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From Rules as Code to Mindset Strategies and Aligned Interpretive Approaches

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Abstract

'Rules as Code' is a broad heuristic that encompasses different conceptual and practical aspects regarding the presentation of legal instruments as machine executable code, especially for use in automated business systems. The presentation of law as code was historically considered a largely isomorphic exercise that could be achieved through a literal translation of law into code. Contemporary research is questioning the value of a literal approach to legal coding and is adopting different interpretive strategies that seek enhanced alignment between law and code. In this article, we report on research findings involving the encoding of an Australian Commonwealth statute – the Treasury Laws Amendment (Design and Distribution Obligations and Product Intervention Powers) Act 2019 (Cth) (the 'DDO Act'), and the Act's concomitant regulatory guidance – the Australian Securities and Investments Commission (ASIC) Regulatory Guide 274 ('RG 274'). We adapt and apply Brownsword's mindsets to develop different interpretive approaches that were necessary to resolve the coding issues encountered. The mindset strategies enabled us to outline and delineate distinct computational, legal and regulatory interpretive approaches that highlight the different cultural contexts and rationales which are embedded in legal instruments, like legislation and regulatory guidance. In conclusion, we contend that different types of mindset strategies better highlight the interpretive choices involved in the coding of legal and regulatory instruments.

Keywords: Rules as Code; design and distribution obligations; Deontic Defeasible Logic; interpretive approaches; mindsets; legal coding.

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Introduction

Rules as Code (RaC) is an amorphous heuristic that captures a growing commercial and governmental focus on the conversion of legislation and regulation into machine executable code.[1] Once coded, legal rules can then be used in automated business systems that aim to improve administrative efficiency and to reduce increasing compliance burdens.[2] The potential promise of efficiency gain and compliance cost reduction has given rise to many vaunted claims about the utility of digitised law as an integral business exercise.

In this article, we highlight the complexities of presenting legislation as code for use in business systems. We extend the literature further by outlining the need for more sophisticated interpretive approaches that better align computational, legal and regulatory logics. New interpretive approaches are required to contextually respect the nuances that arise through the application of different normative mindsets, logics, purposes, rationales and instruments.

To concretize our arguments, we report on research findings involving the coding of an Australian Commonwealth statute – the *Treasury Laws Amendment (Design and Distribution Obligations and Product Intervention Powers) Act 2019* (Cth) (the 'DDO Act') – and the Act's regulatory guidance – the Australian Securities and Investments Commission (ASIC) Regulatory Guide 274 ('RG 274').[3] The encoding exercise gave rise to a range of challenges involving interpretive ambiguities.[4] To resolve these challenges, we adopted different interpretive approaches based on Brownsword's technocratic, coherentist and regulatory-instrumental mindsets.[5] The technocratic mindset emphasises the use of technological solutions to achieve regulatory purposes. The coherentist mindset emphasises the internal consistency, coherence and stability of law. Finally, the regulatory-instrumental mindset focuses on the instrumental efficacy of rules for achieving their policy purposes.

We used Brownsword's mindsets to reflect upon the coding exercise and to develop different interpretive approaches and coding solutions. The mindset strategies enabled us to outline and delineate the distinct computational, legal and regulatory logics involved in legal coding exercises. This delineation gave us a better understanding of the interpretive challenges that arise in legal coding exercises due to the different cultural contexts and rationales which are embedded in legal instruments, like legislation and regulatory guidance. Our research findings highlight the need for more nuanced and aligned interpretive approaches for coding legislation. Different interpretive approaches are needed for different coding tasks. For complex legislation, an aligned combination of different mindset strategies and interpretive approaches is required. Our research therefore suggests that a strategic framework to operationalise coding practice is needed that utilises different mindset perspectives.

Encoding legislation and interpretive tensions

The encoding of legal and regulatory instruments gives rise to interpretive decisions for coders. Most early attempts at legal coding implicitly or explicitly sought to avoid interpretive challenges by focusing on prescriptive,

[1] Matthew Waddington, 'Rules as code' (2020) 37(1) Law in Context 179, 180.

[2] James Mohun and Alex Roberts, 'Cracking the code: Rulemaking for humans and machines' [2020] , 7.

[3] ASIC, 'Regulatory Guide 274: Product Design and Distribution Obligations' [2020] .

[4] An interpretive ambiguity arises where a plain reading of a clause does not provide a deterministic outcome. At that point, reference to extrinsic materials beyond the clause itself is required.

[5] Roger Brownsword, 'Law and Technology: Two Modes of Disruption, Three Legal MindSets, and the Big Picture of Regulatory Responsibilities' (2018) 14(1) Indian Journal of Law and Technology; Roger Brownsword, *Law, technology and society: reimagining the regulatory environment* (Routledge 2019); Roger Brownsword, 'Law disrupted, law re-imagined, law re-invented' (2019) 2019 Technology and Regulation 10; Roger Brownsword, *Law 3.0: Rules, Regulation, and Technology* (Routledge 2020). For previous analysis of how these mindsets apply in the context of digitising legislation, see Anna Huggins and others, 'Digitising legislation: connecting regulatory mind-sets and constitutional values' (2022) 14(2) Law, Innovation and Technology 325.

[6] Waddington (n 1) 182–183.

non-discretionary clauses on the basis that they were relatively objective and therefore easier to code.[6] The need for interpretive approaches as part of legal coding was consequently largely bypassed by some, or tentatively acknowledged by others, as a part of the encoding process.[7] This history plays an important role in today's legal coding context. Even now, a tension exists between optimistic advocates of RaC who put forward a literal or plain reading approach to converting natural-language legislation into code,[8] and scholars who identify the many interpretive challenges involved in legal coding that requires a more nuanced approach.[9]

The interpretive element of legal coding was considered largely unproblematic in early leading works. Sergot and others's seminal 1986 paper regarding the encoding of the *British Nationality Act* describes the process of resolving interpretive ambiguities as one of 'little difficulty'.[10] Though the authors acknowledged some limitations in adequately encoding the legal intent of the legislation, such ambiguities were characterised as logic implementation challenges, rather than genuine questions of statutory interpretation.[11] Bench-Capon and others's 1987 work encoded provisions of the United Kingdom's *Supplementary Benefits Act 1976* and relevant provisions made under the authority of the act.[12] The code was a representation of the authors 'understanding' and 'interpretation' of the law,[13] and acknowledged the possibility of alternative interpretations. Even though the authors were aware of the interpretive elements of encoding, they nevertheless did not attempt to apply statutory interpretation methods and noted that 'the accuracy of the representation [e.g., the code] was not a critical consideration' of the experiment.[14]

The limited interpretive strategies adopted in early works is reminiscent of a literal or plain reading perspective to interpreting legislation.[15] A literal approach focuses on 'objective' or 'plain reading' methods of interpretation without recourse to extrinsic materials.[16] With the recent renewal of interest in RaC solutions, the notion that prescriptive rules can be coded objectively through a plain reading approach has been embraced by some RaC advocates.[17] For example, Mohun and Roberts contend that prescriptive rules require less human interpretation because such rules 'leave little ambiguity about the course of action that must be taken.'[18]

It should be noted, however, that RaC approaches based on a literal interpretation are out of step with modern contextual approaches to statutory interpretation.[19] Fallon, for example, notes a multitude of sources from which one can attempt to derive the meaning of a legal provision, of which the literal meaning is but one option.[20] In con-

[7] Waddington (n 1).

[8] Mohun and Roberts (n 2) 92.

[9] Mireille Hildebrandt, 'Algorithmic regulation and the rule of law' (2018) 376(2128) Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 20170355; Kevin D Ashley, *Artificial intelligence and legal analytics: new tools for law practice in the digital age* (Cambridge University Press 2017); EA Layman and CS Saxon, 'Some problems in designing expert systems to aid legal reasoning' (ICAIL '87, Association for Computing Machinery 1987).

[10] Marek J Sergot and others, 'The British Nationality Act as a logic program' (1986) 29(5) Communications of the ACM 370, 371.

[11] ibid 379–382.

[12] TJM Bench-Capon and others, 'Logic programming for large scale applications in law: A formalisation of supplementary benefit legislation' (ICAIL '87, Association for Computing Machinery 1987) 190.

[13] ibid 193, 198.

[14] ibid 192.

[15] Frederick Schauer, 'Statutory construction and the coordinating function of plain meaning' (1990) 1990 The Supreme Court Review 231; See also David A Strauss, 'Why plain meaning' (1996) 72 Notre Dame L. Rev. 1565

[16] Michael Kirby, 'Statutory interpretation: the meaning of meaning' (2011) 35 Melb. UL Rev. 113, 116.

[17] Tim de Sousa and Pia Andrews, 'When We Code the Rules on Which Our Society Runs, We Can Create Better Results and New Opportunities for the Public and Regulators, and Companies Looking to Make Compliance Easier' [2019] The Mandarin.

[18] Mohun and Roberts (n 2) 92.

[19] A contextual approach to statutory interpretation is favoured by the Australian courts since the landmark case of *Project Blue Sky v Australian Broadcasting Authority* 194, [1998] CLR 355. Although the precise rules of statutory interpretation that apply vary, there is a 'common core' in approaches to statutory interpretation across jurisdictions: Neil MacCormick and Robert S Summers, *Interpreting statutes: A comparative study* (Routledge 2016) chapters 12 and 13.

[20] Richard H Fallon Jr, 'The Meaning of Legal Meaning and Its Implications for Theories of Legal Interpretation' (2015) 82 U. Chi. L. Rev. 1235, 1244–1252.

trast to textualism, which 'of a statutory provision must be considered in context.[21],[22] contextualism assumes that the meaning of Twining in a code-driven context.' The paradigm shift from text to context in judicial interpretation[23] is reflected in a growing body of more recent RaC scholarship. There is increasing interest in – and concern about – the legitimacy of attempts to digitise legislation considering statutory interpretation norms and broader rule of law principles.[24]

Contemporary legal coding research places greater emphasis on the interpretive tensions inherent to encoding legislation. For example, Barraclough and others contend that all natural language rules require human interpretation.[25] Barraclough and others's assertion finds support amongst other academics in the field. Ashley outlines the various types of ambiguities in legal texts, identifying semantic ambiguity, vagueness, and syntactic ambiguity as common occurrences throughout statutory texts.[26] Even where legislative extracts lack obvious or intentional ambiguity,[27] unintentional polysemy[28] can necessitate interpretation on the coder's behalf. Referring to Allen and Saxon's study,[29] Ashley identified forty-eight interpretations of varying strength arising out of a two-sentence long provision due to syntactic ambiguity.[30] In a related vein, Witt and others demonstrate that even where coders are similarly legally trained and working collaboratively, they can encode the same legislative text in significantly different ways.[31]

Even though there is increasing recognition of the importance of interpretation to legal coding, there is as yet no commonly agreed approach to resolving interpretive ambiguities. The question of how best to derive statutory meaning remains one of the most crucial questions in legal academia, and thus, advocacy and application of a particular interpretive method in legal coding exercises should require explicit and critical consideration. There is a sharp contrast between the deliberate application of a plain reading method in appropriate circumstances that flows from consideration of alternative approaches,[32] versus a default alignment to a plain reading approach without critically considering alternative interpretive methods. Thus far, many legal coding forays appear to represent the latter, with minimal consideration given to possible alternative methods of statutory interpretation. Against this backdrop, we now outline the methodological approach adopted in the encoding exercise before highlighting the application of different interpretive approaches based on differing mindset perspectives.

Coding methodology and conceptual framework

Our research findings emanate from a commercially funded research project involving Realta Logic (Realta) (Slevin and McGowan) and QUT Law academics (Bur-

[21] William Twining, *General jurisprudence: understanding law from a global perspective* (Cambridge University Press 2009) for a broad ranging discussion of the jurisprudential role of context in law. See Pedro Rubim Borges Fortes, and Pedro Rubim Borges Fortes and David Restrepo Amariles, 'Law-jobs in the algorithmic society' (2023) 19(1) International Journal of Law in Context 1 for a discussionin its purest form, begins and ends with what the text says and fairly implies

[22] Antonin Scalia and Bryan A Garner, *Reading Law: The Interpretation of Legal Texts* (Thomson/West 2012) 16.

[23] Jeffrey Barnes, 'Contextualism: The modern approach to statutory interpretation' (2018) 41(4) The University of New South Wales Law Journal 1083.

[24] Tom Barraclough, Hamish Fraser, and Curtis Barnes, *Legislation as code for New Zealand: opportunities, risks, and recommendations* (techspace rep, New Zealand Law Foundation 2021); Laurence Diver, 'Digisprudence: the design of legitimate code' (2021) 13(2) Law, Innovation and Technology 325; Huggins and others (n 5).

[25] Barraclough, Fraser, and Barnes (n 24) 160.

[26] Ashley (n 9) 39–42.

[27] For example, discretionary clauses involving terms such as 'likely', 'reasonable', etc.

[28] For example, the potential for multiple possible meanings given to a word or phrase.

[29] Layman and Saxon (n 9).

[30] Ashley (n 9) 46.

[31] Alice Witt and others, 'Converting copyright legislation into machine-executable code: interpretation, coding validation and legal alignment' (ICAIL '21, Association for Computing Machinery 2021) 144–146.

[32] See, e.g., Schauer (n 15); Strauss (n 15); William Baude and Ryan D Doerfler, 'The (Not So) Plain Meaning Rule' (2017) 84 University of Chicago Law Review 539; Victoria F Nourse, 'Two Kinds of Plain Meaning' (2010) 76 Brooklin Law Review 997.

don and Huggins) beginning in May 2021. The encoding work was undertaken by three research assistant coders, all legally trained (Godfrey, Buckley and Simcock). At that stage, the DDO Act[33] was entering operation which generated a significant degree of interest across the financial services industry.[34] Given the rise of automated compliance in the financial services sector in Australia, there may be some expectations that an Act relevant to that area may have been constructed with encoding partially in mind. Nevertheless, despite the clear demand for DDO Act code that could be used as part of automated business systems, the Act proved challenging to encode. An outline of the Act's origins assists to reveal some of its underlying legislative and regulatory complexities.

The DDO Act

The Act was implemented following major law reform inquiries relating to the financial services sector.[35] Concerns relating to predatory lending practices of major financial institutions have been prominent. Following a series of high-profile controversies, the Australian Government instigated a Royal Commission led by former High Court justice, Kenneth Hayne (the 'Hayne Commission'), to investigate the lending practices of Australia's major financial institutions.[36] The Hayne Commission resulted in a range of significant reforms including the imposition of new Design and Distribution Obligations upon issuers of financial products, thus giving rise to the Act.[37]

The Act was inserted as Part 7.8A of The *Corporations Act 2001* (Cth) which in itself is a sprawling, gargantuan beast.[38] The DDO Act requires a consumer-centric approach to product design and obliges producers of financial and credit products to provide a 'Target Market Determination' (TMD).[39] A TMD is a new legal construct,[40] which requires issuers of financial products to provide information about who the product is targeted towards and why it is targeted towards certain groups of individual consumers.[41]

The DDO Act is largely principles-based in focus and features a complex combination of both prescriptive rules and discretionary clauses. It establishes core legal obligations and is supported by Regulatory Guide 274 (RG 274) which indicates how ASIC considers essential compliance activities. ASIC's regulatory guide series is an important compliance enhancing tool regarding broader governance activities.[42] The guides are designed to provide practical guidance that explains ASIC's powers, and the principles that underpin its use of powers including how it interprets law through the provision of practical examples for regulated entities.[43] Under the DDO Act, ASIC was granted new powers to make a 'Product Intervention Order' (PIO). ASIC can make a PIO where there is a risk of significant detriment to consumers of a financial or credit product or class of financial or credit product.[44] As part of their obligations under the Act, financial product issuers are obliged to adhere to any orders included in a PIO where the conditions of the PIO's activation are met.[45]

[33] Treasury Laws Amendment (Design and Distribution Obligations and Product Intervention Powers) Act 2019 (Cth) which was incorporated as Part 7.8 of the Corporations Act 2001 (Cth).

[34] Rosalyn Teskey and Julia Younger, 'DDO Six Months On – What Have We Learnt and What's Next?' [2022] Financial Services (Deloitte).

[35] Jeannie Marie Paterson, 'From Disclosure to Design: The Australian Regulatory Response to Mis-Selling to Consumer Investors by Financial Services Providers' in *Financial Advice and Investor Protection* (Edward Elgar Publishing 2021).

[36] Financial Services Royal Commission, Final Report of the Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry (2019).

[37] Paterson (n 35).

[38] Australian Law Reform Commission, 'Review of the Legislative Framework for Corporations and Financial Services Regulation' [2020] Current Inquiries.

[39] Zofia Bednarz, 'There and back again: how target market determination obligations for financial products may incentivise consumer data profiling' (2022) 36(2) International Review of Law, Computers & Technology 138, 10.

[40] Corporations Act 2001 (Cth) ss 994A, 994B(5) and s94B(8) as inserted by Treasury Laws Amendment (Design and Distribution Obligations and Product Intervention Powers) Act 2019 (Cth) sch 2.

[41] Bednarz (n 39) 10.

[42] The full series is available at ASIC, About the Regulatory Index (2014)

[43] ASIC, Regulatory guides (2014).

[44] Corporations Act 2001 (Cth) ss 1023A, 1023D(1)(b), 1023D(3)(b)2.

[45] Corporations Act 2001 (Cth) ss 1023P-1023Q.

The use of DDOs and PIO powers were conceptualised previously in the 2014 Financial System Inquiry ('the Murray Inquiry') which proposed increasing issuer and distributor responsibilities regarding financial product design and distribution, as well as introducing a PIO power.[46] Consequently, even though the spur for implementation emanated from the Hayne Commission, the TMD and PIO requirements were actually drafted in direct response to the recommendations of the Murray Inquiry.[47] This point becomes important in understanding the complex construction of the Act's clauses. TMD requirements appear facially prescriptive and should therefore be easier to encode. However, key obligations such as appropriateness requirements[48] are based on the principle and outcome-based approach encouraged by the Murray Inquiry.[49] As a result of the principles-based recommendations, the DDO Act utilises significantly more ambiguous language than could be expected in more prescriptively focussed legislative requirements.

Coding methodology

For the project, we used a language and program (reasoner) called 'Turnip', a modern implementation of Defeasible Deontic Logic ('DDL') that is written in the programming language Haskell.[50] DDL is an extension of Defeasible Logic,[51] which refers to an interest that can be defeated, and Deontic Logic, which pertains to the study of logical words and normative expressions .[52] DDL therefore extends defeasible logic 'by adding deontic and other modal operators' (e.g., obligations [O], permissions [P], prohibitions [F], and exemptions [E]).[53] The project entailed a four-step process to the encoding of the DDO Act in Turnip.

1. The QUT coders identified ambiguous provisions in the Act that could not be encoded without further interpretive analysis.

2. The QUT academics and coders conducted a preliminary interpretive analysis of extrinsic materials relevant to the ambiguities identified and provided this information to Realta.

3. Realta then determined how the ambiguity should be resolved and encoded. The determinations were based largely on a business compliance perspective generated from regulatory guidance materials and long-established experience of business needs regarding automated compliance. The regulatory compliance perspective was important to the research because it provided a business operation focus. As discussed in Section 4, this perspective bridged a gap between the production of legal code that was sufficiently aligned to legal and regulatory expectations and was, at the same time, functional as code for an automated business process. The research thus highlighted the need for a nuanced understanding about the role of different logics in the encoding exercise and highlighted the need for business compliance considerations as an intrinsic part of the legal coding exercise.

4. The QUT coders then completed the encoding of the ambiguous provisions based on Realta's determination.

In Step 1, the QUT coders encoded provisions of the Act in isolation of any extrinsic materials. The coders adopted a literal approach that did not attempt to resolve interpretive ambiguities within the coding exercise by reference to judicially confirmed processes of statutory interpretation. During the first step, the coders identified interpretive am-

[46] David Murray and others, Financial System Inquiry Final Report (2014) 194–195; 198–212.
[47] Explanatory Memorandum, Treasury Laws Amendment (Design and Distribution Obligations and Product Intervention Powers) Bill 2019 (Cth) 5-6.
[48] Corporations Act 2001 (Cth) s994B(8)(b).
[49] Explanatory Memorandum, Treasury Laws Amendment (Design and Distribution Obligations and Product Intervention Powers) Bill 2019, 64.
[50] Guido Governatori and others, 'Computing strong and weak permissions in defeasible logic' (2013) 42 Journal of Philosophical Logic 799, 799.
[51] Grigoris Antoniou and others, 'Representation results for defeasible logic' (2001) 2(2) ACM Trans. Comput. Logic 255.
[52] Dagfinn Føllesdal and Risto Hilpinen, 'Deontic logic: An introduction' in *Deontic logic: Introductory and systematic readings* (Springer 1971).
[53] Guido Governatori, Antonino Rotolo, and Erica Calardo, 'Possible World Semantics for Defeasible Deontic Logic' (Thomas Ågotnes, Jan Broersen, and Dag Elgesem eds, DEON 2012, Springer Berlin Heidelberg 2012) 47.

biguities. These were DDO Act clauses that could not be determinatively coded from a literal approach. An ongoing table of interpretive ambiguities was compiled with details of the ambiguity provided by the coders. All research members then developed strategies to resolve the ambiguities by reference to other intrinsic materials within the DDO Act, and by reference to RG274. The QUT academics and coders worked with Realta to determine how interpretive ambiguities should be encoded. Realta then provided instructions to on how to encode ambiguities in the final code.

The QUT academics and coders met either every week or fortnight to discuss encoding updates.[54] These updates typically lasted for an hour and were conducted via Zoom. The QUT coders and academics met with Realta each month, also by Zoom, to discuss ongoing findings and to outline encoding challenges. During these meetings, simpler issues, such as naming of atom construction conventions were resolved but more complex issues were then taken away for further consideration.[55] The ongoing process of dialogue adopted throughout the research proved to be an important mechanism for categorising different types of encoding challenge, and more importantly, for identifying the need for different coding approaches and strategies. Brownsword's mindsets provide a valuable framework for analysing interpretive challenges and coding solutions,[56] to which we now turn.

Mindset framework

Brownsword contends that technological innovations disrupt law in two ways. First, technological design and implementation shapes legal design and implementation. Second, technological instruments increasingly complement or supplant legal and regulatory rules.[57] This 'double disruption' leads to competing concerns about legal coherence, regulatory delivery and computational solutions.[58] Brownsword outlines three mindsets – *coherentist*, *regulatory-instrumental* and *technocratic* – that each highlights separate concerns.

Whilst the traditional starting point for most lawyers is the coherentist mindset, for many stakeholders engaged in RaC initiatives, the starting point is the technological affordances and limitations of code, aligning with a technocratic mindset. This mindset emphasises the use of technological solutions to achieve regulatory purposes. It stresses the use of technological tools to shape, guide and constrain compliance-related behaviours.[59] The technocratic mindset directs attention to technological choices, such as the selection of coding languages, platforms, software and testing practices. It emphasises the use of code to achieve legal and regulatory outcomes.

In the context of the contemporary history of RaC outlined in Section 2 above, and the RaC movement's predominant focus on a plain reading approach, we suggest that a technocratic mindset focusing on technical considerations for converting legal texts into code is more likely to find alignment with a literal approach to interpreting regulatory meaning. This poses challenges when interpretive ambiguities arise, for which a literal or plain reading of a clause does not provide a deterministic outcome without reference to additional extrinsic materials. Literal, plain reading methods of statutory interpretation are considered outdated by Australian courts, which favour a contextual approach to interpreting statutory meaning.[60] The latter approach consequently finds closer alignment with Brownsword's coherentist mindset. The coherentist mindset emphasises the internal consistency, coherence and stability of the law. A coherent system of legal rules contributes to the predictability of law.[61] When applied to the coding exercise, the coherentist mindset promotes align-

[54] The largely same approach to coding was developed and detailed previously in Witt and others (n 31).

[55] As noted below at 'The technocratic mindset', atoms in the coding language used for the research generally refer to the use of variables that represent some fact which can be true or false (a Boolean value). Atom construction, referred to here, regarded building representations of legislative provisions in the code. Standardising atom names was a collective task to ensure the functional operation of coded outputs.

[56] Huggins and others (n 5).

[57] Brownsword, *Law, technology and society: reimagining the regulatory environment* (n 5) 182-187.

[58] Brownsword, 'Law disrupted, law re-imagined, law re-invented' (n 5) 10.

[59] Brownsword, *Law, technology and society: reimagining the regulatory environment* (n 5) 198.

[60] J Spigelman, From Text to Context: Contemporary Contractual Interpretation (Speech delivered at the Risky Business Conference, 2007).

[61] Brownsword, *Law, technology and society: reimagining the regulatory environment* (n 5) 192–194.

ment between encoded legal rules and existing doctrinal frameworks.[62]

A coherentist mindset thus focuses on legal contextual approaches to resolving interpretive challenges. It underscores that the encoded versions of legal rules should aim to reflect the courts' interpretation of statutory meaning.[63] The leading case of *Project Blue Sky v Australian Broadcasting Authority* emphasises that interpretation should be guided by the text, context and purpose of a statute, as well as relevant canons of statutory construction.[64] According to this approach, interpretive challenges in the encoding exercise should be resolved by recourse to a contextual analysis of the legal text by reference to other intrinsic materials within the Act and authorised extrinsic materials, including case law.[65]

In contrast, Brownsword's regulatory-instrumental mindset emphasises the instrumental efficacy of rules for achieving their policy purposes. It underscores the effective use of regulatory structures to better deliver policy objectives.[66] Applied to the coding exercise, the regulatory mindset examines regulatory guidance materials holistically. It identifies regulatory purposes, interconnections between instruments and opportunities to produce 'better rules.'[67] The mindset emphasises the parallel operation of regulation and service delivery software.

For RaC initiatives, a regulatory-instrumental mindset would encourage recourse to regulatory guidance for resolving interpretive challenges. Notably, regulatory guidance is not extrinsic material that provides an authoritative reference point applying a coherentist mindset and the modern approach to statutory interpretation. Existing precedent confirms that regulatory guidance does not have legal effect.[68] From the perspective of regulated entities, however, regulatory guidance provides valuable insight into how regulators interpret the law, and the principles that will underpin their regulatory approach and enforcement strategies.[69] Applying a regulatory-instrumental mindset, non-legislative regulations, rules, guidance, policy documents and standards can provide important interpretive reference points for resolving interpretive challenges.

In the next section, we outline how the mindsets can assist with encoding legislation and resolving ambiguities through aligned interpretive approaches and coding solutions. In doing so, we provide examples of our encoding that show how certain mindsets and interpretive approaches tend to align more closely with each other. It should be noted, however, that such alignments are reflective of individual coding decision-making. These are the mindset strategies and interpretive approaches that we adopted, but that does not mean that every coding team would adopt the same mindset combinations. However, what is important across the legal coding field, as we outline below, is that future coding teams identify their own interpretive approaches and articulate them clearly. We believe that the mindset configuration detailed below can assist in the identification and articulation exercises.

Mindset strategies and aligned interpretive approaches

The section 'Encoding legislation and interpretive tensions' page 2 underscored the latent or explicit interpretive tensions that underpin historical and contemporary legal coding discourses. From our perspective, those tensions cannot be ignored and should be explicitly registered as

[62] Huggins and others (n 5) 333.

[63] Anna Huggins, 'Executive power in the digital age: Automation, statutory interpretation and administrative law' in Lisa Boughey Janina & Burton Crawford (ed), *Interpreting executive power* (Federation Press, Australia 2020) 127.

[64] *Project Blue Sky v Australian Broadcasting Authority* (n 19); Lisa Burton Crawford and others, *Public Law and statutory interpretation: principles and practice* (Federation Press 2017) chs 10 and 11.

[65] See further Barnes (n 23) 1083–1113

[66] Brownsword, 'Law and Technology: Two Modes of Disruption, Three Legal MindSets, and the Big Picture of Regulatory Responsibilities' (n 5) 14.

[67] Barraclough, Fraser, and Barnes (n 24) 19 regarding the focus of a 'better rules' approach.

[68] *Electricity Supply Association of Australia Ltd v Australian Competition and Consumer Commission* 113, [2001] FCR 230, [80]-[81] (Finn J).

[69] ASIC, 'Regulatory Guide 274: Product Design and Distribution Obligations' (n 3) 2.

an integral part of the coding process. We consequently do not believe that RaC exercises have the capability to reduce or remove the interpretive context inherent to the 'translation gap' between law and code.[70] Such arguments may well have some place in purely prescriptive, calculation-based forms of law[71] but they are not suitable to the coding of complex, principles-based legislation, such as the DDO Act. The translation gap cannot be removed or displaced in such encoding exercises and thus interpretive approaches should be explicitly acknowledged and recorded by coders.

We also contend that a sole interpretive focus on the literal or plain reading production of purportedly isomorphic code, which seems to underpin much of the RaC literature, is not a suitable approach either. The section 'Encoding legislation and interpretive tensions' page 2 highlights the limits of that approach, and it is clearly out-of-kilter with modern forms of statutory interpretation. Purely functional encoding of legislation is problematic if there is little or no attempt to legally align the code with established forms of legal meaning.[72] However, the opposite is also apt. Encoding of legislation that focuses purely on legal alignment is equally limited if it does not have some significant degree of functionality. In other words, the code must be fit for some pre-defined compliance purpose otherwise the whole encoding exercise is largely redundant. These considerations suggest that a more holistic interpretive approach to the encoding of legislation, particularly for automated business purposes, is necessary to better align legal, regulatory and computational requirements.

We argue that Brownsword's mindsets provide a valuable framework to develop more holistic and nuanced interpretive approaches to the encoding of legislation. The application of the mindsets to the encoding exercise demonstrates that one perspective, whether it be legal, regulatory or computational, does not provide the sufficient holistic basis for developing strategic interpretive approaches.

In the remaining part of this section, we outline the limitations encountered in our encoding process when individual forms of interpretive approach were adopted. We outline below the limitations of singular interpretive approaches and contend that the encoding of legislation requires a combined alignment of different mindset strategies and interpretive approaches as the basis for a governing framework to guide the coding exercise. The mindset analysis demonstrates that one interpretive approach alone is insufficient to resolve complex interpretive ambiguities. Instead, an aligned combination of approaches is required which in turn highlights the potential limits of Brownsword's current framework.

We begin with Brownsword's technocratic mindset and the application of a literal or plain reading approach to the essential DDL coding task of atom construction. Atom construction proved challenging and this gave rise to crossovers with Brownsword's coherentist mindset as part of the interpretive resolution process. However, further limitations were encountered in the sole application of a coherentist perspective in relation to atom construction. The coherentist mindset encourages interpretation in context, which is a broader interpretive approach than plain reading, but still offered little in the way of resolution, especially given the current absence of case law to guide encoding decisions. Finally, that led us to Brownsword's regulatory-instrumental mindset and the use of regulatory guidance to resolve interpretive challenges. Each mindset and approach has its own strengths, and limitations, and so it is the aligned combination of each that provides a more nuanced and holistic governing framework.

The technocratic mindset

A technocratic mindset sheds light on technical decisions and challenges related to the conversion of statutory provisions into code based on a literal interpretation of the statutory text. These considerations include the use of atoms in DDL to accurately register definitional components relevant to the functioning of obligations. The DDO Act's complex phrasing, and underlying conceptual construction, give rise to challenges in the deterministic nam-

[70] Mohun and Roberts (n 2) 20.

[71] ibid 92. However, note Barraclough, Fraser and Barnes' scepticism of this position outlined in the section 'Encoding legislation and interpretive tensions'.

[72] Huggins and others (n 5) 351.

ing of atoms. These challenges underscored overlaps between the technocratic and coherentist mindsets and interpretive approaches.

At several points throughout the initial coding process we encountered issues regarding the granularity of encoded atoms. Atoms are the most basic variable type in Turnip and are used to describe Boolean values (values which are True or False). Granularity, in this context, describes the extent to which the coders were required to consider different parts of the statutory text in discrete segments when coding it. For example, s994P of the DDO Act describes conduct which caused, or is likely to cause, a class of persons to suffer loss or damage.[73] The section could be coded in several ways:

- `Atom conduct.whichCaused.aClassofPersons.toSufferDamage`
- `Atom conduct.whichisLikelyToCause.aClassofPersons.toSufferDamage`
- `Atom conduct.whichisLikelyToCause.aClassofPersons.toSufferLoss`
- `Atom conduct.whichCaused.aClassofPersons.toSufferLoss`
- `Atom conduct.whichCausedOrIsLikelyToCause.aClassOfPersons.toSufferLossOrDamage`

The phrase only covered three lines in length and so any disparity caused by construction was limited. However, when different approaches to atom construction were applied across the entire section or the entire Act, the impact became more significant.[74] We decided that atoms would only be split when leaving the atom intact as this would give rise to some level of legal inaccuracy or misalignment. For example, in the case of s994P if there was a relevant substantive difference between the terms 'damage' and 'loss', it would be necessary to split these terms into two distinct atoms.

Another example of potentially variable granularity is provisions which create conjunctive obligations. A conjunctive obligation is a single overarching obligation which, from a coding perspective, may be better represented by a sequence of individual obligations.[75] For example, in s994F(3), along with several other sections, an obligation is created to record certain distribution information in relation to a financial product. *Prima facie*, s994F(3) merely creates a single obligation to store information, which would be supplemented by a conjunctive rule indicating what constitutes such information. The obligation can be written as follows as atoms:

- `Atom certainCircumstances`
- `Atom itemA`
- `Atom itemB`
- `Atom itemC`
- `Atom information`
- `Atom record.information`
- `conjunction_information: itemA & itemB & itemC ⇒ information`
- `obligationRule: information & certainCircumstances ⇒[O] record.information`

From a technocratic perspective, this type of Turnip code makes sense and does create the relevant obligation and specify the type of information. However, beyond the atom names, there is nothing linking the atom that specifies what the information is (Atom information) and the atom used to create the obligation (Atom record.information). The alternative, which was adopted in the final encoding of the Act, instead created a series of individual obligations on each of the items within the list. The obligation was written as follows:

- `Atom certainCircumstances`
- `Atom itemA`
- `Atom itemB`
- `Atom itemC`
- `Atom record.itemA`
- `Atom record.itemB`
- `Atom record.itemC`

[73] Corporations Act 2001 (Cth) s994P(1).

[74] A similar issue was also noted in our previous research with Data61 involving *Copyright Act* atom construction. See Witt and others (n 31).

[75] Guido Governatori and Antonino Rotolo, 'A Computational Model for Pragmatic Oddity' in M Araszkiewicz and V Rodriguez-Doncel (eds), *Legal Knowledge and Information Systems* (IOS Press 2019).

- `obligationRule1: itemA & certainCircumstances ⇒[0] record.itemA`
- `obligationRule2: itemB & certainCircumstances ⇒[0] record.itemB`
- `obligationRule3: itemC & certainCircumstances ⇒[0] record.itemC`

Here, there is nothing linking the individual items within the information together beyond the circumstances necessary to give rise to the obligation. However, this form of coding seemed to be more effective as it specified the information that gives rise to the obligation within the obligation itself. As noted above, the naming of atoms is an essential component of coding in DDL. Given its importance, and as outlined here, we had to depart from a plain reading of the text to understand the different contexts pertinent to the same use of words. Different contextual applications thus make the notion of atom-based isomorphism challenging. Our examples highlight that the exact same order of words can have different meanings depending on their context and this needs to be fully represented in code for it to be both functional and legally accurate. A combination of technocratic and coherentist logics were thus required.

The coherentist mindset

The coherentist mindset encourages a contextual legal interpretive approach. Typically, this includes recourse to case law and extrinsic materials that reveal parliamentary intent to help resolve legislative ambiguities.[76] However, this approach to statutory interpretation has limited utility for new legislation, such as the DDO Act, for which there is a paucity of case law to clarify statutory meaning. Yet even in the absence of authoritative guidance from the courts, other aspects of a contextual approach, such as interpreting statutory provisions in the context of the Act as a whole, can still be applied. It was here that we used the coherentist mindset to better identify the contextual nature of atom construction in the DDO Act.

As noted above, determining the meaning of some key terms in the Act required consideration of the Act's broader interpretive context. For example, the Act's integral phrase 'target market determination' appears frequently across the entire statute. The meaning of the phrase itself is clear. However, the central importance of TMD to the Act caused atom naming challenges due to its incorporation in several different provisions.

A TMD is defined across different sections, namely, s994A, s994B(5) and s994B(8). The overall definition stipulates that a determination is being made for a financial product. Accordingly, a TMD must be associated with a financial product. However, in s994F(2), certain subsections apply if, *inter alia*, 'a target market determination has been made for a financial product.' This raised the question of whether the atom construction of targetMarketDetermination, which is already known to apply to financial products, is required to be augmented in the specific context of s994F(2) or whether it already suffices as a general definition to be applied throughout the whole of the Act.

Likewise, s994F(1) refers to 'target market determinations' in the plural. In previous sections of the Act, a TMD is referred to in the singular.[77] Section 994F(1) treats all target market determinations for a financial product as a collective class rather than a specific item. In creating a new pluralised atom to ensure interpretive accuracy in s994F(1), a distinction then had to be drawn in the code. The coded outputs indicated that the s994F(1) atom referred to *all* target market determinations for a financial product, rather than simply a number of target market determinations which was more than one but of an otherwise indeterminate amount.

Similarly, another example of contextual meaning affecting atom construction is the similarity between s994F(2)(b) and s994D(b). The two provisions read:

1. s994F(2)(b): the product is on offer for acquisition by issue, or for regulated sale, to retail clients; and

2. s994D(b): the product is on offer for acquisition by issue, or for regulated sale, to retail clients.

[76] Huggins and others (n 5) 336.

[77] Corporations Act 2001 (Cth) s994A(1) regarding the definition of 'appropriate' involving 'a target market determination.'

Except for excluding the word 'and' at the end of s994F(2)(b), which from an atom construction perspective is immaterial, these two provisions are semantically identical. Therefore, it would seemingly be appropriate to use the same atom for both provisions. However, s994F(2)(a) also ends in an '; and', meaning (a) and (b) are component part requirements in which all elements must be satisfied. In other words, s994F(2)(b) must be read in the context of s994F(2)(a) and (c). Given the divergent contexts and purposes of these sections, with s994D centred on prohibition of conduct and s994F focused on record keeping, these provisions warrant different treatment in code.

In this example, facially similar natural language definitions needed to be coded using a more modular approach that creates individual atoms for each clause. The modular approach to atom construction promoted the contextual integrity of identical clauses, which nevertheless have different intents that needed to be captured in the coded output.

These examples show that the complex interpretive decisions in atom construction required us to move from a technocratic/plain reading approach to a coherentist/contextual approach. However, neither of these approaches on their own were sufficient to resolve the encoding of complex phrasing provisions found in the Act. In fact, there are several provisions throughout the DDO Act that could not be coded in a manner which we believed accurately reflected the intended meaning of the Act. For example, s994B(5)(b) contains the phrase 'within the ordinary meaning of the term.' In the context of s994B(5)(b), the term is referring to the meaning of 'target market.' The definition of 'target market' is defined in the Definitions section of the Act, s994A, but the Act's definition merely provides a circular reference back to s994B(5)(b).[78] To accurately capture the correct statutory meaning in code, the coders therefore needed to consider extrinsic material to ascertain what is intended to be an appropriate definition.

To clarify these interpretive ambiguities, coders could consider the dictionary definition of each word which is akin to a literal or plain reading approach. However, adopting this approach could present challenges from a business compliance perspective. A 'target market' may represent something different for each idiosyncratic implementation or use of the encoded rule set. As such, simply adopting a dictionary definition may unintentionally expand or contract the intended scope of the term from a compliance perspective. Accordingly, a much greater degree of human interpretation is required to ensure that the encoded atom of 'within the ordinary meaning of the term' is both an accurate representation of the legislation and suitable in scope for practical implementation. Thus, the use of 'within the ordinary meaning of the term' in combination with the circular nature of the Act's definition of 'target market' is a helpful example of the DDO Act's complexity which requires further contextual interpretation through regulatory documentation and the application of Brownsword's regulatory-instrumental mindset.

The regulatory-instrumental mindset

The previous sections highlight limitations arising from both literal and contextual interpretive approaches. The interpretive challenges outlined above could not be resolved without other forms of interpretive activity. It was at this point, following discussions with Realta, that the importance of RG 274 became more apparent, both as a means of guidance for the resolution of interpretive challenges, but more importantly, as a different starting point for the collective discourse required for resolution.

The value of this approach became evident when the coding team attempted to code parts of RG 274 that were relevant to understanding the application of s994B(8) of the Act. As noted above, s994B(8) is a core part of the TMD definitional components. It is also a good example of the complex mix of principle-based and prescriptive obligations in the Act. Section 994B(8) requires that a TMD for a financial product 'must be such that it would be *reason-*

[78] S994A states '*target market*, for a financial product, means the class of retail clients described in the target market determination for the product under paragraph 994B(5)(b).'

[79] A retail client is not defined in the DDO Act. It is defined under Part 7.1 of the Corporations Act which refers to financial services and markets. See Corporations Act 2001 (Cth) s761G.

able to conclude' that if the product were issued or sold to a retail client,[79] it would be *likely* that the retail client is in the target market[80] and it 'would *likely be consistent* with the *likely objectives*' of the financial situation and needs of the retail client.[81] From a purely legal coding perspective, it was possible to code the clearly ambiguous elements of s994B(8), namely 'reasonable to conclude' and the use of 'likely' in different contexts. A literal approach enabled the production of legal code that largely mirrored the wording of the section. However, the coded outputs for intended use in business systems were limited in value. We therefore sought to identify why this was the case.

The coding team coded the legal obligation as presented but that did not suffice for Realta's more complex compliance related question of 'what does the law mean?' In other words, how should a business entity interpret the principled obligations of 'reasonable' and 'likely' in the context of its own situation? At this juncture, both literal and legal contextual interpretive approaches offered little recourse. We produced legal code, but that code had limited functionality as part of an automated business system. Hence our recourse to RG 274, to better understand ASIC's interpretation of what the law means, as RG 274 provides greater compliance assistance.

The opening preamble of RG 274 details two broad purposes for ASIC guidance.[82] First, it explains ASIC's interpretation of the law, principally the DDO Act in this situation. Second, it details when ASIC will be inclined to take regulatory action against covered entities by outlining the exercise of powers provided by the legislature, the principles underpinning its regulatory approach and the practical guidance, in the form of examples, that assists regulated entities to meet their DDO obligations. As noted above, ASIC's position is consistent with existing precedent that confirms regulatory guidance does not have legal effect. Regulatory guidance thus guides rather than promulgates in Australian law. Consequently, reference to RG 274 would not be supported from the perspective of current Australian case law or by Brownsword's coherentist mindset. It is a regulatory rather than legal artefact and is therefore within the scope of the regulatory-instrumental mindset.

The key paragraphs relevant to interpreting ASIC's understanding of s994B(8) are RG 274.68-69. Both paragraphs outline ASIC's considerations of what the appropriateness requirement should be in s994B(8)(b) that relates to the 'likely' application of the clause in the context of the retail client. Two aspects are important for our discussion. RG 274.68(b) and (c) regard descriptions and explanations of financial products that relate to the product's 'key attributes' and how those attributes would likely be consistent with likely objectives and the other requirements of s994B(8)(b). RG 274.69 then outlines the following.

> Further, the issuer [of the TMD] must describe the target market with *objective, tangible parameters* and with *sufficient granularity*: see RG 274.80–RG 274.86 [emphasis added].[83]

These paragraphs are important in the production of DDO related legal code for business systems because they appear to add further compliance requirements to the application of s994B(8)(b), namely, 'key attributes' of a TMD which must have 'objective and tangible parameters' and are constructed with 'sufficient granularity.' None of these requirements, including the notion of key attributes, are detailed in s994B(8). These additional requirements therefore appear to be ASIC's considerations of the actions to be taken that would give rise to a reasonable conclusion by an issuer based on the 'likely' requirements aspects of the clause.

Understanding the combined coding requirements of the DDO Act and RG 274 is therefore complex, as it requires different strategies and interpretive approaches. It was particularly important to identify whether the additional RG 274 requirements are separate to the legal obligations that arise from the Act. This was a complex legal task because (a) the basis for the additional requirements needed to be clearly identified from RG 274 and then (b) compared against the DDO Act to confirm whether the RG 274

[80] Corporations Act 2001 (Cth) s 994B(8)(a).

[81] Corporations Act 2001 (Cth) s 994B(8)(b).

[82] ASIC, 'Regulatory Guide 274: Product Design and Distribution Obligations' (n 3) 2.

[83] ibid 69.

	Coherentist rationale	Regulatory-instrumental rationale
Purpose	Declaration of law	Promote discourse
Focus	Meeting obligations	Establishing objectives
Approach	Prescription	Description
Mechanism	Rules	Norms

Table 1: *Outline of coherentist and regulatory-instrumental rationales relevant to the legal encoding exercise*

requirements are correspondent, ancillary to or separate from DDO Act legal obligations. At this point, we found ourselves in the overlapping realms of Brownsword's coherentist and regulatory-instrumental mindsets.

The reflective application of the regulatory-instrumental mindset, in conjunction with the coherentist mindset, helped us to reveal the normative differences arising from the application of legal and regulatory perspectives. The mindsets enabled us to identify the differing rationales inherent to legal and regulatory instruments. These differing rationales impact on the resolution of interpretive ambiguities involved in the encoding process and therefore led us to identify the need for distinct coding strategies that are more contextually and culturally responsive to legal and regulatory differences.

Table 1 outlines the application of the coherentist and regulatory-instrumental mindsets that surface different legal and regulatory rationales relevant to the encoding exercise. For example, the purpose of legal instruments, such as legislation, is largely declarative in nature.[84] Legal instruments focus on obligations that need to be met, principally through the approach of prescribed rules as the primary implementation mechanism. Where rules are part of principles-based legislation, such as the DDO Act, regulated entities are deliberately accorded some degree of interpretive flexibility[85] that is then constrained, at least in Australia, through a defined process of statutory interpretation arising from *Project Blue Sky*.[86]

Regulatory instruments, on the other hand, have a different normative application and rationale. Regulatory instruments, as confirmed by case law, do not declare law *per se*. Instead, they are designed to promote ongoing discourse between regulated entities and regulators, particularly again in principles-based legislation.[87] RG 274 is a case in point as it largely guides regulated entities on how to establish favourably viewed compliance outcomes. It does not declare the law. It outlines ASIC's understanding of the DDO Act's application that focuses on establishing regulatory objectives through encouraged forms of compliance. RG 274's overall rationale therefore is to describe, as part of discourse, rather than to prescribe and to ultimately declare. The discourse-based purpose of regulatory instruments results in a mechanism that is intent on establishing positive compliance norms that are structurally built into organisational cultures, rather than formalistically meeting rules as a form of 'tick in the box', symbolic compliance.[88]

The analysis of different mindset applications to legal coding highlights that individual mindsets are distinct, but at the same time, are also complementary in highlighting different interpretive needs in legal coding exercises. Our findings indicate that each mindset perspective highlights different aspects of the computational, legal and regulatory requirements in encoding legislation. An encoding approach is required that encompasses all mindsets and goes beyond a purely legal, technical or regulatory con-

[84] Edward L Rubin, 'Law and legislation in the administrative state' (1989) 89 Columbia Law Review 369, 372–373.

[85] Julia Black, 'Forms and paradoxes of principles-based regulation' (2008) 3(4) Capital Markets Law Journal 425, 425.

[86] Lisa Burton Crawford and Dan Meagher, 'Statutory Precedents under the'Modern Approach'to Statutory Interpretation' (2020) 42 Sydney Law Review 209, 217–219.

[87] The discourse element is an integral element of principles-based application. See Julia Black, 'The Rise, Fall and Fate of Principles Based Regulation' in Kern Alexander and Niamh Moloney (eds), *Law Reform and Financial Markets* (Edward Elgar 2010)

[88] Lauren B Edelman and Shauhin A Talesh, 'To comply or not to comply—That isn't the question: How organizations construct the meaning of compliance' [2011] Explaining compliance: Business responses to regulation 103.

text to better align and capture compliance perspectives. As such, Brownsword's mindset framework assists significantly in better understanding the complex and diverse requirements of the legal coding exercise.

Nevertheless, there are limits to Brownsword's striated mindset approach, as demonstrated in our research by the additional requirements arising from RG 274.68 and 274.69. These additional requirements do not sit comfortably in either the coherentist or regulatory-instrumental striations especially from a compliance perspective. As noted above, the additional requirements are not legal obligations. They should therefore not be considered from a coherentist mindset perspective. However, the additional requirements clearly establish compliance obligations that go beyond the expected regulatory-instrumental purposes of promoting discourse and establishing objectives through norms. From the perspective of business system designers, such as Realta, they are readily identifiable compliance obligations that are more tangible to business entities. More importantly, there is a direct recognition that business entities are integral regulatory partners in the development of positive compliance cultures intended through the application of principles-based frameworks.[89] This raises the question of whether an additional 'compliance' mindset is needed to capture the nuance of compliance practices within organisations, and to reflect a more sophisticated understanding of how businesses construct compliance in response to legal complexity and ambiguity.[90]

Concluding reflections

Our findings support the application of Brownsword's technocratic, coherentist and regulatory-instrumental mindsets to better understand the encoding of legislation exercise. We show how the mindsets can be used to develop different interpretive approaches that better match the distinctive complexities of legal, computational and regulatory logics and cultures. In doing so, we offer a more nuanced framework to consider the interpretive requirements of legal coding that goes beyond the limited considerations often found in RaC discourses and practices. The interpretive requirements necessary to produce legal and regulatory code for use in automated business systems are integral and cannot be reduced or removed, especially in relation to principles-based frameworks like the DDO regime. Nor should interpretive requirements be totally displaced to professions dominated by one mindset perspective.

Finally, we believe our focus on alignment and connection is important as a means of extending Brownsword's mindset framework.[91] The striated foundations of Brownsword's mindset approach allow for the development of more sophisticated understandings of the different disciplinary components involved in legal coding. However, whilst the striations assist to identify disciplinary differences, such as the different normative bases of legal and regulatory artefacts outlined in the table above, the disciplinary separation inherent to the mindset framework restricts the type of alignments required to resolve the interpretive issues arising from our research. In one sense, Brownsword's mindsets are pillars of contention that surface the tensions emanating within legal systems undergoing radical forms of digital disruption.[92] There are certainly advantages in surfacing tensions, but we believe the mindsets can also be used as complementary associates to better frame the deeper interdisciplinary challenges that arise from legal coding exercises. In our case, the mindset application does not entail a disciplinary tug-of-war. Rather, it provides guiding points to better negotiate the complex computational, legal and regulatory requirements relevant to the development of interpretive strategies and approaches that are essential for the encoding of legislation.

[89] Julia Black, Martyn Hopper, and Christa Band, 'Making a success of principles-based regulation' (2007) 1(3) Law and financial markets review 191, 191.

[90] Edelman and Talesh (n 88) 114.

[91] We started this work in Huggins and others (n 5) 353.

[92] Brownsword, *Law 3.0: Rules, Regulation, and Technology* (n 5) 5, 9.

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A reply: Regulatory mindsets, interpretive canons and computable models. A tangled interaction.

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Introduction

This contribution discusses the relation between legal mindsets and the coding of legal content into a rule-based language, to be processed by an automated business system.

It is argued that guidance for this exercise can be gained by referring to Brownsword's distinction[93] between three mindsets towards regulation: a technocratic, a coherentist and an instrumental one.

It seems to me that the paper contains interesting observations pertaining to the effort of translating legal rules into executable code. However, but I doubt that the theoretical framework that is proposed really contributes to this effort.

Mindsets and theories of interpretation

The background for the paper is provided by Brownsword's[94] distinction between three approaches to the relation between technology and regulation:

- a technocratic mindset, which 'emphasises the use of technological solutions to achieve regulatory purposes';
- a coherentist mindset, which 'emphasises the internal consistency, coherence and stability of law';
- a regulatory-instrumental mindset, which 'focuses on the instrumental efficacy of rules for achieving their policy purposes'.

The paper assumes that different mindsets lead to different ways of understanding the law and therefore to different computational models of it: a technological mindset favours modelling legal provisions according to their literal meaning, a coherentist approach, according to case law and other legal sources, and an instrumental approach according to the legislator's goals.

I fully agree that producing a computable representation of a legal provision (for instance, the prescription to perform a certain action given certain preconditions) requires a specification or *concretisation* of the content of the provision (to the extent that it is needed for the preconditions to be automatically checked and the action be performed). This specification involves an interpretation of the content of the provision, in the general sense of the determination of the meaning of that provision[95].

Following MacCormick and Summers[96], the following kinds of interpretive arguments can be distinguished[97]:

- Linguistic arguments: from ordinary meaning, from technical meaning, from contextual harmonisation.
- Systemic arguments: from precedent, from statutory analogy, from a legal concept, from general principle, from history.

[93] Roger Brownsword, *Law 3.0: Rules, Regulation, and Technology* (Routledge 2020).
[94] ibid.
[95] On the concept of interpretation see Douglas Walton, Fabrizio Macagno, and Giovanni Sartor, *Statutory interpretation: Pragmatics and argumentation* (Cambridge University Press 2021) Ch.1.
[96] DN MacCormick and RS Summers, 'Interpretation and justification' in DN MacCormick and RS Summers (eds), *Interpreting Statutes: A Comparative Study* (Darthmouth 1991).
[97] See also Walton, Macagno, and Sartor (n 95) 44.

- Teleological-evaluative arguments: from purpose, from substantive reasons, from intention.

Given the plurality of available interpretive canons, the content being ascribed to a legal source may vary depending on what interpretative canons are applied, in different legal domains, and on how they are prioritised. The use and prioritisation of different canons may vary between different legal cultures, and according to the views and socio-political preferences and visions endorsed by different interpreters, in general, or with regard to specific issue at stake.

When a determination of the content of legal sources is to be performed for the purpose of specifying the content of a computable models of the law, interpretation issues arise that are similar to those which are addressed by academic scholars, when proposing interpretations of legal sources, or by administrators and judges when applying such sources to concrete cases. This has implications concerning the rule of law[98], which have ramifications concerning the skills that are required in the modelling team, their institutional empowerment, the need to establish procedures for transparency validation and change.

Where I disagree with the authors of the paper is in the assumption that the different mindsets distinguished by Brownsword are the decisive aspect in determining what interpretive canons should be adopted in producing computable models of legislation.

First of all, it seems to me that linguistic interpretation cannot be put aside, as in every legal system there is a presumption in favour it, which can be rebutted under conditions that may differ in legal systems and domains of the law[99].

More importantly, I cannot really understand why literal interpretation should be preferred according to a technological mindset. In fact, both the technological and the instrumentalist approach view regulation as a means to achieve social goals, the difference being in what they mean by 'regulation': for the first (mainly) technologically-enabled abilities and technologically-enforced constraints, for the second (mainly) prescriptions directed to humans. Thus, it seems to me that the technological mindset, as described by Brownsword, involves adopting a teleological approach, that must be sufficiently developed (and thus go beyond the literal meaning) to ensure that the legislative goals are implementable through technology alone.

What is discussed under a 'technological mindset' is rather the difficulty involved in casting the richness of natural language into a logical formalism. This problem is not uniquely linked to a literal understanding of the text; on the contrary, whatever approach is used to determine the content of a legal source, this content is to be expressed in natural language and then translated into a computational formalism.

Similarly, it is claimed that a computable representation that delivers the appropriate output, given certain inputs, may still be inadequate, when it uses artificial intermediate concepts, not present in the original legal text. This may enable a more compact representation of the legal content, but makes it more difficult to understand the rationale of the clauses in the computable representation. This issue is real, but it is not linked to a specific mindset; it rather pertains to the need to maintain a connection between the human representation of the law – whatever its source – and its computable representation[100].

It is also undoubtedly true that determining a computable meaning of vague or anyway undetermined standards requires going beyond legal sources, but this does not depend on the mindset according to which legal content is modelled.

I also agree with the idea that the computational modelling of regulations directed to administrative bodies may require a specific focus on role of the administrative agencies

[98] Mireille Hildebrandt, 'Algorithmic regulation and the rule of law' (2018) 376(2128) Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 20170355.

[99] Brian G Slocum, *The nature of legal interpretation: what jurists can learn about legal interpretation from linguistics and philosophy* (University of Chicago Press 2017).

[100] Simplifying rule-based representation through intermediate concepts is a technique frequently used also in science and in law itself, see Alf Ross, 'Tû-tû' (1957) 70 Harvard Law Review 812

concerned and the approach adopted by them, but this also is a mindset-independent concern.

Conclusion

In conclusion I found this paper to be an interesting account of the interpretive and modelling issues to be addressed for the purpose of providing computable representations of legal sources. However, I doubt that the lens adopted by it, namely, the distinction between technological, coherentist, and instrumentalist mindsets contributes much to this analysis.

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Author's reponse

Mark Burdon and others

We agree with Giovanni Sartor that Brownsword's mindsets need further development before they could be an actionable methodology for legal coding exercises. Our paper is part of an ongoing exploration to examine how the mindset approach can assist with legal coding in practice. This is an important issue given the rapid expansion of automated business systems. We agree that Brownsword could be clearer on how his mindsets apply. His labelling of the mindsets also partially obfuscates our key focus on legal, regulatory and computational logics relevant to legal coding practices for compliance purposes. Nevertheless, our paper highlights that a mindset analysis can surface the disciplinary tensions underpinning practical legal coding exercises, a point which is often overlooked.

Sartor argues that the link between a specific mindset, the 'technocratic', and a specific form of legal interpretation, a literal or plain reading, is problematic. Sartor seems to have read this as a normative argument. We agree that such a link is problematic from a normative perspective, especially if viewed in isolation. In the paper, we used the mindsets as part of an analytical self-reflective process to better understand our legal coding exercise. Our paper highlights that previous studies, including those key historical works that established the genesis of the legal coding literature, reflect a tendency towards the application of literal interpretive approaches as a core part of legal coding exercises. Even now, as highlighted in the early part of our paper, those considerations are still portrayed as the norm in some Rules as Code literature, when a more nuanced and transparent approach is needed. We are not arguing that other interpretive approaches are more normatively valuable or preferable. Rather, we contend that each approach accounts for different interpretive choices, which can lead to different presentations of code. Accordingly, the mindsets alone are not necessarily normative. They are a heuristic device, or ideal type, which serves as an aid for more fine-grained analysis of the different logics, practices and productions inherent in legal coding.

Throughout, Sartor's helpful critique assumes that the interpretive choices of compliance-focused legal coding exercises begin with a legal choice about interpretive strategies and the flexible pathways that arise through different canons and arguments. Sartor is right to highlight the need for a continued connection between 'a human representation of law' and a 'computable representation.' We strongly agree with that argument. Where we differ is the reality of legal coding exercises conducted for business compliance purposes, which is not the clearly delineated and straightforward legal to technical conversion exercise that Sartor describes. Instead, there is a plurality of competing perspectives encompassing legal, technical and regulatory considerations that better highlight the complex actualities of computable legal representations for automated compliance purposes. It is the disruption of clearly defined and readily identifiable disciplinary boundaries that Brownsword's work harks to with his mindsets. We therefore reiterate the value of *aligning* mindsets and interpretive approaches, a point which Sartor seems to miss, and one which best describes the normative component of our paper.