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Rules as code and the rule of law: ensuring effective judicial review of administration by software

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ABSTRACT
This paper considers the possible benefits and substantial risks of 'Rules as Code', the parallel drafting of legislation and codification in software, which has been the subject of attention from policy-makers and pilot studies in some jurisdictions. It highlights the long history of these approaches, and the challenges of ossification, mis-translation of rules, and separation of powers problems. It also examines in the detail the Australian *Pintarich* case, which demonstrates the inadequacy of conventional judicial review of automated decision-making. It outlines some possible solutions to these issues — two 'internal' to development processes (greater transparency, and literate pair programming) and two 'external' (expanding the capacity of judicial review to look beyond a specific citizen/state interaction and consider the design and development of the controlling software system, and greater cross-disciplinary awareness by lawyers).

1. Introduction

This paper critiques the development of the concept of 'Rules as Code' (RaC), which is claimed by its proponents to bring substantial benefits to the processes of drafting and implementing legislation. It contributes to the literature on RaC by pointing out some significant flaws that have not received very much attention to date, such as past failures of expert systems approaches and the possibility that such systems will lead to ossification. It also notes the difficulties of translating the more open language of law to the much more precise language of computer code and possible breaches of fundamental values such as separation of powers and the rule of law. It considers in some detail the need to update judicial review's concept of decision-making to encompass system design.

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It explores practical solutions to these issues, including greater transparency and new programming approaches. It does not deal in detail with questions of bias, which have been extensively discussed in other literature,[1] as these tend to be more of an issue for machine learning (ML) systems whereas RaC approaches are generally situated in an 'expert system' model of development,[2] which is a different approach to automation.[3] It concludes by recommending an expansion of the parameters of judicial review in order to ensure that it provides effective oversight of an increasingly digitised bureaucracy and more critical digital literacy in the education and training of lawyers to ensure that it remains relevant.

2. Rules as code

2.1. Defining 'rules as code'

While scholarship on the development of automated systems for legal applications has focused on artificial intelligence (AI) systems for administrative decision-making, legal advice, and judicial processes, these technologies do not scale well and there have been significant difficulties with their application in practice (such as the Australian Centerlink or Dutch SyRI systems, discussed further below). They may never achieve their promise. However, a much more implementable and consequential approach, involving parallel drafting of legislation and codification in software known as Rules as Code, Law as Code (LaC), Automated Decision-Making (ADM)[4] or even Law as Platform[5] has not yet been closely examined and is the focus of this paper (although it should be noted that there is no clear boundary between AI and RaC approaches).

Full implementations of RaC involve legislators, drafters and programmers working in close collaboration to develop a set of legal rules which are accompanied by software code which purports to entirely implement those rules in a form which can be re-used either as a stand-alone

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[1]Danielle Keats Citron, 'Technological Due Process' (2008) 85 *Washington University Law Review* 1249; Dominique Hogan-Doran, '"Computer Says "No": Automation, Algorithms and Artificial Intelligence in Government Decision-Making' (2017) 13 *The Judicial Review* 345; Karen Yeung, 'Algorithmic Regulation: A Critical Interrogation' (2017) 12 *Regulation & Governance* 505; Monika Zalnieriute, Lyria Bennett Moses and George Williams, 'The Rule of Law and Automation of Government Decision-Making' (2019) 82 *Modern Law Review* 425; Aleš Završnik, 'Algorithmic Justice: Algorithms and Big Data in Criminal Justice Settings' (2019) 18 *European Journal of Criminology* 623.

[2]Liane Huttner and Denis Merigoux, 'Catala: Moving Towards the Future of Legal Expert Systems' [2022] *Artificial Intelligence and Law* 613, 613.

[3]Zalnieriute, Moses and Williams (n 1) 433.

[4]ADM is also used to refer to algorithmic decision-making, which generally involves as predictive tools that rely on ML and other statistical analytics.

[5]Monica Palmirani and others, 'Legal Drafting in the Era of Artificial Intelligence and Digitisation' (2022) 6 <https://joinup.ec.europa.eu/sites/default/files/document/2022-06/Drafting%20legislation%20in%20the%20era%20of%20AI%20and%20digitisation%20–%20study.pdf> accessed 19 May 2023.

programme or incorporated into a larger system.[6] RaC produces a human-language text as well as an official coded version. Technology is used as an aid to understanding both in drafting and in implementation, so that the drafters and policy-makers can verify that it operates as they expect. It can also involve government publishing this code in an openly-accessible application programming interface for re-use by third parties.[7] RaC should be distinguished from Lessig's famous 'Code is Law' claim,[8] which is fundamentally about how software code created and deployed by commercial entities substitute for or supersede legal rules in the online context, particularly in terms of the vindication of user rights in domains such as copyright, although many of his insights (such as the immutability of software control) are relevant in analysing the topic.

2.2. Examples of rules as code

'Live' examples of RaC systems in practical day-to-day use are relatively limited.[9] New Zealand was an early experimenter, as evidenced by a web page from its Service Innovation Lab,[10] but the website listed under 'Work completed using Legislation as Code'[11] is no longer maintained, and the 'Rapa Ture' project[12] is similarly no longer functioning. Nonetheless, some projects were completed, such as the SmartStart website (which advises those starting a family and includes online financial help and paid parental leave checkers),[13] improvements to government payroll systems, and a review of the Holidays Act.[14] (With regard to the latter, it is worth noting that Morris claims that incorrect implementation of the definition of 'week of work' in software applications has cost New Zealand business millions of dollars in unpaid leave entitlements.[15] How to respond to errors in coding is an important issue with RaC and will be returned to later in this article.) RaC work also continues in New Zealand, with Wellington City Council exploring the use of RaC in urban planning.[16]

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[6]Jason Morris, 'Blawx: Rules as Code Demonstration' [2020] MIT Computational Law Report.
[7]James Mohun and Alex Roberts, 'Cracking the Code: Rulemaking for Humans and Machines' (2020) OECD Working Papers on Public Governance No 42, 39–41.
[8]Lawrence Lessig, *Code: And Other Laws of Cyberspace, Version 2.0* (Basic Books, 2006).
[9]Felicity Bell and others, 'AI Decision-Making and the Courts: A Guide for Judges, Tribunal Members and Court Administrators'' (Australasian Institute of Judicial Administration, 2022) 29.
[10]Service Innovation Lab, 'Better Rules and Legislation as Code' (2020) <https://serviceinnovationlab.github.io/projects/legislation-as-code/> accessed 2 May 2023.
[11]https://www.rules.nz
[12]https://nz.openfisca.org
[13]https://smartstart.services.govt.nz
[14]Hamish Fraser, 'What Is Better Rules?' (20 December 2019) <https://www.digital.govt.nz/blog/what-is-better-rules/> accessed 2 May 2023.
[15]Jason Morris, 'Rules as Code: How Technology May Change the Language in Which Legislation Is Written, and What It Might Mean for Lawyers of Tomorrow' (2021) 3 <https://s3.amazonaws.com/us.inevent.files.general/6773/68248/1ac865f1698619047027fd22eddbba6e057e990e.pdf> accessed 19 May 2023.
[16]Bell and others (n 9) 29.

Across the Tasman Sea, the New South Wales government Fair Trading maintains a 'Community gaming check' which allows individuals to determine whether a proposed gambling activity requires a licence.[17] Another New South Wales initiative is the Energy Saving Certificate (ESC) calculator which helps building owners to determine if they are eligible to participate in an Energy Savings Scheme.[18]

The French government has developed the OpenFisca project and a related open source platform. This has been used for simulators for social benefits and business regulation compliance.[19] Also in France, the Assemblée Nationale has created LexImpact, which allows the simulation of the impact of changes to the tax code.[20] Elsewhere in Europe, Denmark is 'aim[ing] to simplify [welfare] legislation in order to facilitate automated digital case processing'.[21]

2.3. Categorising rules as code systems

This survey demonstrates that RaC is at an early stage (although we can expect interest in it to continue, and this paper will show how it has a long history under different names), and that few RaC implementations are as sophisticated as the full definition above. Wong sets out seven levels of adoption of RaC:[22]

1. Non-digital
2. Digital First Steps
3. Digital Applications and Products
4. Declarative Rules with Separate Rule Engines
5. Ontologies
6. Natural Language Generation of Digital Twins
7. Tooling Automation
8. Universal Adoption

It would seem that most jurisdictions are in the first or second stages of this process, with some perhaps at the third or fourth. No real-world projects at the higher levels seem to be in existence.

In addition to these varying levels of adoption, RaC systems can be categorised in different ways. Hall suggests two axes: solely or partially

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[17]NSW Fair Trading, 'Community Gaming Check' (20 August 2020) <https://www.fairtrading.nsw.gov.au/community-gaming/community-gaming-regulation-check> accessed 2 May 2023.
[18]Bell and others (n 9) 29.
[19]Ibid.
[20]https://leximpact.an.fr
[21]Agency for Digital Government, 'Digital-Ready Legislation' (2022) <https://en.digst.dk/digital-governance/digital-ready-legislation/> accessed 2 May 2023.
[22]Meng Weng Huang Mingrong Wong, 'Rules as Code: Seven Levels of Digitisation' (2020) <https://ink.library.smu.edu.sg/sol_research/3093/> accessed 19 May 2023.

automated; and rules-based or statistical (often involving ML).[23] Ma and Wilson propose two major categories: '(1) programming tasks and (2) knowledge-based systems'. The first will encode rules that are already clear, such as taxation or social welfare. The second will extract rules from legislation through the application of logic.[24] The report *Legislation as Code For New Zealand: Opportunities, Risks, and Recommendations* distinguishes between machine-readable and machine-executable implementations of RaC; the first are amenable to processing by what Ma and Wilson called knowledge-based systems, while the second are written with direct implementation by computer in mind.[25]

RaC approaches can therefore be categorised according to their level of adoption, whether they are fully or partially automated; whether they are rule- or statistics-based; and whether they are primarily intended to be read by humans or computers. Some practical examples might include:

	Fully automated	Partially automated
Rule-based	Tax liability calculations	Entitlement to social welfare benefits
Statistics-based	Welfare fraud detection	Automated facial recognition

3. Advantages of RaC

A recent report by the University of Bologna for the European Commission on 'Legislation Editing Open Software' claims to 'demonstrate[] the potential of the use of innovative/advanced IT (including AI) to substantially improve the core business of the Commission, i.e. drafting legislation and developing policy.'[26] Amongst the domains in which this reports claims there are benefits from IT and AI are:

1. Information retrieval
2. Legal reasoning
3. Visualisation
4. Interoperability[27]

The OECD has also published a detailed report which highlights that existing processes for coding rules are often linear and siloed. According to the authors, RaC could improve the alignment between intention and

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[23]Claire Hall, 'Challenging Automated Decision-making by Public Bodies: Selected Case Studies from Other Jurisdictions' (2020) 25 *Judicial Review* 8, 8.

[24]Megan Ma and Bryan Wilson, 'The Legislative Recipe: Syntax for Machine-Readable Legislation' (2021) 19 *Northwestern Journal of Technology and Intellectual Property* 107, 121–2.

[25]Tom Barraclough, Hamish Fraser and Curtis Barnes, 'Legislation as Code For New Zealand: Opportunities, Risks, and Recommendations' [2021] New Zealand Law Foundation Research Reports 76 <https://hamish.dev/research/lac/index> accessed 19 May 2023.

[26]Palmirani and others (n 5) 5.

[27]Ibid 22–4.

implementation, enable more modelling, speed up delivery, and improve consistency. This could then make businesses more efficient and lower compliance costs. It would ensure that participants in the drafting process clearly understood each other and that lawmakers understood the consequences of their choices.[28] It should also improve the rigour applied in the process.[29] This could in turn bring a number of benefits:

1. Better policy outcomes and enhanced service delivery
2. Greater transparency
3. Disintermediation and agile government
4. Improved consistency and fairness
5. De-risking
6. Interoperability and efficiency
7. Innovation[30]

Similarly, Morris suggests that there are 'significant potential benefits for public policy' from applying RaC, including more easily automatable law, better legislative drafting, and more capacity for building and testing models of the impacts of policy choices.[31] Building on Crawford's cautious defence of RaC,[32] McBride and Diver point out that as the volume and complexity of law increases, computational assistance from basic RaC systems may be not just desirable but necessary in order to ensure the application of the rule of law.[33]

4. Issues with RaC

However, there are still questions to be answered about machine-consumable laws. RaC approaches have a longer history than is often appreciated, and previous efforts (particularly legal expert systems) have failed to achieved their promise. Experiences with software systems in public administration also demonstrate how rigid and unchangeable these systems may become. There is a need for a long-term perspective on how they can be maintained and modified. In addition, law is not deterministic and thus very difficult to 'translate' into software code. RaC also raises significant separation of powers issues, which may be unsurmountable. Finally, as these tools are being increasingly deployed, consideration must be given to how they can be overseen through processes of judicial review. Recent case law

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[28]Mohun and Roberts (n 7) 31–7.
[29]Ibid 80.
[30]Ibid 39.
[31]Morris (n 6).
[32]Lisa Burton Crawford, 'Rules as Code and the Rule of Law' [2023] *Public Law* 402.
[33]Pauline McBride and Laurence Diver, 'Research Study on Computational Law' (2024) 55 <https://publications.cohubicol.com/research-studies/computational-law/> accessed 22 January 2024.

in this regard demonstrates a lack of understanding of important issues on the part of some judges. These issues are considered in detail in this section.

4.1. Past failures of RaC approaches

First, it is useful to put this supposedly new frontier in a historical context. Enthusiasm for AI as a solution to legal needs is not as new a phenomenon as the current hype might suggest,[34] and the resurgence of interest in RaC is a facet of this. Although recent literature tends not to take a long-term historical view, there are practical implementations of some levels of RaC as far back as 60 years ago, and academic interest for 40 years or more. The relative failure of such approaches in the past should lead to a certain amount of scepticism regarding the claims that are now being made, although it should also be acknowledged that advocates and implementers may have learned from previous mis-steps, and the adoption of design thinking and the more 'hybrid' better rules approach recommended by Barraclough and others offer new ways forward. In this regard, it is interesting to note the claim by Mowbray and others that they have developed an approach to RaC that can be 'generalised ("scaled up") to deal with the conversion or production of large bodies of legislation',[35] and Witt's and others work on improving the quality of RaC in practice.[36]

Petit suggests that the first real world example might be the deployment of automated parking metres in 1935.[37] The automated application of rules has obvious application in contexts such as taxation, and John Agar's history of the use of computer technology in the British civil service includes a mention of the use of computers for pay as you earn income taxation in the United Kingdom in 1964,[38] while Smith notes similar developments in the United States of America (including the machine selection of returns for audit).[39] According to Schartum, '[i]n Norway, the first example of a fully automated legal decision-making process in government administration with no elements of human assessment dates back to the Housing Benefit System

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[34]Graham Greenleaf, Andrew Mowbray and Philip Chung, 'Building Sustainable Free Legal Advisory Systems: Experiences from the History of AI and Law' (2018) 34 *Computer Law and Security Review* 314, 314–5.

[35]Andrew Mowbray, Philip Chung and Graham Greenleaf, 'Representing Legislative Rules as Code: Reducing the Problems of "Scaling up"' (2023) 48 *Computer Law & Security Review* 105772.

[36]Alice Witt and others, 'Encoding Legislation: A Methodology for Enhancing Technical Validation, Legal Alignment and Interdisciplinarity' [2023] *Artificial Intelligence and Law* <https://link.springer.com/10.1007/s10506-023-09350-1> accessed 15 January 2024.

[37]Nicolas Petit, 'Artificial Intelligence and Automated Law Enforcement: A Review Paper' (2018) 3 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3145133> accessed 19 May 2023.

[38]Jon Agar, *The Government Machine* (MIT Press 2003) 317.

[39]William H Smith, 'Automation in Tax Administration' (1969) 34 *Law and Contemporary Problems* 751, 760.

of 1972.'[40] Weber highlights some early attempts in the 1980s and 1990s, aimed at developing a Lex Informatica.[41] Legal expert systems were in use from the 1980s and 1990s for child protection, taxation and social welfare.[42] During the 1980s, there was also 'development (and hype about) futuristic expert systems to model legalistic decision making.'[43]

There is also a long history of academic debate on RaC. Schartum mentions interest in 'computer-conscious law-making' in the 1970s.[44] In 1983, Gemignani raised some questions regarding the possible advent of electronic judges and juries.[45] In 1991, Sergot surveyed a wide range of academic projects from the previous two decades which attempt to model some limited aspects of legal rules through software.[46] In the same volume, Taylor and Bench-Capon explored how software might support the application of legislation.[47] Recent research has generated extensive literature, much of it cited elsewhere in this paper.

These tools tend to return in popularity on a cyclical basis; writing in 2010, Leith (who had been an initial proponent but later became a sceptic during the 1980s) comments that '[i]deas always have a tendency to return with a vengeance, and there are certainly indications that the idea of a legal expert system has not disappeared entirely.'[48] In this light, it is no surprise that software is becoming an increasingly important aspect of certain aspects of government administration. Tax administrations are being transformed.[49] In the United Kingdom, both the Bank of England and the Financial Conduct Authority are experimenting with using new digital technology for regulatory purposes, replacing rules written in natural legal language with computer code.[50] (Implementing regulatory rules to software is somewhat

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[40]Dag Wiese Schartum, 'Law and Algorithms in the Public Domain' (2016) 10 *Etikk Praksis - Nordic Journal of Applied Ethics* 15, 19.

[41]Rolf H Weber, '"Rose Is a Rose Is a Rose Is a Rose" What about Code and Law?' (2018) 34 *Computer Law and Security Review* 701, 702.

[42]Zalnieriute, Moses and Williams (n 1) 433; Huttner and Merigoux (n 2) 4.

[43]John Zeleznikow and Fernando Esteban de la Rosa, 'Artificial Intelligence as a New Component of the Justice System: How It Creates New Possibilities, but Has Limitations Especially with Regards to Governance' in Fernando Esteban de la Rosa and others (eds), *Justice, Trade, Security, and Individual Freedoms in the Digital Society* (Aranzadi Thomson Reuters, 2021) 72.

[44]Dag Wiese Schartum, 'From Legal Sources to Programming Code: Automatic Individual Decisions in Public Administration and Computers Under the Rule of Law' in Woodrow Barfield (ed), *The Cambridge Handbook of the Law of Algorithms* (Cambridge University Press, 2021) 331.

[45]Michael Gemignani, 'Laying down the Law to Robots' (1983) 21 *San Diego Law Review* 1045.

[46]Marek Sergot, 'The Representation of Law in Computer Programs' in Trevor Bench-Capon (ed), *Knowledge-Based Systems and Legal Applications* (Elsevier, 1991).

[47]Andrew Taylor and Trevor Bench-Capon, 'Support for the Formulation of Legislation' in Trevor Bench-Capon (ed), *Knowledge-Based Systems and Legal Applications* (Elsevier, 1991).

[48]Philip Leith, 'The Rise and Fall of the Legal Expert System' (2016) 30 *International Review of Law, Computers & Technology* 94.

[49]Maria Amparo Grau Ruiz, 'Fiscal Transformations Due to AI and Robotization: Where Do Recent Changes in Tax Administrations, Procedures and Legal Systems Lead Us' (2022) 19 *Northwestern Journal of Technology and Intellectual Property* 325.

[50]Eva Micheler and Anna Whaley, 'Regulatory Technology: Replacing Law with Computer Code' (2020) 21 *European Business Organization Law Review* 349.

easier, as it is not as constrained by the separation of powers issues that are discussed later in this paper, and the rules themselves will tend to be written in a broader and more porous fashion.)

Of course, the fact that these developments have a long history does not mean that we should not pay close attention to them now. Grau Ruiz reminds us that at some point, it is possible that the focus of taxation automation processes pivots from tax experts, well versed in the rules of regulatory interpretation, to programmers, presumably without adequate legal knowledge, who make use of AI—unless there are professionals who have both skills.[51] The concern that she raises has a broader application to other domains of law. It would not be ideal for the locus of control in the development and deployment of systems with legal consequences to lie with individuals without proper legal training (even if they may be careful and well trained professionals in their own fields of expertise).

However, we may have have already reached this point in some aspects of legal administration.[52] Governments have been coding some legal rules into spreadsheets and databases for decades, particularly for obviously computable aspects of the law such as tax. These have stood behind the definitive text, which is the law itself, and been deployed as a support. RaC advocates propose that software code would now be written in tandem with the law or that the law itself would be written in code. However, while the first of these ideas has some value, the latter does not seem feasible or sensible and should be abandoned, for reasons that will be explored in this paper. However, given the over-enthusiasm for digital technology that often infects lawmakers and policymakers, it might not be, creating a need to explore how legal institutions should respond; some possible solutions will be explored later in this paper.

4.2. Ossification

Although some conceptions of RaC incorporate notions of rapid change,[53] the reality is much more prosaic. An issue that has received little attention in the academic literature regarding RaC and ADM is that in the longer-term, tying laws to software code creates maintenance issues, indeterminacy, and ossification.

Huttner and Merigoux highlight how early expert systems acquire

> … all the general characteristics of legacy code: use of obsolete technologies no longer taught in university courses, loss of expertise on critical portions of the

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[51]Grau Ruiz (n 49) 33.
[52]Schartum (n 44) 16.
[53]For example, the OECD report claims that RaC 'is about creating the opportunity for upfront and shared dialogue that enables the policy to be implemented rapidly'. Mohun and Roberts (n 7) 43.

source code, as original programmers retire, and a 'plaster on a wooden-leg' approach to modification and maintenance.[54]

They also note that as the law changes, the tests applied to the system to confirm its validity must also change; this is a slow and expensive process.[55] For example, the United States of America's Internal Revenue Service still relies on an Individual Master File, written in assembly language and COBOL in the 1960s. These languages are no longer well-known. Billions of dollars have been spent on translating millions of lines of code to more modern platforms, but the project is still incomplete. The system encounters hardware and software errors, and has made incorrect payments.[56] As a result, once a RaC system is deployed, it may prove very difficult (or costly) to make adjustments to it,[57] and this frozen system may seem natural and immutable.[58] Even if the system is no longer correctly applying the law, the power and inflexibility of the mechanism through which it operates may mean that it is relied upon nonetheless.[59]

RaC systems could lead to 'perfect' enforcement of the law, in the sense that there is no longer any possibility of human discretion. Whether or not this is desirable is a contested question,[60] but it should be clear that unavoidable enforcement by a software system that no longer accurately reflects the law is not acceptable. Neither is the possible 'fossilization of policy in ICT'[61] that over-enthusiastic and unthinking adoption of RaC could lead to.

4.3. Lost in translation

Another practical challenge is that it is difficult to 'translate' from law to software code.[62] Perfect encoding of legal rules may not be possible.[63] Computer

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[54]Huttner and Merigoux (n 2) 4.

[55]Ibid 7.

[56]Frank R Konkel, 'The IRS System Processing Your Taxes Is Almost 60 Years Old' (19 March 2018) <https://www.nextgov.com/it-modernization/2018/03/irs-system-processing-your-taxes-almost-60-years-old/146770/> accessed 19 May 2023; Government Accountability Office, 'Information Technology: Cost and Schedule Performance of Selected IRS Investments' (2021) <https://www.gao.gov/products/gao-22-104387> accessed 19 May 2023; David Hood, Naomi Jagoda and Jasmine Ye Han, 'Billions of Dollars Later, IRS Lumbers Under Beatles-Era Tech' (21 April 2022) <https://news.bloombergtax.com/daily-tax-report/billions-of-dollars-later-irs-lumbers-under-beatles-era-tech> accessed 19 May 2023.

[57]Rebecca Crootof, 'Cyborg Justice and the Risk of Technological-Legal Lock-in' (2019) 119 Columbia Law Review Forum 233.

[58]Lord Sales, 'Algorithms, Artificial Intelligence and the Law' (2020) 25 Judicial Review 46, 49.

[59]McBride and Diver (n 33) 69.

[60]Marti Petit, 'Towards a Critique of Algorithmic Reason. A State-of-the-Art Review of Artificial Intelligence, Its Influence on Politics and Its Regulation' [2018] Quaderns del CAC 10.

[61]Rónán Kennedy, 'E-Regulation and the Rule of Law: Smart Government, Institutional Information Infrastructures, and Fundamental Values' (2016) 21 Information Polity 77, 92.

[62]For a full description of the steps involved, see Schartum (n 44) 310–9.

[63]Denis Merigoux, Marie Alauzen and Lilya Slimani, 'Rules, Computation and Politics' (2023) 1 Journal of Cross-disciplinary Research in Computational Law 7–12 <https://inria.hal.science/hal-03712130v2> accessed 22 January 2024, provides several detailed examples of the complexity of expressing

code is 'precise and thus unambiguous',[64] while legal texts can be vague, sometimes deliberately. Converting these to code is not straightforward: we 'have no standard methods for exhaustive mapping of legal questions within a domain.'[65] As Barraclough and others point out, legislation is not written with automation in mind and to be suitable for RaC may need to be revised or rewritten.[66] As a result, for example, when 52 programmers were assigned the task of automating the enforcement of speed limits, the programmes that they wrote issued very different numbers of tickets for the same sample data.[67]

While differences in translation to software code may occur for benign reasons, in some instances errors are made out of conscious or unconscious malice. For example, the implementation of digitised income tax system in the Netherlands used nationality as a criterion although this was not explicitly permitted under the enabling legislation. This has since ceased, but investigation of the Dutch system indicated a troubling possibility of racist bias through a focus on particular immigrant groups, and very serious and damaging financial consequences for those who were unfairly investigated by a flawed system.[68] This means that the process of translation must be subjected to critical scrutiny.

Despite many well-documented challenges, predictions of the end of law are made from time to time. For example, almost twenty years ago, Bullinga painted a picture of a future of omnipresent and ambient technology with a significant regulatory dimension:

> Permits and licenses will be embedded in smart cars, trains, buildings, doors, and devices. Laws will automatically download and distribute themselves into objects in our physical environment, and everything will regularly be updated, just as software is now automatically updated in your desktop computer.
>
> …
>
> In the future, all rules and laws will be incorporated into expert systems and chips embedded in cars, appliances, doors, and buildings—that is, our physical environment. No longer will police officers and other government personnel be the only law enforcement. Our physical environment will enforce the law as well.
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> …

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legislative provisions that seem relatively precise in the much more specific language of a computer program.
[64]Schartum (n 40) 16.
[65]Schartum (n 44) 309.
[66]Barraclough, Fraser and Barnes (n 25) 16–17.
[67]Lisa A Shay and others, 'Do Robots Dream of Electric Laws? An Experiment in the Law as Algorithm' in Ryan Calo, AMichael Froomkin and Ian Kerr (eds), *Robot Law* (Edward Elgar Publishing, 2016).
[68]Grau Ruiz (n 49) 328–9.

Automatic law enforcement will be used for environmental regulations, traffic and safety laws, bookkeeping rules, and all social security issues involving proof of identity.[69]

Somewhat more soberly, in 2016 Casey and Niblett suggested

… a world where lawmakers use machines to refine the law, improving on both rules and standards. Ultimately, law will exist in a catalogue of precisely tailored directives, specifying exactly what is permissible in every unique situation. In this world, when a citizen faces a legal decision, she is informed of exactly how to comply with every relevant law before she acts. The citizen does not have to weigh the reasonableness of her actions nor does she have to search for the content of a law. She follows a simple directive that is optimized for her situation. We call these refined laws 'micro-directives'.

These micro-directives will be largely automated. If the state of the world changes, or if the objective of the law is changed, the vast array of micro-directives will instantly update. These laws will be better calibrated, more precise, and more consistent. The law will become, for all intents and purposes, self-driving.[70]

So-called 'self-driving laws' would remove ethical agency from individuals, which is a concern for lawyers,[71] but this paper's focus is more on the practical dimensions of a full-blown RaC implementation. For example, Ma and others point out that 'this approach also avoids the nuances of the law that demand further analysis: in particular, the act of translation.'[72]

That translation is a key issue: the law is always translated from text to thought to action when implemented in any form, whether by human, machine, or some combination of the two. It is also different in each act of translation, as each individual will understand or mis-understand the law in different ways – sometimes quite incorrectly, and sometimes in ways that are subtly different to their colleagues and perhaps not sufficiently divergent from the shared agreement to be 'wrong'. Police officers, regulatory officials or civil servants often mis-apply the law, either because of a lack of competence or because their position pre-disposes them to a perspective which is favourable to their own interests or to an interest group that they (consciously or consciously) align themselves with. Those who have dealt with or observe closely the enforcement of the law by agents of the state will be aware of how understandings of the same legal text will differ.

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[69]Marcel Bullinga, 'Intelligent Government: Invisible, Automatic, Everywhere' [2004] *The Futurist* 32, 32–4.
[70]Anthony J Casey and Anthony Niblett, 'Self-Driving Laws' (2016) 66 *University of Toronto Law Journal* 429, 430.
[71]Roger Brownsword, 'Lost in Translation: Legality, Regulatory Margins, and Technological Management' (2011) 26 *Berkeley Technology Law Journal* 1321, 1352–61; see generally Endicott Timothy and Karen Yeung, 'The Death of Law? Computationally Personalised Norms and the Rule of Law' (2021) 72 University of Toronto Law Journal 373.
[72]Megan Ma and others, 'Deconstructing Legal Text: Object Oriented Design in Legal Adjudication' [2020] MIT Computational Law Report 12 <https://law.mit.edu/pub/deconstructinglegaltext/release/1>.

The structure of our legal systems expose the realities of imperfect translation of law and how experience has taught us to make allowances for it. If the law were always constant, easily understood and uniformly translated to identical consequences in each instance of conflict or transgression, there would be no need for appellate courts, or for those mechanisms of correction to have more than one member. It is relevant here to consider the documented resistance of the judges of national Member State courts to properly follow European Court of Justice rulings,[73] as they are required to but sometimes do not. A formalist reading of the law may be quite different to the reality of practice on the ground, or in this case, on the bench.

By contrast, RaC is often based on a very modernist vision of the world and how it might be understood or controlled. As Pasquale says, '[t]he ideal here is law as a product, simultaneously mass producible and customizable, accessible to all and personalized, openly deprofessionalized.'[74] This is a goal that should cause disquiet to lawyers and to those who care about the rule of law. It is not possible to predict or control human behaviour comprehensively *ex ante*; such efforts will fail, with potentially damaging consequences. If the law becomes too fluid, too rigid or too difficult to interact with, pragmatic citizens will simply avoid or distrust it, ultimately eroding its legitimacy. It will also be more difficult to exercise empathy, which is a key value of administrative law.[75] There must always be discretion somewhere in the system.

Therefore, as Ma and Wilson point out, '[r]ecent implementations of Rules as Code fortify the argument that, currently, machine-consumable legislation is limited to highly structured legislation.'[76] For example, Huggins and others endeavoured to convert the provisions of the Australian Consumer Data Right to a machine-readable format. They found the process challenging: there were drafting errors in the legislation, ambiguous wording, references to external rules that did not yet exist or were also ambiguous, or the re-use of rules which required adaptation to new contexts. Regulatory regimes were interconnected in complex ways. Open statutory wording, such as 'reasonable', created scope for discretion, which is difficult to codify in a deterministic way. Provisions which conferred powers, set standards, or aided interpretation were difficult to encode. Those which granted jurisdiction could not be completely encoded without also encoding significant volumes of legislation which govern the powers of tribunals and courts. The underlying Privacy Safeguards and

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[73]Andreas Hofmann, 'Resistance Against the Court of Justice of the European Union' (2018) 14 *International Journal of Law in Context* 258.
[74]Frank Pasquale, 'Inalienable Due Process in an Age of AI: Limiting the Contractual Creep Toward Automated Adjudication' in Hans-W Micklitz and others (eds), *Constitutional Challenges in the Algorithmic Society* (Cambridge University Press 2021) 42.
[75]Sofia Ranchordás, 'Empathy in the Digital Administrative State' (2022) 71 *Duke Law Journal* 1340.
[76]Ma and Wilson (n 24) 126.

Australian Privacy Principles have different conceptual bases which are difficult to reconcile when encoding. Legislation also operates in different ways at different times, which requires a different approach to coding.[77]

There were also technical issues: limitations in the programming language used, insufficient preliminary mapping of connections between elements, and the need for a style guide.[78] They concluded that '[i]t is impossible to guarantee the validity of any encoded translations of legal rules'[79], because this is a matter for the judiciary, who cannot provide advisory opinions in the absence of litigation. The presumption of innocence and the sometimes shifting nature of the burden of proof is also difficult. Finally, there is the challenge of clear and meaningful interpersonal communication across disciplinary divides when lawyers and computer scientists must work together.[80]

4.4. Separation of powers and rule of law issues

As just alluded to, one of the most cogent objections to a full-blown RaC approach is the separation of powers problem. Implementation as RaC requires closing all of the open questions of interpretation[81], which is very difficult or impossible if the legislation contains ambiguity, and places too much power in the hands of designers, programmers, and unaccountable algorithms. As Barraclough and others explain in detail in their comprehensive report on the possible applications of RaC in New Zealand, '[c]ode is unavoidably rule AND interpretation',[82] and therefore excludes the judiciary, who in constitutional theory should have the final say on how rules are applied.

If this problem is ignored, we may end up with parallel systems of both code and law, which

> … might create a double or even triple legal system: one complicated and quantified code for machines, containing thousands of variables and formulas, another, still rather complicated one for lawyers to handle complaints and to

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[77]Anna Huggins and others, 'The Legal and Coding Challenges of Digitising Commonwealth Legislation' 7–13 <https://eprints.qut.edu.au/210128/> accessed 22 January 2024; for a further study along similar lines, but highlighting the 'digital distortions' which RaC may lead to, see Anna Huggins, Alice Witt and Mark Burdon, 'Digital Distortions and Interpretive Choices: A Cartographic Perspective on Encoding Regulation' (2024) 52 *Computer Law & Security Review* 105895.

[78]Huggins and others (n 77) 13–4.

[79]Ibid 15.

[80]Ibid 18. Systems analysis is another discipline which should be considered when contemplating cross-disciplinary communication challenges.

[81]Schartum (n 40) 16; 'What code-driven law does is to fold enactment, interpretation and application into one stroke, collapsing the distance between legislator, executive and court.' Mireille Hildebrandt, 'Code-Driven Law: Freezing the Future and Scaling the Past' in Simon Deakin and Christopher Markou (eds), *Is Law Computable?: Critical Perspectives on Law and Artificial Intelligence* (Hart Publishing 2020) 70.

[82]Barraclough, Fraser and Barnes (n 25) 9.

serve as a basis of judgement in the case of conflicts, and perhaps yet another system for the ordinary citizen.[83]

These may prove to be much easier to adapt and change than natural language laws, but they may be opaque to humans because they are proprietary or are too complex to be easily understood.[84] This creates rule of law issues,[85] which further militate against a large-scale use of such systems.

4.5. Misplaced legal attention

Even if these issues can be resolved, this focus on the coding of law is misplaced, examining the tail end of a long process. Some policy- and decision-makers and lawyers operate with the underlying assumption that this can be a complete and objective reduction of the problem domain to a deterministic application of computer code, whereas the reality is that the system cannot be closed, the models of reality that it embodies are contingent, and the application will always involve some measure of discretion. The conversion of a set of rules to code in a programming language, or the live use of a trained ML algorithm is only the final stage in a complex process which involves the making of many decisions with normative dimensions,[86] often between choices that are equally valid or at least equally difficult to choose between. Programmers may pre-determine complex questions, they may do so in biased ways, and this may be difficult to review after the fact.[87] What Schartum calls 'embedded legal decision-making … may be seen as "hidden" quasi-legislation, representing processes and decisions that are only recognised and graspable by the few initiated.'[88]

Research indicates that 'choices made by algorithm designers translate their values into the system',[89] which should be of obvious concern to lawyers if increasingly technologically-driven and obscure processes give these systems quasi-legislative status. The mental models of the developers,

[83] Zsolt Zödi, 'What Will Robot Laws Look Like? The Code of AI and Human Laws' (2020) 8 *Acta Universitatis Sapientiae, Legal Studies* 253, 258.

[84] Ibid 254.

[85] Zalnieriute, Moses and Williams (n 1); Monika Zalnieriute, Lyria Bennett Moses and George Williams, 'Automating Government Decisionmaking: Implications for the Rule of Law' in S. de Souza and M. Spohr (eds), *Technology, Innovation and Access to Justice: Dialogues on the Future of Law* (Edinburgh University Press, 2021), UNSW Law Research Paper; Monika Zalnieriute and others, 'From Rule of Law to Statute Drafting: Legal Issues for Algorithms in Government Decision-Making' in Woodrow Barfield (ed), *The Cambridge Handbook of the Law of Algorithms* (Cambridge University Press, 2021); Schartum (n 44).

[86] PN Meessen, 'On Normative Arrows and Comparing Tax Automation Systems', *Proceedings of the Nineteenth International Conference on Artificial Intelligence and Law* (ACM 2023) <https://dl.acm.org/doi/10.1145/3594536.3595160> accessed 15 January 2024.

[87] Melissa Perry, 'iDecide: Administrative Decision-Making in the Digital World.' (2017) 91 *Australian Law Journal* 29, 33.

[88] Schartum (n 40) 15.

[89] Daria Gritsenko and Matthew Wood, 'Algorithmic Governance: A Modes of Governance Approach' (2022) 16 *Regulation & Governance* 45, 48.

the methodology used to design the system, and the assumptions made along the way will all have significant consequences for the final product,[90] often in ways that are almost impossible to discern or undo after the fact. For example, errors in the design of the infamous Australian Centrelink social security system (commonly known as 'Robodebt') led to the system over-reaching on a significant level for years.[91] However, as Harlow and Rawlings highlight, '[t]he point that procedures reflect values or serve as the instruments whereby values are given tangible expression is all too easily overlooked',[92] and the incomplete understanding that this creates has led to at least one questionable court decision which merits detailed consideration.

As has been highlighted above, implementations of RaC are at varying levels of sophistication and completeness. It is therefore not surprising that the judgment most relevant to concerns about RaC involves a system that is not a full codification of a set of rules but is of a computerised support to human decision-making, but a detailed consideration of the outcome is nonetheless illuminating. The Federal High Court of Australia (FCA) case of *Pintarich v Deputy Commissioner of Taxation*[93] concerned a taxpayer who was in negotiation with the Australian Taxation Office (ATO) regarding a sum due.[94] The essentials are summarised well in the majority decision:

> In the present case, the appellant (the taxpayer) applied for remission of all GIC [General Interest Charge] that was payable by him in respect of his tax liabilities … He also applied for a 'payment arrangement' in respect of his liabilities. A delegate of the Deputy Commissioner, by 'keying in' certain information into a computer-based 'template bulk issue letter', caused a letter dated 8 December 2014 (the December 2014 letter) to be issued to the taxpayer to the effect that the Deputy Commissioner would accept a lump sum payment of a certain amount on or before a certain date. The amount specified in the letter was slightly greater than the taxpayer's primary tax liability and significantly less than his total liability for primary tax and GIC.

> The issue is whether, by issuing the December 2014 letter, the Deputy Commissioner made a decision to remit all GIC payable by the taxpayer save for the relatively small amount of GIC covered by the lump sum payment amount referred to in the letter, if the taxpayer paid the lump sum on or before the specified date.[95]

The taxpayer claimed that his understanding, based on a telephone conversation with an ATO official before the letter was issued, was that the amount

[90]Barraclough, Fraser and Barnes (n 25) 38; Merigoux, Alauzen and Slimani (n 63) 2–3.
[91]Anna Huggins, 'Addressing Disconnection: Automated Decision-Making, Administrative Law and Regulatory Reform' [2021] *The University of New South Wales Law Journal* 1056–7.
[92]Carol Harlow and Richard Rawlings, 'Proceduralism and Automation: Challenges to the Values of Administrative Law' in Elizabeth Fisher, Jeff King and Alison L Young (eds), *The Foundations and Future of Public Law* (Oxford University Press, 2020) 278–9.
[93]*Pintarich v Deputy Commissioner of Taxation* (2018) 79 FCAFC.
[94]Robin Woellner, '"It Is a Bad Look",' (2020) 18 *eJournal of Tax Research* 508.
[95]*Pintarich v Deputy Commissioner of Taxation* (n 88) 80–81.

mentioned in the December 2014 would represent a full and final settlement of his tax debts. A key aspect was that the ATO official was under the misunderstanding that he did not have authority to remit GIC and claimed that it was not his intention to do so. The official did not review the letter before it was issued. The ATO subsequently sought payment of the outstanding GIC (although some of it was partially remitted).[96]

The taxpayer was understandably unhappy with this and brought judicial review proceedings. The majority of the Federal High Court concluded that as the ATO official had not made a decision to remit GIC prior to the issue of the December 2014 letter (although the erroneous letter implied that he had), the ATO was entitled to seek full payment.[97] In doing so, it relied on this statement of the essential components of a decision from the FCA case of *Semunigus v Minister for Immigration and Multicultural Affairs*:

> For present purposes I am prepared to hold that the making of a decision involves both reaching a conclusion on a matter as a result of a mental process having been engaged in and translating that conclusion into a decision by an overt act of such character as, in the circumstances, gives finality to the conclusion – as precludes the conclusion being revisited by the decision-maker at his or her option before the decision is to be regarded as final.[98]

The majority in *Pintarich* did acknowledge that

> … the outcome is productive of administrative uncertainty, in the sense that taxpayers or others dealing with government may not be able to rely on letters from government agencies communicating decisions. However, the circumstances of this case are quite unusual. The letter resulted from [the ATO official] 'keying in' certain information into a computer-based 'template bulk issue letter'. This produced a letter that, in some respects, did not reflect his intentions. This type of situation is unlikely to arise very often. And evidence would usually be required if it was sought to be established that a letter communicating a decision did not reflect a conclusion that had been reached.[99]

Kerr J, in the minority, differed both in his approach to the legal question raised and his final conclusion. In counterpoint to the majority view quoted just above, he stated:

> … I would respectfully observe that [the *Semunigus* conception of decision-making] may be rapidly becoming an artefact of the past.

> The hitherto expectation that a 'decision' will usually involve human mental processes of reaching a conclusion prior to an outcome being expressed by an overt act is being challenged by automated 'intelligent' decision making systems that rely on algorithms to process applications and make decisions.

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[96]Ibid 88–116.
[97]Ibid 150–1.
[98]*Semunigus v Minister for Immigration and Multicultural Affairs* (1999) 422 19.
[99]*Pintarich v Deputy Commissioner of Taxation* (n 88) 152.

> What was once inconceivable, that a complex decision might be made without any requirement of human mental processes is, for better or worse, rapidly becoming unexceptional. Automated systems are already routinely relied upon by a number of Australian government departments for bulk decision making. Only on administrative (internal or external) and judicial review are humans involved. This is not an entirely new phenomenon: … And, while yet still uncommon, some legislative schemes … already explicitly provide for computer programs to make decisions that stand as the decision of an agency of government.
>
> …
>
> The legal conception of what constitutes a decision cannot be static; it must comprehend that technology has altered how decisions are in fact made and that aspects of, or the entirety of, decision making, can occur independently of human mental input.[100]

In *Pintarich*, the majority mis-directed its attention to an almost irrelevant point in a long chain of decisions. It held that because the officer did not make a decision to remit GIC, there was nothing to be judicially reviewed and the letter was to be treated simply as an administrative error. However, it is arguable that where a process is automated, the 'mental process of reaching a conclusion' which conventional judicial review expects is no longer present.[101]

The decision which was to be reviewed was much earlier in the process, in the design of the underlying computer system, which allowed an officer to enter figures into a system without correctly advising on the limits of that officer's authority, and did not allow the resulting letter to be reviewed before it was sent. Decisions in individual cases are increasingly pre-determined by choices made at the construction of the system, but these are not visible to or readily comprehensible by those affected, the public generally, or legal professionals who are seeking to contest it. As Huggins points out, there is 'a mismatch between ADM which, by its very nature, requires little or no human input after the initial coding decisions have been made, and the legal meaning of a decision.'[102]

5. Responding to rules as code

5.1. Internal solutions

It is clear, therefore, that RaC may have some advantages, particularly in domains of law-making with a significant quantitive or calculative dimension, but also some substantial issues, which require solving if the idea is

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[100]Ibid 45–49.
[101]Hall (n 23) 18.
[102]Huggins (n 91) 1064.

to be further explored. Some of these possible solutions are 'internal' (improving the development of RaC projects) and some are 'external' (better oversight and remedies). The internal solutions include transparency and literate pair programming. The external solutions complement these to provide meaningful insight by expanding the approach and remit of judicial review, supported by greater cross-disciplinary awareness.

5.1.1. Greater transparency

Similar to the growing pressure on public authorities to release the models that underly their decision-making,[103] there may be calls for them to disclose design documentation and source code for their software systems. As Paterson points out, the design and purchase phase offer an important opportunity to ensure compliance with the rule of law,[104] although there are examples of freedom of information requests for these details being refused as infringing on 'trade secrets'.[105] If administrative law can take up this challenge, it may prove very useful in addressing the new problems of bias and opacity that RaC could lead to.[106] It should, however, be borne in mind that a minimalist compliance with such requirements may not yield significant transparency: source code for ADM systems in France must be released to the public[107] but what is provided is not always comprehensible or usable.[108]

5.1.2. Literate pair programming

Scale is an important aspect of RaC. This tends to be one of the drivers of adoption for ICT solutions: that a particular approach can be rapidly and cheaply expanded in scope once it is up and running. However, the reality of software development is that it is often an artisanal process, which makes development on a large scale challenging. As Ciurak highlights, there is a need to test RaC implementations in a rigorous way, following the methods that have been developed by computer science.[109] This requires tools and approaches that enable us to adopt the more legitimate and

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[103]Jack Maxwell and Joe Tomlinson, 'Government Models, Decision-Making, and the Public Law Presumption of Disclosure' (2020) 25 *Judicial Review* 296.

[104]Moira Paterson, 'The Uses of AI in Government Decision-Making: Identifying the Legal Gaps in Australia' (2019) 89 *Mississippi Law Journal* 647, 663.

[105]Katie Miller, 'The Application of Administrative Law Principles to Technology-Assisted Decision-Making' (2016) 86 *AIAL Forum* 20, 30.

[106]Rebecca Williams, 'Rethinking Administrative Law for Algorithmic Decision Making.' (2022) 42 *Oxford Journal of Legal Studies* 468.

[107]For background on this, see David Restrepo-Amariles, 'Algorithmic Decision Systems: Automation and Machine Learning in the Public Administration' in Woodrow Barfield (ed), *The Cambridge Handbook of the Law of Algorithms* (Cambridge University Press, 2021) 284–7.

[108]Merigoux, Alauzen and Slimani (n 63) 5.

[109]Patryk Ciurak, 'Two Sides of the Same Coin. Possible Interactions Between Text-written Law and Computer Code in the Near Future' in Dariusz Szostek and Mariusz Załucki (eds), *Legal Tech: Information Technology Tools in the Administration of Justice* (Nomos, 2021) 155–8.

appropriate aspects of RaC in a way that protects and supports democracy and the rule of law, and to avoid a shallow and error-prone conversion of rules to software as a short-sighted money-saving measure. Huttner and Merigoux discuss and discard two common approaches to preventing bugs in RaC systems:[110]

1. case-based testing, which involves comparing the actual output of the system with its expected output. This is effective at locating bugs but not at proving that they are not there. It is also resource-intensive.
2. transparency, particularly through access to source code, which is a strong solution on paper but (as already noted) is often incomplete and complex in practice.

They instead recommend the use of literate pair programming in law, which requires close engagement between lawyers and programmers and the use of new paradigms for expressing logic, as law moves from the general rule to the specific, while programming moves from the specific to the general. (Literate programming involves the development of extensively annotated programme code, while pair programming involves two software developers working in parallel, one on detail and one on high-level issues.)[111]

5.2. External solutions

5.2.1. Expanding the parameters of judicial review

That lawyers have fundamental concerns about RaC or improvements could be made to development techniques will not by itself, of course, prevent it from being applied or adopted by jurisdictions worldwide. The concept of parallel legislating in text and code is very likely to become part of the toolkit of the policymaker and civil servant. In addition, the enormous 'installed base' of 'fixed algorithms and well-defined use of databases' will remain essential for the foreseeable future;[112] we have already seen in the *Pintarich* case that even without full-blown RaC implementations, existing computer-based support systems can create complications.

In that context, academic and practising lawyers must consider how to deal with the inevitable mistakes. This corrective action will occur downstream and outside of the RaC development process. Judicial review is the ultimate solution here, but as the discussion of *Pintarich* above demonstrates, judges (at least to date) do not always understand the issues or adapt their conceptual approaches quickly enough. It is acknowledged that one case is

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[110]Huttner and Merigoux (n 2) 10–13.
[111]Ibid 13.
[112]Schartum (n 44) 303.

a limited sample and the dissent provides a clearer perspective on the realities of the functioning of a modern bureaucracy. Therefore, there may yet be scope for 'creative forms of judicial review litigation',[113] but as Lord Sales acknowledges, 'it is not realistic to expect the common law, with its limited capacity to change law and the slow pace at which it does so, to play a major role [in adapting in the increasingly digital age]'.[114] As a result, the solutions outlined below may require legislative intervention.

Whether judicial review is adequate for a context in which algorithms are a central feature of administrative decision-making, either as an assistant to or replacement for, a human decision-maker, has been a topic of some recent academic interest. Much of this literature has focused on systems using ML,[115] while the genealogy of RaC is more in expert systems. Therefore, not all of what has been written is relevant to more rule-based approaches; in particular, explainability[116] might not be as significant an issue with RaC as it is with AI-based applications of ADM, as one of its aims is greater clarity of thought. Indeed, specifying the criteria to be applied to a decision in advance may make it more transparent and easier for a court to review after the fact.[117]

However, not every system achieves all of its goals and the *Pintarich* case indicates that the lack of clarity regarding the legal consequences of using digital technology is the deeper difficulty. There is a difference between decision support and decision making,[118] and RaC implementations may cross this line, creating challenges for current approaches to judicial review as a method for ensuring legality. These approaches are not compatible with an increasingly 'informed' state,[119] and as Kerr J highlights in the excerpt from *Pintarich* above, must change accordingly.[120]

Binns points out that 'numerous administrative law scholars have argued, when an official who has been invested with the power to make a decision delegates it to an algorithm, they could be unlawfully fettering their discretion.'[121] This analysis is most cogent when applied to ML-based systems but can also be the basis for a critique of judicial review as applied to RaC. In the

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[113]Harlow and Rawlings (n 92) 295.

[114]Sales (n 58) 58.

[115]Jennifer Cobbe, Michelle Seng Ah Lee and Jatinder Singh, 'Reviewable Automated Decision-Making: A Framework for Accountable Algorithmic Systems', *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (2021).

[116]Jennifer Cobbe, 'Administrative Law and the Machines of Government: Judicial Review of Automated Public-Sector Decision-Making' (2019) 39 *Legal Studies* 636, 638–9; See also Joe Tomlinson, Katy Sheridan and Adam Harkens, 'Judicial Review Evidence in the Era of the Digital State' [2020] *Public Law* 740, 743.

[117]Williams (n 106) 484.

[118]Zeleznikow and de la Rosa (n 43) 71–2.

[119]Will Bateman, 'Algorithmic Decision-Making and Legality: Public Law Dimensions' (2020) 94 *Australian Law Journal* 520, 529.

[120]Huggins (n 91) 1069–70.

[121]Reuben Binns, 'Algorithmic Decision-making: A Guide For Lawyers' (2020) 25 *Judicial Review* 2, 19.

latter context, the problem is not just that an official relies on an algorithm or a statistical calculation to reach a conclusion. Expert systems and RaC approaches raise particular and mis-understood issues, as they displace the point in time when decisions are made; design and programming choices, made in abstract contexts, will implicitly foreclose the possibilities and options available in real-life cases. Before the official has responsibility for a decision or any opportunity to delegate it to software, it has already been delegated for them into the logic of the RaC system, 'without intentional commitment.'[122] Therefore, to the unlawful fettering of discretion, I would add the unlawful removal of that discretion by design and development decisions that make administrators and decision-makers redundant.

Scholars have also put forward ideas for how judicial review can remain relevant. Some are a better fit for the challenges of ML approaches to decisions. For example, Oswald argues that English administrative law, particularly the duty to give reasons, the requirement to only consider what is relevant, and the limits on discretion, is flexible enough to respond to many of the challenges posed by predictive ML algorithms.[123] Bateman relies on Lon Fuller[124] to assert that the 'human element' can never be removed from administrative decision-making and argues for a legislative framework that governs the exercise of automated statutory powers while respecting the principles of public law.[125] Tomlinson and others have suggested that the ways in which UK judicial review deals with questions of evidence requires reconsideration.[126] While these may be helpful in both ML and RaC contexts, of more relevance to the latter and thus to this paper is Chauhan's suggestion that the 'systemic review' which has been developed by the courts of the United Kingdom could be usefully applied to 'upstream' decision-making processes.[127] As the state becomes more digital and code-bound, judicial review must develop the capacity to look back further along the decision-making pipeline.

5.2.2. Cross-disciplinary awareness

In order for this re-thinking of the limits of accountability to judicial review to be effective, it will be necessary to ensure that lawyers and judges understand the realities of software development and deployment so that they can

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[122]Sancho McCann, 'Discretion in the Automated Administrative State' (2023) 36 *Canadian Journal of Law & Jurisprudence* 171, 179.

[123]Marion Oswald, 'Algorithm-Assisted Decision-Making in the Public Sector: Framing the Issues Using Administrative Law Rules Governing Discretionary Power' (2018) 376 *Philosophical Transactions A* 20170359, 3.

[124]Lon Luvois Fuller, *Anatomy of the Law* (Mentor Books, 1968).

[125]Bateman (n 119).

[126]Tomlinson, Sheridan and Harkens (n 116).

[127]Abe Chauhan, 'Towards the Systemic Review of Automated Decision-Making Systems' (2020) 25 *Judicial Review* 285.

better scrutinise RaC and make that 'look-back' meaningful.[128] Equipping present and future practitioners with the knowledge necessary to be effective guardians of principles and rights in an increasingly digitised administration will require effort to break down disciplinary barriers and integrate algorithmic thinking and critical digital literacy into the law school curriculum,[129] with a holistic mindset,[130] based on 'adaptive professionalism'.[131] Open tools such as *ylegis*[132] can be used in order to familiarise students with the RaC idea, while giving them an understanding of its limitations. Law schools may need to provide education and training in co-drafting for textual and software rules.[133] In time, these types of competences may become a basic requirement.[134]

6. Conclusion

RaC approaches have a long history, including past failures, and may not prove viable in the long run, because of technical and legal limitations. A group of New Zealand-based researchers who engaged in a deep exploration of RaC concluded that 'for both pragmatic and principled reasons, rules written in code … should never be given the status of legislation' because it would undermine the separation of powers and moves towards plainer language in law.[135] Despite this lack of fully-demonstrated viability, it is likely that ADM and RaC will continue to attract attention from policy-makers and decision-makers.[136] This paper has argued that there are internal and external solutions that can be used to mitigate against the risks that this will create: transparency, literate pair programming, expanding the parameters of judicial review to allow a longer 'look-back' at 'upstream'

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[128]Hildebrandt makes a similar argument for inter-disciplinary awareness in order to develop what she calls 'legal protection by design' in the context of ML approaches in Hildebrandt (n 81) 83; and has developed a detailed set of recommendations for curriculum reform and new learning objectives to ground students in computational methods in Mireille Hildebrandt, 'Grounding Computational "Law" in Legal Education and Professional Legal Training' in Bartosz Brożek, Olia Kanevskaia and Przemysław Pałka (eds), *Elgar Handbook on Law and Technology* (Edward Elgar, 2023).

[129]Mireille Hildebrandt, 'Law as Information in the Era of Data-Driven Agency' (2016) 79 *Modern Law Review* 1; Anna Huggins and others, 'Digitising Legislation: Connecting Regulatory Mind-Sets and Constitutional Values' (2022) 14 Law, *Innovation and Technology* 1, 19.

[130]Huggins and others (n 129) 29.

[131]Lisa Webley and others, 'The Profession(s)' Engagements with LawTech: Narratives and Archetypes of Future Law' [2019] *Law, Technology and Humans* 6.

[132]Mowbray, Chung and Greenleaf (n 35).

[133]Wolfgang Alschner and John Mark Keyes, 'Translatability of Law and Legal Technology Findings from Corpus Analyses and Bilingual Legal Drafting in Canada' in Meng Ji and Sara Laviosa (eds), *The Oxford Handbook of Translation and Social Practices* (Oxford University Press, 2020).

[134]Morris (n 15) 12.

[135]Barraclough, Fraser and Barnes (n 25) 3.

[136]For a recent example, see a briefing paper for the G20 meeting in India in 2023: Rhea Subramanya and Pete Furlong, 'Revolutionising Rulemaking: How Digitised Rules Can Accelerate Digital Transformation' (T20 2023) Policy Brief <https://t20ind.org/wp-content/uploads/2023/06/T20_PolicyBrief_TF2_223_RevolutionisingRulemaking.pdf> accessed 15 January 2024.

decision-making in the development process, and ensuring that lawyers have sufficient critical digital literacy in order to engage fully with the realities of these systems. These will be essential to ensure the protection of essential values such as the rule of law in an increasingly 'informed' state.

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