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Technological Due Process

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TECHNOLOGICAL DUE PROCESS

DANIELLE KEATS CITRON∗

ABSTRACT

Distinct and complementary procedures for adjudication and rulemaking lie at the heart of twentieth-century administrative law. Due process requires agencies to provide individuals notice and an opportunity to be heard. Through public rulemaking, agencies can foreclose policy issues that individuals might otherwise raise in adjudication. One system allows for focused advocacy; the other features broad participation. Each procedural regime compensates for the normative limits of the other. Both depend on clear statements of reason.

The dichotomy between these procedural regimes is rapidly becoming outmoded. This century’s automated decision making systems combine individual adjudications with rulemaking while adhering to the procedural safeguards of neither. Automated systems jeopardize due process norms. Hearings are devalued by the lack of meaningful notice and by the hearing officer’s tendency to presume a computer system’s infallibility. The Mathews v. Eldridge cost-benefit analysis is ill-equipped to compare the high fixed cost of deciphering a computer system’s logic with the accumulating variable benefit of correcting myriad inaccurate decisions made based on this logic. Automation also defeats participatory rulemaking. Code, not rules, determines the outcomes of adjudications. Programmers inevitably alter established rules when embedding them into code in ways the public, elected officials, and the courts cannot review. Last century’s procedures cannot repair these accountability deficits.

A new concept of technological due process is essential to vindicate the

∗ © Danielle Keats Citron. Assistant Professor of Law, University of Maryland School of Law. The comments of Richard Boldt, Maxwell Chibundu, John Henry Clippinger, Karen Czapanskiy, Lisa Fairfax, Jon Garfinkel, Mark Graber, Debbie Hellman, Bob Katzorowski, Gene Koo, Dan Markel, Helen Norton, Frank Pasquale, Doc Sears, Jana Singer, Max Stearns, David Super, Michael Van Alstine, and Greg Young greatly improved this Article. I am grateful to Andy Bardwell, Val Greenfield, Ed Kahn, Jennifer Lang, Don McCubbrey, Nan Morehead, Melissa A. Rodgers, and Ed Stevens who generously shared with me their expert and practical knowledge of automated decision-making systems. Jonathan Bliley, Pamela Bluh, Adam Coleman, Alice Johnson, Susan McCarty, Janet Sinder, and Peter Suh provided excellent research assistance. I presented an earlier version of this Article to the Berkman Center for Internet and Society at the Harvard Law School, the Stetson Law School faculty, and the Junior Faculty Workshop at the University of Maryland School of Law, and I benefitted from the discussions at those sessions. I am indebted to Dean Karen Rothenberg and the University of Maryland School of Law for supporting this research. I am grateful to the editorial staff of the Washington University Law Review, specifically Jess Feinberg, Ele Forbes, Laura Uberti, Matt Walczewski, and Ben Warr, for their valuable contributions to this Article.
norms underlying last century’s procedural protections. This Article will
demonstrate how a carefully structured inquisitorial model of quality
control can partially replace aspects of adversarial justice that
automation renders ineffectual. It also provides a framework of
mechanisms capable of enhancing the transparency, accountability, and
accuracy of rules embedded in automated decision-making systems.

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INTRODUCTION

The executive branch grew exponentially in size and mission in the twentieth century. Administrative agencies wielded ever-increasing power, implementing comprehensive regulatory programs and distributing benefits to tens of millions of people. Congress and the courts allowed the administrative state to expand so long as it adhered to extensive procedures designed to ensure the fairness, transparency, and accountability of agencies’ decisions about particular individuals and their policymaking. Procedural due process protected the important interests of individuals while constraints on rulemaking served as legitimate substitutes for individual adjudications.

In the twentieth century, those procedures enjoyed mixed success. The administrative state faced serious criticism, ranging from agency capture and the ossification of rulemaking to chronic backlogs and perceived

4. See 1 Kenneth Culp Davis & Richard J. Pierce, Jr., Administrative Law Treatise § 6.1 (3d ed. 1994) (explaining that guarantees of procedural due process in addition to rulemaking procedures found in administrative decisions provide basic structural protections for individuals); see, e.g., Londoner v. City of Denver, 210 U.S. 373 (1908) (providing due process protections to individuals subject to special tax because City levied tax on the basis of facts peculiar to individuals’ situations); Bi-Metallic Inv. Co. v. State Bd. of Equalization, 239 U.S. 441, 445 (1915) (finding no due process right to a hearing to challenge an across-the-board tax because “it is impracticable that everyone should have a direct voice in [the] adoption” of a “rule of conduct” that “applies to more than a few people”); John Hart Ely, Democracy and Distrust 87 (1980) “[The Constitution] is overwhelmingly concerned, on the one hand, with procedural fairness in the resolution of individual disputes (process writ small), and on the other, with what might capaciously be designated process writ large—with ensuring broad participation in the processes and distributions of government.”) (citation omitted).
7. See White v. Mathews, 434 F. Supp. 1252, 1261 (D. Conn. 1976) (finding that the delays in the Social Security Administration’s (SSA’s) disability benefits appeals process denied applicants procedural due process); see also Jerry L. Mashaw et al., Social Security Hearings and Appeals (1978); Maurice E.R. Munro, The EEOC: Pattern and Practice Imperfect, 13 YALE L. &
unfairness in agencies’ adjudicatory arms. Through it all, however, procedural due process and formal and informal rulemaking provided a common structure for debating and addressing concerns about the propriety of administrative actions.

The twenty-first century’s automated decision-making systems bring radical change to the administrative state that last century’s procedural structures cannot manage. In the past, computer systems helped humans apply rules to individual cases. Now, automated systems have become the primary decision makers. These systems often take human decision making out of the process of terminating individuals’ Medicaid, food stamp, and other welfare benefits. Another of these systems targets people for exclusion from air travel. Computer programs identify parents believed to owe child support and instruct state agencies to file collection proceedings against those individuals. Voters are purged from the rolls without notice, and small businesses are deemed ineligible for federal contracts.

Champions of automated systems extol their cost savings. Because automation radically reduces the human role in executing government policy and programs, state and federal governments can cut staff and close field offices. Supporters also argue that automation ensures consistent
decisions: systems interpret rules in the same way in every case.  

Computerized systems eliminate the hassle of physically visiting an agency’s office.  

Automation offers all of this. But it also risks dismantling critical procedural safeguards at the foundation of administrative law. Whereas the differences between rulemaking and individual adjudications and their procedural safeguards animated twentieth-century administrative law, today’s automated systems defy such classification. Computer programs seamlessly combine rulemaking and individual adjudications without the critical procedural protections owed either of them.  

Automation generates unforeseen problems for the adjudication of important individual rights. Some systems adjudicate in secret, while others lack recordkeeping audit trails, making review of the law and facts supporting a system’s decisions impossible.  

Inadequate notice will
discourage some people from seeking hearings and severely reduce the value of hearings that are held.23

Even if an individual seeks and receives a hearing, a hearing officer’s belief that computer decisions are error-resistant increases the likelihood of inaccurate outcomes. Although expert testimony about a computer system’s reasoning could combat a hearing officer’s presumption that a computer decision is correct,24 a Mathews v. Eldridge25 cost-benefit analysis would likely deny such additional process due to its extreme cost. As a result, hearings may not provide individuals with opportunities to meaningfully challenge automated decisions. Changes must be made if procedural due process is to be effective in the twenty-first century.26

Automation also impairs the rulemaking procedures that traditionally substituted for individualized consideration with procedural due process. Although programmers building automated systems may not intend to engage in rulemaking, they in fact do so. Programmers routinely change the substance of rules when translating them from human language into computer code.27 The resulting distorted rules effectively constitute new policy that can affect large numbers of people.

The opacity of automated systems shields them from scrutiny.28 Citizens cannot see or debate these new rules.29 In turn, the transparency, accuracy, and political accountability of administrative rulemaking are lost.30 Code writers lack the properly delegated authority and policy

Colorado and Texas lack recordkeeping audit trails that record the facts and law at the heart of each mini-decision made by the computer. See infra notes 191–95.

23. Indeed, the lack of meaningful notice effectively prevents some individuals from receiving hearings. See infra note 187 and accompanying text (discussing the lack of notice to individuals who are erroneously labeled dead-beat parents and the default judgments against innocent individuals who never received notice of their dead-beat status).

24. See infra notes 243, 248–49 and accompanying text (discussing the potential value of expert testimony on a system’s logic at hearings to dispel automation bias).


27. See infra notes 123–31 and accompanying text (discussing distorted policy embedded in Colorado’s public benefits system known as CBMS).


29. James Grimmelmann, Note, Regulation by Software, 114 YALE L.J. 1719, 1736, 1750–55 (2005) (arguing that software’s opacity is unproblematic when code regulates online markets and Digital Rights Management Systems). The programmer determines a system’s responses but the user sees only the results of the software’s decisions. Id.

expertise that might ameliorate such unintentional policymaking. They also usurp agency expertise when they inadvertently distort established policy.

Expert agency deliberation is another casualty of the acceleration of automated decision making. Agencies may be increasingly inclined to adopt policies involving simple questions and answers that are easy to translate into code, even when strong substantive reasons favor a more nuanced approach. At the same time, agencies may forsake policies that require a human being to exercise discretion because these are more difficult to automate. A strong a priori preference for simplified policy over nuance and discretion narrows the field for the expertise model of administrative law.

In short, automation undermines several pivotal assumptions at the heart of twentieth-century administrative law. Under these rapidly eroding assumptions, agencies exercise broad discretion to pursue either adjudication or rulemaking, although whatever path an agency ultimately chooses bears a distinct set of procedures. These procedures, which are the essence of an individual’s due process rights, begin with an agency’s statement of reasons for its intended actions. In agency adjudications, assessments of hearing officers’ partiality hinge upon their connections with the parties appearing before them. Furthermore, the traditional due

determinations for public-benefits programs risks transparency since state employees may not be aware of extent to which an automated program deviates from state or federal policy).

31. Rochelle Hahn explains that in Massachusetts, information technology specialists dissuaded agency decision makers from adopting public benefits policies that would be difficult and expensive to automate. Comments of Rochelle Hahn, Website Coordinator for Massachusetts Legal Services, Podcast, Berkman Center for Internet and Society at Harvard Law School, “Danielle Citron on Technological Due Process,” Jan. 15, 2008, http://blogs.law.harvard.edu/mediaberkman/2008/01/15/danielle-citron-on-technological-due-process-podcast/.

32. Congress and the courts delegated power to agencies largely on the basis that agencies could develop the kind of expertise that legislators could not. LANDIS, supra note 2, at 23 (“[Expertise] springs only from that continuity of interest, that ability and desire to devote fifty-two weeks a year, year after year, to a particular problem.”); see also Martin v. Occupational Safety & Health Review Comm’n, 499 U.S. 144, 151–53 (1991) (deferring to Secretary of Labor’s interpretation of regulation because Secretary’s involvement with everyday enforcement gave her expertise that explained, in part, Congress’s delegation of rulemaking functions to Secretary); Danielle Keats Citron, Open Code Governance, 2008 U. CHI. LEGAL F. (forthcoming Sept. 2008) (discussing expert model of administrative law).

33. See NLRB v. Bell Aerospace Co., 416 U.S. 267, 291 (1974) (ruling that the choice between rulemaking and adjudication lies within the agency’s discretion).

34. See sources cited supra note 4 (discussing different procedural regimes governing individual adjudications and rulemaking).


process cost-benefit analysis is structured so that the significant costs are almost always the variable ones, and are replicated in all future adjudications. Lastly, agencies can engage in legislative-type rulemaking only after seeking and considering the public’s input. All of these assumptions are fast becoming obsolete in this automated age.

Consider the following illustrations of failed automated systems. The Colorado Benefits Management System (CBMS) has issued hundreds of thousands of incorrect Medicaid, food stamp, and welfare eligibility determinations and benefit calculations since its launch in September 2004. Many of these errors can be attributed to programmers’ incorrect translations of hundreds of rules into computer code. As a result, CBMS imposed rules that, in their translated form, distorted federal and state policy without providing required opportunities for public input. Even after years of efforts to correct the system, affected individuals still cannot readily determine if errors made by CBMS stem from incorrectly translated rules or from mistaken factual adjudications. Had the failure of CBMS been less catastrophic, and thus less noticeable, the system’s invalid rules might well have remained hidden.

Every week, approximately 1,500 airline travelers reportedly are mislabeled as terrorists due to errors in the data-matching program known as the “No Fly” list. Innocent individuals face extensive questioning and miss flights, never knowing why the automated system has targeted them. Individuals on the “No Fly” list have no assured means to clear their names.

of procedural due process for administrative judge to sit on case after he expressed an opinion as to whether certain types of conduct were prohibited by law).

37. See infra notes 244–47 and accompanying text (discussing the high cost of providing hearings in future cases under the traditional Mathews v. Eldridge due process analysis).

38. See Kerwin, supra note 3, at 158 (“[T]he legitimacy of the rulemaking process is clearly linked to public participation.”).

39. Jerd Smith, Audit: Costly Errors in Computer System for Benefits Had High Mistake Rate, ROCKY Mtn. News, Apr. 19, 2006, at 4A. Before CBMS went live, the error rate for food stamp decisions was approximately 2.93%. Id. In 2005, a year after Colorado launched CBMS, the food stamp error rate stood at 7.42% whereas the national error rate was 5.48%. Id.

40. See infra notes 123 & 144.

41. See, e.g., Boatman v. Hammons, 164 F.3d 286, 288 (6th Cir. 1998) (enforcing requirements that states consult their medical care advisory committees before changing Medicaid policy); 7 C.F.R. § 272.3(d) (2007) (“State agencies shall solicit public input and comment on overall Program operations as State laws require or as the individual State agency believes would be useful.”).


their names and could be detained every time they attempt to board an airplane.\footnote{44.


Unsophisticated algorithms and faulty data generate high rates of false positives that might serve as a basis for baseless, stigmatizing criminal investigations.\footnote{49. CONGRESSIONAL RESEARCH SERVICE, PUB. NO. RL31798, DATA MINING AND HOMELAND SECURITY: AN OVERVIEW 3 (2007), available at http://www.fas.org/sgp/crs/intel/RL31798.pdf [hereinafter CRS, DATA MINING]; Harris, supra note 48; Schneier, supra note 48.}

The automated Federal Parent Locator Service has erroneously identified individuals as “dead-beat” parents who owe child support.\footnote{50. Megan Garvey, Net to Snag Deadbeats Also Snares Innocent, L.A. TIMES, Apr. 12, 1998, at B1.}

Some of these mistakenly identified individuals never receive notice of their alleged dead-beat status before their wages are garnished and their credit is impaired.\footnote{51. Stephanie Walton, The Real Cost of Unreliable Child Support Data 1, 2 (National Conf. of State Legislatures, Legislative Brief No. 0190001220, 2004); see Danielle Keats Citron, Reservoirs of Danger: The Evolution of Public and Private Law at the Dawn of the Information Age, 80 S. CAL. L. REV. 241, 295 (2007) (exploring how an individual’s credit-worthiness is critical to market identity and personhood in the twenty-first century).} These systems offend basic norms of due process by failing to provide both notice of the basis of their decisions and the means to review them.
These examples leave no doubt that the procedural guarantees of the last century have been overmatched by the technologies of this one. Due to the public’s crushing demand for services, and the increasing complexity of regulatory regimes, agencies will increasingly automate their decisions.52 With further automation on the horizon, the inadequacy of last century’s procedural protections can no longer be ignored. Administrative law must evolve to face these changes.

This Article offers a new framework for administrative and constitutional law designed to address the challenges of the automated administrative state. Part I describes how automated systems are built and the varying ways that policy is embedded, and often distorted, in software code. It provides a typology of the automated systems that agencies use. Part I then considers the recent failures of automated systems and explains why human operators provide little protection against such failures.

Part II highlights how automation jeopardizes the procedural protections that have long been deemed foundational to the administrative state. It explores how computer systems collapse individual adjudications into rulemaking, making it difficult, if not impossible, to determine whether a decision resulted from factual errors, distorted policy, or both. Part II shows how automation erodes the due process guarantees of notice and an opportunity to be heard. It assesses the myriad ways automation strips procedural integrity from administrative rulemaking, including the elimination of notice-and-comment participation, transparency, and political accountability. Lastly, Part II highlights the difficulties involved in judicial review of automated rules and adjudications.

Part III articulates a new model of technological due process. Drawing theoretical support from the rules-versus-standards literature, it offers a systematic way for an agency to approach the threshold decision of whether to favor automation over human discretion. This technological due process provides new mechanisms to replace the procedural regimes that automation endangers. In certain instances, surrogate rules can be used to protect the transparency, accountability, and fairness of rulemaking and adjudication. In others, new standards can be implemented to prevent procedurally defective rulemaking and arbitrary government decision making.

52. See Kersten, supra note 10 (noting that decision automation has become increasingly indispensable to government due to computers’ ability to process large volumes of information); Grimmelmann, supra note 29, at 1734 (explaining that software successfully applies rules whose complexity would confound human beings).
I. THE ROOTS AND NATURE OF AUTOMATED GOVERNMENT POLICY-MAKING AND ADJUDICATION

The automated administrative state took root after the convergence of a number of trends—budget shortfalls in the 1990s, the falling costs and increased performance of information systems, and the emergence of the Internet. Government officials saw computerized automation as an efficient way to reduce operating costs. Automated systems meant less paperwork and fewer staff.

Federal and state agencies have made significant strides in their quest to automate government policy and decision making. Today, computer systems determine whether children receive medical assistance, businesses obtain licenses and permits, and travelers board airplanes. All states automate a significant portion of the administration of their public benefits programs. More than fifty federal agencies execute policy with data-matching and data-mining programs.

Section A details the process involved in building automated systems and explains why policy so often gets distorted when programmers translate it into code. It describes how agencies use systems that exclude human operators, as well as those that mix automation with human intervention. Section B considers the recent failures of automated

53. See EGERS, supra note 18, at 5, 15–16 (explaining that the late 1990s witnessed productivity growth from IT investments and certain sections of government took advantage of its promise); Shane Peterson, Squeeze Play, GOV'T TECH., Jan. 6, 2004, available at http://www.govtech.net/magazine/story.print.php?id=83612.
54. Peterson, supra note 53.
55. EGERS, supra note 18, at 29.
56. See infra notes 111, 112, and 117 for a discussion of automated public benefits systems, “No-Fly” data-matching program, and grant eligibility advice systems.
systems, including the encoding of incorrect policy, faulty notices, and mistaken identifications. It explains why human operators in mixed systems fail to provide adequate protection against such problems.

A. Government 2.0

1. Designing Automated Decision Systems

Automated decision systems have been characterized as rules-based programs, data-matching programs, or data-mining programs. First, rules-based systems apply policy to a set of facts. 60 Programmers translate policy from human language into computer code and embed it into the system’s “rules base,” which is often called the “decision tables.” 61 The “rules engine” provides the system’s logic. 62 Second, data-matching systems compare two or more databases with an algorithmic set of rules that determine the likelihood that two sets of personal identifying information represent the same individual. 63 Third, data mining employs algorithms and search engines to find specific patterns and correlations in information stored in large databases. 64

Private vendors typically build these systems, often with the help of government information technology personnel. 65 For example, state agency workers played a significant role in building Colorado’s public benefits system. State programmers encoded policy into the system’s decision tables; a private vendor, EDS, constructed the system’s rules
Although EDS currently runs the system, state programmers continue to maintain the decision tables.\(^66\)

Policy is often distorted when programmers translate it into code. Although all translations shade meaning,\(^68\) the translation of policy from human language into code is more likely to result in a significant alteration of meaning than would the translation of policy from English into another human language.\(^69\) This is, in part, because the artificial languages intelligible to computers have a more limited vocabulary than human languages.\(^70\) Computer languages may be unable to capture the nuances of a particular policy.\(^71\)

Code writers also interpret policy when they translate it from human language to computer code.\(^72\) Distortions in policy have been attributed to the fact that programmers lack “policy knowledge.”\(^73\) This is neither surprising nor easily remedied. Information technology consultants cannot be expected to have specialized expertise in regulatory or public benefits programs. Finding and hiring individuals who possess both information systems proficiency and policy knowledge would undoubtedly be difficult and expensive. Many governments find it cost-effective to use the same system designers for a wide variety of programs,\(^74\) making it even less likely that a designer will have the necessary policy expertise in each distinct program.


\(^67\) Id.


\(^70\) Id.; Grimmelmann, supra note 29, at 1728.


\(^72\) AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 35.

\(^73\) OFFICE OF INSPECTOR GEN., TEX. HEALTH & HUMAN SERVS. COMM’N, TIERS/IEES REVIEW 29 (2007) (on file with author) [hereinafter TEXAS OIG, TIERS]; see also DELOITTE, STATE OF COLORADO: CBMS POST-IMPLEMENTATION REVIEW 7 (May 2005) (on file with author) (explaining that incorrect rules embedded in CBMS were in part due to incorrect policy interpretation by programmers); cf. Jessica Weidling, Housing Hopes, GOV’T TECH., June 2007, at 47, available at http://www.govtech.com/dc/articles/123618 (noting that in an “uncharacteristic move for the public sector,” Philadelphia Housing Authority administrators spent time with software provider to carefully discuss requirements of their automated telephone system).

\(^74\) Eggers, *supra* note 19, at 14.
Changes in policy made during its translation into code may also stem from the bias of the programmer. 75 Programmers can build matching algorithms that have biased assumptions or limitations embedded in them. 76 They can unconsciously phrase a question in a biased manner. 77 The biases of individual programmers can have a larger, accumulating effect, because, in a complex software system composed of smaller subsystems, the actual bias of the system “may well be a composite of rules specified by different programmers.” 78

Policy could be distorted by a code writer’s preference for binary questions, which can be easily translated into code. 79 Government policy, however, often requires the weighing of multiple variables. For example, the Food Stamp Act and accompanying federal regulations limit unemployed, childless adults to three months of food stamps, but provide six exceptions to this rule, which then cross reference other exceptions that, in turn, refer to still other exceptions. 80 Programmers may be tempted to write code employing a simplified three-month rule, leaving out the complicated and arguably confusing exceptions. 81 Thus, code writers could end up distorting complicated policy through oversimplification. 82 Programmers might also inappropriately narrow the discretion intended to be given to administrators. 83

Programmers are not the only individuals to blame for distorted policy. Bureaucrats themselves might be responsible for altered rules. Professor 75. Code embeds the values and choices of the code writer. LAWRENCE LESSIG, CODE: VERSION 2.0 101 (2006).
76. Steinbock, supra note 63, at 60–61; see Grimmelmann, supra note 29, at 1733 (explaining that a software rule can be partisan as it implements programmer’s idea of right result).
77. See Helen Nissenbaum, How Computer Systems Embody Values, COMPUTER, Mar. 2001, at 119 (noting that systems can unfairly discriminate against specific sectors of users). Batya Friedman and Helen Nissenbaum have written about automated systems whose algorithms embody bias. Batya Friedman & Helen Nissenbaum, Bias in Computer Systems, 14 ACM Transactions on Info. Systems 330, 333–35 (1996) (describing automated loan program whose system assigns negative value to applicants from certain locations, such as high-crime or low-income neighborhoods). Their study, however, does not reveal whether the bias originated from the programmer’s bias or that of a policymaker.
78. Grimmelmann, supra note 29, at 1737.
79. Cf. AUSTRALIAN GOV’T AUTOMATED ASSISTANCE IN ADMINISTRATIVE DECISION-MAKING, at 37 (Feb. 2007) (on file with author) (explaining that automated system must reflect the structural complexity of rules and accurately reflect all of the relevant factors such that the embedded business rules do not incorrectly “restrict or fetter the powers provided for under legislation or policy”).
81. See Super, supra note 30, at 1096 n.205 (discussing potential for eligibility workers and those designing notices to read three-month rule with regard to childless adults seeking food stamps without regard to the exceptions).
82. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 18–20.
83. Id. at 21.
Evelyn Brodkin has studied frontline bureaucratic routines that create new policy at the point of delivery.84 Lower-level bureaucrats may make policy when established policy is ambiguous or internally contradictory.85 Such practices produce “street-level” welfare policies that have not received rulemaking procedures.86 Decision systems might automate such policies.

2. Different Types of Automated Systems Used by Agencies

Automated systems involve individuals in the administrative decision-making process in varying ways. Fully automated systems apply policy and render decisions without any human intervention.87 For instance, computer programs identify students eligible for free or reduced-price school lunches by matching the names of enrolled students with the names of families receiving certain public benefits.88 This data-matching program automatically registers identified children into the National School Lunch Program.89 Computers can automatically enroll eligible senior citizens into Medicare coverage of outpatient care and prescription drug discount cards.90 Human operators cannot interfere with the system’s enrollment decisions.91

An agency’s telephone system is an example of a fully automated system. A telephone tree presents choices to a user, closing off paths that the system’s designers deemed irrelevant. This preclusion of choices constitutes an automated decision.92 For example, for a period of two

85. Id. at 149.
86. Id.
87. Parasuraman & Riley, supra note 59, at 247. Although human operators can have little impact on a completely automated system’s decision, the system’s designers play an enormous role in creating that system. Id.
89. Id.
91. Id.
92. See Tim Wu, When Code Isn’t Law, 89 VA. L. REV. 679, 707-08 (2003) (noting that code can constrain behavior by specifying what behavior is or is not possible just as a “brick wall in the middle of the road modifies behavior”); see also Lee Tien, Architectural Regulation and the Evolution of Social Norms, in CYBERCRIME: DIGITAL COPS IN A NETWORKED ENVIRONMENT 37, 43 (Jack M.
years, the CBMS website instructed individuals to call a toll-free number if they needed emergency assistance with their public benefits.\footnote{R EPORT OF THE COLO. STATE AUDITOR, ELIGIBILITY DETERMINATIONS FOR FEDERAL BENEFIT PROGRAMS: PERFORMANCE AUDIT 10–11 (Apr. 2006), available at http://www.leg.state.co.us/OSA/coauditor1.nsf/All/DE8F7D03359F1A0B87257154005DE9DA/$FILE/1735%20CBMS%20Elig%20Deter%20Fed%20Ben%20Per%20Apr%202006.pdf [hereinafter COLO. AUDITOR, PERFORMANCE AUDIT].} Callers reached a telephone system that provided nine choices for individuals seeking customer service.\footnote{Id.} None of these choices offered assistance with food stamps or Medicaid.\footnote{Id.} One could argue that the automated telephone system, by its design, determined that emergency help was unavailable to those receiving food stamps and Medicaid.\footnote{Id.}

Similarly, Florida residents seeking public assistance must submit online applications to ACCESS, the state’s automated benefits system.\footnote{Petition to Determine Invalidity of Proposed Rule 65A-1.400 and ESS Online Benefits Application Form at 6, Tamara Clark v. Dep’t of Children & Family Servs., No. 05-2105RP (Fla. Div. Adm. Hrgs. June 10, 2005) [hereinafter Clark Petition] (arguing that relative caregivers could not apply for Temporary Assistance to Needy Families due to the design of the online application in violation of Florida law). Florida’s Department of Children and Family Services settled the litigation, agreeing to fix the system to allow relative caregivers to apply for benefits on behalf of children as required by federal law. Telephone Interview with Valory Greenfield, staff attorney for Florida Legal Services, in Miami, Fla. (June 1, 2007) (notes on file with author). New York’s automated public benefits system similarly failed to offer “battered qualifying alien” as a choice in its drop-down menu for food stamp eligibility, thus precluding such individuals from applying for food stamps. M.K.B. v. Eggleston, 445 F. Supp. 2d 400, 418 (S.D.N.Y. 2006) (granting preliminary injunction ordering New York City agencies to fix automated system to comply with established policy).} These online applications require individuals to choose their status from a limited menu of options.\footnote{Id.} In 2005, that menu did not include an option for a relative seeking benefits on a child’s behalf.\footnote{Id.} The mandatory nature of the online system effectively precluded such relative caregivers from applying for public benefits, a denial that directly contravened state law.\footnote{Id.} Eligibility workers were unable to overrule this decision, implicit in the code of the automated system, because the ACCESS system was the only way an individual could apply for benefits.\footnote{Id.}

Mixed systems, by contrast, provide a role for human operators in the execution of policy. There are three distinct types of mixed systems. The
first type uses automation to generate an agency’s decisions, but permits appeals from those decisions. For instance, a data matching program known as the Federal Parent Locator Service (FPLS) compares federal and state databases to identify parents who owe child support. The system notifies relevant state enforcement agencies of matches. Federal law requires state agencies to take expedited action to collect child support from those individuals. Individuals who have been mistakenly identified as delinquent parents can appeal to state officials to remove child-support orders issued against them.

Another example of this first type of mixed system are the public benefits systems that deny certain claims made by Medicaid providers without initially seeking a human operator’s review, but allow for later human review. For example, when a medical provider seeks payment for twelve services, but state policy generally only permits coverage for ten, the system automatically pays the provider for ten services without determining whether exceptional circumstances apply that would permit coverage of all twelve. Medical providers can ask for administrative review of those decisions.

The second type of mixed system integrates human operators into the initial decision-making process. For example, Florida’s ACCESS system requires eligibility workers to determine whether individuals suffer from a “hardship” that would warrant extending their cash assistance payments beyond the state’s time limits. Eligibility workers conduct telephone interviews with applicants to determine whether an individual’s circumstances constitute a “hardship” within the meaning of the state’s rules. The worker then inputs that decision into the ACCESS

105. E.g. ARIZ. REV. STAT. ANN. § 25-517 (2007) (explaining that child-support obligor may request an administrative review to contest whether individual owes child support).
107. Id. at 10–11.
108. Telephone Interview with Jennifer Lang, Director of ACCESS Florida, in Miami, Fla. (June 8, 2007) (notes on file with author). In California, eligibility workers determine whether Medicaid applicants have a qualifying disability. Telephone Interview with Melissa Rodgers, Directing Attorney, Legal Aid Society of San Mateo County, in San Mateo, Cal. (June 4, 2007) (notes on file with author).
109. Interview with Jennifer Lang, supra note 108.
Similarly, automated public benefits systems in Colorado, Texas, California, and Florida produce recommended eligibility determinations and benefit calculations, which are then reviewed by eligibility workers who issue the final decisions.

The “No Fly” program is another example of a mixed system that allows human operators to exercise discretion as part of the decision-making process. In that program, a matching algorithm compares the names of air travelers with names listed in the “No Fly” database. When the computer system generates a match, an airline employee or federal official is given discretion to determine whether or not the name should be forwarded to the Terrorist Screening Center (TSC). When the TSC receives information about a match, its officials use their discretion to assess whether the individual poses a terrorist threat. People who endure extensive questioning and miss flights as a result of this program can file redress claims with the Transportation Security Administration (TSA).

The third type of mixed system generates automated advice for citizens and entities, who may then use the advice to make further decisions. Many states employ online portals where citizens can complete a survey to

110. Id. In CBMS, eligibility workers also exercise their judgment on certain issues before the system determines eligibility and calculates an individual’s benefits. Telephone Interview with Nancy Morehead, Public Relations Administrator for Colorado Department of Human Services, April 16, 2007 (notes on file with author). See Ross Wehner et al., Blame Game in Benefits Woes, DENVER POST, Sept. 30, 2004, at B1 (explaining that “caseworkers in 64 counties determine which of the six benefits programs a person qualifies for” and with a touch of a key the system notifies the bank to send a check).

111. Interview with Jennifer Lang, supra note 108; Interview with Melissa Rodgers, supra note 108; Terry Sapp, Ventura County Combines Automation and Collaboration, POL’Y & PRAC., June 1, 2006, at 40; Cynthia V. Fukami & Donald J. McCubbrey, Colorado Benefits Management System (B): The Emperor’s New System, 18 COMM. OF ASS’N FOR INFO. SYSTEMS 488 (2006); COLO. AUDITOR, PERFORMANCE AUDIT, supra note 93, at 21; Reeves, supra note 17.

112. U.S. GAO, TERRORIST WATCH LIST, supra note 12, at 7–8. Customs and Border Protection officers screen travelers entering the United States while the Transportation Security Administration prescreens air travelers flying from and throughout the United States. Id.

113. Id. at 9.


determine which public services they may be eligible to receive.\footnote{Harris & Dovey, supra note 16, at 153.} Other systems advise individuals and entities on the likelihood that the government will approve their grant requests.\footnote{Id.} In these examples, automated systems provide advice to citizens, but do not render final decisions on behalf of agencies.

The next section provides examples of recent failures of today’s automated decision-making systems and explores how regardless of whether the system is fully automated or mixed, the problems are the same.

\section*{B. Failure of Government 2.0}


Undeterred by these initial problems, agencies today increasingly use computer systems to make decisions. The recent failures of these systems have had wide-sweeping consequences.\footnote{CElia Hagert, Senior Policy Analyst, Center for Public Policy Priorities, Testimony on the Integrated Eligibility System 33 (2007), \url{http://www.cppp.org/files/3/House%20HHS%202_07.ppt} [hereinafter Hagert Testimony] (testimony before the Texas House Human Services Committee, 80th Legislature, Session 33) (describing 6.82% food stamps error rate in Texas vis-à-vis 2.96% error rate in Pennsylvania since TIERS went live). Failures of Texas’s TIERS system also caused children’s Medicaid enrollment to drop 29,000 individuals and the Children’s Healthcare Initiative Program renewal rate to fall from 84% to 52%. CENTER FOR PUBLIC POLICY PRIORITIES, PUB. NO. 267, ROCKY ROAD FOR CHILDREN’S HEALTH CARE 2 (2006), available at \url{http://www.cppp.org/files/3/EE%20Impact%20on%20Medicaid%20and%20CHIP.pdf}. See generally Henry Petroski, Success Through Failure: The Paradox of Design (2006) (explaining that a system fails when it does not meet its stated goals).} Hundreds of thousands of individuals have lost public benefits, missed airplanes, and faced erroneous child support delinquency charges.
Some of these problems can be attributed to programmers’ failure to properly translate policy into code. These failures inadvertently altered established policy and consequently violated federal and state law. For example, from September 2004 to April 2007, code writers embedded over nine hundred incorrect rules into Colorado’s public benefits system. With one such incorrect rule, CBMS denied Medicaid to patients with breast and cervical cancer based on income and asset limits that were not authorized by federal or state law. Another rule led CBMS to exclude a child’s relatives from Medicaid benefits on the legally baseless grounds that the child received Medicaid. Yet another caused CBMS to deny pregnant women Medicaid in contravention of federal law.

CBMS’s problems were not limited to Medicaid. CBMS incorporated an incorrect rule that discontinued food stamps to individuals with past drug problems in violation of Colorado law. Incorrect rules also caused the system to fail to offer food stamps to individuals with “permanent disabilities” and to incorrectly refuse to recognize phone bills as a valid expense for households seeking food stamps. Contrary to federal law,
CBMS provided food stamps to college students who did not work the required twenty hours a week.\textsuperscript{130} CBMS rendered hundreds of thousands of erroneous eligibility decisions and benefits calculations during this period.\textsuperscript{131} The enormity of the system’s failure, and the litigation that followed, forced state agency officials to spend significant resources to find and fix the system’s defective rules.\textsuperscript{132} Despite significant pressure to resolve these problems quickly, computer programmers delayed fixing incorrect rules for extended periods of time.\textsuperscript{133} During that period eligibility workers had to use fictitious data to work around the system’s errors.\textsuperscript{134} “child support-not court ordered” would not be allowed as an expense as required by 7 C.F.R. § 253.7).

\textsuperscript{130.} COLORADO BENEFITS MANAGEMENT SYSTEM, DECISION TABLE RELEASE NOTES, JULY 22, 2005, at 2 (July 23, 2005) (fixing rule contravening 7 U.S.C. § 2015(e) and 7 C.F.R. § 273.5, which excluded students not working over twenty hours per week from eligibility for food stamps); see generally David A. Super, The Quiet “Welfare” Revolution: Resurrecting the Food Stamp Program in the Wake of the 1996 Welfare Law, 79 N.Y.U. L. REV. 1271, 1358 (2004) (discussing changes to Food Stamp program).

\textsuperscript{131.} David Migoya, Feds Give Colorado a Big Bill, DENVER POST, Apr. 12, 2007, at B1 (explaining that CBMS made up to 11,000 errors per month).

\textsuperscript{132.} Fukami & McCubbrey, supra note 111, at 491–92; Bill Scanlon, Millions Spent on Welfare Fix: A Year Later, State Benefits System Still Fighting Kinks, ROCKY MTN. NEWS, Sept. 3, 2005, at 6A; COLO. AUDITOR, PERFORMANCE AUDIT, supra note 93, at 22 (explaining that seventy-two percent of sample food stamp applications and forty-one percent of a sample of Medicaid cases had at least one error). The federal government sued Colorado for CBMS’s overpayment of over ten million dollars of food stamps. Letter from Dennis Kaplan, Chairman, State Food Stamp Appeals Board, to Wade S. Livingston, First Assistant Attorney General, Human Services Section (Apr. 5, 2007) (on file with author) (decision of the Colorado Food Stamp Appeals Board, Administrative review No. 02-2006, amending decision of the Food and Nutrition Services against Colorado for improper issuance of duplicate or restored Food Stamps benefits from $11,162,598 to $10,864,345 owed federal government). The Colorado Center on Law and Policy filed a class-action lawsuit against the Colorado Department of Health and Human Services on behalf of Colorado residents whose public-benefits applications were delayed, incorrectly reduced or terminated, or who received insufficient notice. Fourth Amended Complaint, Davis v. Tool, No. 04-CV-7059 (Denver D. Ct. May 25, 2006). That litigation is ongoing. Telephone Interview with Ed Kahn, Counsel, Center on Policy Priorities, in Denver, Colo. (Apr. 10, 2007) (notes on file with author).

\textsuperscript{133.} Fukami & McCubbrey, supra note 111, at 493. E.g. COLORADO BENEFITS MANAGEMENT SYSTEM, DECISION TABLE RELEASE NOTES, MARCH 10–11, 2007, supra note 124, at 10 (Mar. 7, 2007) (fixing rule that improperly imposed income limits on women with breast or cervical cancer in violation of 42 U.S.C. §§1396-1b, COLO. STAT. § 25.5-5-308). Despite newspaper accounts of this illicit policy, Colorado administrators delayed fixing it for years. Karen Augé, Computer Benefits System Ticks off Cancer Survivor, DENVER POST, May 16, 2005, at A1 (explaining that CBMS failed to recognize that women with breast or cervical cancer could retain Medicaid despite an increase in their cost of living); COLORADO BENEFITS MANAGEMENT SYSTEM, DECISION TABLE RELEASE NOTES, MARCH 10–11, 2007, supra note 124, at 10 (Mar. 7, 2007) (CBMS took two years to fix the problem).

\textsuperscript{134.} Interview with Nancy Morehead, supra note 110 (explaining that workers used fake data to work around the system); Fukami & McCubbrey, supra note 111, at 493 (noting that officials have published 5,943 pages of workarounds). Although CBMS exemplifies a worst-case scenario, this level of policy distortion could be replicated in another case. Distortions in policy changes in systems with less dramatic or obvious results would be more likely to remain hidden. This may even be more
Code writers incorrectly translated policy into California’s automated public benefits system known as CalWIN, causing overpayments, underpayments, and improper terminations of public benefits. For instance, CalWIN denied Medicaid to foster children in contravention of federal law. According to a class action filed in April 2007, CalWIN canceled Medicaid for over five thousand “Qualified Medicare Beneficiaries” because they failed to obtain annual redeterminations. Neither federal nor state law requires annual redeterminations for such individuals. There, an incorrectly coded rule had disastrous results. Texas’s automated public benefits system, known as Texas Integrated Eligibility Redesign System (TIERS), also altered established policy. For example, TIERS granted benefits to individuals whose Social Security number, citizenship, or residency had not been verified in violation of federal and state policy. A 2007 audit found that TIERS made incorrect
eligibility determinations for food stamp applicants in four out of six test cases. On May 25, 2007, the Texas legislature passed a bill to demand that TIERS comply with applicable federal law and regulations.

The mixed systems of CBMS, CalWIN, and TIERS rendered vast numbers of incorrect decisions despite the fact that eligibility workers reviewed and finalized the computer’s decisions. These failures of mixed systems strongly suggest that the practical distinction between fully automated systems and mixed ones should not be overstated. Eligibility workers’ intuitive trust in computer systems tends to reduce the value of human participation in mixed systems. The cognitive system’s engineering literature has found that human beings view automated systems as error-resistant. Operators of automated systems tend to trust a computer’s answers.

As a result, operators of government decision systems are less likely to search for information that would contradict a computer-generated solution. Studies show that human beings rely on automated decisions even when they suspect system malfunction. The impulse to follow a computer’s recommendation flows from human “automation bias”—the “use of automation as a heuristic replacement for vigilant information moving ahead with the rollout of TIERS despite its problematic software. Dave Mann, Trail of TIERS, Texas Observer, Apr. 20, 2007, at 12. That month, THHSC terminated its contract with Accenture and delayed its roll out of TIERS. Stephanie Goodman, HHSC, Texas Access Alliance Agree to End Contract Early (Mar. 13, 2007), http://www.hhs.state.tx.us/news/release/031307_AccessAlliance.shtml.

143. TIERS/IEES REVIEW, supra note 142, at 3.
145. See Clark Petition, supra note 97 (describing how eligibility workers in mixed systems such as CBMS, TIERS, CalWIN, and ACCESS reviewed and finalized program’s decisions).
146. Kersten, supra note 10, at 38 (explaining that people tend to rely on and trust “less-than-perfect systems”—a kind of laziness that means people do not check information and computer findings).
147. M.L. Cummings, The Social and Ethical Impact of Decision Support Interface Design, in INT’L ENCYCLOPEDIA OF ERGONOMICS AND HUMAN FACTORS (Waldemar Karwowski ed., 2d ed. 2006); Thomas B. Sheridan, Speculations on Future Relations Between Humans and Automation, in AUTOMATION AND HUMAN PERFORMANCE: THEORY AND APPLICATIONS 449, 458 (Raja Parasuraman & Mustapha Mouloua eds., 1996) (“It is so tempting to trust to the magic of computers and automation . . . if a computer program compiles, we often believe, the software is valid and the intention will be achieved.”).
149. Cummings, supra note 147, at 5.
seeking and processing.” Automation bias effectively turns a computer program’s suggested answer into a trusted final decision.  

Under the influence of automation bias, workers will likely adopt a computer’s suggested eligibility determinations and benefit calculations. Members of the public, desiring public benefits but lacking sophisticated knowledge of federal and state rules, would rely upon an agency’s automated recommendations about their likely ineligibility. In this respect, little meaningful difference exists between a mixed system and its fully automated counterpart.

Automation bias may become increasingly acute in the twenty-first century as our regulatory rules become increasingly intricate. As a general matter, those who view themselves simply as data processors will lose their motivation to learn the rules applied by computers. This may be especially true where human operators believe that an automated system is better equipped than they are to master a wide swath of complicated rules. Over time, human operators may lose the skills that would allow them to check a computer’s recommendations. As the public’s demand for government services grows, and as policy becomes more complicated, human operators may be increasingly forced to trust automated systems. The distinction between mixed and fully automated systems has the potential to disappear as the twenty-first century progresses.

Agencies also fail to test automated public benefits systems in a way that would ensure that the embedded rules accurately reflect policy. For instance, programmers at EDS failed to test CBMS for mistakes in the embedded policy. According to a 2005 auditor’s report, EDS did not

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152. Cummings, supra note 147, at 7.
153. See id. (noting that where automated system gives advice to human operator, that advice turns into a de facto decision due to human tendency to trust automated systems).
154. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 29; Sheridan, supra note 147, at 459 (“[S]ophisticated automation technology will alienate workers—where alienation means losing their identity as skilled manual craftspeople to become button pushers, understanding less and less of how the technology works as it becomes more sophisticated and requires white-coated high priests to program it . . . blissfully trusting the technology and abandoning responsibility for one’s own actions.”).
156. This may not be true in instances where computer programs do not suggest answers or recommendations to human operators. But even those systems may provide misleading cues to operators based on the system’s design or the questions asked operators.
157. Texas’s independent contractor also inadequately tested TIERS. Hagert Testimony, supra note 122, at 14.
158. OFFICE OF CBMS, CO. DEP’T OF HEALTH CARE POLICY & FINANCING & DEP’T OF HUMAN SERVS., REPORT ON CONTROLS PLACED IN OPERATION AND TESTS OF OPERATING EFFECTIVENESS
perform risk assessments for “regulatory compliance, legal compliance, technical reliability, or information integrity.”159 After only twenty days of piloting the program in a few counties, Colorado rolled out CBMS across the state.160

Agencies routinely delay the implementation of new federal and state law into automated systems.161 For instance, CBMS programmers belatedly incorporated changes to cost-of-living adjustments into the system.162 During the period between the adoption of a rule change and the programmer’s correction of the rule, automated systems will render inaccurate decisions.163

Automated systems misidentify individuals.164 The FPLS has incorrectly classified individuals as dead-beat parents because they share the same or similar names as individuals properly designated as dead-beats.165 These erroneously labeled individuals must undergo lengthy proceedings to prove their innocence.166 For example, the FPLS identified the wrong man in a case involving a $206,000 child-support debt.167 It took the accused man and his attorney over two months to convince the California district attorney’s office that the system had made a mistake.168 The difficulties individuals must endure to clear their names may be the result of an agency worker’s intuition that the computer system is infallible.

(2006) (on file with author) [hereinafter COLO. HEALTH CARE, REPORT ON CONTROLS]; see DELOITTE, supra note 73, at 7 (urging EDS to conduct comprehensive regression testing on CBMS to check rules already encoded in system for accuracy and to test modifications made to rules).

159. Glen Emerson Morris, Lessons from the Colorado Benefits Management System Disaster, ADVERTISING & MARKETING REVIEW, Oct. 2004, available at http://www.ad-mkt-review.com/public_html/air/air200411.html; see COLO. HEALTH CARE, REPORT ON CONTROLS, supra note 158, at 4–5 (noting that CBMS was not programmed to automatically provide accessible case histories for recipients, trace eligibility determinations, or to verify applicants’ income); James Bieman, Editorial, Is Anyone Listening?, 13 SOFTWARE QUALITY J. 225, 225 (2005) (explaining that CBMS disaster could have been prevented if proper software assurance practices had been applied).

160. Opsahl, supra note 65.

161. Kersten, supra note 10 (explaining that federal agencies such as Centers for Medicare and Medicaid Services and Social Security Administration have difficulty updating rules embedded in automated systems in a timely manner); U.S. DEP’T OF AGRICULTURE, STATE AUTOMATION SYSTEMS STUDY: VOL. II, at VI-6 (1995).

162. Perlman, supra note 65.

163. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 45.


165. Garvey, supra note 50.

166. Id.

167. Id.; Nancy Lloyd Barrett, Editorial, Paternity, PRESS-ENTERPRISE (Riverside, Cal.), Aug. 25, 2002, at D3 (arguing that many “dead beat dads” are being arrested for children who are not theirs).

168. Garvey, supra note 50.
The “No Fly” computer matching system routinely targets innocent individuals as terrorists. Over half of the tens of thousands of matches sent to TSC between 2003 and January 2006 were misidentifications. These mistakes stem from faulty information stored in “No Fly” databases and from unsophisticated matching algorithms that fail to “distinguish between similar names.” Airline and TSC officials reviewing the computer’s identification of a “No Fly” match might be more inclined to endorse the computer’s decision due to the influence of automation bias.

Individuals who are mistakenly included on watch lists or who are misidentified as someone on these lists “face consequences ranging from inconvenience and delay to loss of liberty.” The automated “No Fly” system works to exclude numerous innocent individuals from air travel. For example, since 2005, the “No Fly” system has prevented two U.S. senators, a State Department diplomat, a Continental Airlines crew member, and a four-year-old boy from boarding their scheduled flights. An American Airlines pilot, testifying before the Senate Judiciary Committee, explained that he was detained approximately eighty times in

170. Id.
173. Gordon, supra note 42 (according to TSA spokeswoman, “an average of 1,500 airline travelers applied each week for redress on the grounds that they’d been mistakenly included on terrorist watch lists” and were denied the right to fly).
174. Singel, supra note 42 (quoting State Department diplomat and Continental Airlines flight-crow member held up at airports); 60 Minutes: Unlikely Terrorists on No Fly List (CBS television broadcast Oct. 8, 2006) [hereinafter 60 Minutes], available at http://www.cbsnews.com/stories/2006/10/05/60minutes/main2066624.shtml (interviewing twelve innocent travelers who all share the same name as someone on the “No Fly” list and who have faced interrogations every time they fly); Local Nightly News: Boy, 4, has Name Show Up on TSA Watch List (ABC television broadcast Dec. 31, 2005), available at http://abclocal.go.com/ktrk/story?section=local&id=3771743 (reporting that a commercial airline refused to allow a four-year-old child to travel based on “No Fly” recommendation); Marc Rotenberg, Executive director, Electronic Privacy Information Center, Prepared Testimony and Statement for the Record, Hearing on “The Future of Registered Traveler” Before the H. Subcomm. on Economic Security, Infrastructure Protection, and Cybersecurity of the H. Comm. on Homeland Security (Nov. 3, 2005), available at http://www.epic.org/privacy/airtravel/rt_test_110305.pdf [hereinafter Rotenberg Testimony] (explaining that Senators Ted Kennedy and Don Young were both improperly placed on watch lists). Cf. Ian McEwan Will Now Take Your Questions, TIME, June 18, 2007, at 6 (explaining that award-winning British novelist was detained for twenty-four hours by U.S. immigration officials).
a single year. Individuals mistakenly identified as terrorists face intensive questioning that can last for several hours.

Individuals have no way of knowing if they are in the “No Fly” database. As the Department of Homeland Security’s website explains, the United States government will not reveal whether a particular person is on the terrorist watch list so as to prevent those on the list from circumventing the system. The only information the agency will release to aggrieved individuals is information they themselves have provided in their redress applications as well as TSC’s decision resolving their claims. At present, there is no assured way to get removed from the “No Fly” list. An Army major has been “pulled aside and interrogated” over fifteen different times despite having repeatedly filed redress claims with the TSA.

Automated systems routinely send faulty notices. For example, CBMS sent denial notices for cases that, in fact, were pending verification.

175. Gordon, supra note 42.
176. U.S. GAO, TERRORIST WATCH LIST, supra note 12, at 16 (recounting interviews with Customs and Border Protection officers who noted that individuals can spend several hours in secondary screening).
177. DHS TRIP, supra note 115; Ronald D. Lee & Paul M. Schwartz, Beyond the “War” on Terrorism: Towards the New Intelligence Network, in EVOLVING LAWS AND PRACTICES IN A SECURITY-DRIVEN WORLD 455, 485 (PLI Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series No. 8966, 2006).
178. DHS TRIP, supra note 115.
179. U.S. DEP’T OF HOMELAND SECURITY, PRIVACY IMPACT ASSESSMENT FOR THE DHS TRAVELER REDRESS INQUIRY PROGRAM (DHS TRIP) 12 (2007), available at http://www.dhs.gov/xlibrary/assets/privacy/privacy_pia_dhstrip.pdf. The Department of Homeland Security (DHS) allows those who feel that they were wrongly detained or delayed to file redress complaints. DHS TRIP, supra note 115. DHS explains that its redress process is intended “to help travelers improve their travel experience and correct inaccuracies.” U.S. Dep’t of Homeland Security Website, Step 3: After Your Inquiry, August 2, 2007, http://www.dhs.gov/xtrvlsec/programs/gc_1169827489374.shtm. DHS notes because travelers may be selected for enhanced screening due to a variety of reasons or at random, a redress resolution “may not resolve all of your travel-related concerns in the future.” Id.
180. SECURITY ROUNDUP, AIRPORT SECURITY REPORT, Feb. 13, 2008, 2008 WLNR 2881025 (explaining that measures taken to ameliorate the process for innocent individuals getting off the “No-Fly” list provide little help as the lists are fluid and regularly updated); Editorial, No-Fly List Belongs in the Wastebasket, ST. PETERSBURG TIMES, Nov. 11, 2007, at 2P, 2007 WLNR 22305650 (although procedures exist to get off the “No-Fly” list, they are lengthy, bureaucratic, and not always successful); see SOLOVE, supra note 43, at 182 (explaining that twenty-nine-year-old member of the U.S. national rowing team with a Muslim last name was repeatedly detained by officials at the airport, causing him to miss flights). Senator Kennedy was only able to remove himself from the “No Fly” list after appealing to then–Homeland Security Secretary Tom Ridge. Rotenberg Testimony, supra note 174, at 2. The ordinary citizen affected by watch list errors could not invoke this option. Id.
181. 60 Minutes, supra note 174. An Army major, Robert Johnson, shares the same name as a sixty-two-year-old man convicted of plotting to bomb a Hindu temple in Toronto who was subsequently deported to Trinidad. Id. Because the “No Fly” list apparently only provides a name to operators, individuals with the same name face extensive screening, no matter the circumstances. Id.
182. COLORADO BENEFITS MANAGEMENT SYSTEM, DECISION TABLE RELEASE NOTES, MAY 7,
These and other notices failed to explain the grounds for the agency’s termination of benefits. Furthermore, individuals have reported that they received multiple, inconsistent messages within the same month. In 2005, one Colorado family received seventy-one conflicting notices regarding their Medicaid benefits in a six-month period.

Automated public benefits systems have changed or terminated benefits without providing any warning at all. Similarly, some individuals never received notice of their erroneous dead-beat status or of the state’s intent to collect the allegedly unpaid child-support debt from them. As a result, states can obtain default judgments against innocent individuals, garnishing their wages, intercepting federal and state tax refunds, and revoking driver’s and professional licenses. States can also notify credit agencies of these unpaid default judgments. In the wake of a default judgment, an individual wrongfully labeled a dead-beat parent will find it difficult to prove his innocence and restore his credit.

Automated systems often fail to maintain audit trails of their decisions, further compounding the problems caused by automation. Audit trails


183. Deloitte, supra note 73, at 21 (explaining that the system does not tell the user whether they fail due to income limits, inadequate relationship, living arrangements and instead simply says “Eligibility Denied”); Colorado Benefits Management System, Decision Table Release Notes, January 29, 2005, at 2 (Jan. 29, 2005) (“client was getting wrong notice” for not signing a form but should have been notified that the problem was ineligibility for SSI due to income); see also April M. Washington, Hearing Eyes Benefits Woes: Counties’ Concerns About Overpayments to Needy at Issue, Rocky Mt. News, Jan. 18, 2007, at 6A (explaining that CBMS system has generated 11,000 notices of overpayment that fail to tell clients what to do).

184. Karen Augé, Contempt Orders Sought Over Benefits Backlog, Denver Post, Apr. 7, 2005, at B1 (explaining that CBMS participants receive dozens of contradictory notices about eligibility); see also Dick Foster, System Bugs Still Plaguing Welfare Offices, Rocky Mt. News, Dec. 17, 2005, at 29A (explaining that CBMS paid individuals benefits one month and the next sent a faulty notice saying the individuals were over paid and were required to pay back benefits).

185. Fukami & McCubrey, supra note 111, at 488.


188. Id.; Garvey, supra note 50, at B7 (explaining that over seventy percent of paternity establishments in Los Angeles County were by default and over twenty percent of those defaults involved innocent individuals).

189. Garvey, supra note 50, at B7.

190. See Citron, supra note 51, at 253 (describing difficulties that individuals face in repairing mistakes on credit reports).

record the facts and rules supporting a computer program’s decision.\textsuperscript{192} Although the system designers of TIERS and CBMS could have included audit trails, they chose not to do so. These systems are unable to generate transaction histories showing the “decisions with respect to each eligibility criterion for each type of assistance” in individual cases.\textsuperscript{193} This leaves “no way to determine . . . what information was used to determine benefits.”\textsuperscript{194} As a result, workers cannot check for errors in an individual’s case.\textsuperscript{195}

The “No Fly” computer system similarly fails to provide a way to trace the basis of the system’s decisions.\textsuperscript{196} The underlying information and data matching techniques are not made available to those affected by the program. Even the system’s administrators are unable to understand the logical and factual bases for the inferences made by the program.\textsuperscript{197} Without access to the logic of a “No Fly” determination, an individual cannot meaningfully challenge it. Moreover, the system’s lack of statements of reasons inevitably strengthens the already formidable automation bias, effectively rendering human oversight ineffective.

Notwithstanding all of these problems, agencies plan to increase automation in an attempt to satisfy the public’s demand for services, to decrease costs, and to ensure consistent decisions. As the next Part explores, agencies must recognize and address the ways in which automation undermines the procedural safeguards typically attached to individual adjudications and rulemaking under the Due Process Clauses of the Constitution and federal and state law.\textsuperscript{198}

\textsuperscript{192} AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 79, at 23.
\textsuperscript{193} TEXAS OIG, TIERS, supra note 73, at 13; see COLO. AUDITOR, PERFORMANCE AUDIT, supra note 93, at 4, 41 (explaining that EDS did not program CBMS to automatically provide a case history for each benefits recipient that would track changes made to an individual’s file). CBMS also cannot produce lists of individuals who the system deemed ineligible or whose benefits were terminated. Id. at 4.
\textsuperscript{194} TEXAS OIG, TIERS, supra note 73, at App. 6; see COLO. AUDITOR, PERFORMANCE AUDIT, supra note 93, at 4.
\textsuperscript{195} COLO. AUDITOR, PERFORMANCE AUDIT, supra note 93, at 4.
\textsuperscript{196} DHS TRIP, supra note 115.
\textsuperscript{198} This Article focuses on the impact that automation has on the procedural protections afforded individuals. The use of the Internet to enhance public participation in rulemaking is beyond the scope this Article. For more on this topic, see Beth Simone Noveck, The Electronic Revolution in Rulemaking, 53 EMORY L.J. 433, 435–36 (2004) (discussing e-rulemaking as a way to reform the administrative process by encouraging widespread public participation).
II. PROCEDURAL PROTECTIONS IMPERILED BY AUTOMATION

This Part considers the procedural costs that automated systems impose. Section A demonstrates how automation can blur the line between adjudication and rulemaking, confounding the procedural protections governing both systems. Section B shows the many ways in which the combination of adjudication and rulemaking in automated systems comes at the expense of individual rights. Section C assesses the difficulties that courts will likely face when reviewing rules embedded in, and adjudications performed by, automated systems.

A. Combining Adjudication and Rulemaking in Automated Systems

In the twentieth century, agency decisions typically came in the form of either adjudications or policy-making. In adjudications, procedural due process safeguards the important interests of individuals when an agency acts against a person or a small group of people on the basis of their particular circumstances. Londoner v. City of Denver epitomizes this approach. Londoner held that due process protected property owners who had been subjected to a special tax as a result of the owners’ specific situations.

When agencies adopt policies that affect a large number of people, by contrast, no individualized due process protections apply. As Justice Oliver Wendell Holmes explained in Bi-Metallic Investment Co. v. State Board of Equalization, “where a rule of conduct applies to more than a few people it is impracticable that every one should have a direct voice in its adoption.” Instead, as the twentieth century progressed, Congress established rulemaking procedures intended to enlighten agencies’ policymaking with public input. The opportunity to participate in rulemaking was seen as a substitute for individualized due process.

The archetypal Londoner/Bi-Metallic distinction has long animated the separate, yet parallel, procedural regimes that govern individual
adjudications and rulemaking. Today’s automated systems, however, resist this traditional classification. Now, computers both render decisions about important individual rights and engage in rulemaking.

Colorado’s public benefits system, CBMS, captures this point well. CBMS adjudicates individuals’ property interests in Medicaid benefits based on their unique circumstances, adjudications that would typically fall within the meaning of Londoner. Because the programmers changed hundreds of established rules when encoding them into the system, CBMS also articulates new rules in the spirit of Bi-Metallic. Although these changes may have been caused by programming problems, rather than an agency’s deliberate decision to make new rules, the improperly encoded policies nonetheless affect a significant number of Colorado residents. The computer programmers made new policy by encoding rules that distorted or violated established policy.

Significant problems result when individual adjudications and rulemaking are combined in computer systems. An inaccurate decision could result from incorrect factual adjudications, invalid policy, or both. The opacity of automated systems prevents an easy determination of the source of the error. This creates confusion about the procedures owed individuals, interfering with both due process guarantees and rulemaking procedures.

Consider this example. In Colorado, a sixty-year-old food stamp recipient informs an eligibility worker that she lost her apartment. The recipient explains that she initially stayed at her sister’s house for two weeks, but that she now lives on the streets. Under federal law, those considered “homeless” receive certain accommodations, such as income deductions, which can result in higher food stamp allotments.

208. Richard J. Pierce, Jr. et al., Administrative Law and Process 279 (4th ed. 2004) (positing that Londoner/Bi-Metallic distinction should be interpreted broadly to mean that due process safeguards do not apply to agency policymaking that deprives large number of people of protected interest because political process provides them adequate safeguards); Minnesota State Bd. for Comm. Colleges v. Knight, 465 U.S. 271, 285 (1984) (explaining that considerations identified in Bi-Metallic were “as weighty [in 1984] as they were in 1915”).

209. Of course, even in the twentieth century, the distinctions between individual adjudications and rulemaking, so central to the Administrative Procedure Act, were not perfectly conceived. Some agency action fell within a grey area between them.


211. See supra note 123 and accompanying text (noting that CBMS programmers changed over nine hundred rules).

Individuals can be considered homeless even if they reside somewhere temporarily, so long as their stay lasts less than ninety days.\textsuperscript{213} The worker enters the recipient’s information into CBMS. The computer program asks the worker to identify the woman’s living situation from a list of options that includes homelessness.\textsuperscript{214} The system also requires the worker to enter whether or not the recipient is a “beggar.”\textsuperscript{215} The system decides that the recipient should not be recognized as homeless under federal law and determines the amount of her food stamps. The worker adopts the decision.

The recipient will be unable to determine exactly why the system declined to categorize her as homeless because CBMS is a black box.\textsuperscript{216} The system’s finding could be based on the worker’s erroneous interpretation of the facts regarding the recipient’s stay with her sister. It could be the result of an incorrect rule encoded in the system. For instance, it could be that CBMS was programmed to exclude individuals from homeless status if they temporarily stayed with relatives, in contravention of established policy.

The denial could also stem from the answer the worker gave to the question about whether the recipient was a “beggar.” That answer involved a factual adjudication about the manner in which the recipient receives income, but it also may have articulated a new rule. Neither federal nor state policy requires administrators to ask if individuals receiving food stamps are “beggars.”\textsuperscript{217}

Due to the system’s opacity, the process owed the recipient is unclear. Procedural due process is certainly implicated if the system deprived the recipient of her property interest in food stamps based on inaccurate facts. If the system’s error involved the creation of a new rule, the recipient should have been given the opportunity to comment on it. And if the decision’s inaccuracy resulted from both factual errors and illicit rules,


\textsuperscript{214}  Bill Scanlon, \textit{Pressure to Go Online}, ROCKY MRTN. NEWS, Oct. 1, 2004, at 5A.

\textsuperscript{215} See id. (explaining that CBMS asked workers if participants were homeless and if that answer was yes, then the system asked if the person was a "beggar").

\textsuperscript{216}  Bill Scanlon, \textit{Welfare Computer System Faces Review}, ROCKY MRTN. NEWS, Mar. 17, 2005, at 4A.

\textsuperscript{217} Scanlon, \textit{supra} note 214, at 5A. Many eligibility workers expressed dismay that CBMS asked them to assess whether a claimant was a “beggar” as no federal or state policy warranted such a patently offensive inquiry. \textit{Id}. Indeed, the system’s demand that workers ask such a crude and insulting question may anger and humiliate the claimant and cause her to drop off the program. This would constitute another form of automation-induced error.
both due process and rulemaking procedures would presumably protect the recipient’s interests.

As the next section explains, in the automated administrative state, neither due process nor policymaking procedures adequately protect individuals like the Coloradan food stamps recipient. Automation jeopardizes the due process safeguards owed individuals and destroys the twentieth-century assumption that policymaking will be channeled through participatory procedures that significantly reduce the risk that an arbitrary rule will be adopted.

B. Procedures Protecting Individuals in Jeopardy

1. Threats to Due Process

Automated decisions often deprive individuals of their liberty and property, triggering the safeguards of the Due Process Clauses of the Fifth and Fourteenth Amendments. For example, computers can terminate individuals’ Medicaid benefits, impairing a statutorily-granted property interest. The FPLS can designate innocent individuals as dead-beat parents, resulting in lost property, revoked driver’s and professional licenses, and injury to their reputations. The federal government’s “No Fly” data matching program labels some individuals as potential terrorists, resulting in the postponement or denial of air travel, both significant impairments of liberty rights.

a. Notice

Automated decision systems endanger the basic right to be given notice of an agency’s intended actions. This right requires that notice be

218. U.S. CONST. amends. V, XIV.


221. Cafeteria & Rest. Workers Union v. McElroy, 367 U.S. 886, 894 (1961) (“One may not have a constitutional right to go to Baghdad, but the Government may not prohibit one from going there without by means consonant with due process of law.”) (quoting Homer v. Richmond, 292 F.2d 719, 722 (D.C. Cir. 1961)); Steinbock, supra note 76, at 52 (explaining that “No Fly” list can impinge on liberty and property interests of individuals whose travel documents are held while a match is confirmed and who are denied air travel).
“reasonably calculated” to inform individuals of the government’s claims.\textsuperscript{222} The sufficiency of notice depends upon its ability to inform affected individuals about the issues to be decided, the evidence supporting the government’s position, and the agency’s decisional process.\textsuperscript{223} Clear notice decreases the likelihood that agency action will rest upon “incorrect or misleading factual premises or on the misapplication of rules.”\textsuperscript{224}

Some decision systems fail to provide any pre-deprivation notice of agency actions. For instance, CalWIN and TIERS have terminated public benefits without prior notification.\textsuperscript{225} Some individuals erroneously labeled dead-beats never received notice of their purported debts.\textsuperscript{226} The “No Fly” program provides no notice of its decisions, much less of the evidence supporting them.\textsuperscript{227}

Even when systems provide notice, it is often inadequate. Recipients of public benefits receive termination notices that provide little information about the reasons supporting an automated system’s decisions.\textsuperscript{228} Inadequate notices are particularly common in systems that do not maintain audit trails, such as CBMS and TIERS.\textsuperscript{229} As a result, affected individuals lack the information they would need to effectively respond to an agency’s claims.\textsuperscript{230} Without sufficient warning of the government’s position, resulting administrative hearings resemble a “scene from Kafka.”\textsuperscript{231}


\textsuperscript{223} Jerry L. Mashaw, \textit{Due Process in the Administrative State} 176 (1985); see, e.g., Vargas v. Trainer, 508 F.2d 485, 489–90 (7th Cir. 1974) (ruling that notice violated due process because it failed to inform public benefits recipients why their benefits were reduced, compounding problems created by human tendency to assume action taken by government agency is correct).

\textsuperscript{224} Goldberg v. Kelly, 397 U.S. 254, 268 (1970); see also Hamby v. Neel, 368 F.3d 549 (6th Cir. 2004); Ortiz v. Eichler, 794 F.2d 889 (3d Cir. 1986).

\textsuperscript{225} See supra note 186 and accompanying text.

\textsuperscript{226} See supra note 187.

\textsuperscript{227} Steinbock, supra note 76, at 64–65.

\textsuperscript{228} See supra text accompanying note 183.

\textsuperscript{229} See supra text accompanying notes 191–95.

\textsuperscript{230} Cosby v. Ward, 843 F.2d 967, 984 (7th Cir. 1988) (finding computer-generated notices deficient because they failed to tell claimants that they violated a rule of thumb); see also Screws v. United States, 325 U.S. 91, 96 (1945) (finding that enforcement of laws that fail to adequately convey their terms “would be like sanctioning the practice of Caligula who ‘published the law, but it was written in a very small hand, and posted up in a corner, so that no one could make a copy of it.’”) (citation omitted).

\textsuperscript{231} Cosby, 843 F.2d at 982 (citation omitted); see Mashaw, supra note 223, at 175–76 (“Kafkaesque procedures take away the participants’ ability to engage in rational planning about their situation, to make informed choices among their options.”).
b. Opportunity to be Heard

Automation presents novel problems for a standard *Mathews v. Eldridge* cost-benefit analysis. A *Mathews* analysis is used to determine the nature of due process hearings owed individuals whose life, liberty, or property is threatened by agency action.233 Under *Mathews*, courts weigh the value of the person’s threatened interest, the probable benefit of additional or substitute procedures, and the government’s asserted interests, including the cost of additional safeguards.234 *Mathews* balances the value of enhanced accuracy against the cost of obtaining it, while aspiring to provide individuals with an opportunity to be heard “at a meaningful time and in a meaningful manner.”235

In agency actions involving Medicaid, courts have held that due process requires a pre-termination *Goldberg v. Kelly*236 evidentiary hearing, where individuals can present evidence and cross-examine adverse witnesses before an impartial decision maker.237 Despite these safeguards, an agency might still erroneously deprive a recipient of important benefits. A hearing officer may be influenced by automation bias, and thus be less inclined to entertain an individual’s arguments, especially if the individual lacks the ability to reconstruct the entire eligibility determination as it should have occurred. Although hearing officers may be impartial among human witnesses, they likely have a bias for computer systems.238

Such bias, however, would not disqualify hearing officers, diminishing the value of a hearing. Courts typically limit findings of prejudice to adjudicators who have some personal connection with the individuals appearing before them.239 Officers who have no disqualifying personal

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233. Id. at 334–35.
234. Id. at 335. Judge Richard Posner describes the utilitarian balancing test in *Mathews* as minimizing the sum of the cost of erroneous judicial decisions and the cost of operating the procedural system. RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 563 (6th ed. 2003).
235. *Mathews*, 424 U.S. at 333 (citations omitted); id. at 347–49.
237. E.g. Id. at 269–71; 42 C.F.R. §§ 431.205, 431.220(a)(2) (2006) (requiring *Goldberg*-type evidentiary hearings for decisions under Medicaid Act); see, e.g., Hamby v. Neel, 368 F.3d 549, 559 (6th Cir. 2004) (finding property interest protected by procedural due process for applicants who had hoped to qualify for Medicaid benefits but were denied); see Henry J. Friendly, “*Some Kind of Hearing*,” 123 U. PA. L. REV. 1267, 1279–81 (1975) (highlighting importance of an unbiased tribunal, clear notice of grounds for agency action, and a chance to present reasons why agency should not take action).
238. See text accompanying notes 146–53 (discussing automation bias).
connection with individuals but who are influenced by automation bias might endorse inaccurate computer decisions even in the face of contrary evidence. Under present conditions, the guarantee of an impartial reviewer may be illusory.

Access to an automated program’s source code—the programmer’s instructions to the computer—might provide a meaningful way for individuals to challenge an agency’s claims and dispel the influence of automation bias. Hearings about the logic of a computer program’s decision would require experts to decipher and explain the code and its operation. Unfortunately, the Mathews calculus likely would not provide such additional process. Courts would likely find that the cost of this expert testimony would outweigh both the individual interest involved and the reduction in the risk of erroneous deprivation.

Whatever the merits of this sort of cost-benefit calculation in twentieth-century hearings, it cannot respond effectively to automated decision making. Computer systems fundamentally change the costs and benefits of additional process in ways Mathews could not have anticipated. Expert testimony unraveling a computer’s decision would be expensive. But it

hearing officers are unbiased can only be overcome by a showing of a conflict of interest such as financial interest at stake; see also 2 Davis & Pierce, supra note 4, § 9.8 (discussing the neutral decision maker); 28 U.S.C. §§ 144, 455 (2000) (describing disqualification grounds for judges). An officer’s views about law or policy do not constitute grounds for disqualification. NLRB v. Pittsburgh S.S. Co., 337 U.S. 656, 659 (1949) (“[T]otal rejection of an opposed view cannot of itself impugn the integrity or competence of a trier of fact.”); United States v. Morgan, 313 U.S. 409, 416 (1941) (finding that expression of strong views did not disqualify decision maker).

240. See Christopher W. Clifton et al., Data Mining and Privacy: An Overview, in PRIVACY AND TECHNOLOGIES OF IDENTITY 191, 203 (Katherine J. Strandburg & Daniela Stan Raicu eds., 2006) (explaining that, without access to the underlying data and logic of the “No Fly” program, individual’s ability to challenge inclusion on list is impaired).

241. Telephone Interview with Andy Bardwell, Systems Analyst, in Denver, Colo. (Apr. 9, 2007) (notes on file with author) (explaining that even if Colorado’s Department of Health and Human Services had published the code of CBMS, it would be an expensive and time-consuming task to decipher); Grimmelmann, supra note 29, at 1745 (“[Examining software] is not a hunt for a needle in a haystack. It is a hunt for the broken needle in a field covered two feet deep in other needles.”).

242. The standard Mathews v. Eldridge analysis typically involves requests for additional process that would enhance the accuracy of factual determinations. Ascertaining the law that an automated system applied arguably constitutes a factual issue. In the automated administrative state, the de facto rules are hidden from hearing officers who may be inclined to adopt a computer’s finding without checking the accuracy of a computer-generated decision. Determining the de facto rules constitutes a factual question that must be resolved to achieve more accurate results. Moreover, the Court applied a Mathews v. Eldridge analysis in a child custody case where the proposed additional process—appointed counsel—might have enhanced the legal and factual accuracy of an agency’s decision to terminate parental rights in a neglect case. Lassiter v. Dep’t of Soc. Servs., 452 U.S. 18, 27–31 (1981). Although the Lassiter majority refused to appoint counsel because the issues were not sufficiently complex, the Court noted that another case might present sufficiently complicated issues to warrant such additional process. Id. at 31–32. Mathews v. Eldridge arguably extends to additional process that would enhance the accuracy of factual and legal issues.
may also facilitate corrections of the system’s code by identifying software flaws or invalid rules embedded in the system. When programmers remedy software errors, there are virtually no costs to replicate that improvement in future cases.243 Thus, any Mathews analysis that focuses on a single adjudication will capture all of the costs of improved process but only a tiny fraction of its benefits.

This differs from the typical due process case of last century involving relatively inexpensive fixed costs but burdensome variable ones.244 In Goss v. Lopez,245 for instance, the Supreme Court found no due process right to full-blown evidentiary hearings for nine students facing temporary suspensions from school.246 The Court reasoned that even though the added procedure for the nine students would not be expensive, the value of the individual interests at stake did not warrant the additional process given the significant expense of providing such process in all future cases.247

The Mathews calculus implicitly assumes that the significant costs will be repeated in all future cases. In the twentieth century, that was certainly true. Providing improvements for future cases necessarily imposed burdensome expenditures. For instance, if the Goss Court had upheld the students’ right to a full-blown hearing, the cost of such a hearing would have been incurred in all future cases where students faced temporary suspensions.

With automated systems, however, future cases will benefit from the additional process almost without charge. Once experts correct a problem in a system’s software, that cost never needs to be replicated. Every future use of the improved system is practically free.248 As a result, unless calculated with the entire run of cases that a software program will decide in mind, the Mathews calculus will overstate the burden of introducing experts to explain the code. The Mathews analysis fails to spread the fixed

243. See Grimmelmann, supra note 29, at 1729 (explaining that once a piece of software is written, the marginal cost of using the program is low).

244. This Article uses the term “fixed costs” to refer to the expense of the additional process—the expert testimony—in the case before the court. It uses the term “variable costs” to refer to the accumulating cost of that additional process in all future cases.


246. Id. at 582–84.

247. Id. at 583–84; Ingraham v. Wright, 430 U.S. 651, 680–82 (1977) (finding no due process right to a hearing owed school children facing punishment by “paddling” because incremental benefit of hearing would not justify the cost as hearings require time, personnel, and diversion of school resources and because the risk of error would be low).

248. See Grimmelmann, supra note 29, at 1729 (explaining that software is an inexpensive way to solve problems because once written, marginal cost of running a program to handle other cases is vanishingly small).
costs across the variable benefits of achieving a more accurate outcome in each future case. The due process analysis should be recalibrated to compare fixed costs with the significant benefit of avoiding errors in countless future cases.249

“No Fly” adjudications raise different Mathews issues. The government refuses to produce the matching algorithms and the information contained in the “No Fly” databases on national security grounds. The additional process necessary to decipher the algorithms and the information, if released by the government, would also be expensive. As a result, the Mathews calculus would likely deny hearings on the “No Fly” matching system because the government’s anti-terror interests and the high fixed cost of expert testimony would likely outweigh the individual’s liberty and property interests and the value of added procedures.250

Some have suggested that a Mathews analysis might contemplate the creation of an independent advisory board with security clearance to review the outcomes of the “No Fly” data matching program and to make recommendations for its revision.251 Such a board could examine the number of false positives and false negatives produced by the program.252 Although an expert board might provide a balanced assessment of the program’s computerized reasoning,253 an extensive review of the program’s algorithms would be costly. The current due process analysis thus might find that such a searching review outweighs any benefits.

More generally, secret algorithms raise serious concerns.254 In certain

249. Such aggregated future benefits should, of course, be discounted to their present value. Some due process scholars argue that Mathews should not just look at individual costs and benefits but should also consider society’s interest in added procedures. See Lawrence B. Solum, Procedural Justice, 78 S. CAL. L. REV. 181, 306 (2004) (providing a theoretical account of due process that would “maximize systemic accuracy where the arrangement will not result in inaccuracy in particular cases”); Jane Rutherford, The Myth of Due Process, 72 B.U. L. REV. 1, 79–80 (1992) (offering “communitarian” view of due process that would assess benefits of additional procedures by looking at individuals or groups directly affected by decision).

250. To be sure, such a determination involves a subjective assessment of the decision maker. See Jerry L. Mashaw, The Supreme Court’s Due Process Calculus for Administrative Adjudication in Mathews v. Eldridge: Three Factors in Search of Value, 44 U. CHI. L. REV. 28, 39 (1976). But most would agree that anti-terrorism concerns are sufficiently weighty so as to tilt the scales against the individual’s interest in additional process.

251. Steinbock, supra note 76, at 79.

252. Id.

253. Id.

instances, algorithms must prove themselves in practice. For example, an algorithm for picking stocks that leads to losses would likely be adjusted or dropped. If the computerized logic used to predict credit card fraud regularly errs, it would likely be discarded. Yet algorithms in public automated systems are not necessarily subject to revision and review based on their performance in practice. At best, they may be tested for false negatives. For instance, if a terrorist slips through the system and is allowed to fly, the algorithms designed to prevent terrorists from flying might indeed be studied and fixed. But if an algorithm mistakenly identifies a four-year-old child as a potential terrorist, the algorithm will probably not be probed for over-inclusiveness. Correcting only one type of error in an algorithm or encoded rule tends to systematize bias.

One could argue that, under *Parratt v. Taylor* and its progeny, deprivations arising from programming mistakes warrant only tort remedies, not procedural due process. In *Parratt*, a state prisoner sued prison officials under 42 U.S.C. § 1983 for failing to provide him due process in a case where prison guards negligently lost materials that he ordered by mail. The Court found no procedural due process violation because pre-deprivation process would be “impossible” to provide, and because the prisoner had a meaningful post-deprivation tort remedy. The Court explained that because the state could not foresee an employee’s “random and unauthorized act,” it could not provide process in advance of the prison guards’ negligence.

The Court has limited *Parratt*’s application to cases where “no matter how significant the private interest at stake and the risk of its erroneous deprivation,” pre-deprivation process would be impossible to provide. In *Zinermon v. Burch*, the plaintiff sued officials of a mental hospital for admitting him as a voluntary patient without a hearing when they knew or should have known that he could not make an informed decision about his own admission. The *Zinermon* Court upheld the plaintiff’s procedural

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256. Id. at 529.
257. Id. at 541.
258. Id. The Court extended the *Parratt* holding to cases involving the random, intentional acts of state prison guards whose abuse of position could not be predicted. *Hudson v. Palmer*, 468 U.S. 517, 533 (1984) (finding it impossible for state to provide pre-deprivation process in case where prison guard destroyed property of inmate to avenge a personal vendetta).
260. Id.
261. Id. at 123–24.
due process claim because pre-deprivation process was not impossible to provide.262

At the outset, the Court made clear that the mere availability of tort remedies did not extinguish the plaintiff’s due process right to a pre-deprivation hearing.263 The Court distinguished Parratt because, unlike the prison officials who could not possibly predict when guards might negligently lose a prisoner’s mail, the hospital officials could foresee that individuals seeking treatment for mental illness might be incapable of informed consent.264 The Court concluded that the state should have held a hearing before admitting the plaintiff as a voluntary patient.265

Parratt has no application here. Unlike the unpredictable conduct of the prison guard in Parratt, programming mistakes happen all the time. As the problems with CBMS and the “No Fly” program make clear, agency officials can reasonably expect that software flaws or crude algorithms will produce erroneous decisions that impair the important rights of individuals. In that regard, our case is akin to Zinermon. Because agency officials ultimately control the administration of automated decision systems, pre-deprivation process is surely possible.

Administrative law has long presumed that rulemaking procedures help protect against arbitrariness when due process does not apply. The next section explores how that presumption fails in an age of automation.

2. Avoiding Participation and Transparency in Rulemaking

Computer programmers inevitably engage in rulemaking when they construct an automated system’s code. Whether or not the distortion in policy was intentional, the encoding process lacks procedural safeguards mandated by the Administrative Procedure Act (APA), the Freedom of Information Act (FOIA), and similar state laws. Such inadvertent rulemaking by programmers constitutes a troubling delegation of legislative power.

a. Notice and Comment

Automated systems establish new policy when they embed distorted or simplified rules. Section 551 of the APA defines a “rule” as an “agency

262. Id. at 136.
263. Id.
264. Id. at 136–37.
265. Id.
statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy." Automated policy falls within the APA’s definition of a rule, as it articulates general policy that prospectively affects a large number of individuals.

Some might argue that a rule is “new” only if an agency actually intends to set forth new policy. Automated rules that reflect “street-level” welfare policy fall under this conception of a rule. A strong argument also exists that policy changes caused by programming mistakes constitute new rules, regardless of the agency’s specific motive. Courts, interpreting Section 551 of the APA, look to an agency’s actions to determine if an agency has adopted a new rule. For instance, the D.C. Circuit found that an agency’s practice of adhering to a policy statement in approximately 292 out of 300 cases illustrated that the agency had, in fact, adopted a new rule. An automated system’s application of distorted policy in hundreds of thousands of cases similarly can be seen as establishing a new rule.

Whether accomplished overtly through informal rulemaking or covertly through programming, new rules must be issued in accordance with the APA and its state analogues. Although section 553(a)(2) of the APA exempts agency actions relating to “public property, loans, grants, benefits, or contracts” from notice-and-comment rulemaking, Congress and federal agencies have overridden that exemption for public benefits programs such as Medicaid and food stamps. State administrative procedure acts, in turn, govern the state’s administration of public benefits programs.

When a state agency interprets an existing rule in a

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266. 5 U.S.C. § 551(4) (2000); 1 DAVIS & PIERCE, supra note 4, § 7.2 (explaining that agencies adopt general laws or rules where “facts do not usually concern the immediate parties but are general facts which help the tribunal decide questions of law and policy and discretion”); see also Bi-Metallic Inv. Co. v. State Bd. of Equalization, 239 U.S. 441, 442 (1915).

267. See supra notes 84–86 and accompanying text (discussing “street-level” welfare policy studied by Professor Evelyn Brodkin of the University of Chicago).

268. See U.S. Tel. Ass’n v. FCC, 28 F.3d 1232, 1234 (D.C. Cir. 1994).

269. Id.


271. 5 U.S.C. § 553 (a)(2) (2000); see, e.g., 7 U.S.C. § 2014(b) (2000) (requiring USDA to control food stamp program through “uniform national standards” promulgated through informal rulemaking); Hosp. Ass’n v. Bowen, 834 F.2d 1037, 1047 (D.C. Cir. 1987) (finding that HHS’s waiver of APA exemption remains in effect until HHS says otherwise). Federal regulations require that changes in state Medicaid policy be discussed in advance with the state Medical Care Advisory Committee. See supra note 41.

272. See, e.g., 42 C.F.R. § 430.0 (2006) (“Within broad Federal rules, each State decides eligible
substantially different manner from a prior interpretation of that rule, or creates a new rule, the agency usually must provide notice-and-comment participation. Notice-and-comment rulemaking requires agencies to publish the rule, solicit the public’s comments, and issue a final rule that responds to those comments and articulates the basis for the rule.

Rulemaking by code fails to satisfy the notice-and-comment requirement. Agencies have not published the source code or data model of automated public benefits systems such as CBMS or TIERS. Because vendors typically build these systems, the source code is proprietary and closed. The public has no opportunity to review new rules embedded in closed source code. Individuals lack notice of the new rules that will bind them.

Without notice of a change in the rules, citizens lack the information they need to respond to such changes. The public cannot provide feedback on rules it cannot see. The value of participation by interested citizens and entities is lost. In turn, computer programmers inadvertently create rules that cannot be critiqued or improved.

Embedding new rules in code undermines the democratic process. Because the public has no opportunity to identify problems with troubled

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273. E.g., COLO. REV. STAT. ANN. § 24-4-103 (West 2006). The particular contours of public participation would naturally depend upon the particular state’s administrative procedure law. States, in general, require some form of public participation. BONFIELD, supra note 270, § 6.4.1.

274. KERWIN, supra note 3, at 52–57.

275. See Clark Petition, supra note 97, at 7–8 (arguing that Florida’s Department of Children and Families failed to follow applicable rulemaking procedures for change in rule embedded in design of Florida ACCESS online application that precluded relative caregivers from applying for TANF benefits in violation of state law).

276. See Citron, supra note 32.


278. Lee Tien notes that if no one perceives something as a regulation, “no one will complain that the government acted unwisely.” Tien, supra note 92, at 43.

279. See JERRY L. MASHAW, BUREAUCRATIC JUSTICE: MANAGING SOCIAL SECURITY DISABILITY CLAIMS 140 (1983); Levy & Shapiro, supra note 3, at 480; Rossi, infra note 282, at 186 (noting that “[p]articipation begets better information for the agency decisionmaking process” and encourages decision makers to closely scrutinize evidence and arguments).

280. The fact that the official rules received notice-and-comment participation is of no consequence. When rules are changed, the letter and the spirit of administrative procedure demands the transparency, accountability, and expertise that rulemaking provides.

systems, it cannot present those complaints to elected officials. In turn, government actors are unable to influence policy when it is shrouded in closed code.282

Some scholars argue in favor of granting agencies more deference because they are increasingly creatures of a democratically elected President and hence are more accountable to the public than has been generally assumed.283 Whatever force the executive model of administrative law has generally, it has none here. Even the most aggressive President will be unable to exercise meaningful oversight over opaque code.284

Altered rules would arguably be exempt from notice-and-comment requirements if they constituted interpretative rules or changed other interpretative rules.285 Interpretative rules are rules that clarify existing norms without constraining agencies’ discretion, whereas rules subject to section 553 of the APA and analogous state requirements are rules that create binding norms.286 Unfortunately, the opacity of code makes it difficult to determine if a change has imposed a “new rule” requiring rulemaking procedures or an “interpretative rule” arguably demanding less process.

b. FOIA and Open-Records Laws

The hidden nature of encoded rules violates open-government laws and regulations that are intended to provide the public access to basic information about the conduct of agencies.287 FOIA and similar state laws


284. See citron, supra note 32 (exploring how closed code systems interfere with Presidential model of administrative law).

285. 5 U.S.C. § 553(b)(A) (2000) (explaining that rulemaking procedures do not apply to interpretative rules and policy statements); Richard J. Pierce, Jr., Distinguishing Legislative Rules From Interpretative Rules, 52 ADMIN. L. REV. 547, 547 (2000) (“[A]n agency can issue an interpretative rule at any time without using the notice-and-comment procedure.”). Some courts, however, have noted that when an agency changes its interpretative rules, the new interpretative rules require notice-and-comment participation. Paralyzed Veterans of Am. v. D.C. Arena L.P., 117 F.3d 579, 586 (D.C. Cir. 1997) (“To allow an agency to make a fundamental change in its interpretation of a substantive regulation without notice-and-comment requirements would undermine the APA.”).

286. M. Elizabeth Magill, Agency Choice of Policymaking Form, 71 U. Chi. L. Rev. 1383, 1434 (2004); see also Am. Mining Cong. v. Mine Safety & Health Admin., 995 F.2d 1106, 1111 (D.C. Cir. 1993) (explaining that interpretative rules are those that lack the force of law).

Federal rules also contain numerous provisions allowing the public to receive information about the operation of such programs.

Under FOIA and state open-record laws, agencies must publish “substantive rules of general applicability,” policy statements, and interpretative rules, even if some of those rules are not published for notice-and-comment. Agencies must also make records available to the public for inspection. Records subject to inspection include electronic and digital materials compiled by the government. These public-access requirements guard against the dangers of secret and unchecked government.

Automated public benefits systems arguably flout these transparency mandates. For instance, the source code of CBMS has not been published for review. Although FOIA exempts “trade secrets” from its disclosure

288. 5 U.S.C. § 552(a)(2), (b) (2000 & Supp. IV 2004) (requiring every agency to make available for public inspection and copying, inter alia, statements of policy, interpretations not published in Federal Registry, and administrative staff manuals with narrow exceptions that do not include benefits information).


290. “Policy statements” announce an agency’s tentative intentions for the future without binding the agency. Am. Hosp. Ass’n v. Bowen, 834 F.2d 1037, 1046 (D.C. Cir. 1987). They are not supposed to establish binding norms. Id.; see Anthony, supra note 277, at 1372–73 (raising concerns that policy statements do, in fact, create norms).


295. Interview with Andy Bardwell, supra note 241. Although the artificial language of computer code may be incomprehensible to the average person, interested groups could hire experts who would be able to read a system’s “rules base” and “rules engine.” See text accompanying notes 61–64 (describing “rules-based” systems).
requirements, that exception is inapplicable to CBMS’s decision tables because agency personnel built this portion of the source code.

The source codes for systems built exclusively by private vendors, such as TIERS and CalWIN, might qualify for FOIA’s “trade secret” exemption. Interestingly, state agencies have refused FOIA requests for the source code of privately built benefits systems on different, and less persuasive, grounds. For instance, the Texas Health and Human Services Commission (HHSC) rejected a FOIA request to produce the “logical data model” for TIERS on the grounds that computer source code did not constitute public information. HHSC argued that the TIERS code had no significance other than as a tool to maintain, manipulate, or protect client data. The Office of the Texas Attorney General agreed, finding that producing the code would divulge “confidential client information.”

Contrary to the Texas Attorney General’s position, no sensitive personal information would be revealed in the release of the source code of the system’s rules base, which embeds policy, or of its rules engine, which provides the system’s logic. Although the trade secrets exception to FOIA might exempt the disclosure of an automated system’s source code, concerns about the release of sensitive client information should not. Moreover, even if the trade secrets exemption applies here, the refusal to produce the code of automated decision-making systems allows agencies to enforce laws that no one can see or monitor, which is the very antithesis of open government.

297. See supra notes 65–67 and accompanying text.
298. See supra notes 135–43 and accompanying text (describing TIERS and CalWIN).
301. Id. (ruling that TIERS data model is not subject to TEX. GOV’T CODE ANN. § 552.002).
302. Computer programmers also arguably comprise advisory committees subject to the transparency requirements of the Federal Advisory Committee Act (FACA). FACA requires advisory committees—those “established or utilized” by the President or an agency for advisory purposes—to open their meetings, minutes, reports, and records to the public. 5 U.S.C. app. §§ 3(2), 10(a), 10(b) (2000). Courts exempt government contractors from FACA’s mandates because procurement regulations impose transparency requirements on contractors in order to prevent the misuse of government resources. Food Chem. News v. Young, 900 F.2d 328, 331 (D.C. Cir. 1990) (citing H.R. REP. No. 1403-92, at 2 (1972) (Conf. Rep.)). An argument can be made that the contractors here—computer programmers—should not fall within that exemption. Unlike the transparency provided by the contracting process that the FACA exemption addresses, here, the key issue is the opaque nature of
c. Questionable Delegations of Power

Automated systems can be conceptualized as de facto delegations of rulemaking power. Congress has vested in state officials the power to implement and enforce federal programs providing Medicaid, food stamps, and other public benefits.\(^{303}\) State agencies, in turn, have enlisted information technology consultants to encode policy into decision-making programs. Agencies inadvertently give rulemaking power to computer programmers who can, and do, alter established policy when embedding it into code.

Automation raises a unique but parallel set of issues to those that the courts addressed in another era involving delegations to administrative agencies. In the 1930s, the Supreme Court raised concerns about the lack of political accountability in Congress’s sweeping delegations to the executive branch. In two 1935 cases, the Court required Congress to set meaningful limits on the discretion afforded agencies.\(^{304}\) The Court has since set the bar very low for what constitutes a sufficient limitation,\(^{305}\)

the advice that software engineers provide in embedding new rules into an automated system’s code. Such programmers do not solely execute policy. Instead, they effectively provide advice to the agency by changing established policy in the course of translating it into computer language and encoding it. That advice is, in turn, adopted by the agency through its automated decision system. Because FACA aims to secure transparency in the policy advice given to agencies, the spirit of the statute counsels its applicability to the consultants that design automated systems like the Federal Parent Locator Service. See A. Michael Froomkin, Wrong Turn in Cyberspace: Using ICANN to Route Around the APA and the Constitution, 50 DUKE L.J. 139 (2000) (questioning whether private company running ICANN on behalf of Department of Commerce should be covered by FACA’s mandates).

303. For instance, Congress has delegated substantial authority to the states to administer Medicaid. 42 U.S.C. §§ 1396–1396s (2000). Although the Medicaid statute establishes binding policy, 42 U.S.C. § 1396a(a) (2000), and the Secretary of Health and Human Services issues regulations expanding them, 42 C.F.R. pt. 430–56 (2006), participating states must design programs that lay out the conditions of eligibility and covered services. 42 C.F.R. § 430.0 (2006).

304. Panama Refining Co. v. Ryan, 293 U.S. 388 (1935) (invalidating a section of National Industrial Recovery Act that delegated power to prohibit shipment of “hot oil” in interstate commerce to President because the statute failed to provide standard governing when the President could exercise that power); A.L.A. Schechter Poultry Corp. v. United States, 295 U.S. 495, 541–42 (1935) (striking down delegation to President and groups of private citizens the power to prescribe codes governing businesses subject to federal authority because statute “does not undertake to prescribe rules of conduct to be applied to particular states of fact determined by appropriate administrative procedure”). As John Hart Ely explains, the fundamental principle of nondelegation is the accountability of government decision making. Ely, supra note 4, at 132–33; see also Froomkin, supra note 302, at 146 (exploring how nondelegation doctrine aims to ensure that “public power is exercised in a manner that makes it both formally and, insofar as possible, actually accountable to elected officials, and through them—we hope—to the electorate”); Cass R. Sunstein, Is the Clean Air Act Unconstitutional?, 98 MICH. L. REV. 303, 335–37 (1999) (contending that constitutional goal of ensuring an accountable deliberative democracy and concern for the rule of law animate nondelegation theory).

305. Yakus v. United States, 321 U.S. 414, 424–26 (1944) (“Only if we could say that there is an absence of standards for the guidance of the Administrator’s action, so that it would be impossible in a
and the APA’s procedural constraints on the exercise of delegated
discretion have effectively replaced the nondelegation doctrine.\textsuperscript{306} The
Court, however, has never abandoned the nondelegation doctrine, and
some state courts have enforced more robust versions of it.\textsuperscript{307}

Automated systems impose accountability deficits that administrative
procedures cannot remedy. Because the policies embedded in code are
invisible, administrators cannot detect when the rules in an automated
system depart from formal policy.\textsuperscript{308} As a result, presidentially or
gubernatorially appointed agency heads cannot meaningfully review
programmers’ actions.\textsuperscript{309} Not surprisingly, administrators fail to provide
the procedural safeguards that are typically applied to rulemaking.\textsuperscript{310}
Although administrators are politically accountable due to their
relationships with elected officials, administrators cannot meaningfully
review or provide political legitimacy to changes in rules that they cannot
see and did not propose.\textsuperscript{311}

\textsuperscript{306}. E.g., Greater Boston Television Corp. v. FCC, 444 F.2d 841, 850 (D.C. Cir. 1970)
(emphasizing importance of rule of law in administrative process); Amalgamated Meat Cutters v.
President because, in part, administrative procedures would provide check on executive action); see
also KENNETH CULP DAVIS, DISCRETIONARY JUSTICE: A PRELIMINARY INQUIRY 50 (2d ed. 1977)
(explaining that any “hope” to address dangers of delegation should be directed to ensuring that
administrators clarify standards they use).

\textsuperscript{307}. See, e.g., Boreali v. Axelrod, 517 N.E.2d 1350, 1356 (N.Y. 1987) (finding Public Health
Council exceeded scope of authority delegated to it by legislature).

\textsuperscript{308}. See Froomkin, supra note 302, at 142–43 (arguing that Department of Commerce’s
handing over power to ICANN to regulate Internet violates private nondelegation doctrine because Department
of Commerce did not retain right to review ICANN’s decisions and because Congress did not clearly
authorize handing over policymaking to private group but instead agency did so via contract); see also
FM Props. Operating Co. v. City of Austin, 22 S.W.3d 868, 875–80 (Tex. 2000) (ruling that private
delegations deserve more searching scrutiny under eight-part test).

\textsuperscript{309}. See Texas Boll Weevil Eradication Found., Inc. v. Lewellen, 952 S.W.2d 454, 473–77 (Tex.
1997) (striking down delegation to private group because private delegate’s actions were not subject to
meaningful review by state agency and delegate had personal interest which might be inconsistent with
public interest). Concerns about accountability would also be true if an agency’s information
technology specialists, who wrote the code, had no policy experience.

\textsuperscript{310}. See supra notes 270–85 (discussing lack of notice-and-comment participation and FOIA
compliance).

(“While agencies are not directly accountable to the people, the Chief Executive is, and it is entirely
appropriate for this political branch of the Government to make such policy choices . . . .”); JERRY L.
Jody Freeman, Gillian Metzger, David Super, and others are engaged in a parallel enterprise to identify appropriate standards for delegations of public power to private contractors. Conventionally, the nondelegation doctrine has been understood as having two components—one limiting delegations to public entities, and the other limiting delegations to private parties. Today, the nondelegation doctrine should be viewed as having three parts. Automation produces a new delegation of legislative power to automated systems and their designers—a delegation that needs to be addressed.

This third component of the nondelegation doctrine borrows from each of the other two, as code is often created by a mix of public and private programmers. Delegations to computer systems and their programmers, however, are more troubling than delegations to private contractors. The type of private delegation addressed by scholars often involves individuals or entities that arguably can be viewed as having some expertise in carrying out policy objectives, such as doctors in hospitals interpreting Medicaid regulations. By contrast, code writers lack policy expertise.

Today’s society requires expertise on technical matters, an expertise that agencies can provide and that the public does not possess. As Justice Stephen Breyer explains, a workable democracy requires “striking a balance—some delegation, but not too much . . . [thereby] avoid[ing] conflict between democracy and administration.” But programmers who build code and design algorithms have no authority to engage in policymaking. In fact, their mistakes work to essentially, albeit unintentionally, usurp an agency’s own expertise and delegated...
authority. The rulemaking power that programmers inadvertently wield thus defies the democratic origins and purposes of delegation.

More generally, the delegation of public power to code writers offends rule-of-law principles. The rule of law requires that legal directives be “duly authorized.” Laws should be clear and accessible so that those subject to them can know and understand their content. But neither concern is met here. When computer programmers establish new rules, it is often by accident or convenience, not as the result of a thoughtful delegation of public power. Encoded rules that change established policy cannot be understood by affected individuals or reviewed by more democratically accountable superiors. In that regard, rulemaking by code writers is ultra vires even as it is inevitable.

d. Expertise and Discretion

Even if computer programmers minimized, or somehow even eliminated, code’s deviation from established policy in a manner that dispels accountability and transparency concerns, the automation of administrative law poses other problems. Automation encourages agencies to adopt overly simplified policy, which can more easily be translated into code. This forfeits much of the policy expertise that agencies offer.

Automation, in time, will be a driving force in the retreat from the discretionary model of administrative law. Although automation may be a superior alternative to discretion in many instances, it would be a

317. See Citron, supra note 32.
318. See Richard B. Stewart, Administrative Law in the Twenty-First Century, 78 N.Y.U. L. REV. 437, 438 (2003) (“The traditional core of administrative law has focused on securing the rule of law and protecting liberty by ensuring that agencies follow . . . decisional procedures, act within bounds of statutory authority delegated by legislature, and respect private rights.”).
321. H.L.A. HART, THE CONCEPT OF LAW 124 (2d ed. 1994) (speaking of rules “which multitudes of individuals could understand” and without which law could not exist); FULLER, supra note 320, at 63 (discussing law’s clarity).
323. FRANCIS E. ROHRKE, BUREAUCRACY, POLITICS, AND PUBLIC POLICY 15 (2d ed. 1976) (“[D]ealing day in and day out with the same tasks gives public agencies an invaluable kind of practical knowledge that comes from experience.”), BREYER, supra note 315, at 102-03.
mistake to completely eradicate all discretion.\textsuperscript{325} Kenneth Culp Davis’s declaration that discretion is a “principal source of creativeness” in government remains true.\textsuperscript{326} Automation should be pursued only after a careful assessment of all risks. Part III provides a framework to assess the risks that may result from choosing complete automation over human discretion.

\textbf{C. Meaningful Judicial Review in Jeopardy}

For the reasons articulated above, code alters policy without transparency or participation. The process by which programmers produce those changes, in turn, may be so divorced from reasoned policy analysis that it amounts to “arbitrary and capricious” action or an “abuse of discretion.” Policy, as embedded in code, could do a number of things. It could violate federal law. It could alter established rules. It could change existing interpretative rules. It could embed distorted policy statements. The opacity of software, however, makes it impossible to tell exactly what the code has accomplished. Because courts cannot see the rules that were actually applied in a given case, meaningful judicial review is impaired.

Even if the court could somehow discover that code has effectively established a new rule, there would be no record supporting the policy change. The Supreme Court has long required contemporaneous records of agency decision making to facilitate judicial review.\textsuperscript{327} Without such a record, courts cannot determine if an agency has abused its discretion in its interpretation of policy or if it based the rule on inappropriate factors.\textsuperscript{328}

Courts certainly could find encoded policy to be an abuse of discretion without knowing the agency’s reasons behind it. Indeed, a court can find an agency’s decision arbitrary and capricious precisely because the agency has offered little or no reason for its rule.\textsuperscript{329} Under conventional doctrine, a

\begin{itemize}
\item \textsuperscript{325} Diller, \textit{supra} note 294, at 1126 (discussing problems with new discretionary model for administration of public benefits as eligibility workers lack professional norms they once possessed).
\item \textsuperscript{326} DAVIES, \textit{supra} note 306, at 15 (explaining that discretion has significant value as well as perils, and thus key task is to figure out discretion we ought to discard or that we should impose).
\item \textsuperscript{328} 5 U.S.C. § 706 (2000); DAVIES & PIERCE, \textit{supra} note 4, § 11.5, at 204 (“An agency action that constitutes an unexplained departure from precedent must be reversed as arbitrary and capricious . . . .”).
\item \textsuperscript{329} Motor Vehicles Mfrs. Ass’n v. State Farm Mutual Auto. Ins. Co., 463 U.S. 29, 46–48 (1983) (deeming agency rescission of rule arbitrary and capricious on the grounds that agency failed to
\end{itemize}
computerized system would fail this test automatically if contemporaneous explanations for changed rules are absent.

After an automated system has failed, and aggrieved individuals have filed lawsuits, agency heads could consult with programmers and bureaucrats to ascertain why a certain rule was encoded. But administrative law does not recognize post-hoc rationalizations of agency actions. As the Court has held since the first Chenery case, the “grounds upon which an administrative action must be judged are those upon which the record discloses that its action was based.” Precluding such after-the-fact explanations ensures that agencies carefully weigh policies before imposing them on the public.

If the court finds that code has effectively created new policy, no deference should be accorded the agency’s action. In United States v. Mead Corp., the Supreme Court denied Chevron deference to the voluminous work of low-level functionaries whose work Congress could not plausibly have intended to have the “force of law.” Mead suggested that formal adjudication, formal or informal rulemaking, or some indication in the particular statutory scheme that the agency could make legally binding policy through other means was necessary to receive deference. None of these indications are typically present when programmers change policy in building code. Absent Chevron deference, courts afford the less-powerful Skidmore deference to the extent that agency policy has the “power to persuade.” Yet code writers typically leave no contemporaneous explanation of their actions that might have the potential to persuade under Skidmore.

Normatively, then, policy changes accomplished through code should be reviewed with no deference at all. In practice, however, the reverse is true. Because code is hard to unearth, and because of automation bias, encoded policy tends to receive even more powerful deference than that provided under Chevron.

provide factual or evidentiary support for rule); cf. Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 419–20 (1971) (finding agency’s decision to build highway through park arbitrary and capricious after hearing because agency failed to explain its decision).

330. Camp v. Pitts, 411 U.S. 138, 142 (1973) (“[T]he focal point for judicial review should be the administrative record already in existence, not some new record made initially in the reviewing court.”).


332. Id. at 94; Dia v. Ashcroft, 353 F.3d 228, 242 (3d Cir. 2003).


334. Id. at 230–32.

Automated systems also generate erroneous adjudications that escape judicial review. An automated decision about an individual’s Medicaid benefits is an amalgam of different factual determinations. Claimants and others report critical information to eligibility workers. Oftentimes, a claimant tells information to a variety of workers at different times. Those workers interpret that information and enter conclusions into systems that do not record the specifics of the information or the identity of those who assessed and entered it. Because the system does not retain the individual’s data, and because the system does not record the worker’s impressions, that information is effectively lost. Although hearing officers are typically tasked with reviewing automated decisions regarding public benefits de novo, the factual predicates for those decisions cannot be reviewed.

Similarly, an automated system offering finite choices to users effectively forces its users to guess the category under which their information falls. A poorly expressed question presents the risk that a decision will be made without sufficient information and without awareness that further information is needed for the decision-making process. Errors that occur when an individual fails to submit certain information will be almost impossible to review administratively or judicially because no record exists of the information that an individual attempted to communicate or was not prompted to communicate. As a result, a system’s design may create unreviewable problems for individuals.

Automation jeopardizes due process values, falsifies the central assumptions of administrative law, and subverts much of the social contract underlying the expansion of the administrative state. The loss of such procedural safeguards cannot stand. The next Part lays out a new framework to secure technological due process for the automated administrative state.

338. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 26.
339. Cf. Diller, supra note 294, at 1201 (noting that techniques that case workers use to dissuade applicants from pursuing benefits are insulated from review as agency never denied applicants benefits and thus no decisions exist from which the applicants could appeal).
III. THE CASE FOR TECHNOLOGICAL DUE PROCESS

Legal scholars and systems experts must work together to shape the contours of due process in this automated age. This Part contributes to that effort. At the threshold, it draws upon the rules-versus-standards literature to provide a systematic approach to deciding between automation and human discretion. It reconceives procedural guarantees for the automated age by providing mechanisms to vindicate the norms of due process and rulemaking.

A. Rules and Standards

Law can take the form of rules, standards, or combinations of each. A rule prescribes ex ante an outcome for a particular fact scenario. A fifty-mile-per-hour speed limit, for instance, operates as a rule that a police officer or clerk cannot change. On the other hand, a standard requires decision makers to exercise discretion, applying ex post policies to events. A standard might ask a decision maker to assess whether a person drove at a speed that was reasonable under the circumstances.


344. HART & SACKS, supra note 340, at 140. Administrative and constitutional law often combine rules and standards. For instance, procedural due process mandates notice and an opportunity to be heard. Although notice and hearings constitute rules, courts determine the contours of such requirements through standards. Those standards, in turn, may include subsidiary rules. For example, the Court in Withrow v. Larkin, 421 U.S. 35, 49 (1975), provided a per se rule for the impartiality of decision makers.
Rules and standards have different goals. Rules establish basic instructions for behavior. They facilitate predictability. Because rules provide notice of the consequences attached to an activity, the public can order its affairs accordingly. Rules promote fairness by requiring consistent treatment of similar cases. They prevent decision makers from basing decisions on parties’ perceived attractive qualities. Rules cut the costs of decision making by eliminating the need to reconsider recurring issues.

Standards, on the other hand, permit decision makers to tailor an outcome to the facts, increasing the likelihood of an “ideal” ruling. They can account for changing circumstances brought about by technology. Standards also force decision makers to articulate their choices, increasing the chance that they will “make visible and accountable the inevitable weighing process that rules obscure.”

345. E.g., Davis, supra note 306, at 35; Dworkin, supra note 340, at 17–39 (outlining theory of law based on rules, principles, policies, and standards); Schauer, supra note 340, at xv. This Article does not provide an exhaustive account of this important debate. Instead, it aims to capture certain features of rules and standards that will be helpful in directing an agency’s choice between rules and standards in automation decisions and in finding surrogate mechanisms for the automated administrative state.


349. Scalia, supra note 347, at 1178 (“When a case is accorded a different disposition from an earlier one, it is important, if the system of justice is to be respected, not only that the later case be different, but that it be seen to be so.”); Fuller, supra note 320, at 39.

350. Sullivan, supra note 341, at 62; Sunstein, supra note 342, at 974 (explaining that rules can counteract bias, favoritism, and discrimination by decision maker).


352. Schauer, supra note 340, at 98. Frederick Schauer explains that unlike standards, a literal application of rules runs the risk of “causing the rule to collapse into its underlying justification.” Id. at 63; Kennedy, supra note 340, at 377–91 (arguing that rule application can produce arbitrary or irrational results given substantive ends sought to be realized). For instance, a rigid rule may not fit a particular scenario but a bureaucrat may be forced to enforce it without the power to make its application sensible. Davis, supra note 306, at 52.


354. Davis, supra note 306, at 67; Wallace Mendelson, On the Meaning of the First Amendment: Absolutes in the Balance, 50 Cal. L. Rev. 821, 825 (1962) (“Open balancing compels a judge to take full responsibility for his decisions, and promises a particularized, rational account of how he arrives at them—more particularized and more rational at least than the familiar parade of . . . elastic absolutes . . . .”).

https://openscholarship.wustl.edu/law_lawreview/vol85/iss6/2
The proper division of law’s work between rules and standards has been one of the most hotly debated topics in jurisprudence. The emergence of automation threatens to overwhelm this debate by giving rules a huge, and often decisive, advantage on the basis of cost and convenience rather than the desirability of the substantive results they produce.

The next section provides a framework to navigate between automation and discretion in order to avoid the loss of human discretion simply for efficiency’s sake.

B. Automation and Discretion

Agencies may be inclined to automate many of their policies and to adopt policies that can be easily automated. Certainly those who trumpet automation’s cost savings, responsiveness, and consistency urge this result. But agencies should follow a more systematic approach to pursuing automation at the expense of human discretion. The rules-versus-standards literature can help guide an agency’s initial decisions with regard to automation.

Automated systems inherently apply rules because software predetermines an outcome for a set of facts. Thus, an agency’s choice to automate current policies or to adopt new ones that can be automated constitutes a decision to govern through rules. As the rules-versus-standards literature implies, well-implemented automation is preferable to human discretion where the need for consistency outweighs the value of human discretion. Automation is more attractive where the risks associated with human bias outweigh that of automation bias. It is advantageous when an issue does not require the exercise of situation-specific discretion.

355. See, e.g., Lessig, supra note 353, at 1744–45 (arguing that cyberspace should not be governed by rules due to rapid changes in the Internet); Jerry Kang, Cyber-Race, 113 HARV. L. REV. 1130, 1188 (2000) (“Cyberspace is too novel and dynamic a medium for anyone to be confident that she has gotten policy just right.”).

356. As Professors Lawrence Lessig and Jerry Kang note, the digital age may be far better suited to governance by standards in situations where rapidly changing technologies will render rules obsolete. See supra note 355. This concern certainly applies for any solutions suggested to address the automated administrative state where best practices may be subject to change. This Part addresses this concern where it is relevant.

357. See EGGERS, supra note 18, at 22–27, 118.

358. Grimmelmann, supra note 29, at 1732 (“Because software is automated, it operates without human discretion.”).

359. Id.; see JAMES Q. WILSON, BUREAUCRACY: WHAT GOVERNMENT AGENCIES DO AND WHY THEY DO IT 54 (rev. ed. 2000) (explaining that operators who enter data on social security earnings...
Decisions best addressed with standards should not be automated.\textsuperscript{360} Policies that explicitly or implicitly require the exercise of human discretion cannot be automated.\textsuperscript{361} For instance, agencies should not automate policies that allow individuals to plead extenuating circumstances that software cannot anticipate.\textsuperscript{362} Legal materials providing that a “decision maker may” take a given action explicitly signal that automation is inappropriate.\textsuperscript{363} Others implicitly do so by including indeterminate terms that require decision makers to consider conflicting norms that resist precise weighting.\textsuperscript{364}

Some may suggest that a preservation of discretion in decision-making systems merely substitutes a programmer’s policy distortions with a human operator’s prejudice or whim. Indeed, policy distortions in code would be more likely to contain a mix of positive and negative impacts on individuals than would human operators harboring discriminatory motives, who would more consistently harm one group and favor another. Computer systems, however, can be designed to alleviate some of these concerns. Decision systems can outline the factors that operators should consider when making judgments.\textsuperscript{365} Fields can be created to require operators to enter the reasons for their decisions and to detail the different weight they attached to relevant factors.\textsuperscript{366} So constructed, decision systems would give operators the opportunity to craft “ideal” rulings while obtaining a degree of transparency about the basis of the operator’s decision.

The next section lays out legal principles for today’s automated systems intended to replace the procedures that automation jeopardizes.

\textsuperscript{360} Grimmelmann, supra note 29, at 1732. Another consideration should be a rule’s complexity. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 46. Although “[s]oftware rules can become almost unimaginably complex without their hard edges blurring,” Grimmelmann, supra, at 1733, the constrained nature of computer languages may limit a programmer’s ability to accurately capture a rule’s nuances. See supra notes 61–62.

\textsuperscript{361} See AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 46.

\textsuperscript{362} Grimmelmann, supra note 29, at 1732–33.

\textsuperscript{363} See Peter H. Schuck, *Legal Complexity: Some Causes, Consequences, and Cures*, 42 DUKE L.J. 1, 4 (1992) (describing indeterminate terms as standards); HART, supra note 321, at 124–32 (discussing open-textured rules); DAVIS, supra note 306, at 78 (explaining that undefined concepts in legislation, such as “undesirable,” confer discretionary power on administrators).

\textsuperscript{364} AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 38.

\textsuperscript{366} Id. at 23.
C. Procedures Reconceived and Replaced for the Automated State

1. Protecting Individual Rights

Automation jeopardizes the due process guarantees of meaningful notice and opportunity to be heard. Both technological and legal mechanisms can secure meaningful notice, combat automation bias, and enhance the accuracy of decisions about constitutionally significant individual rights.

a. Securing Meaningful Notice

The inadequacy of notice in this automated age must be addressed. At a minimum, automated systems should generate audit trails that record the facts and rules supporting their decisions. Audit trails should include a comprehensive history of decisions made in a case, including the identity of the individuals who recorded the facts and their assessment of those facts. Audit trails should detail the actual rules applied in every mini-decision that the system makes. With audit trails, agencies would have the means to provide individuals with the reasons supporting an automated system’s adjudication of their important rights.

Requiring audit trails would adopt a norm that other countries, such as Australia, have embraced. It would ensure that agencies uniformly provide detailed notice to individuals, no matter the identity of the private vendor that built the system. A per se requirement would guard against a contractor’s inclination to omit this feature as a cost-saving measure. It would facilitate judicial review of the different factual adjudications made by human operators.

Furthermore, audit trails might help to combat a hearing officer’s presumption that automated decisions are infallible. By providing a detailed map of a computer’s decision-making process, audit trails would

367. In the “No Fly” context, national security concerns may outweigh an individual’s right to advanced notice of her “No Fly” status. But in nearly all other instances, courts should insist on strict compliance with notice requirements.
368. See AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 23; WEITZNER ET AL., supra note 197, at 4–5 (describing TAMI software architecture that records justifications for data matching and mining “No Fly” determinations to ensure transparency in such systems, including clear view of logical, factual, and legal bases for inferences made by system).
369. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 23, 48. This can be accomplished by additional prompts that ask operators to describe their thought processes. Some jurisdictions, such as Australia, already provide such prompts to operators. Id.
370. Id. at 46–47.
encourage officers to critically assess the computer’s specific findings. Although developing the capability to produce audit trails would have initial fixed costs, it would have few variable ones.

Individual agencies would naturally determine the precise contours of such audit trails and the notices they generate. Agencies should ensure that their audit trails follow industry best practices. They, and reviewing courts, should apply the familiar Mullane standard to ensure that the system provides sufficient notice. This approach would encourage agencies to incorporate advances in the design of audit trails into their systems.

b. Protections for Hearings

Administrative law must confront the automation bias that threatens the impartiality of hearing officers and deprives individuals of meaningful opportunities to be heard. This may be more difficult than avoiding hearing officers’ biases for or against particular parties because recusal is unlikely to help. Two rules could be employed to combat such bias.

First, agencies should make it clear to hearing officers that automated systems are fallible. To that end, hearing officers should receive explicit training about the phenomenon of automation bias. Studies demonstrate that individuals who receive such training are more likely to scrutinize an automated system’s suggestions. The training of judges has been effective in a parallel enterprise. Special workshops on scientific theory and methodology have provided needed training to federal district court judges charged with assessing the reliability of expert testimony.

371. A rule prescribing the exact contours of an audit trail would surely be inadvisable given the rapidity of change in technology and industry best practices.
372. See supra text accompanying notes 204–06 (discussing due process notice formulation of Mullane v. Central Hanover Bank & Trust Co., 339 U.S. 306, 319 (1950)).
373. See supra notes 150–54 and accompanying text (discussing the phenomenon of automation bias and its risks).
375. See Skitka et al., supra note 151, at 94 (arguing that automation bias can be dispelled by training decision makers about phenomenon).
377. Scott Brewer, Scientific Expert Testimony and Intellectual Due Process, 107 YALE L.J. 1535,
Second, agencies should require hearing officers to explain, in detail, their reliance on an automated system’s decision. Officers should identify the computer-generated facts or legal findings on which they relied in making their decisions. This accords with administrative law’s longstanding faith in the prophylactic power of requiring explicit statements of reasons. Asking hearing officers to evaluate the basis for their decisions would further mitigate the effects of automation bias.

Fighting automation bias is a logical next step from *Daubert v. Merrell Dow Pharmaceuticals, Inc.* and *Kumho Tire Co. v. Carmichael.* In those cases, the Court upheld the exclusion of unreliable expert testimony due to the jury’s inability to reject evidence carrying the imprimatur of science or engineering. If the Seventh Amendment countenances taking issues away from juries due to the risks of scientific bias, surely administrative law can similarly address automation bias. These suggested requirements are certainly less invasive than the exclusion of evidence in *Daubert* and *Kumho.* Requiring warnings and statements of reasons would be the equivalent of cautionary instructions, not flat bans on officers beset by automation bias.

Providing a means to combat the effects of automation bias would not undermine the Court’s traditional reluctance to dissect the motives of decision makers. In *United States v. Morgan,* an agency head publicly announced his disappointment about the Court’s reversal of an earlier decision of his agency. Addressing allegations of bias, the Court refused to assess the administrator’s convictions on matters of policy. The Court reasoned that decision makers are presumed to be persons of “conscience and intellectual discipline.”

The reporting and warning requirements would not transgress the letter or the spirit of *Morgan.* They would not entail an individual assessment of


378. Cummings, supra note 147, at 4.
379. Id. (requiring operators to explain extent to which they relied on automation leads to fewer instances of bias).
384. 313 U.S. 409 (1941).
385. Id. at 420.
386. Id. at 420–21.
387. Id. at 421.
a particular hearing officer’s inclination to adopt computerized decisions. Instead, they would erect safeguards to dispel the influence of automation bias without intruding on and evaluating a particular judge’s thought process.

Reconceptualizing the Mathews balancing test would also help individuals to receive meaningful hearings. As suggested in Part II, the Mathews analysis needs a more realistic way to compare the fixed costs of corrective action with the future benefits of that correction. The theoretical foundations of Mathews would, in turn, reflect the new realities of the automated administrative state. It might countenance requiring additional costs in cases where retrofitting an automated system’s reasoning was essential to enabling individuals to address an agency’s intended actions.

For instance, a reconceived Mathews test might permit hearings on flaws in the CBMS software in a case involving a child whose Medicaid benefits were abruptly terminated. Because CBMS does not generate audit trails, and because automation bias will likely influence the hearing officer, expert testimony would be critical to demonstrate that the computer decision is flawed. If experts discover a distortion in the encoded policy that, once fixed, would avoid errors in thousands of other cases, the Mathews analysis might support such additional process. In the “No Fly” context, if independent advisory boards were provided testing data that included false positives, the system might be recalibrated to be more accurate. Coupled with measures to combat automation bias, this approach would vindicate due process values for the automated administrative state.

2. Replacing Rulemaking Procedures

Automated systems must be designed with transparency and accountability as their primary objectives, so as to prevent inadvertent and procedurally defective rulemaking. This approach incorporates several basic norms of behavior.

First, vendors should release systems’ source codes to the public. Opening up the source code would reveal how a system works. It would

388. See supra text accompanying notes 243–53.
389. See supra text accompanying notes 248–50.
390. See Citron, supra note 32 (arguing that the release of various information systems’ source codes used by agencies, including decision-making systems, would advance various models of the administrative state); Lawrence Lessig, Open Code and Open Societies, in PERSPECTIVES ON FREE AND OPEN SOURCE SOFTWARE 358 (Joseph Feller et al. eds., 2005).
shed light on the policies encoded in it.\textsuperscript{392} The Office of Management and Budget could issue a circular conditioning the provision of federal funding for technology purchases on the use of open code.\textsuperscript{393} A state budget office could do the same for local purchases receiving state aid.\textsuperscript{394} Alternatively, legislators could mandate open code systems.\textsuperscript{395} Certain systems such as the “No Fly” program, however, might fall outside an open code mandate because public safety concerns might outweigh transparency’s benefits.\textsuperscript{396}

One might argue that the public’s ability to identify encoded policy changes would force agencies to engage in notice-and-comment rulemaking, the costs and delays of which have already caused it to fall into disuse. This concern, however, is inapplicable in cases where the public has identified programming mistakes that can be fixed. For example, a software glitch may have caused CBMS to apply illegal income and asset requirements to breast cancer patients on Medicaid.\textsuperscript{397} There, the agency programmers may have understood established policy, but nonetheless executed it improperly. An open code system would help ensure the correction of encoded policy without involving expensive rulemaking procedures.

This argument, however, does indeed have force in cases where programmers’ interpretations establish new rules. CBMS’s inquiry about whether individuals seeking food stamps were “beggars” arguably falls into that category.\textsuperscript{398} Programmers’ translations of policy into code inevitably involve some interpretation, and it would be impossible to force

\begin{thebibliography}{99}
\bibitem{391} David M. Berry & Giles Moss, \textit{Free and Open-Source Software: Opening and Democratising e-Government’s Black Box}, 11 INFO. POLITY 21, 23 (2006).
\bibitem{392} Dr. John Henry Clippinger, Senior Fellow at the Berkman Center for Internet & Society at The Harvard Law School and Director of the Open Identity Meta-system, suggests that programmers write the code in natural languages, which lend themselves to policy commands and are easier to read.
\bibitem{394} Id.
\bibitem{396} Citron, supra note 32.
\bibitem{397} See supra note 133 and accompanying text (discussing programming error that imposed income and asset limits on breast cancer patients on Medicaid in violation of federal and state law).
\bibitem{398} See supra note 217 and accompanying text (discussing CBMS inquiry into applicant’s status as a “beggar”). Agency programmers seemingly did not generate notes documenting their thought processes while building the decision tables. My FOIA request for the decision tables and accompanying notes only yielded the decision table fixes that I cite throughout the Article. Such notes, however, would be fruitful in ascertaining whether the question “Are you a beggar?” can be attributed to policy interpretations made by programmers or bureaucrats.
\end{thebibliography}
agencies to write rules on every possible interpretation of a rule. But certain interpretations, such as the “beggar” inquiry, arguably exceed what would constitute a permissible interpretation and instead arbitrarily create new rules that deserve notice-and-comment rulemaking. 399 If so, an agency should consult with programmers before publishing its notice of proposed rulemaking in order to clearly establish the precise rule that would be automated.

Second, agencies should be required to test a system’s software. 400 Agencies should maintain testing suites that run expected and unexpected hypothetical scenarios designed by independent policy experts through decision systems to expose distorted policy. 401 Agencies should invest resources into designing such suites, which should include many complex and varied cases with expected outcomes. 402

Testing protocols should be run before a system’s launch, during implementation, and every time policies change. Federal procurement regulations could require contracts to specify that decision systems pass testing suites before states can accept systems from vendors. 403 This would prevent programmers who otherwise might test a system from foregoing testing in the face of dwindling resources. 404

Rigorous testing reflects a norm of proper software development. 405 Testing would help identify and eliminate a programmer’s bias. 406 It would

399. See, e.g., Hoctor v. U.S. Dep’t of Agric., 82 F.3d 165, 169–72 (7th Cir. 1996) (striking down interpretative rule imposing eight-foot fence requirement as a procedurally defective rule that required notice-and-comment because interpretation was arbitrary choice that did not necessarily derive from the rule).

400. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 40, 45; PETE GOODLIFFE, CODE CRAFT: THE PRACTICE OF WRITING EXCELLENT CODE 130 (2007); Mark Underseth, A Test-Driven Approach to Developing Embedded Software, EVALUATION ENGINEERING, Apr. 2007, at 44. Testing is a term of art that includes a variety of methodologies. GOODLIFFE, supra, at 130. Naturally, the particular type of testing that should be used would be determined by systems specialists who could identify the “best practices” for testing a particular system.

401. See Comments of Dr. John Henry Clippinger, supra note 392. Although outcome testing cannot cover every possible situation, the Australian government notes that it would test enough scenarios for agencies to have a high level of comfort in the rules embedded in the system. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 45.

402. To address policy changes and possible leaks to vendors, the contents of the testing suite should be constantly evolving and expanding.

403. I thank my colleague David Super for this insightful point.

404. See Terry Shepard, Margaret Lamb, & Diane Kelly, More Testing Should be Taught, 44 COMM. OF THE ACM, June 2001, at 103, 104 (explaining that because testing is usually allocated at end of software development process, it bears brunt of resource constraints). It may be worth considering whether the details of testing protocols should be kept confidential to prevent vendors from “teaching” to the test by inserting hidden work-arounds into the system so that it produces the right answers in the testing suite.

405. AUS. ADM. REV., AUTOMATED ASSISTANCE, supra note 69, at 21; GOODLIFFE, supra note 400, at 130 (explaining that testing is central to building software).
pinpoint policies that have been altered in their translation to code.\textsuperscript{407}
Testing would identify software bugs that distort policy. Although testing
would not provide all of the benefits of obtaining public comment on
proposed rules, it would provide a critical layer of assurance about the
content of encoded policy and the algorithms employed by systems.\textsuperscript{408}

To be sure, testing would entail fixed costs. But it would add negligible
variable ones. It is certainly cheaper, and arguably more precise, to find
defects in a computer program’s decisions before its implementation than
it is to uncover ex post a software program’s flaws in individual cases.

Despite the fact that rigorous testing is a baseline requirement of
software development, independent contractors did not adequately test
CBMS or TIERS before those systems went live.\textsuperscript{409} This caused many of
the problems that currently plague those systems. Absent a testing
requirement, contractors seeking to submit the lowest bid are unlikely to
build testing costs into their project budgets. As state and federal agencies
automate more of their decisions, often relying upon many of the same
private contractors,\textsuperscript{410} a uniform testing rule is essential.

Trial-run testing embodies the notion that the accountability of
rulemaking can be replaced with an adjudication involving interested
parties. In \textit{NLRB v. Bell Aerospace Co.},\textsuperscript{411} the Court allowed the agency to
make policy through such adjudications in lieu of formal or informal
rulemaking.\textsuperscript{412} The Court explained that adjudicative procedures can
produce “relevant information necessary to mature and fair consideration
of the issues” in the same way that rulemaking generates informed views
of affected groups.\textsuperscript{413}

Testing would serve as a substitute, albeit an imperfect one, for the
interested parties of \textit{Bell Aerospace}. Testing provides a set of hypothetical
scenarios to reveal software’s flaws.\textsuperscript{414} Although broad public

\begin{itemize}
  \item \textsuperscript{406} Friedman & Nissenbaum, \textit{supra} note 77, at 344 (arguing in favor of rules regarding testing of
    software to detect programmer bias).
  \item \textsuperscript{407} GOODLIFFE, \textit{supra} note 400, at 130; Underseth, \textit{supra} note 400, at 44.
  \item \textsuperscript{408} See Grimmelmann, \textit{supra} note 29, at 1738 (“The ambition of software engineering is to
    remove the most important bugs and reduce the unpredictable errors (i.e., ‘wrong’ decisions) to a
tolerable level, not to eliminate them entirely.”).
  \item \textsuperscript{409} See \textit{supra} notes 139, 145–47 (discussing involvement of EDS and Accenture in building
    CBMS and TIERS).
  \item \textsuperscript{410} See \textit{supra} note 65 (detailing role that EDS will play in building future Medicaid automated
    systems).
  \item \textsuperscript{411} 416 U.S. 267 (1974).
  \item \textsuperscript{412} Id. at 295.
  \item \textsuperscript{413} Id.
  \item \textsuperscript{414} Dr. John Henry Clippinger and Gene Koo, Senior Fellow and Fellow, respectively, at the
    Berkman Center on the Internet and Society at Harvard Law School, both suggested that vendors
\end{itemize}
participation naturally would not occur in testing regimes, the set of scenarios designed to expose a system’s errors would serve as a surrogate for clients adjudicating cases, which would reveal a software flaw.  

Third, agencies should explore ways to allow the public to participate in the building of automated decision systems. Such participation is not without precedent. For instance, states and localities have established welfare reform boards that create opportunities for the public to participate in setting welfare policy. The City of Denver has a Welfare Reform Board, consisting of appointees of the Mayor, representatives of the business community, service providers, and welfare recipients.  

In the same vein, agencies could establish information technology review boards that would provide opportunities for stakeholders and the public at large to comment on a system’s design and testing. Although finding the ideal makeup and duties of such boards would require some experimentation, they would secure opportunities for interested groups to comment on the construction of automated systems that would have an enormous impact on their communities once operational.

Last, agencies might consider refraining from automating policy that has not undergone formal or informal rulemaking procedures, such as interpretative rules and policy statements. The public and often elected officials have not had the opportunity to respond to these policies. Programmers encoding interpretative rules and policy statements are simply too far removed from the democratic process to justify the significant risk of distorted policy that automation entails. Although adherence to rulemaking procedures would not solve the accountability
deficit accompanying today’s inadvertent delegation of legislative power to code writers, it would allay some of these concerns.

CONCLUSION

This Article engages in a crucial conversation about means to protect our due process values in this age of automation. In an earlier era, legislators and judges embarked on a project to safeguard the interests of individuals without stifling the administrative state’s expansion. Their efforts produced the twin procedural regimes governing individual adjudications and policymaking.

Automation demands that we revisit that project. Automation has enormous potential to eliminate persistent errors in human-based systems and to produce consistent decisions. But today’s decision systems fail to take advantage of the potential for error correction and indeed become devices for error propagation themselves. This Article offers a model of technological due process that would protect individuals’ interest in fair, accountable, and transparent adjudications and rulemaking without forgoing the benefits offered by computerized decision systems.