks, government institutions, and global forums tend to promote private and permissioned blockchains. 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.[181] Meanwhile, those advocating public/permissionless 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. 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.[182] Rather, they are cautious about the "the prospect of automated legal governance" because it

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[180] "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." *See* Angela Walch, *The Bitcoin Blockchain as Financial Market Infrastructure: A Consideration of Operational Risk*, 18 N.Y.U. J. LEGIS. & PUB. POL'Y 837 (2015) (citing BITFURY GRP. & JEFF GARZIK, PUBLIC VERSUS PRIVATE BLOCKCHAINS: PART I: PERMISSIONED BLOCKCHAINS (2015), http://bitfury.com/content/4-white-papers-research/public-vs-private-pt1-1.pdf.

[181] Giulio Prisco, *Blythe Masters and Wall Street Opt for 'Permissioned' Non-Bitcoin Blockchains*, BITCOIN MAG. (Sept. 2, 2015), https://bitcoinmagazine.com/articles/blythe-masters-wall-street-opt-permissioned-non-bitcoin-BLOCKCHAINS-1441227797 (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").

[182] Primavera De Filippi & Samer Hassan, *Blockchain Technology as a Regulatory Technology: From Code Is Law to Law Is Cod*e, 21 FIRST MONDAY no. 12 (Dec. 4, 2016); http://firstmonday.org/ojs/index.php/fm/article/view/7113; *see also* Aaron Wright & Primavera De Filippi, Decentralized Blockchain Technology and the Rise of Lex Cryptographia (Mar. 10, 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2580664.

may "reduce the freedoms and autonomy of individuals."[183] 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.[184]

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.[185] 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 21st century political economy.[186] 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,

[183] *Id.*

[184] ADAM GREENFIELD, RADICAL TECHNOLOGIES 303 (2017) ("the 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…by existing concentrations of power.).

[185] Paul F. Kirgis, *The Knowledge Guild: The Legal Profession in an Age of Technological Change*, 11 NEV. L.J. 184, 184 (2010) ("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.").

[186] *See* FORD, RISE OF THE ROBOTS, *supra* note 10.

ideally replaced by a full automation of present jobs.[187] But this is just one vision of human progress—and not a very attractive one.[188]

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.[189] 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.").[190] 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 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.[191] As Fallon explains:

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[187] RAY KURZWEIL, THE AGE OF SPIRITUAL MACHINES: WHEN COMPUTERS EXCEED HUMAN INTELLIGENCE (2000); *see also* NICK SRNICEK & ALEX WILLIAM, INVENTING THE FUTURE: POSTCAPITALISM AND A WORLD WITHOUT WORK (2015).

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

[189] 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.

[190] *Id.* at 11–17.

[191] *Id.* at 18. The term Legal Process here denotes the approach of a school of jurisprudence that emerged in the mid-twentieth century United States in order to reconcile realist and formalist approaches to interpretation. Donald A. Dripps, *Justice Harlan on Criminal Procedure: Two Cheers for the Legal Process School,* 3 OHIO ST. J. CRIM. L. 125, 126

> 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.[192]

This elaborate definition may seem awkward in comparison with the relatively compact accounts of the historicist and formalist schools. While those approaches emphasis the "rule" side of the rule of law, the Legal Process approach emphasizes "law" as its core component. Law as a social institution is multi-faceted 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.[193]

When conflicts over interpretation arise, the Legal Process approach to the rule of law demands the clashing parties are offered "reasoned elaboration of the connection between recognized, pre-existing sources of legal authority and the determination of rights and responsibilities in

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(2005); LAURA KALMAN, THE STRANGE CAREER OF LEGAL LIBERALISM 20 (1998) (describing emergence of the Legal Process school.).

[192] *Id.* at 18. 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: BASIC PROBLEMS IN THE MAKING AND APPLICATION OF LAW 4–5, 152–53, 157–58, 695 (William N. Eskridge, Jr. & Philip P. Frickey eds., 1994)).

[193] *Id.* at 18.

particular cases"—not simple disposition of their cases via code.[194] 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.[195] 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.[196] 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.[197] Automatic transmission makes it easier to shift from high to low gear.[198] Collision avoidance software can warn him about cars in his blind spot.[199] Technology can make the job much easier—until it replaces the driver altogether.[200] 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.[201]

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[194] *Id.* at 19.
[195] *Id.*
[196] *Id.* at 54–55.
[197] NATIONAL HIGHWAY TRAFFIC & SAFETY ADMINISTRATION, FEDERAL AUTOMATED VEHICLES POLICY 9 (2016) (describing the SAE (Society of Automotive Engineers) International levels of autonomy in driving).
[198] *Id.*
[199] *Id.*
[200] *Id.*
[201] *See, e.g.*, WILLIAM J. BAUMOL & ALAN S. BLINDER, ECONOMICS: PRINCIPLES AND POLICY 120 (13th ed. 2015) (describing complements and substitutes).

In computing, artificial intelligence (AI) research has focused on technologies that can substitute for human cognition and attention.[202] For example, even in the 1960s, roboticists at the Massachusetts Institute of Technology were developing mechanical sentries to relieve soldiers of the boring and dangerous duty of standing guard at vulnerable sites.[203] 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.[204]

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 arrange of services and protections offered by attorneys.[205] Nevertheless, federal policymakers have recently menaced states which 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 and Department of Justice weighed in to criticize the state and threaten antitrust action against it.[206] Framed as an

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[202] JOHN MARKOFF, MACHINES OF LOVING GRACE xii (2015).
[203] *Id.* at 5.
[204] *Id.* at 16.
[205] Brian Sheppard, *Incomplete Innovation and the Premature Disruption of Legal Services*, 2015 MICH. ST. L. REV. 1797, 1825 (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).
[206] Letter from Marina Lao, Dir. of the FTC Office of Policy Planning & Robert Potter, Chief of the Legal Policy Section, Antitrust Div. of the U.S. Dep't of Justice to N.C. 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.

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.[207] They appear committed to promoting software as a substitute for attorneys, even though the sellers of such software often foist exculpatory clauses (or other limitations of liability) on end users.[208] Such clauses prematurely extinguish litigation over bad outcomes, which could help both attorneys and consumers better understand the risks involved in AI approaches to law.[209] 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 software.[210] 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.[211] This resistance of human know-how to codification and

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[207] Sandeep Vaheesan & Frank Pasquale, *The Politics of Professionalism: Reappraising Occupational Licensure and Competition Policy*, ANN. REV. L. & SOC. SCI. 7 (forthcoming), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2881732 (criticizing the FTC for failing to take into account important consumer protection goals in its complaints about occupational licensure restrictions).

[208] *See, e.g.*, H.B. 436, 2015-2016 Sess. (N.C. 2016) (North Carolina 2016 law exempting certain website providers from the definition of the "practice of law" and creating additional requirements for website providers).

[209] MARGARET JANE RADIN, BOILERPLATE: THE FINE PRINT, VANISHING RIGHTS, AND THE RULE OF LAW 139–40 (2014) (describing suboptimal social outcomes arising out of exculpatory clauses).

[210] HUBERT DREYFUS, STUART E. DREYFUS & TOM ATHANASIOU, MIND OVER MACHINE: THE POWER OF HUMAN INTUITION AND EXPERTISE IN THE ERA OF THE COMPUTER (1986).

[211] *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.").

standardization persists in many contexts far less complex than legal practice is today. 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 itself is.[212]

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.[213] 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*,[214] a leading case on the "independent contractor/employee" distinction in

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[212] David Autor, *Polanyi's Paradox and the Shape of Employment Growth* 31 (NBER 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."); David H. Autor, *Why Are There Still So Many Jobs? The History and Future of the Workplace Automation*, 29 J. ECON. PERSP. 3 (2015).

[213] 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/; 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."); 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.").

[214] 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.") (internal citations omitted).

copyright law, many law review articles tried to isolate payment of payroll taxes as the touchstone, despite the multi-factor test in the case.[215] More ambitious articles might try to explain variations with elaborate sub-rules, as treatise writers are prone to typologize cases.[216]

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 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.[217] 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.[218]

These methods also mirror advances in translation accomplished by Google over the past decade. Google translate does not deploy some

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[215] *See* Julie Goldscheid, *Copyright Law: Toward an Improved "Works for Hire" Doctrine*, 1990 ANN. SURV. AM. L. 557 (1991).

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

[217] This may either exemplify or solve Bentham's complaints about overcomplexity of law. FREDERICK SCHAUER, THE FORCE OF LAW (2015). *See also* Blue J Legal, Bardal Factors, *What's Reasonable?*, http://www.bardalfactors.ca/whats-reasonable/; Samuel Gibbs, *Chatbot Lawyer Overturns 160,000 Parking Tickets in London and New York*, THE GUARDIAN (June 28, 2016), https://www.theguardian.com/technology/2016/jun/28/chatbot-ai-lawyer-donotpay-parking-tickets-london-new-york].

[218] PHAEDRA DAIPHA, MASTERS OF UNCERTAINTY: WEATHER FORECASTERS AND THE QUEST FOR GROUND TRUTH 51 (2016) (describing the project of "employing the brute force of computers to mathematically simulate the laws of atmospheric physics.").

hierarchical set of rules to convert a word or phrase or sentence from one language to another. Rather, it simply tries to match the phrase to be converted to an identical or similar phrase in an extant, translated document, and then finds the matching phrase in the translation of that document to use it in the target context.[219] 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. 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.[220]

Far from being conflicting approaches to automating legal analysis, expert systems and machine learning approaches based on predictive analytics are deeply complementary methods of advancing substitutive automation in law. Once predictive analysts take a distant reading of cases,[221] 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.[222] 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 a complete mess,

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[219] *See How Google Translate Works*, GOOGLE SYSTEM BLOG (Aug. 12, 2010), http://googlesystem.blogspot.com/2010/08/how-google-translate-works.html; *see also* Tomas Mikolov et al., *Distributed Representations of Words and Phrases and Their Compositionality*, 2013 ADV. NEURAL INFO. PROC. SYSTEMS 3111 (describing the use of language vectors to improve Google Translate); DAVID BELLOS, IS THAT A FISH IN YOUR EAR?: TRANSLATION AND THE MEANING OF EVERYTHING 255 (2011).

[220] Google Translate Community, *FAQ*, GOOGLE, https://docs.google.com/document/d/1dwS4CZzgZwmvoB9pAx4A6Yytmv7itk_XE968RMiqpMY/pub (last visited Jan. 12, 2017) ("While Google Translate is a statistical machine translation tool . . . , we sometimes need help from native speakers to improve our algorithms . . . .").

[221] 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).

[222] Anthony Casey & Anthony Niblett, *The Death of Rules and Standards* (U. of Chicago, Public Law Working Paper No. 550, Nov. 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2693826##; Katz, *supra* note 12.

algorithmic analyses may find patterns in cases beyond human comprehension, and successfully brute force a prediction of optimal legal strategy.[223] If the law, by contrast, is perfectly ordered, an expert system can reduce it to a series of rules to be applied.[224] 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 or rule before a complaint or enforcement action is lodged against them.[225] But this battle was lost in the 1940s.[226] As the Supreme Court decided in *Chenery II*, there is "a very definite place for the case-by-case evolution of statutory standards."[227] A humane legal order, flexibly adapting to new realities and political change, demands nothing less.

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[223] Even in this scenario, though, hard ethical questions arise about the potential use of such programs. See Frank Pasquale & Glyn Cashwell, *Prediction, Persuasion, and the Jurisprudence of Behaviorism*, U. TORONTO L.J. (forthcoming 2018) ("The pragmatic and the critical uses of predictive algorithms [in law] are deeply 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 past training data reflect bias, they are likely to reinforce and spread the influence of that bias when they are utilized by actors outside the judicial system (who may, for example, not even try to advocate for a particular class of meritorious cases, since decisionmakers are systematically biased against them).").

[224] However, it is also important to acknowledge that the process of articulating a rule may not improve decisionmaking. Chad Oldfather, *Writing, Cognition, and the Nature of the Judicial Function*, 96 GEO. L.J. 1283, 1386 (2008).

[225] Frederick Schauer, *Rules and the Rule-Following Argument*, 3 CAN. J.L. & JURIS. 187 (1990).

[226] Securities and Exchange Commission v. Chenery Corp., 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 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.").

[227] *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

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 NWS [National Weather Service] 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 assist them in their task.[228]

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.[229] 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 discretion. Many past

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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.") (internal citations omitted).

[228] DAIPHA, MASTERS OF UNCERTAINTY, *supra* note 218, at 52.

[229] Woodrow Hartzog & Daniel J. Solove, *The Scope and Potential of FTC Data Protection*, 83 GEO. WASH. L. REV. 2230, 2233 (2015).

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 pre-programmed factors in social security disability determinations was originally seen as a prelude to automation of such decisions.[230] 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.[231]

This is not to discount entirely the deployment of artificial intelligence in law. Brute force predictors may help advise clients as crystalline rules turn into muddy standards, and vice versa.[232] They can also alert decisionmakers when biases begin to emerge.[233] For example, a notable study in behavioral economics recently exposed judges imposing shorter sentences after lunch than before it.[234] Ideally, such studies do not inspire predictive analytics firms like Lex Machina 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

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[230] MARTHA DERTHICK, AGENCY UNDER STRESS 122 (1990).

[231] Bernard Wixon & Alexander Strand, *Identifying SSA's Sequential Disability Determination Steps Using Administrative Data*, SOCIAL SECURITY (June 2013), https://www.ssa.gov/policy/docs/rsnotes/rsn2013-01.html ("Beginning in 1999, SSA implemented modifications to the disability determination procedures in states known as prototype states. One modification was to allow disability 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.") (citation omitted).

[232] Carol Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577 (1988).

[233] Julia Angwin et al., *Machine Bias*, PROPUBLICA (May 23, 2016), https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing (discussing Northpointe recidivism scoring, and the biases of judges making decisions without such a system); *see also* McCleskey v. Kemp, 481 U.S. 279 (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 (2016).

[234] Shai Danziger, Jonathan Levav & Liora Avanim-Pesso, *Extraneous Factors in Judicial Decisions*, 108 PROC. NATL. ACAD. SCI. USA No. 17, 6889–92 (2010) (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").

against this hunger bias once they're alerted to it (or, failing that, to snack regularly).[235] Other professionals (like physicians and pharmacists) routinely utilize automated alarms as "guard rails" to warn against potentially wrong decisions.[236] 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.[237]

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 billed as supporting. 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.[238] 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.

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[235] David Golumbia, *Judging Like a Machine*, *in* POSTDIGITAL AESTHETICS (2014) ("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 judgement, though it be systematically flawed, is nevertheless the only responsible form for human power to take.").

[236] 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 S.L.U. J. HEALTH L. & POL'Y 257, 259 (2012) (describing promise of decision support systems, and the need for judgment in the face of excessive alerts).

[237] Jack M. Balkin, *The Path of Robotics Law*, 6 CAL. L. REV. CIRCUIT 45 (2016).

[238] *See, e.g.*, John O. McGinnis, *Accelerating Artificial Intelligence*, 104 NW. U.L. REV. 366, 368 (2010); SUSSKIND & SUSSKIND, FUTURE OF THE PROFESSIONS, *supra* note 7, at 68; *but see* Frank Pasquale, *Automating the Professions?*,

Both humble and ambitious versions of substitutive legal automation have stalled, or failed to fully realize their announced ambitions.[239] 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 advances in computing over the past half-century than dreams of general artificial intelligence.[240] 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.

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[239] 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 Pasquale, *The Automated Public Sphere*, *in* THE POLITICS AND POLICIES OF BIG DATA: BIG DATA, BIG BROTHER? (Ann Rudinow Sætnan, Ingrid Schneider & Nicola Green eds., 2018) (describing the pervasiveness and effect of fake news in automated environments)

[240] JOHN MARKOFF, MACHINES OF LOVING GRACE 1-20 (2015) (describing history of computer science research); *accord*, DANIEL CREVIER, AI: THE TUMULTUOUS HISTORY OF THE SEARCH FOR ARTIFICIAL INTELLIGENCE 209 (1993) (describing the AI winter of the 1980s and the failures of substitutive expert systems).