Interoperable AI Regulation

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Note to WeRobot 2025 Participants:

This paper is an early draft in which I seek to better understand the work that "interoperability" is doing in the context of domestic AI regulation and more broadly. My interest is less in the ins and outs of debates about *AIDA*, Canada's now "dead" draft *AI and Data Act*, or the legislative process. Others have covered that terrain pretty robustly. Rather, I'm interested in exploring what legislators' expressed conception of AI regulation *as* needing to be "interoperable" across jurisdictions might tell us about regulating technology. Of interest, too, is how concepts like interoperability, and laws themselves, serve as boundary objects or as information systems, respectively. This aspect of the paper needs more development, however.

At present, I explore these ideas by diving into a range of literatures that discuss interoperability: technological, administrative, sociotechnical, and regulatory texts are all canvassed. The ordering of the different paper sections is still a work in progress. In some spots, I have opted for longer quotes from texts (which I plan to whittle down in a future draft) so that I can "show" WeRobot participants some of what I've discovered, rather than simply "tell." I've done this to provoke conversation and italicized some sections of longer passages where concepts are framed in ways that I would like to explore further in a later draft.

My goal with this paper is not to argue for some "pure" theory of law or of regulation. Instead, I seek to make sense of a phenomenon that I am seeing in other areas of my research: that is, the adoption of technological concepts or frameworks into statutory or policy frameworks without much reflection on how these concepts mean different things to different communities (as "boundary objects").[1] I'm equally interested in how adopting these concepts shifts the content and functions of laws themselves.

Comments, questions, reflections, and more are all welcome. Thanks for taking time to engage with this paper.

I. Introduction

> "We have spoken with our European counterparts and interoperability is essential. Our European colleagues are closely watching what is happening in Canada."
>
> Hon. François-Philippe Champagne

[1] See for instance, Jennifer Raso, "Responsible AI: Binaries that Bind" (2024) 69:4 *McGill Law Journal* 395-417; Victoria Adelmant and Jennifer Raso, "Data Entry and Decision Chains: Distributed Responsibility and Bureaucratic Disempowerment in the United Kingdom's Universal Credit Program" (2025) forthcoming in *Oxford Journal of Legal Studies*.

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While introducing an amended version of Bill C-27 to the Standing Committee on Industry and Technology, Canada's Minister of Innovation Science and Industry, François-Philippe Champagne, emphasized the need for regulatory "interoperability." Throughout his discussion with Standing Committee members, the Minister highlighted the importance of interoperable legal frameworks, proposing that such frameworks would make Canadian AI firms better able to "interoperate" in other jurisdictions, including within the European Union.[2]

Bill C-27, which included Canada's draft *Artificial Intelligence and Data Act* (or *AIDA*), did not become law before a federal election was called.[3] But the legislative preoccupation with interoperability is provocative and worth exploring. While the notion of interoperable regulatory regimes may be new to some readers, it is a concept with a longer history that takes on new life in these Canadian discussions about AI regulation.

As a concept, *interoperability*'s roots can be traced to technological and administrative governance literatures. It is found in data and computer science texts illustrating how to design computing systems so that they can communicate with one another. It is also found in texts focused on administrative governance, from early accounts of "e-Government" to more recent sociotechnical examinations of regulatory tools and systems.[4] It is also found in more recent scholarship on regulation, where the concept is used to argue for regulatory models that enable norm (and likely data) transfers across systems. It is useful to consider this conceptual genealogy in light of the work that interoperability does in discussions of how Canadian regulators *ought* to regulate AI, in part because it tells us something about how the shape and function of regulatory regimes may (or may not) themselves be shifting in relation to technological shifts (AI or otherwise).

This paper thus asks how "law" and "technology" reconstitute one another, as observable in the evolving discussions of interoperability. Does the move to develop interoperable AI regulations mark an important shift in what regulators do, and what they think that they ought to do, when they regulate AI systems?

To answer these questions, this paper draws on multidisciplinary research spanning sociotechnical studies, computer science, public administration, and regulatory theory. Rather than propose impermeable boundaries between legislators and technologists, this paper takes a more interactionist approach. The reconfigurations it explores extend beyond conventional framings that view legislators as

[2] For instance, the Minister stated "The fifth [amendment] that I wish to highlight is to align with the EU AI Act as well as other advanced economies of the OECD by making targeted amendments to key definitions and clarifying requirements. This change will specifically ensure that Canadian AI companies are interoperable with other jurisdictions and that our companies have access to international markets. It is fundamental to the world we live in to be able to be interoperable."

[3] See Blair Attard Frost, "The Death of Canada's Artificial Intelligence and Data Act: What Happened, and What's Next for AI Regulation in Canada?" (January 17, 2025) *Montreal AI Ethics Institute*, online: <https://montrealethics.ai/the-death-of-canadas-artificial-intelligence-and-data-act-what-happened-and-whats-next-for-ai-regulation-in-canada/>.

[4] Yeung 2022.

easily "captured" by the interests of powerful tech companies. Rather, the interactions between different fields or contexts traced below, this paper suggests, more closely resemble the boundaries, figuring, and mutual constitution processes that sociotechnical scholars, including Lucy Suchman, Geoffrey Bowker, and Susan Leigh Star have explored in their work.[5]

This paper extends the insights of sociotechnical scholars to make sense of interoperable AI regulation. It explores interoperable AI regulation as an example of mutual constitution between law (including legislative actors and regulatory scholars) and technology (from ICT to AI and digital administration systems). It argues, ultimately, that interoperability functions as a "boundary object": that is, a concept that facilitates communication between different communities but that has distinct meaning among each of those communities. In AI regulation, interoperability allows for the transfer of norms and potentially data across legal systems. While this functionality is not evident in debates about *AIDA*, examples of interoperable digital infrastructures suggest that interoperability as a design feature also requires and anticipates a deep degree of interwovenness at the level of socio-legal-technical infrastructure. This interweaving enables not only the transfer and to some degree the homogenization of legal norms, but it also performs the same type of transfer and tailoring of data. At this stage, I am still thinking through what this means for interoperability and the role it plays in more conventional regulatory processes (such as the creation of a statute like *AIDA*). But one important intuition is that *because* interoperability's meaning shifts between communities, its use in legislative discussions and its gesturing towards seamless or synergistic legislation may shape expectations about how *other* elements of state legal systems (including digital administrative elements) ought to operate. In other words, the dream of seamlessness might distract from why states might want, and might need, some degree of "friction" or "seams" as between them.

These insights are new and timely. Digital government studies have, for some time now, examined how AI systems and their developers reshape administrative governance. Digital state initiatives have transformed how bureaucrats conceptualize their roles as members of the executive branch of government.[6] The shift from "waterfall" to "agile" models of bureaucratic processes have, in some senses, transformed how agencies dedicated to digitalizing government administration approach program design and delivery.[7] Few studies have deeply explored how other technological concepts, like interoperability, are reconfiguring other forms of lawmaking including the form and function of AI regulation itself.[8]

The paper proceeds as follows. Part II draws on sociotechnical literature to introduce the concepts of mutual constitution and boundary objects. Part III tells the "origin story" of interoperability, drawing on early ICT, data/computer science, and e-Government literatures. It then connects interoperability with contemporary analyses of socio-legal-technical systems. Part IV then traces the influence and meaning of

[5] Suchman, *Human-Machine Reconfigurations* (2007); Bowker & Star, *Sorting Things Out* (1999).
[6] Burrell, Singh and Davison 2024.
[7] Tomlinson 2019; Raso 2022; McConvey and Guha 2024
[8] Here, I plan to add EU-focused work that examines how "risk" (a concept from actuarial science) now dominates AI regulation in the EU's *AI Act*. Risk is arguably a "technological" concept in some ways, but the phenomenon I'm exploring here is the blending in of concepts from computer system or ICT design itself, which is where interoperability comes from.

interoperability in regulatory literature. Part V returns to interoperability in the context of Canadian AI regulation and makes sense of what is happening through the lens of the sociotechnical concepts identified in Part II. Part VI concludes.

II. Sociotechnical Insights: Interaction, Reconfiguration, Boundaries

Sociotechnical literature provides useful insights into how different entities, and concepts from different disciplinary communities, interact and, through these interactions, reconstitute meaning. Some of the work in this field, especially human-computer interaction studies, has centred on how humans make sense of machines. It shows how, in the process, humans develop and evolve popularized understandings of machines and even intelligence. This evolution can occur in a community that is relatively closed, such as office workers in one workplace who interact with and make sense of a new copying machine.[9] But it can also occur across a wider cross-section of society; a good example is how popular notions of intelligence or even what it means to think or to write have shifted as technologists have claimed to produce "intelligent" machines.[10]

The relationship between law and technology, or more specifically between how legislators describe regulation and how technologists design digital computer systems (from AI to ICTs), is interactive and shifting. For legal scholars, this may sound very wishy-washy. Sociotechnical scholars, meanwhile, might recognize the phenomena described below as situations where the meaning of particular concepts, from interoperability to law itself, shift as members of different communities (legislators and technologists, for instance) interact with one another.

Early studies about the relations between humans and machines can shed light on how different disciplines or professions relate and how their different conceptions of system design interact. Suchman, an anthropologist by training, is well known for her insights into how humans make and remake meaning as they interact with machines. A key insight from her work is the importance and function of interfaces. Suchman, writing about human-machine interfaces, notes that they are a "relation enacted in a particular setting" and one that, over time, shifts.[11] Through these interfaces, humans and machines reconstitute each other, though this reconstitution is not necessarily symmetrical. In some cases, for example in engineering or "technoscience" research, an entity on one side of this relation ("the technical" in research and development regimes, for example) might be centred, while the other side ("the social", in Suchman's words) might be "separated out and relegated to the margins."[12]

Other scholars have provided helpful insights into how different communities of practice construct meaning in relation to information systems. Their thinking is synergistic with Suchman's analysis about how entities reconstitute one another on either side of an interface. In this vein, Bowker and Star's analysis is instructive on the question of how interoperability is given meaning by different communities

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[9] Lucy Suchman, *Plans and Situated Actions: The Problem of Human-Machine Communication* (Cambridge: Cambridge University Press, 1987).
[10]Abeba Birhane, "Human Agency in the Age of Algorithms" in Michael Salu, ed, *Cybernetics and Ghosts: The Digital Future of Writing* (March 2023), online: https://writersmosaic.org.uk/content/cybernetics-and-ghosts-writing-under-the-technological-influence/ , Adrian Daub, *What Tech Calls Thinking* (New York: FSG Originals x Logic, 2020); John Warner, *More Than Words: How To Think About Writing in the Age of AI* (New York: Basic Books, 2025).
[11] Suchman, *Human-Machine Configurations* at 263.
[12] *Ibid* at 269-270.

in different settings.[13] Their analysis is part of a larger sociotechnical theory about how classification systems operate. Classification systems, they note, are the backbone of the information infrastructures that underlie institutions ranging from colonial bureaucracies to nursing. These classification systems are sites where technological and bureaucratic techniques, objects, and communities of practice (i.e., different professional or disciplinary communities) interact, and where those interactions become perceptible. Though Bowker and Star do not use the term, we might think of these systems as functioning like interfaces between different professional communities: nurses and lab technicians, for example, who make sense of a particular patient through medical records, or policymakers and statisticians who make sense of a population through census data.

Different communities working with the same information system are bound to communicate with each other using varied lexicons and different conceptual starting points. The tensions that can arise from these interactions must be managed in some way. This management is often done, as Star suggests in earlier work, through the use of "boundary objects."[14] Boundary objects are things that "inhabit several communities of practice and satisfy the informal requirements of each of them." They are thus "both plastic enough to adapt to local needs and constraints" of the many people who use them, while also being "robust enough to maintain a common identity across sites."[15] Boundary objects may have different meanings for the different communities who use them, but they have a common structure so that they are recognizable to members from more than one community of practice. In any setting where members of different communities interact with each other, including through an information system, boundary objects are central to developing and maintain some sense of coherence.[16]

Boundary objects are thus vital for any information system to function. They are indispensable because a key aim of the designers of information systems is to "transmit information across contexts."[17] This aim, however, raises communication problems because information systems are almost always used by people who belong to different communities of practice. "Standardization" is sometimes proposed to solve the problem of creating a mutually intelligible information system (i.e., one whose categories and labels function for nurses and lab technicians alike, for example). However, Bowker and Star suggest that such an approach is often unsuccessful when applied to information systems because meanings shift. In their words, "standards do not remain standards for long, and one person's standard is another person's mess."[18]

In the above literatures, sociotechnical scholars have identified what might be described as an interoperability problem, and have also articulated the dilemma that is in fact at the heart of expressed desires for interoperable regulation. In their study of information systems, Bowker and Star describe the tools and strategies required – boundary objects being one of these – to ensure that any particular

[13] Bowker and Star, *Sorting Things Out* (Cambridge: MIT Press, 1999).
[14] Susan Leigh Star and James R Griesemer, "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39" (1989) 19 *Social Studies of Science* 387, Susan Leigh Star, "The Structure of Ill-Structured Solutions: Heterogeneous Problem-Solving, Boudnary Objects, and Distributed Artificial Intelligence," in M Huhns and L Gasser, eds, *Distributed Artificial Intelligence 2* (Menlo Park, CA: Morgan Kauffmann, 1989).
[15] Bowker & Star at 297.
[16] *Ibid*.
[17] *Ibid* at 293.
[18] *Ibid*.

information system is *interoperable* across contexts and communities. To be interoperable, an information system must use classifications that *can* be used by different communities of practice, even though those classifications will mean different things to different communities. This is a phenomenon that we can see in the earliest examples of interoperability, as well as more recent ones, traced in Part III, below. Second, in examining how community members make sense across distinct differences (in disciplinary training, in categorization, in language use), sociotechnical scholars unknowingly identify dynamics that are also at play when legislators and regulatory scholars propose that AI (or other) regulations ought to be designed in an interoperable fashion. This final observation is explored in Parts IV and V.

III. Interoperability's Origin Stories: Computing System Design and e-Government

As a concept, interoperability has technological and administrative roots. It is traceable in literature on the design of computing systems. Interoperability is also found in literature on the technical and administrative or bureaucratic aspects of e-Government initiatives, primarily those that took hold in Europe and the United Kingdom in the late 1990s. It remains prevalent, too, in more recent literature on digital government. This parallel development of interoperability in two streams of literature may surprise legal scholars, but as sociotechnical thinkers such as Ali Alkhatib have noted, the logic and structures underlying computing and bureaucratic systems often overlap.[19] As a concept with relatively widespread adoption across distinct communities, we might consider interoperability itself as functioning like a boundary object, helping technologists and public administrators alike make sense of digital government and other software and internet-enabled institutional relations.

Computing System Design Literature

In technical literature, interoperability is often discussed in texts that detail how computing and computational systems are designed and how they function. These texts span generations of computational developments. They include earlier texts on information and communications technology (or "ICT") system design to more recent literature on machine learning. While the paragraphs that follow trace the term's appearance in more recent computing literature, the dream of storing all knowledge in a single form that could then be accessed by compatible systems dates back hundreds of years to Leibniz.[20]

In these texts, interoperability ultimately describes the ability of one software system to coexist and to function with other systems.[21] An early source uses some familiar examples to illustrate what interoperable systems might include: "a word processor's ability to incorporate a chart produced by a graphing package, or the graphics package's ability to graph the data produced by a spreadsheet, or the spreadsheet's ability to process an image scanned by a scanner."[22] The authors of this text note that, in

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[19] Ali Alkhatib, "To Live in Their Utopia: Why Algorithmic Systems Create Absurd Outcomes" (2021) *CHI '21, May 8-13 2021, Yokohama, Japan*, https://doi.org/10/1145/3411764.3445740

[20] Geoffrey Bowker & Susan Leigh Starr, *Sorting Things Out: Classification and its Consequences* (Cambridge: MIT Press, 1999) at 107-111.

[21] *The Computer Science and Engineering Handbook*, edited by Allen B Tucker, Jr, and others (CRC Press:1997) at 2300.

[22] *Ibid* at 2288.

the 1990s, interoperability was relatively uncommon across software products, primarily due to proprietary development and control of such products. Other technologies, such as stereo systems, were much more "interoperable" in that components of one system (speakers, for instance) could be used by another system with relative ease. Over time, the desire for interoperable computational systems has spurred some standardization efforts: for instance, in the interfaces used for database access.[23] Of course, other elements of computing systems (including the cables used to connect different system components together) have taken decades to standardize to enable some degree of interoperability between the different components of one system.

When computing texts describe interoperability in further detail, they use the term to refer to both *code* (i.e., interoperable machine instructions) and to *data* (i.e., the formats in which data is saved). These two components are related and cannot easily be disentangled. Concerns about the longevity of digital data, including code itself (which is a form of data), and about the degree to which one file format will be interoperable with, or readable by, a future device or system are both related to the un/availability of software and hardware that might be needed to "read" or interpret data stored in a particular format.

Interoperability is also related to code when it comes to improving the functionality of a computing system, including a system built on machine learning. As data scientist Kristen Kerher and software engineer Caleb Kaiser note, in order to design systems that *can* be improved over time, software engineers must ask: "is our code written in such a way that we could easily refactor it to improve the system?" [24] This question ultimately relates to the degree to which a software system has components that interoperate and that can be scaled up or down. If code is crafted with interoperability and scalability in mind, then "[a]ny discrete improvement could be adopted into [that] system without massive disruption."[25]

Interoperability, too, mobilizes or relies upon wider components (hardware, software, data) of a computational system. One feature that makes interoperability possible in a computational system is the degree to which the system's components are "modular." Media studies scholar Lev Manovich helpfully illustrates this aspect of interoperability in his analysis of modularity, which appears in his early writing on different forms of media. His accounting of file storage types and structured computer programming is evocative. As will be shown further below, it foreshadows some of the facets of interoperability as discussed within texts on e-Government and administration. Manovich writes:

> We can also make an analogy between modularity of new media and structured computer programming. Structural computer programming which became standard in the 1970s involves writing small and self-sufficient *modules* (called in different computer languages subroutines, functions, procedures, scripts) which are assembled into larger programs. Many new media objects are in fact computer programs which follow structural programming style. For example, most interactive multimedia applications are programs written in Macromedia Director's Lingo. A Lingo program defines scripts which control various repeated actions, such as clicking on a button; these scripts are assembled into larger scripts. In the case of new media objects which are not computer programs, an analogy with structural programming still can be made because

[23] *Ibid*.
[24] Kristen Kerher and Caleb Kaiser, *Machine Learning Upgrade* (Wiley 2024) at 23.
[25] *Ibid*.

> *their parts can be accessed, modified or substituted without affecting the overall structure of an object.* This analogy, however, has its limits. If a particular module of a computer program is deleted, the program would not run. In contrast, just as it is the case with traditional media, deleting parts of a new media object does not render its meaningless. In fact, the modular structure of new media makes such deletion and substitution of parts particularly easy. For example, since a HTML document consists from a number of separate objects each represented by a line of HTML code, it is very easy to delete, substitute or add new objects. Similarly, since in Photoshop the parts of a digital image are usually placed on separate layers, these parts can be deleted and substituted with a click of a button.[26]

To today's reader, Manovich's account may appear to be vintage or dated. Yet, his observations about modularity remain salient. They parallel contemporary insights about the design of machine learning systems. Kerher and Kaiser, for instance, describe interoperability as a central part of the overall "architecture" or logic of a machine learning system. As an architectural feature, interoperability is something that engineers must attend to when they design a software system. Some features, such as observability, scaleability, reproducibility, or improveability, are identified as "core" architectural features of a machine learning system. Interoperability, meanwhile, is essential for enabling machine learning systems to evolve forward, or to integrate new advancements in computing. Kerher and Kaiser write:

> Some people may not consider [interoperability] a universal principle as much as it is our preference. After all, there are plenty of companies running on software stacks that are not interoperable outside of their ecosystem but are still robust and stable. In machine learning, however, where the field is changing so rapidly, interoperability is essential. You might want to be able to adopt some huge breakthrough the field generates, and having an interoperable platform makes this easier.[27]

The authors go on to describe how interoperable software is vital for ensuring that machine learning systems for ensuring stable, relatively reliable machine learning systems:

> Building interoperable software is a topic that goes beyond machine learning and could be the topic of many books. Instead of going deep into philosophies of software architecture, we are going to focus on some actionable principles for you to keep in mind. … [F]or now, the key idea is modularity.
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> When implementing our system, *we want to contain every basic operation of our system inside its own atomic function. Each function and each tool is responsible for only one thing. In principle, this allows us to swap individual pieces out without cascading failures*. For example, in a later chapter, we will write a `get_completion()` method for calling our LLMs. If we were to change foundation models, *all we would have to do is edit this single function, and everything should work the same*. Similarly, our observability platform can output data to any host, meaning *we can change our analytics platform however we like without disrupting our system*. [28]

[26] Lev Manovich, *The Language of New Media* (MIT Press 2002) at 52 [*emphasis added*].
[27] Kristen Kerher and Caleb Kaiser, *Machine Learning Upgrade* (Wiley 2024) at 17.
[28] *Ibid* at 21 [*emphasis added*].

The authors note, too, that interoperability requires that different sources of information, or data, must be able to function across computational systems. The many different formats and structures that data takes, however, can be a barrier to wider system interoperability:

> Data interoperability is also a big challenge when getting models into production. Although we expect our phones and phone apps to have a high level of interoperability, with different devices and platforms communicating, sharing data, and working together seamlessly, it is often not the case in industry, particularly in healthcare. Often data sources across departments will come from different (sometimes legacy) systems, with different formats and structure. "Data silos" as they're often called, can be a huge hurdle in getting machine learning models into production.[29]

Interoperability, then, has a relatively stable meaning within technical literatures. As a design concept, it centres on the degree to which a computational (or software) system is able to work with, or be compatible with, other computational systems. To achieve interoperability, the many components of one system (code, data, software, hardware) must be designed so that they *can* interoperate with those of other systems. Modularity is one way of achieving this goal, but we might also imagine some degree of harmonization, adaptability, or standardization (as in the case of cable connections) as another technique for achieving interoperability. In some senses, the dream of interoperability also suggests the need for a degree of homogeneity (and even monopoly power) across systems, insofar as uniform coding language, data storage formats, and hardware interconnections would (in theory) simplify the task of interconnecting systems.

E-Government and Administrative Literature

Interoperability also appears in literature on digital administration, particularly analyses of the bureaucratic and technical arrangements mobilized in early "e-Government" initiatives. In this literature, it is clear that the concept of interoperability is not merely "technical." Rather, the term is used in ways that implicate technical and bureaucratic (i.e., "un-siloed" institutions) models and concerns.

In e-Government literature, the dream of interoperable or integrated administrative systems underlies much of the early discussions of what e-Government might mean and what it might require. Interoperability also appears in later literature that seeks to diagnose why catastrophic failures happen in e-Government projects, especially from a managerial perspective. In the most recent literature analyzing digital government practices (which rarely mentions the now retro-sounding "e-Government"), interoperability is used more descriptively and critically to document a state of affairs – that is, to trace what is happening in practice as socio-legal-technical infrastructures expand – rather than as an ideal to be achieved. This more recent literature observes, too, that interoperability is often described by technologists and governments alike as a self-evident vision of a desirable future. As Matthias Leese puts it, interoperability is a "political imaginary" that "illustrates how things are supposed to work in contrast to current shortcomings."[30]

Computing in government is as old as the digital computer.[31] Despite this long history, in the late 1990s the term e-Government (or "eGov") started to be used by policymakers to articulate the challenges

[29] *Ibid*.
[30] Matthias Leese, "Fixing State Vision: Interoperability, Biometrics, and Identity Management in the EU," (2022) 27 *Geopolitics* 113 at 147.
[31] Jenna Burrell, Ranjit Singh, and Patrick Davison, *Keywords of the Datafied State* (New York: Data & Society, 2024).

associated with implementing internet-enabled computerized administration.[32] As sociologist Paul Henman has noted, e-Government has sometimes referred broadly governments' use of older ICTs (telephone call centres, for example). In these contexts, the term has described tools and systems used to share information and deliver services, which operated in parallel with internet-connected technologies such as records sharing mechanisms.[33]

In e-Government literature, interoperability represents the dream of integrated, networked administration. In the earliest accounts of e-Government, it promised to make government services seamlessly available, via electronic and internet-enabled means, to people and to businesses. It also promised to enhance efficiency within inter-agency operations themselves. The vision of using technology to break down administrative silos is common. This vision is clearly expressed in early statements by agencies such as the British National Audit Office and the OECD.[34] Bodies like the International Social Security Association, too, were drawn to e-Government as a strategy that would facilitate new, linked up, forms of government administration. For instance, in a 2002 opening address to the Association's members, then-president Johan Verstraeten remarked:

> E-government is a way of making the delivery of government services more efficient by 'integrating' or perhaps 'clustering' them, and making them available through a single point of access on the Internet: the so-called 'single window' that provides 'one-stop shopping." E-government is also *information-based government*. In this view, e-government involves creating a series of overlapping information networks and encouraging the practice of information networking. E-government is smart government too. E-government will improve exponentially the quality and quantity of data in the coming years.[35]

While the term "interoperability" is not explicitly used in the above text, the functionalities described in early accounts like this one rest upon the promise of interoperable software systems within and beyond domestic administrative agencies.[36] Indeed, some have pointed to policymakers and technologists' mutual *under*appreciation of the massive scope and scale of e-Government projects, which have usually been approached as merely IT projects rather than projects that require interoperability at all levels.[37]

Critics suggest that a key reason early e-Government projects resulted in catastrophic failures was that policymakers failed to ensure sufficient interoperability. In other words, they note that the administrative and technical infrastructures underlying many e-Government projects were *not* designed to facilitate

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[32] Åke Grönlund and Thomas A. Horan, "Introducing e-Gov: History, Definitions, and Issues" (2004) 15 *Communications of the Association for Information Systems* 713-729.
[33] Paul Henman, *Governing Electronically: E-Government and the Reconfiguration of Public Administration, Policy and Power* (London: Palgrave Macmillan, 2010) at 34-35.
[34] National Audit Office, *Better Public Services Through eGovernment* (2002) at 13; OECD "The e-Government Imperative" (2003) 3:1 *OECD Journal on Budgeting*.
[35] Johan Verstraeten, "Opening address," (2002) paper presented at *ISSA International Conference on Information in Social Security*, Valencia, Spain, 14-16 [*emphasis added*].
[36] See, for example, Howard Besser, "The Next Stage: Moving from Isolated Digital Collections to Interoperable Digital Libraries" (2002) 7:6 *First Monday*.
[37] An exception to this is the INSPIRE system, a spatial data infrastructure introduced in EU member states in 2007. See Rumyana Tonchovska, Victoria Stanley, and Samnatha De Martino, "Spatial Data Infrastructure and INSPIRE" (September 2012) vol 55 World Bank Europe and Central Asia Knowledge Brief No 76208.

deep integration across bureaucratic and technological borders.[38] Scholars of informatics, for instance, note, "The eGov history shows a large amount of unsuccessful projects and sometimes even total failures. Failures are often attributed to the complexity of integration."[39] To avoid failing forward, we are told, more recent e-Government projects strive "towards integration and interoperability. Integration by definition means involving more actors and hence a shift towards governance."[40]

Most recently, interoperability has become widely referenced in critical socio-legal-technical studies of administrative systems. It is especially common in studies of spatial governance systems, including those regulating people or things that move (truckers, vehicles, goods, migrants, citizens).[41] Scholarship in this field identifies interoperability as a feature of systems governing *spaces* where rules from different jurisdictions or authorities overlap. Interoperability is also identified as a feature of systems that govern *actors* who move through these spaces, and to whom these layers of rules also apply. In these examples, social, legal, and technical mechanisms intertwine. For instance, border control policies materialize in the technological and social interactions and mechanisms that bring digital borders to life.[42]

In this critical literature, interoperability may illustrate the ideals underlying digital infrastructures, such as the dream of integrated, comprehensive governance of people or things on the move. However, it is more often used descriptively to illustrate, and to critique, how system components function together. In some cases, interoperability discussions also highlight how integrated systems affect domestic law, such as privacy protections or the right to be heard, and how they affect the lives of people on the move.[43]

For instance, Karen Levy uses interoperability to explore how technologies, legal rules, and management techniques govern long-haul truckers in the United States. She uses the concept to articulate how tools, such as electronic logging devices that record data about a trucker's activities, interoperate with an integrated network of state regulatory agencies, such as the Federal Motor Carrier Safety Administration, and corporate governance techniques to regulate truckers. She proposes that the interconnected government, corporate, and third-party surveillance of truckers' behaviour is in some senses "interoperable" even though each of these sources of regulation seeks to accomplish different aims. Here, Levy uses interoperability to describe the deep compatibility of each type of surveillance, linking it to economic, legal, technical, and other features.[44]

In the wider world of datafied state literature, interoperability is used by scholars to make sense of new e-Government initiatives (though that term is no longer used).[45] Digital identity systems are one such

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[38] BCS, "Why are complex IT projects different?" *BCS thought leadership debate* (16 March 2005). http://www.bcs.org/server.php?show=conWebDoc.2619

[39] Ann-Sofie Hellberg and Åke Grönlund, "Implementing Interoperability: Re-operationalizing basic values" (2013) 30 *Government Information Quarterly* 154-162.

[40] *Ibid*.

[41] E.g., Clancy Wilmott, "Small moments in spatial big data: Calculability, authority and interoperability in everyday mobile mapping" (2016) 3:2 *Big Data & Society*.

[42] E.g., Gavin Sullivan and Dimitri Van Den Meerssche, "The Legal Infrastructures of UK Border Control: Cerberus and the *Dispositif* of Speculative Suspicion" (2024) 25 *German Law Journal* 1308.

[43] E.g., Petra Molnar, *The Walls Have Eyes* (New York: The New Press, 2024).

[44] Karen Levy, *Data Driven; Truckers, Technology, and the New Workplace Surveillance* (Princeton: Princeton University Press, 2023) at 74-75.

[45] It is also important to note that, in some of this literature, interoperability is discussed using other language. Some related terms include integration, as in integrated data systems; modularity; and compatibility. See, for

case. Like the systems used in the trucking industry, digital ID systems seek to govern people as they move through different spaces and to streamline the application of rules from multiple agencies or sources. Literature exploring digital ID projects, then, often describes them as using interoperable systems to create legible, "machine-readable" citizens that state agencies (and others) can "know from a distance."[46] For instance, in their analysis of state-based digital ID systems, sociologist Mardiya Siba Yahaya and policy researcher Bonnita Nyamwire describe interoperability as central. Tracing the development and functionality of digital ID systems in Kenya, Tunisia, and South Africa, they illustrate how ID data released in an "interoperable" format allows it to be "processed" or used by a variety of state and non-state systems. This phenomenon extends the technical and legal arrangements of previous classification regimes, such as those used in apartheid-era South Africa.[47] This functionality allows modern digital ID systems to be used to monitor, screen, and analyze peoples' everyday interactions across society.[48] Similarly, sociolegal scholar Malavika Raghavan highlights the place of interoperability in her analysis of India's Aadhaar system. She notes that, through its release of data in interoperable formats, Aadhaar creates tension between the logic underlying India's efforts at achieving open government and the state's desire for political control over its datasets, including those generated by digital ID systems.[49]

A final example that illustrates interoperability's prevalence in socio-legal-technical literature is the growing work on digital or virtual borders. Largely focused on efforts undertaken in the UK and the EU, this literature highlights interoperability as an essential feature of the technical and administrative architectures upon which digital borders rely. In his book on digital border infrastructure, science and technology studies scholar Huub Dijstelbloem observes that the linking up of different technologies in the EU's digital border creates a "combination of systems" rather than a "seamless web."[50] Dijstellbloem reveals how, in this context, interoperability is not a neutral technical or administrative phenomenon. Rather, he argues (like Leese) that interoperability is a political choice that supports the socio-legal-technical infrastructure of Europe's digital border. He writes:

> Monitoring mobility [along borders] requires protocols and personnel to gather, interpret, compare, and apply information. This monitoring is based on a distinction of different areas, such as the coastal waters of EU member-states, the open sea, and coastal waters of third countries. Each area requires *specific modes of detection*, such as systems to identify vessels by monitoring and tracking, radio, coastal radar, infrared cameras, satellites, and unmanned aerial vehicles (UAVs) such as drones. The key word is "*interoperability*," and the aim of such monitoring is to create *situational awareness*. A military term by origin, situational awareness

instance, Virginia Eubanks' discussion of the integrated data systems that made Allegheny County's algorithmic risk assessment possible: *Automating Inequality: How High Tech Tools Profile, Police, and Punish the Poor* (New York: St Martin's Press, 2018), Chapter 4, especially 135-136.

[46] Burrell, Singh and Davison ___; Matthias Leese, "Fixing State Vision: Interoperability, Biometrics, and Identity Management in the EU," (2022) 27 *Geopolitics* 113.

[47] See also Geoffrey Bowker and Susan Leigh Starr, *Sorting Things Out: Classification and Its Consequences* (Cambridge: MIT Press, 1999), especially Chapter 6, "The Case of Race Classification and Reclassification under Apartheid" 195-225.

[48] Mardiya Siba Yahaya and Bonnita Nyamwire, "Digital ID" in *Keywords of the Datafied State* (Data & Society 2024) 118-127.

[49] Malavika Raghavan, "Open Data" in *Keywords of the Datafied State* (Data & Society 2024) 142-154.

[50] Huub Dijstelbloem, *Borders as Infrastructure: The Technopolitics of Border Control* (MIT Press 2021) at 45.

> aims to *visualize critical situations* such as emergencies and irregular border crossings *to assess whether intervention is required*. In addition to boats, cameras, and radar, since 2014, EUROSUR has been using satellite imagery obtained through the European Satellite Centre. For example, when a Hellenic coast guard patrol spots an unregistered ship in Greek waters, it contacts the national coordination center in Piraeus, which directs it to the agency's headquarters in Warsaw to compare the crew's observations with satellite images. *Armed with this information, the coast guards can then decide what to do*.
>
> The notion of interoperability, as this discussion shows, applies to *the interconnection of the European Union's various databases and information systems concerning migration, borders, and security, as well as to the cooperation that is required for specific border operations, such as the ones conducted by Frontex and the EU member-states*. The EDPS [the European Data Protection Supervisor] says, with regard to the new legislation that was adopted by the European Union in April 2019, that "interoperability is not primarily a technical choice; it is first and foremost a political choice to be made." A political choice indeed, but of what kind of politics? The issue of pursuing the policies of interoperability is not just that a big, greedy data monster or an all-seeing apparatus is created. Most striking is the appearance of all kinds of novel mediating moments at which new connections are being established among actors, institutions, and technologies.[51]

These new connections, and the wide range of actors that they link together, have become a focal point for legal scholarship on digital borders.[52] Dimitri Van Den Meerssche, for instance, has identified the interoperability within the EU's virtual border systems as generating "associative inequalities" that reshape both international law and legal subjects. It is the *integration* of and *communication* between algorithmic systems, and their use of clusters of data as a stand-in for people, that creates "forms of disenfranchisement" that, Van Den Meerssche argues, escape conventional legal thinking. [53] The in-built integration of different components of the virtual border, Van Den Meerssche notes, makes it difficult for legal scholars and regulators to perceive, critique, or otherwise address the inequalities that are built into the risk-based ranking systems at work in border control systems.

In their article on digital borders in the UK, Gavin Sullivan and Van Den Meerssche detail the logic underlying the UK's digital border strategy. It is a logic that draws a range of data from a wide variety of sources through a centralized "window" for analysis. Reminiscent of early e-Government projects, Sullivan and Van Den Meerssche note:

> [The UK's digital border] strategy, launched in December 2020, sets out an ambitious 5-year strategic plan for harnessing advanced digital technologies to rebuild borders as 'resilient ports of the future' that facilitate better pre-emptive security. … This is a border that 'embraces innovation', 'extract[s] maximum value from border data', develops and relies on 'advanced detection technologies to identify threats', and 'maximis[es] data driven, automated decision making'. It hinges on an infrastructure through which all incoming and outgoing traveller data

[51] *Ibid*.
[52] Dimitri Van Den Meerssche, "Virtual Borders: International Law and the Elusive Inequalities of Algorithmic Association" (2022) 33:1 *European Journal of International Law* 171.
[53] *Ibid* at 174.

> will be collected in advance of travel, fused together with other Home Office data, customs and freight data, terrorism watchlist data and other police and security databases (both domestic and international), and passed through a 'single window' for analysis using 'advanced analytics enabled risk engines'. The digital border thereby relies on the 'real-time sharing of data-driven risk insights across government departments. [54]

This infrastructural design reflects the statutory framework underlying the EU's own digital borders, which itself emphasizes interoperation between systems.[55]

The authors, too, note that interoperability affects not just the design of the UK's border system, but that it also influences how the digital border's components interact with, and generate, interoperable data. Cerberus – one of the components of the UK's digital border system– is an exemplary effort to achieve data interoperability. Drawing on their fieldwork, Sullivan and Van Den Meerssche observe that Cerberus is designed to integrate data in interoperable formats. Any data that comes "in" to the system is identified and classified according to a common taxonomy (person, object, location, event). Through this design feature, Cerberus is to overcome a central challenge for digital infrastructures: that is, establishing common standards for data shared among diverse actors. The authors note:

> Cerberus routes around these interoperability problems through internal data engineering methods more commonly used in [machine learning] infrastructures. Instead of "say[ing]: 'This is our standard. Everyone has to adhere to it, and we won't ingest anything until you do'"—which has long shaped database interoperability politics and which helped sink the earlier E-Borders programme— the Home Office are building a "transformer capability" into Cerberus' architecture or "layer of mapping, from the real world into our world" that translates public and privately sourced data in different formats into a "common data model and ontology that's consistent across the whole system, across Cerberus."[56]

This type of interoperability – translating plural data into a compatible, standardized model and ontology – ensures that data from diverse sources is compatible with Cerberus' software layers and its digital infrastructure. As digital government operations expand throughout borders, immigration, social benefits, and policing, efforts to gather and format data so as to allow for its use across different government programs and state agencies are only likely to grow.[57]

As the next section illustrates, similar concerns about harmony, standardization, and the overall interaction between legal schemes are raised in regulatory literature. But the influence of

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[54] Gavin Sullivan and Dimitri Van Den Meerssche, "An Infrastructural Brussels Effect: The Translation of EU Law into the UK's Digital Borders" (2024) 55 *Computer Law & Security Review* 106057 at 1-2.
[55] See Council Regulation 2019/817, OJ L 135/27 (establishing an interoperability framework between EU information systems governing borders and visas); Council Regulation 2018/1240, OJ L 236/1 (establishing ETIAS, or the European Travel Information and Authorisation System).
[56] Gavin Sullivan and Dimitri Van Den Meerssche, "The Legal Infrastructures of UK Border Control: Cerberus and the *Dispositif* of Speculative Suspicion" (2024) 25 *German Law Journal* 1308 at 1318.
[57] Lina Dencik, "The Datafied Welfare State: A Perspective from the UK" in A Hepp, J Jarke, and L Kramp, eds, *The Ambivalences of Data Power: New Perspectives in Critical Data Studies* (London: Palgrave Macmillan, 2021). A Desrosières, *The Politics of Large Numbers: A History of Statistical Reasoning* (Cambridge, MA: Harvard University Press, 2002).

interoperability as a technical concept – or of the design features of socio-legal-technical systems – within regulatory literature raises its own sets of questions and dilemmas.

IV. Regulatory Interoperability

While the term may appear novel to legal scholars, interoperability already has a short history in regulatory scholarship. In this way, interoperability is similar to other technical concepts that have also influenced how legal scholars conceptualize the purpose and function of laws. Earlier examples of this cross-pollination include debates on the potential of "personalized law." This brief movement sought to extend the thinking behind personalizable digital technologies into the realm of regulation,[58] (an approach that was not without its critics).[59] Likewise, the proposal to treat law itself as "information" or "data" was inspired by computer science attempts to do the same, to use legal texts (statutes, court decisions) to train machine learning systems so that they might predict outcomes in legal proceedings.[60]

Regulatory literature on interoperability suggests a similar blending of meanings, with interoperability itself acting as a boundary object of sorts vis-à-vis legal and technical communities. Compared to personalized law or law as information literatures, however, interoperability literature draws on older technical literatures and with different effects on how regulatory scholars conceptualize statutory regimes. Most regulatory scholars acknowledge interoperability's roots in ICT systems literature,[61] though they are less likely to draw upon or analyze the parallel development of interoperability in e-Government literature.

Regulatory scholars conceptualize interoperability in law as what is probably best described as a *transfer technology*: an interface, or an information communication technology.[62] By this, I mean that regulatory scholarship on interoperability describe interoperability as a mechanism through which legal systems,

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[58] See, e.g., Benjamin Alarie, "The Path of the Law: Towards Legal Singularity" (2016) 66 UTLJ 443; Anthony J Casey & Anthony Niblett, "Self-Driving Laws" (2016) 66 *UTLJ* 429; Philipp Hacker, "Personalizing EU Private Law: From Disclosures to Nudges and Mandates" (2017) 25 *Eur R Priv L* 651; Ariel Porat & Lior Jacob Strahilevitz, "Personalizing Default Rules and Disclosure with Big Data" (2014) 112 *Mich L Rev* 1417; Omri Ben-Shahar & Ariel Porat, "Personalizing Negligence Law" (2016) 91 *NYU L Rev* 627; Christoph Busch, "Implementing Personalized Law: Personalized Disclosures in Consumer Law and Data Privacy Law" (2019) 86 *U Chicago L Rev* 203.

[59] Timothy Endicott & Karen Yeung, "The Death of Law? Computationally Personalized Norms and the Rule of Law" (2022) 72:4 *UTLJ* 373.

[60] Mireille Hildebrandt, "Law *as* Information in the Era of Data-Driven Agency" (2016) 79:1 *Modern Law Review* 1-30. See also Alarie, *supra* note __ [add BlueJ Legal examples].

[61] See for e.g. Urs Gasser & John Palfrey, "Fostering innovation and trade in the global information society: The different facets and roles of interoperability" in Mira Burri & Thomas Cottier, eds, *Trade Governance in the Digital Age* (Cambridge University Press, 2012); Sarah McCosker, "The 'Interoperability of International Humanitarian Law and Human Rights Law: Evaluating The Legal Tools Available to Negotiate Their Relationship" in Andrew Byrnes et al., eds, *International Law in the New Age of Globalization* (Leiden, The Netherlands: Brill, 2013); Matthias Leese, "AI and Interoperability" in Regine Paul et al, eds, Handbook on Public Policy and Artificial Intelligence (Edward Elgar, 2024).

[62] Here, I might need to expand to gesture towards media theorists who have discussed transfer technologies to flesh out the implications of what I am describing here. These would include Cornelia Vismann and Friedrich Kittler. For interested WeRobot attendees, I recommend Panu Minkkinen's accessible overview: "Media, Cultural Techniques, and the Law: The Other Cornelia Vismann" (2023) 24:9 *German Law Journal* 1597.

especially text-based statutory regimes, might communicate with and transfer meaning to one another.[63] Drawing on ICT principles, and expanding them to encompass regulatory issues, scholars in this area describe interoperability as essentially facilitating communication among different nation state legal systems, or among different states within a larger federal government.[64] Interoperability, then, is distinct from the modularity proposed by Lawrence Lessig.[65] It is also different from the homogenization practiced by international standards initiatives, such as those developed by the IEEE or represented in international documentary or cryptography standards.[66]

What is being transferred or communicated through interoperable regulatory systems? Scholars focus on data (i.e., on information transfered between regulators) as well as on the transfer of values or legal principles across different legal systems. These dual meanings are perceptible in Urs Gasser and John Palfrey's work. Gasser and Palfrey describe interoperability as facilitating transfer and rendering "useful data and other information across systems (including organisations), applications or components while also maintaining, if not enhancing, the core effectiveness of the services sharing the data."[67] They also underlie Sarah McCosker's account of interoperability and her focus on the interaction between legal systems. McCosker writes that interoperability "refers to the ability of two complex systems to interact together in a harmonious way to achieve effective functionality, compatibility and mutual outcomes, through various processes including innovation, adaptation and partial standardisation."[68]

To an outsider, these descriptions of transfer, interaction, and mutual intelligibility may seem to implicate data transfers alone. Yet, for legal systems to be interoperable (at least in "technical" or ICT terms, traced in Part III) there must be some synergy between code, data, and perhaps even hardware. Taking interoperability on its technical terms, and drawing on the e-Government examples above, the content of a law (the text of a statute and the regulations and policies that embellish the statute, for instance) is not just "code", it is also "data."[69] In this way, then, the dream of interoperability articulated in regulatory literature is not simply one that seeks to create regulatory systems in which the things that we might commonly think of as data (geospatial or personal data) can seamlessly transfer. Rather, regulatory scholars advocate for a system that *enables legal norms or principles themselves to transfer*, or interoperate, between domestic legal systems (as a kind of data, and also as code).

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[63] This approach is evident in transnational legal literature on the topic, such as Amedeo Santosuosso and Alessandra Malerba, "Legal Interoperability as a Comprehensive Concept in Transnational Law" (2014) 6:1 *Law, Innovation and Technology* 51.

[64] Santosuosso & Malerba, *supra* __ at 53.

[65] Lawrence Lessig, *Code 2.0*, (New York: Basic Books, 2006). Lessig's intuition was that modularity would enhance the quality and robustness of written laws not because those laws would interoperate with laws from other domestic legal systems, but because the content of the laws would be improved through competition from market actors. He writes, "The best code (from the perspective of constitutional values) is both modular [i.e. interoperable] and open. Modularity ensures that better components could be substituted for worse. And from a competitive perspective, modularity permits greater competition in the development of improvements in a particular coding project" (at 328).

[66] Henry M Gladney, *Preserving Digital Information* (New York: Springer 2007) at 138; See also Besser 2002, *Moving From Isolated Digital Collections to Interoperable Digital Libraries*.

[67] Gasser & Palfrey, *supra* __ at 125.

[68] McCosker, *supra* __ at 151.

[69] See Jennifer Raso & Nofar Sheffi "Data," in Valverde et al, eds, *The Routledge Handbook of Law and Society* (Routledge, 2021) __.

The legal literature on interoperability illustrates how this normative interoperability would function. For instance, Gasser and Palfrey propose interoperability as "the working-together among legal norms, either within a given legal system of a nation state … or across jurisdictions or nations."[70] In a world where digital technologies are widespread, these scholars propose that policymakers ought to not just "aim for higher levels of technical and related layers of interoperability, but should by default also seek to increase legal and, eventually, policy interoperability, particularly as we move towards multigovernance systems."[71] In other words, the ways that legal scholars and lawyers might distinguish between code and data breaks down (even though, from a "technical" perspective – that is, in the operations of digital computers – code and data are synonymous).

Why would regulatory scholars propose this degree of harmony between legal systems? The reasons offered in the literature often centre on efficiency or the need to foster an "innovation economy." But a kind of regulatory diplomacy underlies interoperability justifications, too. Regulatory scholarship in this area proposes a vision of seamless (or minimal) borders between states, and a degree of harmony not just between domestic legal systems but between the politics and values underlying those legal systems.[72] These visions are articulated most clearly in the regulatory literature from scholars based in the European Union, who write in relation to their own domestic and regional governance system. But they appear elsewhere, too, including in discussions of interoperability at an international scale. Some, like Rolf Weber, view interoperability as a way for weaker or non-dominant states within an international setting to ensure that they still have a degree of regulatory control over their own territories. Without it, Weber proposes, dominant states will be inclined to apply their laws extraterritorially (i.e., outside of their own borders).[73] On this point, the reasoning aligns with some of the motivations that Canadian legislators expressed in their discussions of *AIDA* (described in Part V). The degree to which their vision reflects a "code as data/law as data" approach, and the new types of questions that approach raises, seem to be underappreciated by legislators and others working "on the ground", however.

To conclude, this section has shown that in regulatory literature interoperability has a distinct meaning. It is distinct from software engineering-inspired approaches to AI regulation, such as the use of algorithmic impact assessments to constrain automated decision-making tools.[74] Furthermore, while interoperability echoes some of the assumptions driving arguments that we should consider law as information,[75] it also diverges in important ways. For instance, interoperability suggests that there ought to be a structural, even infrastructural, synergy *between* statutory regimes across borders and regions. This synergy may more closely resemble the meaning that interoperability has achieved in practice, as observed by socio-legal-technical studies of spatial governance mechanisms, discussed in Part III,[76] rather than in initiatives that seek to develop or treat statutory laws as information or as code. It also

[70] Gasser & Palfrey, *supra* __ at 128.
[71] *Ibid* at 133.
[72] This vision is out of step from other mainstream scholarship on regulation, including many of the sources canvassed in Karen Yeung & Sofia Ranchordás, *Introduction to Law and Regulation*, 2nd ed (Cambridge: Cambridge University Press, 2024).
[73] Rolf H. Weber, "Legal Interoperability as a Tool for Combatting Fragmentation" (2014) Global Commission on Internet Governance Paper Series at 12.
[74] explored by Scassa 2021, in a paper presented at WeRobot 2020
[75] i.e., Hildebrandt 2016 MLR article
[76] e.g. Leese 2022 – cited by Dimitri and Gavin.

replicates efforts to ensure that domestic laws regulating a particular phenomenon, such as carbon emissions, are transnationally harmonious with the laws of other states or regions.[77]

Although this facet of interoperability places it in tension with more state-centric approaches to regulation, especially those common in Canadian domestic regulatory conversations, interoperability is present there too. In recent efforts to craft new legislation governing AI, federal legislators described their law-making role as one requiring that they craft statutes to be "interoperable" with AI regulations elsewhere, primarily the European Union (EU).

But if interoperability is a boundary object – a concept that technologists, digital government designers, socio-legal-technical scholars, and regulatory scholars each use to communicate with one another, and to make sense of, law or digital administration as an information system – what meaning might it have for Canadian legislators? Although *AIDA* is no more, what might legislators (and legal scholars) want to recognize and be attentive to when it comes to future attempts to develop interoperable AI regulation? The next section offers some observations.

V. Interoperability in Practice: *AIDA* and Shifting Canadian Legislative Visions

In the discussions surrounding *AIDA*, interoperability is mentioned primarily as a mechanism for fostering Canada's "innovation economy." Yet, comments made by legislators suggest an interest in crafting Canadian AI regulations to be in harmony with, while remaining separate and distinct from, the EU's *AI Act*. At this point, I remain undecided about the degree to which *AIDA* was actually interoperable with the *AI Act*, but in many ways that question is tangential for this paper's purposes. Rather, what is of interest to me here (and what I need to flesh out more fully) is the degree to which the interoperability discussions that took place related to *AIDA* prioritized economic efficiency or integration while overlooking the deeper normative integration being proposed. Of interest, too, is the degree to which interoperable regulatory aspirations in *AIDA* are already being replicated elsewhere, without robust discussion, through the design and integration of other interoperable socio-legal-technical systems (including, most notably, Canada's digital border control efforts, which are intensifying *without* being debated in legislative committees).

For readers unfamiliar with *AIDA*, some important context will help ground the discussion. First introduced in 2022 as part of Bill C-27, the proposed federal *Digital Charter Implementation Act*,[78] *AIDA* was one of a series of legislative initiatives aimed at regulating the design, development, and use of AI systems in Canada.[79] In April 2023, *AIDA* was referred to the Standing Committee on Industry and Technology, a specialist committee made up of Members of Parliament, for further consideration and

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[77] Yeung and Ranchordás 2024.

[78] See Part 3 of Bill C-27, *An Act to enact the Consumer Privacy Protection Act, the Personal Information and Data Protection Tribunal Act and the Artificial Intelligence and Data Act and to make consequential and related amendments to other Acts*, 1st Sess, 44th Parl, 2022, online: <https://www.parl.ca/legisinfo/en/bill/44-1/c-27> [*Digital Charter Implementation Act*].

[79] For a comprehensive snapshot, see Blair Attard-Frost et al, "The governance of artificial intelligence in Canada: Findings and opportunities from a review of 84 AI governance initiatives" (2024) 41:2 Government Information Quarterly 101929.

finessing. Over the course of a year and a half, the Standing Committee received written and oral submissions from experts, industry, and members of the public about *AIDA*'s scope and its approach.[80] In response to some of the critiques raised to the Standing Committee, *AIDA* was further modified.[81] However, it remained in draft form in January 2025 when Parliament was prorogued by then-Prime Minister Justin Trudeau. As a result, *AIDA* "died on the order paper."

Despite its "death", the Standing Committee discussions about *AIDA* reveal a curious preoccupation with ensuring that Canada's AI regulation would be interoperable with European legislation. Top of mind was developing a law that would be interoperable with the EU's recently created *AI Act*. This preoccupation is evident in the following exchange from the Standing Committee's minutes between Minister Champagne, the Minister tasked with moving *AIDA* forwards through the committee hearing process, and MP Sebastien Lemire, a Bloc Québécois representative from Quebec:

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> Sébastien Lemire:
>
> I really like the idea that Canada could be a leader at the forefront, and could highlight its own cultural distinctiveness and that of Quebec, especially with regard to our start-ups. There is still basic interoperability, as you said earlier. Does the legislative framework provide for future harmonization with European legislation or automatic updates of the Canadian act?
>
> Hon, François-Philippe Champagne:
>
> Absolutely.
>
> You made that point very well and you are right. That is exactly our objective: even with respect to definitions, the Canadian act is aligned with the European legislation. We have spoken with our European counterparts and interoperability is essential. Our European colleagues are closely watching what is happening in Canada. I think the European framework will not be in place in the member countries before 2026, as I understand it, so Canada will indeed be the first country in the world to establish a legislative framework.
>
> It [*AIDA*] will nevertheless be based on principles and will be an evolving framework. I would remind you that what has made it possible for the current privacy legislation to remain in force for 20 years is that it is based on principles. Very specific legislation runs the risk of being overtaken by technology. The idea of a framework, codes of conduct and regulations is what allows for evolution. [...]

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[80] *Ibid*.

[81] Letter from The Honourable Francois-Philippe Champagne to Mr. Joel Lightbound (28 November 2023) at 6, online (pdf): <https://www.ourcommons.ca/content/Committee/441/INDU/WebDoc/WD12751351/12751351/MinisterOfInnovationScienceAndIndustry-2023-11-28-Combined-e.pdf> [Letter from The Honourable Francois-Philippe Champagne].

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As one might expect, ongoing legislative developments in Europe at the time impacted how *AIDA* evolved as it was amended during the Standing Committee hearings. However, the degree to which *AIDA* was ever made "interoperable" with EU legislation remains up for debate. Industry representatives, such as those from Microsoft or Meta, asserted during Standing Committee hearings that *AIDA* was too strict. Law and policy scholars, meanwhile, noted that *AIDA* lacked some of the key elements found in the EU's *AI Act*.[82] While the EU's *AI Act* was influential for both legislators and those who made submissions to the Standing Committee, key differences remained as between *AIDA* (before its death) and the EU's *AI Act*.

In official communications about *AIDA*, it is clear that federal legislators were looking to Europe. The Minister of Innovation Science and Industry emphasized the need for *AIDA* to be "interoperable" – in harmony or integrated with – the *AI Act* regime. The Minister and officials in his office stressed that AI developers in Canada should benefit from a degree of regulatory certainty. That is, if developers designed AI systems to comply with *AIDA*, then those tools should also comply with the EU's *AI Act*.[83] The Minister's concern here seems to have been ensuring that *AIDA* facilitates the global competitiveness of Canadian AI firms. This focus resonated with the Minister's mandate as one of five Ministers responsible for shepherding the activities of the Ministry of Innovation Science and Economic Development: that is, to promote and support a robust domestic innovation economy. Members of Parliament, too, articulated these concerns in their questions during the Standing Committee hearings.[84] Ensuring harmony between *AIDA* and the EU's *AI Act* seems to have been one of those rare issues that united MPs from across political parties and from across the country, based on transcripts of the Standing Committee hearings.

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[82] Robert D. Atkinson, Daniel Castro and Lawrence Zhang, "Comments to the Canadian House of Commons Standing Committee on Industry and Technology Regarding the AI and Data Act", *Centre for Canadian Innovation and Competitiveness* (1 March 2024), online: <https://itif.org/publications/2024/03/01/comments-to-canadian-house-of-commons-regarding-the-ai-and-data-act/ >. See also Blair Attard-Frost and Helen A. Hayes, "Valuing Value Chains: On Canadian AI Regulation, Co-Governance, and the Scope of AI Value Chains" in *Regulating Digital*, edited by Helen A. Hayes and Nicole Goodman (forthcoming, University of Toronto Press), online: < https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4624840>.

[83] House of Commons, Standing Committee on Industry and Technology, Evidence, 44-1, No 86 (26 September 2023), online: <https://www.ourcommons.ca/DocumentViewer/en/44-1/INDU/meeting-86/evidence>. In this comment, the Minister of Innovation Science and Industry also notes that Canadian officials have been conversing with EU representatives. He states: "We have spoken with our European counterparts and interoperability is essential. Our European colleagues are closely watching what is happening in Canada. I think the European framework will not be in place in the member countries before 2026, as I understand it, so Canada will indeed be the first country in the world to establish a legislative framework."

[84] See, for instance: House of Commons, Standing Committee on Industry and Technology, Evidence, 44-1, No 98 (23 November 2023), online: <https://www.ourcommons.ca/DocumentViewer/en/44-1/INDU/meeting-98/evidence>; House of Commons, Standing Committee on Industry and Technology, Evidence, 44-1, No 107 (31 January 2024), online: <https://www.ourcommons.ca/DocumentViewer/en/44-1/INDU/meeting-107/evidence>; House of Commons, Standing Committee on Industry and Technology, Evidence, 44-1, No 111 (14 February 2024), online: <https://www.ourcommons.ca/DocumentViewer/en/44-1/INDU/meeting-111/evidence>.

As a result of this shared concern over regulatory harmony, some of the Minister's proposed amendments to *AIDA* were explicitly designed to align *AIDA* with the EU's *AI Act*.[85] For instance, these amendments would have made *AIDA* applicable only to AI systems placed on the market or put into use in the course of interprovincial or international trade. In this way, then, AI system developers would not have had to ensure that their activities complied with *AIDA* during the research and development stages of creating an AI system.[86] Other amendments were designed to ensure symmetry between *AIDA* and the *AI Act* on issues including substantially modified AI systems and accountability frameworks. For example, *AIDA* was amended to require that the scope and depth of quality management systems ought to be proportionate to the nature and size of the entity developing an AI system and the risks associated with its activities, which reflected the approach in the EU's *AI Act*.[87]

While *AIDA* is no more, the notion of interoperable AI regulation – from interoperable statutes to interoperable digital/technical infrastructures – continues to raise complex issues. Not only does the extension of interoperability into the language and philosophy of regulating AI systems in Canada suggest a new dimension or phase of the digital computer "as a universal machine that impos[es] its logic on the law."[88] It also suggests that interoperability has a role in shifting conceptions of which sites of regulation matter and of the ease with which (written) domestic regulations ought to be seamless and harmonious. As a boundary object between regulators, technologists, and designers of digital administration, perhaps interoperability allows for this dream of harmonious regulatory flows conceals more than it reveals. By this, I mean that the seamlessness that is a motivating factor in the Standing Committee discussions allows for "sharp edges" of digital government to regulate elsewhere: in digital borders, for example, or in other settings like social assistance administration.

In other words, the potential influence of interoperability as a concept or approach in Canadian AI regulation suggests that the design and function of computing systems, and even of digital administrative systems, has growing influence over how legislators conceptualize what it is that they do as lawmakers and regulators. But there are important distinctions between computing systems and not just regulation but law. A key difference is the legal ability to contest and to protest, which is protected not by regulation but by law.[89] To what degree is that feature present or absented, not in the legislative process that created *AIDA* but in the types of socio-legal-technical systems that are enabled by a dream of interoperable AI regulations (as in interoperable digital administration)? These are questions that I plan to offer comment on in the next iteration of this paper.

VI. Conclusion: Reconstituting Law and Technology

[To be developed]

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[85] Note that these amendments were proposed in late November 2023, so it is possible that further modifications of the EU's *AI Act* since that time would mean that *AIDA* is still slightly out of step.
[86] Letter from The Honourable Francois-Philippe Champagne, *supra* note 16.
[87] *Ibid*.
[88] Cornelia Vismann and Markus Krajewski, "Computer Juridisms" (2008) 29 *Grey Room* 90-109
[89] See Yeung chapter in Karen Yeung and Martin Lodge, eds, *Algorithmic Regulation* (OUP 2019); Marion Oswald, "Algorithm-assisted decision-making in the public sector: framing the issues using administrative law rules governing discretionary power" (2018) 376 *Phil Transactions Royal Society A* 20170359.