Coherence in technology law
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ABSTRACT
Technology law is emerging as a distinct field of law among the canon of more established law subjects. This paper examines the requirements for coherence in law subjects and begins the process of classifying the field of technology law. It examines historical struggles for coherence in health law and environmental law in order to distil a methodology that will guide the analysis. The paper sets out a menu approach that refines some of the unifying principles of technology law that mark it out as a distinct field. The methodology is then tested against the ostensibly disparate papers that can all be said to be on ‘technology law’ in the Oxford Handbook on Law, Regulation and Technology. The paper concludes by directing further work to more fully classify this emerging field.

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1. Introduction
Conflict of laws was once described as ‘a dismal swamp, filled with quaking quagmires, and inhabited by learned but eccentric professors who theorize about mysterious matters in a strange and incomprehensible jargon’.1 Prosser was acknowledging that, at least in 1952, it was difficult to distil coherence in conflict of laws with its multiple conflicting theories and applicable laws.2 Since then, conflict of laws, or private international law, has developed into a more defined and coherent legal field.3 A colleague of mine who studies intellectual property law noted recently that he thought that technology law, too, lacked coherence; ostensibly because of the number of seemingly

1William L Prosser, ‘Interstate Publication’ (1952) 51 Michigan Law Review 959, 971. Here Prosser is only discussing the conflict of laws between the states within the United States without introducing the further complications of international conflict of laws.
2Ibid.
3See generally, Martin Davies, Nygh’s Conflict of Laws in Australia (LexisNexis, 9th ed 2014); Geert van Calster, European Private International Law (Hart Publishing, 2nd ed 2017) www.bloomsbury.com/au/european-private-international-law-9781849466721/.

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disparate topics covered under the rubric. However, by not further explaining exactly what was meant by this seeming lack of coherence, my colleague left me with a number of questions: what is meant by coherence in this respect; and is it true that technology law is so lacking?

There is little literature discussing coherence in technology law, so the literature discussing similar difficulties with defining coherence in health law and environmental law provides rich insight into what establishing an independent field of legal study, and what coherence means in this context. Ruger, discussing coherence in health law, described this type of coherence as ‘field coherence’ — a kind of trade usage for a set of attributes that those in legal academia have developed to establish a hierarchy among legal subjects. In this ‘intellectual tournament’, Ruger argued, ‘more prestige is traditionally bestowed on those fields regarded as having strong [coherence]’.

As an alternative to trying to achieve formal field coherence, Aagard argued that simply classifying a field of law creates an ‘explanatory power’ that can cohere a field of law such as environmental law, or, indeed, technology law. He argued that the strength of this type of coherence depends on the simplicity of a recognisable pattern that predominates within the field and explains the various issues that arise within the field. Ultimately though, classification of this sort is ‘inevitably and inherently … a quest for coherence’.

After a brief discussion about what coherence in legal fields is, the paper has two purposes: first to establish a means by which the field of technology law can be classified, and then to begin the argument for coherence within that field. It sets out a method by which to classify technology law as a legal field, and in doing so to distil its fundamental elements, describe connections between them, and to explain anomalies. The simple but effective methodological approach that I set out in this paper shows that technology law exhibits recognisable patterns that explain the issues that arise within the field. I argue that technology law ultimately coheres around the synchronicity between the disruptive risks that might arise because of developments in...

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4A Professor in intellectual property law made this remark to me when I suggested starting a reading group on technology law using the *Oxford Handbook of Law, Regulation and Technology* as the source of the first readings. See also Giovanni Sartor, ‘Human Rights and Information Technologies’ in Roger Brownsword, Eloise Scotford and Karen Yeung (eds), *The Oxford Handbook of Law, Regulation and Technology* (Oxford University Press, 2017) 425 [www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199680832.001.0001/oxfordhb-9780199680832-e-79](http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199680832.001.0001/oxfordhb-9780199680832-e-79). Sartor argued that approaching information technology through the lens of human rights had ‘the capacity of providing a unifying perspective over the fragmented regulation of information technologies; it provides a purposeful framework able to cover the variety of IT technologies and contexts of their deployment, and to support the integration of diverse valuable interests pertaining to multiple stakeholders’. This analysis misses a key component of technology law – the legal or regulatory aspect.

5See Theodore W Ruger, ‘Health Law’s Coherence Anxiety’ (2008) 96 *Georgetown Law Journal* 625, 627.

6Ibid, 630.

7Ibid.

8Todd S Aagaard, ‘Environmental Law as a Legal Field: An Inquiry in Legal Taxonomy’ (2010) 95 *Cornell Law Review* 221, 229.

9Ibid 228.
technology and the array of possible regulatory responses that might be enlivened to limit or avoid those risks. Accompanying this interplay of technology, risk, and response, is the potential impact that developments in technology can bring. It is not merely an economic or political impact, but one that goes to the heart of our humanity. Oliver Sacks worried ‘about the subtle, pervasive draining out of meaning, of intimate contact, from our society and our culture’\(^\text{10}\), wrought by new technologies. He was talking about the impact of digital technologies, but other technologies also strike at the heart of what it means to be human: consciousness, freedom, love, reproduction, safety, and understanding to name a few. It is these human implications that justify the study of technology law as a distinctive field.

This paper shows that technology law, far from being a quaking quagmire, is now able to emerge from its adolescent coherence anxiety to begin the process of establishing itself as a recognised field of law within the canon of more established law subjects. Whether technology law, as a legal field, displays the attributes of what Ruger called field coherence is a separate but related question that can only be answered more fully after a full taxonomy of technology law is undertaken. Initial analysis such as this cannot be dispositive. Bowker and Star argued that fully investigating such a system would require ‘long-term and detailed ethnographic and historical studies of information systems in use’.\(^\text{11}\) Establishing firmer boundaries to technology law as a field of law will thus require further empirical analysis and research, testing the methodology outlined in this paper. In proposing the taxonomic approach set out in this paper, I do not seek to reject other approaches to defining technology law that may not fit within this model but I aim to create common or safe ground; to open the field for greater, and more consistent research, discussion, and debate.

In the next section of the paper, Part 2, I examine several types of coherence that have been explored in relation to legal fields and determine that field coherence, while predominant in these discussions is not the only, or even the ultimate type of coherence. In Part 3, I argue for a taxonomy of technology law. In Part 4, I describe the limitations of current legal fields to respond to technological disruption and its associated risks. In Part 5, I review similar classification projects in health law and environmental law and distil the methodology that guides the analysis in this paper. Part 6 sets out the particular characteristics of technology law that are apt to classification. In Part 7, I set out the menu approach to classifying technology law.

\(^{10}\) Oliver Sacks, ‘The Machine Stops’ *The New Yorker* (11 February 2019) www.newyorker.com/magazine/2019/02/11/the-machine-stops?utm_campaign=aud-dev&utm_source=nl&utm_brand=tny&utm_mailing=TNY_Magazine_020419_DailyList&utm_medium=email&bxid=5c47785d576f2c5c0a283b89&user_id=56181479&utm_term=TNY_Daily.

\(^{11}\) Geoffrey C Bowker and Susan Leigh Star, *Sorting Things Out. Classification and Its Consequences* (MIT Press, 1999) 323.
In Part 8, I distil some of the unifying principles that emerge from applying the menu approach that connects the seemingly disparate topics in technology law as set out in the Table annexed to this paper. I do this by reference to the ostensibly disparate papers that can all be said to be on ‘technology law’ in the Oxford Handbook on Law, Regulation and Technology (Handbook) edited by Brownsword, Scotford and Yeung. In Part 9, I test the methodological approach by applying it to papers chosen from different chapters of the Handbook.

2. What is coherence?

The arguments, such as that made by my colleague, that a field of law lacks coherence often fail to clarify what the assertion means. There are a number of different types of coherence that we can distinguish after some brief discussion.

2.1. Theories of coherence

Amaya noted that coherence features prominently in support of arguments for reasoning and rationality across various disciplines, such as philosophy, psychology, linguistics, and law. Amaya’s analysis grapples with a number of theories of coherence applicable in these disciplines, including epistemic coherence, explanatory coherentism, practical coherence, normative coherence, and discourse coherence, before dealing with the coherence theory of legal reasoning. It is outside the scope of this paper to discuss each of these theories – one will suffice to make the point. Amaya argued that normative coherence is based on a society’s ‘notions of common value/s, common principle/s and satisfactory form of life’. In theories of legal justification, coherence connotes correctness and truth. The arguments that technology law lacks coherence do not range into these theories of coherence, nor do they specify that technology law is deficient in any of these areas. I am also content not to address them further in this paper.

Here we can also distinguish arguments about judicial coherence in legal reasoning that seeks to establish congruity and consistency between legal rules in judicial decisions. This understanding of coherence in law grants that ‘a set of rules is coherent if it is free from contradiction. Rules which

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12Roger Brownsword, Eloise Scotford and Karen Yeung (n 4) (Handbook).
13Amalia Amaya, The Tapestry of Reason: An Inquiry into the Nature of Coherence and Its Role in Legal Argument (Hart Publishing, 2015) 1.
14Amaya (n 13) chs 3–9.
15Ibid 14.
16Ibid 31–56.
17See for example Andrew Fell, ‘The Concept of Coherence in Australian Private Law’ (2017) 41 Melbourne University Law Review 1160, 1162.
belong to the same legal system must not prescribe different outcomes in relation to the same set of facts’. 18 Thus, this form of coherence in legal reasoning requires, for example, that judicial decisions must not contradict other established principles of law on the same topic. This type of coherence is said to lead to reasonable and rational decisions that further enforce trust in the rule of law. 19 Again though, those complaining about a lack of coherence in technology law do not seem to be referring to these more theoretical and philosophical approaches to coherence. They do not engage with these theories of coherence but seem to impute a lack of some other kind of coherence.

2.2. Field coherence in law

Claims about a lack of coherence tend to compare its lack, against its presence in established areas that are unquestionably members of a canon of coherent legal subjects, such as contract law, tort law, or property law (or indeed, intellectual property law). 20 When a new subject seeks to enter the canon in any field, it meets resistance from the incumbents – particularly the latest entrants, such as, in this case, intellectual property law – that look to protect their position in the canon. Ruger acknowledged that ‘the intellectual pressure to achieve singular coherence is felt most acutely by newer fields aspiring to more established, if not canonical, status’. 21

Ruger noted that, over the last one hundred years or so, the legal academic establishment had developed ‘a set of core internal principles’ that were required to establish what he termed “field coherence”: that is (1) a reductionist focus on internal logic; (2) a focus on essential legal form; (3) an emphasis on linear historical development; and (4) a high level of institutional specification and centralization. 22 This reductionist bent seeks to reify a ‘natural’ historical development of a singular core organising principle that brings the disparate parts of a subject together. It is argued that, by referring to this core legal principle, participants within the field can derive consistent doctrinal outcomes that can be applied consistently and coherently, not only in the field itself, but throughout the legal universe. Thus, in contract law, the binding nature of contracts entered freely between

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18 Ross Grantham and Darryn Jensen, ‘Coherence in the Age of Statutes’ (2016) 42 Monash University Law Review 360, 363.
19 Amaya (n 13) 1.
20 Henry T Greely, ‘Some Thoughts on Academic Health Law’ (2006) 41 Wake Forest Law Review 391, 405. ‘Is health law a “real” legal category, like contracts, torts, property, and so on, or is it just an industry-specific law of the horse, best analyzed by applying the separate approaches of fundamental legal subjects as they are relevant?’ Intellectual property law was not a recognised field of law until around the middle of the nineteenth century – see Brad Sherman et al, The Making of Modern Intellectual Property Law: The British Experience, 1760–1911 (Cambridge University Press, 1999) 1–7 <http://ebookcentral.proquest.com/lib/qut/detail.action?docID=147300.
21 Ruger (n 5) 630.
22 Ibid 629.
parties is a core tenet that the law respects and enforces. Similarly, criminal
classic tenet that the law respects and enforces. Similarly, criminal
law is built around principles of punishment and deterrence for acts deemed
crime by society, and property law respects the bundle of rights held by
owners of property against the world at large. These core principles
provide the bedrock around which legal doctrine can be consistently de-
veloped and applied. Those subjects that can establish all of the require-
ments are deemed more coherent and, therefore, are preferred in the hierarchy of
legal subjects. However, these conditions seem almost impossible to reach
(or to maintain) except for the most preeminent of established subjects
(such as contract law). Ruger conceded that, if these are the conventional
requirements for coherence in law, then ‘the deck is decidedly stacked
against health law’.23

Without a clear pronouncement about what an alternative to field coher-
ence might be, it is pertinent to look at how other fields have negotiated
similar charges to get a fuller sense. A decade ago, health law was in a
similar disaggregated state to technology law now. In 2008, Hunter identified
complaints about a lack of a central doctrinal core around which health law
might cohere. She noted that:

… scholars differ as to whether health law is an intellectually coherent field or a
variation on ‘the law of the horse.’ These scholars wrestle with a maze of doc-
trinal paths in health law that pass through torts, contracts, antitrust, bioethics,
constitutional law and administrative law (among others), but seem to have no
conceptual center.24

Also in 2008, Ruger cited three scholars who bemoaned the seeming lack of
coherence in health law:

Clarke Havinghurst has argued that health law rules ‘emanate from such
diverse sources, and are so uncoordinated, inconsistent, and incomplete that
they fail to constitute a coherent legal regime that can be studied as an inte-
grated whole.’ Likewise, Gregg Bloche has described the field as ‘a jumble of sta-
tutes and common-law doctrines’ that, in the main, constitutes ‘a chaotic,
dysfunctional patchwork.’ In the view of Einer Elhouge, health law suffers
from ‘an identifiable pathology’ due to its haphazard borrowing from other
fields, resulting in an ‘incoherent legal framework’.25

Ruger acknowledged that health law rules, ‘emanate from such diverse
sources, and are so uncoordinated inconsistent, and incomplete that they
fail to constitute a coherent legal regime that can be studied as an integrated
whole.’26 Indeed, he said that:

23Ibid 638.
24Nan D Hunter, ‘Risk Governance and Deliberative Democracy in Health Care’ (2008) 97 Georgetown Law
Journal 1, 2–3.
25Ruger (n 5) 631.
26Ibid, citing Clark C Havinghurst, ‘Health Care as a Laboratory for the Study of Law and Policy’ (1988) 38
Journal of Legal Education 499.
As a field, health law is defined in large part by an unusual multiplicity of forms of law, ultimate goals, and historical roots. There are multiple (and often conflicting) values served by multiple (and often conflicting) legal forms, and implemented by multiple (and often conflicting) institutional actors.27

Health law is not the only legal field that has suffered claims about incoherence. In 1994, Westbrook argued that environmental law was:

complex, messy, and disorganized. Despite being a burgeoning area of practice, environmental law is not a discipline, because it lacks a professional consensus on a coherent internal organization of materials a discipline requires.28

Sixteen years later, in 2010, Aagaard also noted that environmental law was considered ‘highly fragmented and unduly complicated [and that] there is a strong sense that environmental law needs an overall vision or descriptive framework that works to cohere the subject matter’.29 While the decks did indeed seem stacked against establishing field coherence in health law, and environmental law, actors in those fields asked whether a more limited coherence might be achievable instead.

Aagaard argued that even though environmental law could not be ‘reduced to a set of fundamental unifying legal principles’,30 it could still be classified as a legal field despite its apparent incoherence.31 He said that ‘we can think of coherence as the strength, simplicity, and predominance of the field’s patterns’.32 These arguments show that those fields that do not display the characteristics of formal field coherence can still cohere to some degree, in other ways, either through consensus among the professionals within the field, or by establishing an overall descriptive framework for the field. Perhaps a more satisfactory approach would be to combine those tests and seek to establish an overall descriptive framework that is, through consensus, acceptable to the professionals within the field. This is what this paper seeks to achieve.

Technology law is now at the stage of development at which a coherent framework is needed to push it to the next level within the canonical hierarchy. The characteristics of health law and environmental law described above are also evident in technology law. Different technologies promise benefits to humanity but raise varying levels of risks or threats to society. The responses to these risks, threats or benefits spring from diverse societal norms and require different regulatory responses that must balance a range of interests and needs. These responses range from doing nothing, self-regulation,

27Ibid 638.
28David A Westbrook, ‘Liberal Environmental Jurisprudence’ (1993) 27 U.C. Davis Law Review 619, 621 (emphasis added).
29Aagaard (n 8) 223.
30Ibid 282.
31Ibid.
32Ibid 231.
industry codes, or standards, through to the various levels of responsive regulation that ultimately includes hard law or legislation. Complicating matters further, different regulatory agencies may be required to regulate different applications of the same technology for different outcomes. It would seem from this initial analysis that the decks are similarly stacked against finding field coherence in technology law, but that there is scope to seek consensus among the professionals within the field on an overall descriptive framework that can cohere it as a legal field.

2.3. Is there coherence in technology law?

These arguments, that a new area of law such as technology law lacks coherence, are not new. The principles of coherence developed by the legal academy have been used to control entry to the canon of legal subjects for many years and have been wielded to devastating effect. In the 1990s, the use of the term cyberlaw was an early attempt at a broad term to describe the burgeoning field of new computer technologies and the internet. In 1996, when the internet was still in its infancy, Judge Frank Easterbrook, when addressing an inaugural ‘Law of Cyberspace’ conference at Chicago Law School, indelicately compared cyberlaw to an ill-conceived ‘law of the horse’, indicating that discrete areas of legal study should be limited to ‘subjects that could illuminate the entire law’. He argued that areas of law that claimed to be distinct without such broad application are ‘doomed to be shallow and to miss unifying principles’. This argument about cyberlaw has been rebutted in a number of prominent ripostes, most notably by Lessig, who countered that ‘there is an important general point that comes from thinking in particular about how law and cyberspace connect’, and that this provides unique insights into ‘law’s regulation outside of cyberspace’. This argument by Lessig about cyberspace provided an introductory analysis to the more complex interaction between technologies and law (or regulation) that have evolved since then. It may be that Judge Easterbrook unwittingly provided the key to establishing coherence in technology law. To adapt his argument about the law of the horse and apply it to technology law, his argument

33See Michael Guihot, Anne F Matthew and Nicolas P Suzor, ‘Nudging Robots: Innovative Solutions to Regulate Artificial Intelligence’ (2017) 20 Vanderbilt Journal of Entertainment & Technology Law 385, 452–54.
34However, cyberlaw, if it ever did claim to be a separate field of legal study, would now more correctly be classified as a sub-element of the broader class of technology law as proposed in this paper.
35Frank H Easterbrook, ‘Cyberspace and the Law of the Horse’ (1996) 1996 University of Chicago Legal Forum 207.
36Ibid 207.
37Ibid.
38Lawrence Lessig, ‘The Law of the Horse: What Cyber Law Might Teach’ (1999) 113 Harvard Law Review 501.
39Ibid 502.
becomes ‘only by putting [technology law] in the context of broader rules about [law and regulation] could one really understand the law about [technology]’.\textsuperscript{40}

A decade after Judge Easterbrook’s broadside at cyberlaw, in the first decade of this century, there was a surge of interest in identifying a unified theory of technology law.\textsuperscript{41} In 2007, Cockfield noted that there was a tendency to study how disparate areas of technology intersect with the law as ‘distinct legal topics … in sealed boxes’\textsuperscript{42} which meant that ‘any law and technology theory lacks overt coherence’.\textsuperscript{43} He argued for a cohesive theory of technology law that ‘should strive to teach us how to protect interests in particular cases as well as how a decision will affect other interests once it is integrated within the whole law’.\textsuperscript{44} Also in 2007, Bennett Moses argued that a theory of law and technology could provide ‘a structure through which lessons learned from technologies of the past can help make decisions about how to regulate and adapt to future technologies’.\textsuperscript{45} These arguments by Lessig, Cockfield, and Bennett Moses address Easterbrook’s requirement that, to be coherent, an area of law must ‘illuminate the entire law’ and contain unifying principles. When we begin to think about the unique connections between, not only cyberspace and law, but many other technologies and regulation, those insights become more prescient, powerful, and applicable. As I discuss in Part 8, the synchronicity of technology, disruptive risk, and a regulatory response provides a critical cohesive thread for technology law that is worthy of study in its own right.

For similar reasons to those set out by Ruger above, the author accepts that perhaps formal field coherence may yet be a step too far for technology law to achieve at this stage. However, coherence in technology law will become clearer and stronger as we continue to study and identify congruencies among the seemingly disparate topics and the complexity of interactions within the field. There is more that can be learned from technology law than it merely providing insight into how the whole law is illuminated or about ‘law’s regulation outside of’ technology law. But, a search for coherence should look less to dogmatic field coherence that has been designed to protect

\begin{itemize}
\item \textsuperscript{40}Easterbrook (n 35) 208. This pugnacious stance might have been expected from a Chicago School law and economics alumnus. This area of law itself had only ‘formed’ or cohered in the preceding two decades. Or more accurately, its proponents had, by sheer force of argument, chiselled it into existence and defended its coherence. It is no surprise then that Judge Easterbrook took the combative approach he did to those developing cyberlaw.
\item \textsuperscript{41}See Gaia Bernstein, ‘Accommodating Technological Innovation: Identity, Genetic Testing and the Internet’ (2004) 57 Vanderbilt Law Review 965; Arthur J Cockfield, ‘Towards a Law and Technology Theory’ (2003) 30 Manitoba Law Journal 383; Arthur Cockfield and Jason Pridmore, ‘A Synthetic Theory of Law and Technology’ (2007) 8 Minnesota Journal of Law, Science & Technology 475.
\item \textsuperscript{42}Cockfield (n 41) 387.
\item \textsuperscript{43}Ibid.
\item \textsuperscript{44}Ibid 410.
\item \textsuperscript{45}Lyria Bennett Moses, ‘Why Have a Theory of Law and Technological Change’ (2007) 8 Minnesota Journal of Law, Science & Technology 589, 605.
\end{itemize}
established legal fields, and arguments about illuminating the entire law, and instead look more broadly. Again, we can learn from similar debates in relation to health law and environmental law. In fact, both Ruger and Aagaard noted in relation to those areas, that the strictures of establishing field coherence can inhibit new knowledge and ossify ways of thinking. Ruger acknowledged in relation to health law that it lacked a central core, but he did not see this as a failure. He argued that health law still had an ‘identifiable structure and architecture’ and ‘essential, or special attributes worthy of study’. He said that:

To say that health law is messy is not the same as saying it is random; to say it is multifaceted and difficult to center on a parsimonious internal core is not the same as saying it defies all abstraction and generalization. Health law is a legal field shaped dramatically by external dynamics: the surrounding political and economic climate, interest group pressure from various organized actors, and institutional change and interaction among the bodies that apply and shape the law.

Ruger also saw that this complexity provided a generalisable pattern that itself could create a level of coherence. He argued that:

… its mix of various legal forms, its institutional multiplicity, its permeability to external historical development and political pressure – are themselves generalizable features that are worthy of future examination from a theoretical and empirical perspective.

Aagaard also noted shortcomings in attempting to establish field coherence in environmental law and recognised that blindly seeking field coherence has several disadvantages. Like Ruger, he argued that ‘an organizational framework that prioritizes coherence may do so at the cost of imprecisely and inaccurately characterizing the field by ignoring complexity and variation’. The resulting reductionist framework, he argued, ‘oversimplifies the law, disregarding outcomes that do not match the coherent ideal’. As a corollary to the first point, Aagaard’s second argument against pursuing coherence was that it ‘discourages experimentation in law-making’. This means that laws can become ‘deterministic, helping to perpetuate the patterns they identify by obscuring and discouraging opportunities to depart from those identified patterns’.

These depictions of the characteristics of health law and environmental law could well describe the complex interaction of participants, pressures and regulatory responses in technology law. It is instructive then, that both

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46Ruger (n 5) 627–28.
47Ibid.
48Ibid 628.
49Aagaard (n 8) 233–34.
50Ibid 231.
51Ibid 235.
Ruger and Aagaard warned against striving for field coherence at the cost of the benefits that could be had from classifying a more nimble and responsive regulatory approach. In the milieu of technology law, for example, there are a range of interests that must be balanced, including having to balance the risk or threat that a technology might pose against the benefits to society that might accrue from allowing the technology to develop its full potential. Another, and sometimes related, balance must be struck between the rights of citizens against the interests of corporations to obtain the full benefit of their developments. Given the size and rate of change that often accompanies developments in technology, any regulatory response must strike a balance that might only be obtained with full knowledge of these risks and rewards. This is something that is rarely known at the time that technologies become available but experience with similar situations can provide guidance to the regulator of new technologies. Hence, it is this that technology law is uniquely able to provide.

3. An argument for taxonomy of technology law

Aagaard argued that the mere act of classifying an area of law itself creates coherence. By establishing the bounds of a legal field, we begin to understand more about its elements, how they interact, and what this means for the field, and how it fits within the broader legal universe. He said that:

An area of law is a legal field if it exhibits patterns associated with common and distinctive features that predominate within the area to an extent that justifies studying the area as a distinct category of legal situations. We can cohere an area of law into a field by employing an organizational framework to highlight the distinctive patterns associated with the field.\(^{52}\)

This relates more closely to Raz’s notion of general coherence, in relation to which he said ‘what is coherent is intelligible, makes sense, is well expressed, with all its bits hanging together’.\(^{53}\) He noted further that ‘[t]he more united the law is made to be, the more coherent it is. The more pluralistic the law, the less coherent it is.’\(^{54}\) There can be no objection to these claims about coherence: that it must be intelligible, make sense, be well expressed, hang together, and be united. These arguments provide some guide toward defining coherence in technology law and provide an alternative to formal field coherence.

There is value in beginning to classify technology law in this way even if a finding of formal field coherence does not immediately follow. Bowker and Star argued that ‘to classify is human’,\(^{55}\) and that we inherently classify the

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52Ibid 282.
53Joseph Raz, ‘The Relevance of Coherence’ (1992) 72 Boston University Law Review 273, 276.
54Ibid 286.
55Bowker and Star (n 11) 1.
things around us to bring order to, and to simplify our lives. Interestingly, they argued that classifications themselves are ‘powerful technologies’. But there are more functional benefits to classifying fields of law. For example, Cockfield, like Lessig, noted that classifying the field that he termed law and technology provided ‘insight into the ways that the whole law is transformed by policy decisions at the intersection of law and technology’. Aar-gaard stated that classifying a situation as falling within a particular legal field (in his case, environmental law) ‘often carries powerful associations about how the situation should be understood and what legal rule should apply to it’. Berring too noted that ‘putting information in context gives the researcher a powerful tool for understanding legal information’. He argued that as the classified system matures, ‘it becomes authoritative … Researchers mature using it, organize their thoughts around it, and it then defines the world of “thinkable thoughts.”’ Even more specifically, Emily Sherwin argued that classifying an area of law ‘makes it easier for lawyers to argue effectively about the normative aspects of law, for judges to explain their decisions, and for actors to coordinate their activities in response to law.’ Taking a taxonomy of technology law then, should begin to open these benefits to those studying and working in it.

There are other – perhaps more opportunistic, if not self-serving – reasons for the members of a particular field to mark it out and self-identify. Belonging to a field allows researchers to assert themselves in a recognised area. They are able to take comfort in common language and practices, and external parties, such as funding bodies, recognise their research as validly belonging to a particular area. Teachers in legal academia can begin to develop courses in technology law that continue to develop and define the area. All of these are valid reasons to seek to mark out a legal field such as technology law. However, first, we must distinguish the field among other legal fields to establish whether it has a distinct existence.

4. New technologies and current legal frameworks

The alternative to establishing technology law as an independent field of study, it seems, is to leave the issues that arise from developing technologies to those already established areas of law. This is what Judge Easterbrook

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56 Ibid 319.
57 Cockfield (n 41) 415. Also see Lyria Bennett Moses, ‘Recurring Dilemmas: The Law’s Race to Keep Up with Technological Change’ (2007) 2007 University of Illinois Journal of Law, Technology & Policy 239, 247–58.
58 Aagaard (n 8) 228.
59 Robert C Berring, ‘Legal Research and the World of Thinkable Thoughts: The Evolution of Research’ (2000) 2 Journal of Appellate Practice and Process 305, 306.
60 Ibid.
61 Emily Sherwin, ‘Legal Positivism and the Taxonomy of Private Law’ in Charles EF Ricket and Ross Grantham (eds), Structure and Justification in Private Law: Essays for Peter Birks (Hart Publishing, 2008) 119 www.bloomsburycollections.com/book/structure-and-justification-in-private-law-essays-for-peter-birks.
proposed in relation to property in cyberlaw. His answer was to ‘[d]evelop a sound law of intellectual property, then apply it to computer networks’, and then let the markets have their way. This is no longer a satisfactory answer for many of the problems associated with technology law today. It is not enough any longer to wait for the law or laws to develop organically. Developments in technology law are occurring at increasingly rapid rates. New technologies create novel issues that press at the extremes of the established laws. As has been argued, the established fields of law, weighed down by the requirements of field coherence, are often slow to respond in time or with adequate answers. The description of technology law that I develop in this paper is not so constrained by a need to fit old notions of coherence or the rules of established legal fields. The speed of change, the rate of change, the novelty of the challenges, the rapidity with which they swamp, not only local markets, but the whole world (the range of change), and the depth of those changes to our society, our environment, and what it means to be human, makes it necessary to have a set of regulatory responses to new technologies that can, well, respond, in time and at a global level.

As an example of the challenges that established legal fields face from new technologies, consider the notions of consent, capacity, asymmetrical information, freedom to bargain, and the growing need for consumer protection regimes to protect consumers from unfair or unconscionable bargains that are testing the limits of contract law. In tort, new duties of care in negligence are arising that challenge the old accepted duties such as employer to employee, doctor to patient etc. Admittedly, novel duties of care have been something with which tort law has grappled for some time, but the sheer novelty and the rate and range of change that new technologies bring push this bedrock element of tort to its limits. Added to this are problems with causation and liability that arise from black box programmes that fail to give away a clear causal link. Also in tort law, drones are challenging notions of trespass and privacy. In relation to privacy laws, vast oceans of data created by and about each of us in our daily transactions are mined and aggregated by corporations to profile us and target advertising. This infringement on our private lives is barely conceived of, let alone adequately addressed by current privacy laws – including the stagnant tort of breach of privacy. Also in the privacy arena, the increasingly sophisticated surveillance society created by ubiquitous CCTV systems, national security systems, and personal

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62 Easterbrook (n 35) 208.
63 See Matthew U Scherer, ‘Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies’ (2016) 29(2) Harvard Journal of Law and Technology 354.
64 For a discussion of this phenomenon in relation to developments in artificial intelligence, see Guihot, Matthew and Suzor (n 33).
65 Joseph Turow et al, Americans Roundly Reject Tailored Political Advertising (Annenberg School for Communication, University of Pennsylvania, 2012) https://repository.upenn.edu/cgi/viewcontent.cgi?article=1414&context=asc_papers.
device applications, threatens every aspect of our personal privacy. Traditional notions of consent are proving inadequate to deal with any of these issues. Old concepts of property ownership and consequent rights are also being displaced, leaving us without recourse as our data is swept up at the click of a button. We no longer own, but license, music and the apps and operating systems that we use daily to operate our computers. Further, the current trend to hire Lime scooters at will is a forerunner of the future of automated vehicles that will be ordered on demand and will do away with the need to own a car. Antitrust or competition laws that have developed over the last eighty years or so, use understandings of monopolies and market power developed in the shadow of big corporations. Nine of the ten biggest companies today are technology companies that have been allowed to expand almost without constraint because of a fundamental lack of understanding about what they do and whether current laws are even applicable to them. All of these established areas of law are proving inadequate to address what are now some of the most pressing issues of our time. Many of these laws rely on the machinations of the common law to develop solutions, but the common law is a slow moving beast that relies on perfect cases moving through the court systems until ultimate appellate courts can set the law. In many instances, it is just too slow to react appropriately. Similarly, legislation developed in response to technological change might appear more effective and is arguably faster moving, but legislation also moves slowly, is subject to the vagaries of parliamentary members and systems, and is prone to corporate influence.

Technology law must operate where these other laws do not, or cannot adequately. It develops among the interactions between technologies, risks, and their regulation (in all its guises). It works alongside, sometimes with, and sometimes outside of other established areas of law and must be defined accordingly. Judge Easterbrook’s contentions notwithstanding, the disruptive levels, rate and range of change that developments in technologies sometimes bring cannot be left to established areas of law to address in good time. Figure 1 shows the dynamic between technology law and other, more established areas of law, and also illustrates the clear area (shaped like the face of a fox) where technology law alone must operate.

This diagram does not depict the limit of the areas with which technology law interacts but it illustrates the way that technology law exists as a distinctive element among its interactions with many other areas of law. Neither is the area a neat shape, but its influence and the influence or crossover with other areas is greater or lesser depending on the type of technology and the strength of the policy or regulatory responses to it, and the strength of the hold that the established law has on the area. Fuller research mapping the area would provide a more accurate picture of the field. Defining the area that technology law takes up is the goal of this paper and the further research
that must spring from it. Then, if one is to attempt to classify a field of law, what methodology should be used and how might technology law fit within the currently established fields of law?

5. Methodology

According to Cockfield, as we have seen, ‘law and technology’ can generate insights of general legal significance. He argued that:

The challenge for a law and technology theory would similarly be to assist in providing prescriptions to courts and others who seek optimal policy solutions. Two sets of interests must be taken into account by courts and regulators when they consider a proposed policy solution: (1) the interests at stake for a particular person in a given fact pattern; and (2) the broader interests at stake for other current or future parties.

Bowker and Star stated that ‘an ideal classification system exhibits the following traits: (1) there are consistent, unique classificatory principles in operation, (2) the categories are mutually exclusive, and (3) the system is

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66Cockfield (n 41). Also see Bennett Moses (n 57) 247–58.
67Cockfield (n 41) 410.
complete’. However, they also immediately acknowledged that ‘no real-world working classification system…meets these “simple” requirements and we doubt that any ever could’. Instead, they argued for a reading of classification systems that are ‘simultaneously sensitive to these conceptual, organizational, and political dimensions’.

Aagaard set out a similar methodological approach to his taxonomy of environmental law with three components. Firstly, identify the substantive topic, the legal process involved or the institutional actor for example. As discussed, technology law takes as its baseline a substantive topic of technology, the risks, threats or benefits that it creates and the responses to those risks, threats and benefits.

Secondly, set the focus of the study from one or more of four ‘constitutive dimensions: factual context, policy trade-offs, values and interests, and legal doctrine’. These dimensions are dynamic and interact to display distinctive patterns that compose the field. For example, ‘factual characteristics create certain policy trade-offs, which dictate the range of options available to law-making institutions such as courts, legislature, executive branch agencies, and the public’. A classification is the study of this dynamic in action. In relation to the first two dimensions (factual circumstance and policy trade-offs), Aagaard stated that ‘the commonalities must be legally relevant; that is, they must make a difference in how the law applies’. He argued that:

An ideal, complete analytical model of a legal field would identify interrelated patterns across all of the dimensions of the field. Depending on the features of the area of law, however, this ideal may not be possible. If there is not a stable mix of values and interests that operates in an area, there may not be a consistent set of policy trade-offs that encompasses decision making. Or, even if a stable mix of values and interests (and therefore a consistent set of policy trade-offs) exists, if those values and interests are not balanced consistently, the legal rules may not have enough consistency to yield coherent legal doctrine. In such situations, our account of an area of law necessarily may be limited to an incomplete model that addresses only those dimensions of the area that exhibit recognizable patterns. Depending on the objectives of our analysis, this limitation may be fatal to the project, insignificant, or something in between.

Thirdly, Aargaard’s classification system requires one to choose either a descriptive framework that ‘reflects an area of the law as it currently is’ or a

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68 Bowker and Star (n 11) 10–11.
69 Ibid 11. See also Aagaard (n 8) 242 who stated that ‘at a minimum, a legal field must exhibit two characteristics: commonality and distinctiveness. An organizational framework for a legal field therefore must focus on identifying a combination of features that, as a group, are common and distinctive to the field’.
70 Bowker and Star (n 11) 12.
71 Aagaard (n 8) 237–38.
72 Ibid 236.
73 Ibid 238.
74 Ibid 242.
75 Ibid 240.
prescriptive framework that ‘attempt[s] to reflect how the taxonomist thinks the law in an area should exist’.76

How can this taxonomic approach be applied to technology law? Firstly, we need to identify the principles or features that are distinctive to technology law.77 As far as can be, these must be able to be separate to the principles or features from other fields or are distinctively part of technology law, but ‘the unique interplay of otherwise nonunique features’78 can also be distinctive.

Technology law, as will be shown in Part 6, is distinctive in the way that technologies, the risks that they create and the regulatory response to those risks interact to create unique patterns. The regulatory response comes from a mix of the interactions with other areas of law, policy, regulation, and legal and social norms. The disruptive rate and range of these changes that impact what it means to be human makes technology law distinctive. There are certain areas of technology law that could, and arguably should be left for more established legal fields such as contract law or tort law to govern. But there is also a place in which technology law stands alone and should be defined as such.

The approach outlined in this paper is not the only valid way to classify technology law. By setting an arguably positivist or descriptive position, I do not mean to reject other valid ways of analysing technology law such as through historical studies, social scientific studies or cultural studies for example. I simply mean to corral the means by which the majority of writing in the area is conducted to establish a common methodological approach to technology law.

6. Classifying technology law
The study of technology law poses problems to those approaching the area for the first time. They can quickly become lost in a thicket of different new technologies, applications of those technologies, the benefits, threats and risks associated with each technology, and the plethora of different regulatory approaches to balancing those risks and benefits. Simply defining ‘technology’ can be a perilous exercise.79 Indeed, Leo Marx was concerned that ‘the generality of the word – its lack of specificity, the very aspect which evidently enabled it to supplant its more explicit and substantial precursors – also made it peculiarly susceptible to reification’, a condition that endows ‘a human activity with the characteristics of a thing or things’.80 He argued

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76Ibid.
77Ibid 244, citations removed.
78Ibid, citations removed.
79See Lyria Bennett Moses, ‘Regulating in the Face of Sociotechnical Change’ in Brownsword, Scotford and Yeung (eds) (n 4) 573.
80Leo Marx, ‘Technology: The Emergence of a Hazardous Concept’ (2010) 51 Technology and Culture 561, 576.
that ‘[b]y consigning technologies to the realm of things, this well-established iconography distracts attention from the human – socio-economic and political – relations which largely determine who uses them and for what purpose’.  

He argued that ‘[b]y treating these inanimate objects – machines – as causal agents, we divert attention from the human (especially socio-economic and political) relations responsible for precipitating [consequent] social upheaval’.  

The taxonomy in this paper seeks to undo some of this reification of the word technology. Sacasas, noting Marx’s views, acknowledged that ‘technology’ indeed possesses ‘a hazardous tendency’, but asked ‘what alternatives do we have left to us? Are we to name every leaf because speaking of leaves obscures the multiplicity and complexity of the phenomena?’ While a very broad definition is inclusive, it is less useful in a taxonomic exercise than highlighting and investigating specific areas of technological development. Using technology as the descriptor for the field is no broader than using ‘contract’ or ‘intellectual property’ is in other domains.

6.1. Why technology law and not technology regulation?

Judge Easterbrook may well have had a point about cyberlaw in 1996. However, he could not then have predicted the breadth or depth of the impact that new technologies would have on almost every aspect of our lives and laws over the succeeding twenty-three years. Even the term cyberlaw has lost favour as our technical sophistication has developed. Indeed, Cyberlaw and its kin, information technology law and internet law, are now probably more correctly classed as a subset of a much broader category of the interaction between technology (in its broadest sense), regulation, and law. Burkert rightly acknowledged that ‘Information Law’ should be ‘at least a sub-discipline’ – of what though, he did not say.

I argue that ‘technology law’ should be recognised as a legal field in its own right, and that ‘technology law’ is the appropriate nomenclature. I use ‘technology law’ to refer to the expanding literature or scholarship that seeks to explore the relationship between technology, law and regulation. I prefer ‘technology law’ as the name of the proposed field rather than ‘technology regulation’ or ‘technology and regulation’ or some such name. I accept that,

81Ibid.
82Ibid 577.
83LM Sacasas, ‘What Are We Talking about When We Talk about Technology?’, The Frailest Thing (14 February 2014) https://thefrailestthing.com/2014/02/14/what-are-we-talking-about-when-we-talk-about-technology/.
84In fact, he acknowledged his limitations in relation to his knowledge of cyberspace – see Easterbrook (n 35) 208.
85Herbert Burkert, Information Law: From Discipline to Method (SSRN Scholarly Paper No ID 2402866, Social Science Research Network, 28 February 2014) 1 https://papers.ssrn.com/abstract=2402866.
on many accounts, regulation is a much broader concept than law. At its broadest, it is a deliberate attempt to induce a change in behaviour to manage risks or threats.86 This broad definition would subsume state-enacted and enforced ‘hard’ law or legislation. However, when seeking to enter the canon of legal fields, it is prudent to adopt its naming conventions. The names of areas of law within the canon of law subjects tend to be descriptive of the whole area over which they claim dominion: for example, contract law, criminal law, property law, and more lately health law, environmental law, and intellectual property law.87 While these subjects take the ‘law’ classification, regulation plays a significant part in their governance. Even so, they do not take the bait and extend the name to include ‘and regulation’ as part of the super name. It makes sense to adopt this naming convention and to use the broadest descriptive noun – technology law – as the overarching, or super, category under which to further classify the elements that will make up the field.

6.2. The elements of technology law

The methodology set out in this paper may at first seem overly simplistic, but its simplicity provides a very effective means of clarifying complexity in the field and bringing order to the many disparate elements of technology law. Feinman argued that:

classification is designed to reduce the complexity of complex analysis and to highlight similarities and differences among the objects classified. The structure is likely to be less effective if it is too complex or open-ended.88

In this paper, I first distil and categorise the archetypal elements of technology law. I then analogise these elements with the choices available on a takeaway food menu. In many takeaway shops, it is possible to choose one each of a range of vegetables, meats, sauces and bases and to have them blend together to make a flavoursome and well-textured meal. For example, the first step in choosing a meal might be to choose between vegetarian, chicken, beef, or seafood. Step two is to choose the sauce that will flavour the meal; for example, satay, teriyaki, Mongolian or Szechuan style. Then step three offers a choice between rice noodles, Hokkien noodles, or fried or steamed rice. Selecting the meal in this way means that, from a very simple menu setup, there are a great number of different meals to explore. Of course, the buyer might choose to begin with the third step, and choose rice as the base and then build the meal on this selection; it is entirely the buyer’s

86On this point, see Peter Drahos and Martin Krygier, ‘Regulation, Institutions and Networks’ in Regulatory Theory (ANU Press, 2017) 1 <www.jstor.org/stable/j.ctt1q1crtm.7.
87Greely (n 20) 405.
88Jay M Feinman, ‘The Jurisprudence of Classification’ (1988) 41 Stanford Law Review 661, 674.
choice. However, the hungry buyer must be careful not to choose too many items from each category. If he or she did choose too many items, the flavours and textures would meld, and the subtleties to be found in each of them separately would be lost. If the buyer chose every item in each category, he or she would end up with brown mush that would have no distinct flavour.

So it can be said of technology law, in which there are myriad different technologies, and an even greater number of applications of those technologies in different fields and industries. These technologies (and particularly new technologies) offer possibilities to solve the world’s great and small problems, but it is also possible that they could create an equal number of threats and risks of varying degrees. A person studying technology law is confronted with this seemingly limitless number of starting points, and points of divergence. Given this apparently limitless number of combinations of approaches, it is understandable that the field is sometimes referred to as lacking coherence or structure. However, if we begin to map the area, as in the table (or menu) in the Appendix to this paper (Table), it is possible to divine a coherent taxonomy for technology law by choosing from the different columns of the Table, much in the same way we would choose from the takeaway food menu. By applying the menu methodological approach to technology law, researchers and policymakers can thread a path through the quaking quagmire and sustain clarity and precision by carefully delineating their desired approach; all under the rubric of technology law. However, the writer must be mindful not to choose too many things to study at once or he or she will end up with the literary equivalent of brown mush.

6.3. Limitations

It may be argued that attempts such as this to bring coherence to technology law, underplay the value that might be had through other approaches to the subject, for example through seeking order in the seeming chaos in technology law by applying chaos theory to the field. Technology law is still a relatively new field. There may well be real value in new research that tests system parameters and combinations within dynamic systems to begin to add structure and to build a methodological approach that way. However, I argue that greater value can be had by categorising the field and working within set methodological parameters, at least until more solid foundations of a methodological approach are set.

As with any mapping exercise, this one is limited and in no way represents the totality of technologies or their applications, or the myriad approaches to

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89See for example applications of chaos theory in nursing in Carol Haigh, ‘Using Chaos Theory: The Implications for Nursing’ (2002) 37(5) Journal of Advanced Nursing 462; and Denise F Coppa, ‘Chaos Theory Suggests a New Paradigm for Nursing Science’ (1993) 18(6) Journal of Advanced Nursing 985.
and theories of regulation available today, but is merely a snapshot of the most current and significant elements of each. It is highly likely that in ten years’ time the Table will look dated and quaint. However, if it can be developed as a live document online, it can be curated as new technologies and applications arise. Its main benefit at this stage is to show the possibility of a methodological roadmap that provides a possible coherent whole for technology law.

7. A menu approach to classifying technology law

The *Handbook* provides a good example of the range of diverse interests in technology law and a very useful attempt at classifying areas within the field. It includes papers that traverse a large number of different technologies, using various critical lenses, and different approaches to regulation. The *Handbook* itself provides a useful attempt at classifying the various elements of technology law as a coherent field. The papers in the *Handbook* are sorted into chapters headed ‘Legitimacy and Technological Regulation: Values and Ideals’, ‘Technological Change: Challenges for Law’, and ‘Technological Change: Challenges for Regulation and Governance’ that is divided into sub-categories of Regulating New Technologies, and Technology as Regulation. The last broad chapter heading is ‘Six Key Policy Spheres’ that groups papers together under subheadings: (A) Medicine, (B) Population, reproduction, and family, (C) Trade, commerce, and employment, (D) Public safety and security, (E) Communications, Information, Media, and Culture, and (F) Food, Water, Energy, and Environment. This list of headings itself provides a dizzying number of topics in seemingly disparate and distinct areas. However, the Introduction to the *Handbook* provides a useful summary of its contents, proposes a possible cohesive approach, and draws the themes presented in each of the papers together under the headings above. Despite this, Brownsword et al perhaps too readily admit to a lack of coherence in technology law:

> Given the breadth of the field, one might wonder whether there is a unifying coherence to the various inquiries within it. The short answer is, probably not. Any attempt to identify an overarching purpose or common identity in the multiple lines of inquiry in this field may well fail to recognize the richness and variety of the individual contributions and the depth of their insights.\(^9\)

Despite the diversity of topics within the field, Brownsword et al acknowledged the search for coherence in the field of technology law (or ‘law, regulation, and technology’) was ‘a work-in-progress’.\(^9\) This paper seeks to

\(^9\)Roger Brownsword, Eloise Scotford and Karen Yeung (n 4).

\(^9\)Ibid 7.

\(^9\)Ibid 3.
continue that work and, in Part 8, I identify a possible unifying theme that creates a thread along which technology law may cohere. In the next section, I explain the menu approach that sets the framework through which that unifying theme engages to construct a coherent methodological approach to technology law.

7.1. The menu approach described

This Part provides an overarching methodological approach to defining technology law. This is not the first attempt to map the field of technology law.93 In 2010, Koops attempted to map the subject using ten dimensions: technology type, innovation, place, time, regulation type, normative outlook, knowledge, discipline, defining the problem, and framing the problem.94 Koops sought to impose some order to the developing field by mapping the contours of technology regulation as he saw them at the time. As I do in this paper, Koops proposed that his map could be used as a ‘heuristic tool to position research – ex post … but also ex ante by researchers embarking on writing a paper’.95 However, in 2010, he thought it too early to claim that technology regulation could be considered a distinct discipline.96 His stated aim in mapping the area was to ‘support the emerging discipline to gain some foothold in terms of analytic tools that help us understand what this discipline is about, how it approaches its research, [and] what it can contribute to the body of knowledge …’.97

This paper now stakes a claim for technology law as a legal field. The sheer weight of literature that has evolved on the topic since 2010 has developed the field to the point that its contours can now be more clearly defined. The categories that I use in the Table, and the methodological approach that I outline, define the subject of technology law without being too prescriptive. For example, my categories do not include Koops’ place or time which are not essential to establish a coherent subject. Dimensions such as Koops’ normative outlook, and discipline, would be included in my sixth column (critical lens) and, again, are not mandatory in all discussions about technology law. The method of categorising the elements of technology law, and the methodological approach outlined in this paper, capture the essential characteristics of

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93 Again, here I argue to establish technology law as a discrete law subject, the study of which would include the study of technology regulation – see discussion in note 3 above.
94 Bert-Jaap Koops, ‘Ten Dimensions of Technology Regulation: Finding Your Bearings in the Research Space of an Emerging Discipline’ in Dimensions of Technology Regulation (Tilburg Institute for Law, Technology, and Society, 2010) 311, 325 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1633985&download=yes. Brownsword and Goodwin use Koops’ ten dimensions as a filip to their discussion of technology and regulation in Roger Brownsword and Morag Goodwin, Law and the Technologies of the Twenty-first Century (Cambridge University Press, 2012), see the discussion on pages 3–6.
95 Koops (n 94) 325. See discussion in the last paragraph of this Part.
96 Ibid 312.
97 Ibid 325.
what technology law is and provide a pragmatic and inclusive approach to its study.

I have set out the most relevant categories of elements of technology law in the five columns in the Table. Other categories might also push for validity, but for clarity and concision, I have limited the selection to the five. The literature in technology law often includes discussion about several of these categories. Papers tend to identify a technology or, more particularly an application of that technology and the range or spectrum of possible perceived risks that arise in relation to an aspect of technology. Other papers might view a technological threat or risk through a theoretical lens which will illustrate a risk or threat. Given the nature of the subject – technology law – there must always be some attempt to grapple with column five; the regulatory responses to technological developments. The vast majority of papers in this field deal with two or more of the elements within the six columns and can thus be described using the menu approach.

The first column sets out a number of the current paradigmatic fields of technology. Part of the problem with establishing coherence in technology law is the breadth of meaning given to the term technology. Allenby preferred a list similar to the one in the first column. He noted that:

Technological change is always potent, but now we have not just one or two enabling technologies undergoing rapid evolution, we have five: nanotechnology, biotechnology, robotics, information and communication technology (ICT), and applied cognitive science (NBRIC).98

However, Bennett Moses eschewed a list ‘such as nano-info-bio-robo-neuro-technology’99 that, she argued, would date with the development of new technologies, and opted for a broad definition of technology that would:

… include all the above fields, as well as older fields, and to encompass ‘any tool or technique, any product or process, any physical equipment or method of doing or making, by which human capability is extended’.100

This definition would arguably include as ‘technology’, old technology, such as typewriters and printing presses. Bennett Moses’ point in doing this is to shift the attention of much of technology law discussions from ‘regulating technology’ as a precautionary reflex, which tends to occur in response to new developments in new technology, to instead focus on ‘adjusting law and regulation for sociotechnical change’,101 no matter the technological development.

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98Braden R Allenby, ‘Governance and Technology Systems: The Challenge of Emerging Technologies’ in Gary E Marchant, Braden R Allenby and Joseph R Herkert (eds), The Growing Gap Between Emerging Technologies and Legal-ethical Oversight: The Pacing Problem (Springer, 2011) 3, 7–8 https://doi.org/10.1007/978-94-007-1356-7_1.
99Bennett Moses (n 79) 576.
100Ibid citing D. Schön, Technology and Change (Pergamon Press, 1967).
101Ibid 574.
Of course, a broad definition such as proposed by Bennett Moses that does not list specific technologies but refers to ‘any tool or technique’ is useful as an all-encompassing definition, but, for the purposes of providing examples of that work in the menu approach it is not sufficiently precise. For this reason, I have included in column one of the Table, a number of technologies as set out by Allenby, and have added some others referred to in the literature.

The second column in the Table sets out applications of technologies that, again, capture those most referred to in the literature. There are very many more of these, but this list is sufficient to establish the methodological approach suggested in this paper.

The third column lists the main threats, risks, and benefits that are often associated with the applications in column two. When discussing new technologies, the purported benefits must be weighed against any threats or risks that the technology may pose. A common, and sometimes maligned, approach in technology law is to identify the risks or threats involved in or posed by the technology and then to suggest a regulatory ‘solution’ to those risks or threats. This precautionary approach, while a common reflex, is limited in that there is often a broad and diffuse range of effects that must be considered before regulating from the hip. Also, the technology may be inherently benign and not require any regulation. I have attempted to capture the major benefits, as well as the risks and threats that arise in response to technological developments but, given the nature and levels of complexity in this field, no list can be exhaustive.

In the fourth column, I set out some of the frames of reference through which technology law can be described or developed. For example, some authors have taken an approach that views the impacts of technology from within a human rights framework. Sartor, for example, argued that a human rights approach ‘had a unique ability to connect the new issues emerging from ITs’. He also said that:

… the fragmentation of IT law does not exclude, but rather requires, an overarching and purposeful view from which the regulation of different technologies in different domains, under different regimes, may be viewed as [a] single enterprise, aiming at a shared set of goals.

Others have framed their work using the criminal law as the basis upon which to analyse developments in technology. However, given the ubiquity and reach of new technologies, almost any area of law could be used as a lens

102 Allenby (n 98) 11–12.
103 Thérèse Murphy, ‘Human Rights in Technological Times’ in Brownsword, Scotford and Yeung (eds) (n 4) 953.
104 Sartor (n 4) 434.
105 Ibid.
106 Lisa Claydon, ‘Criminal Law and the Evolving Technological Understanding of Behaviour’ in Brownsword, Scotford and Yeung (eds) (n 4) 338.
through which to study technology law. A human rights approach may indeed provide an overarching theme for some categories of technology, but it does not unify the field, without more. I propose that a taxonomy of technology law will provide such an overarching view.

The fifth column lists a range of regulatory ‘tools’ that are often suggested as a response to the threats or risks posed by new or developing technologies. As pointed out by Bennett Moses, there is a tendency in technology lawyers to react and to regulate to counter perceived threats and risks posed by new technologies, and the range of possible regulatory responses is itself a cornucopia. She cautions against this reflex.107 Even though Bennett Moses asserts that technology should not beget regulation per se, she does acknowledge that ‘new technology does often require new regulation (whether or not directed at technological artefacts or processes directly).’108 Again a list such as this can only capture some of the regulatory responses that are suggested to counter threats from technological advancements and this list is only indicative of the most pervasive regulatory tools available.109

7.2. Classifying technology law through the menu approach brings coherence

By categorising the elements in the Table as I have done, one begins to see how the seemingly disparate elements of technology and the legal and regulatory responses to it might begin to cohere as a unified field. I develop this theme further in Part 8. An added benefit of listing these categories in the way set out in the Table, is that those studying technology law or seeking to write in the field can simply pick and choose from the columns in the menu as they might from a takeaway menu. For example, under the theme of autonomy, a writer may choose to write about robotics (from the technology column), war (from the application column) and ethics (from the threat or risk column). The author may then appeal to international norms of behaviour, as well as discussing treaties or conventions (all from the regulatory response column) as the appropriate regulatory response. This topic would probably not require a specific critical lens (such as contract law, or human rights law) and so, viewed through the menu approach, those five discussion points, chosen from the columns of the menu, would allow for a clear and coherent argument. Alternatively, the writer may choose to write about genomics (from the applications column). The technology might be biotechnology

107 Bennett Moses (n 79).
108 Ibid 586.
109 For an excellent and complete discussion of possible regulatory responses, see Bert-Jaap Koops, ‘A Taxonomy for Descriptive Research in Law and Technology’ in E Palmerini and E Stradella (eds), Law and Technology, The Challenge of Regulating Technological Development (Pisa University Press, 2013) 37. Also see Guihot, Matthew and Suzor (n 33).
from column two, and the theme might be human futures. This time the
writer might choose to discuss ethics (from the threat or risk column), and
then, as a response (if one is required), may prescribe legislation. Analysing
technology law in this way, not only avoids confusion, but also provides a
coherent pathway to approaching the subject. As long as the author has
picked a clear path through the technology law menu, they will have
avoided the quagmire. This does not mean that they must choose from
each column, but they will have been wise not to have spread themselves
too thinly.

This approach also offers warnings to writers if they begin to lose their way.
Choosing too many elements from each column could mean that the argu-
ment could quickly become unworkable and become bogged down in the
quagmire. If researchers or writers are not careful and deliberate in choosing
their approach, the resulting work might become unwieldy and confused. For
example, it would be unwise to choose to study technology law through the
critical lens of both contract and criminal law, then focus on biotechnology
and information technology, and then study CRISPR and AI as creating
threats to privacy, safety, ethics and ownership. If that approach was not con-
fused enough, the writer might then suggest legislation, self-regulation and
incentives as regulatory responses. If not carefully structured and delimited,
the resulting paper could lack sufficient clarity and purpose and would
likely offer no coherent answers to the problems that it raised. By reviewing
the paper through the menu approach, the author could quickly diagnose
the problem and prescribe a way of streamlining the argument.

8. Unifying principles of technology law

I do not suggest that simply ticking the boxes on the menu will create a cohe-
sive body of law on its own. There must be more. There needs to be an organ-
ising or unifying question around which an area of law can cohere. The
cohesion is provided, I suggest, if research in the field grapples with the ade-
quacy of regulation to deal with a threat or risk posed by a particular technol-
ogy. It is the synchronicity of the technology, risk and regulatory response that
defines technology law. Brownsword, Scotford and Yeung propose three
themes, based on the disruptive nature of new technologies, which knit
these disparate topics together. They argue that the disruption that new tech-
nologies are apt to bring is firstly to ‘established legal frameworks, doctrines,
and institutions’, secondly to the ‘adequacy of existing regulatory regimes’ and
structures, and thirdly, and most presciently, to the ‘ideas and justifications
offered in support of regulatory intervention’. It is the speed of change that
new technologies can bring, the systemic nature of the threats and risks
that they pose and the depth of impact that those changes have the potential
to create that requires such a broad mix of regulatory tools to respond. Even if
no regulatory response is required, the study of the interaction of technology and law requires that the question must be posed and answered. This is what gives technology law its coherence. The questions we must ask and the answers we must provide to new technological developments arise, not because they are technological developments per se, but because of the disruptive nature of certain aspects of technology and the risks that inevitably arise. Given the level and speed of disruption wrought on our legal and regulatory structures by new technological development, we are almost constantly required to look to the touchstone of the normative underpinnings of our laws to ensure they remain fit for purpose. Technology law coheres because of the way that any new technology requires us to engage with the various elements within column five (regulatory response). Technology law also asks if the regulatory environment adequately responds to a particular technology or application of technology. In this regard, the regulatory environment will be adequate only if its innovation-incentivising elements are appropriate, if risks to health and safety and the environment are acceptably managed, and if fundamental values (human rights, human dignity, autonomy, liberty, justice etc.) are respected. It will also only be adequate if the particular regulatory instruments employed are effective to balance these issues.

Only by studying these things together over the range of technologies can we begin to see commonalities, so that technology law as a whole begins to unify and hang together. Only through grappling with the fundamental questions about technology and regulation can technology law provide the answers to the question Judge Easterbrook posed for the cyberlaw conference in 1996. This is how technology law can cohere to illuminate the whole of the law. We must learn from the effect of, and responses to, technological disruptions across a range of technologies to ensure effective regulatory responses to threats or risks of new technological developments.

To further clarify the way this methodological approach might apply, the next Part provides working examples of how the menu approach can be used to analyse the literature in technology law.

9. Applying the menu approach to the literature

In this Part, I will dissect several of the papers from the Handbook to show how each can be described by reference to the menu approach. I am not

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10See Bennett Moses (n 79) 574 who argues that technology on its own is not a reason to leap to regulation, but that any challenges that might stem from new technologies ‘stem not from “anything technological” but rather from the fact that the sociotechnical context in which laws and regulation operate evolves as a result of a stream of new technologically enabled capabilities’.

11Brownsword, Scotford and Yeung (n 4) 7–15. Ironically, in this way, the study of technology law tests our understanding of normative coherence as set out in Part 1. This paper will not address normative coherence in detail but this may be a subject of further study.
sure that the authors would agree that this is the way that they approached their work, but that does not take away from the validity of the exercise as a measure of whether the methodological approach set out in this paper applies.

In ‘Human Dignity and the Ethics and Regulation of Technology’, Düwell chose the human rights framework (from column five), and specifically, the impact on the right to dignity (as a human right from column four), to analyse technology and its regulation. Düwell resisted targeting specific technologies (from column one), but instead, outlined a broad group of technologies with goals as diverse as to ‘avoid harm for human beings (e.g. medical technologies)’, ‘fulfil basic needs (e.g. technology for food production)’, ‘mitigate side effects of other technologies (e.g. technologies for sustainable production)’, or to ‘facilitate human beings in life projects, such as by making their lives easier, or by helping them to be more successful in reaching their goals of action’.

Here, he purposefully prefers a broad understanding of technology rather than the more explicit examples in column two. Expounding on the idea of human dignity as the lens through which to view technology regulation, Düwell then asked if these goals were ‘acceptable under the requirements of the human rights regime?’ By looking at technologies that respect human dignity, Düwell urged that ‘we must first ask what this respect requires from us regarding the development of new technologies, instead of first developing new technologies and then asking what kind of ethical, legal, and social problems they will create’. He then broadened the scope of the technologies he discussed to include those that affect ‘relationships between human beings regarding place and time in a way that alters responsibilities significantly’. He provided as examples, nuclear energy and climate change as imposing responsibilities that extend in time (from column four). Düwell then discussed the need for global regulation of these technological regimes as they have a global impact. Here he outlined contracts or conventions between states (from column five). In relation to this approach, he highlighted the deficiencies that exist with supranational bodies such as the lack of harmonization and how these can sometimes be incompatible with human rights goals. Düwell argued that certain technologies directly impact human beings and therefore that respect for human dignity must underpin all regulatory approaches to these technologies. Düwell’s argument, while referring broadly to technologies and regulation, limits itself to recognised categories of study within technology law as set out in the menu and therefore maintains coherence.

112 Marcus Düwell, ‘Human Dignity and the Ethics and Regulation of Technology’ in Brownsword, Scotford and Yeung (eds) (n 4) 177.
113 Ibid 187.
114 Ibid 188.
115 Ibid 189.
116 Ibid 190.
The methodological approach taken by Morgan in ‘Torts and Technology’,\(^\text{117}\) should be evident from the title. In the chapter, Morgan examined one of the recurring questions about law and technology: whether the law, as developed over almost 100 years, is capable of adapting to respond to developing technologies, and if that development poses any unique problems. Morgan concentrated on tort law (from column four), and its sometimes competing goals of ‘compensation, deterrence, and innovation’ to examine the issues that arise in relation to new technologies. Those issues include internet speech, product liability generally, and a number of disparate product liability issues in relation to new pharmaceutical products and driverless cars (from column three). Morgan chose a clear methodological approach that concentrated on tort law (from column four) as the lens through which to review several of the threats risks or benefits posed by new technologies (from column three). As is often the case, Morgan’s discussion balanced the positive and negative aspects of a range of regulatory responses (from column five), including tort law and litigation, European Council directives, and less direct regulatory means such as taxation through, for example, the UK’s Vaccine Damage Payments Act 1979.\(^\text{118}\) In relation to liability for driverless cars, Morgan again considered the effectiveness of tort law to respond to a number of the liability issues that could arise, and considered other methods of regulation including more stringent regulations for manufacturer liability, to the influence of insurance systems, and industry standards (again from column five). Again, by threading a clear path using a limited number of elements from each of the categories within the Table, Morgan is able to construct a cohesive and cogent argument about the efficacy of tort law to address the challenges of new technologies. By thus confining his argument, he avoids the pitfalls of overindulgence in one or more of the menu areas and maintains coherence.

Finally, in ‘Surveillance Theory and its Implications for Law’,\(^\text{119}\) Timan, Galič and Koops explore surveillance theory (from column four) both to bring surveillance theory closer to legal and regulatory scholarship and to attempt to incorporate the legal and regulatory implications of surveillance into surveillance theory.\(^\text{120}\) Surveillance techniques have, because of rapid improvements in technology, become almost ubiquitous and ‘are convergent, operating or communicating through the same networks’.\(^\text{121}\) Those involved in and affected by surveillance include the state, corporations, and individuals. The authors note that surveillance occurs both online and also physically, in

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\(^{117}\)Jonathan Morgan, ‘Torts and Technology’ in Brownsword, Scotford and Yeung (eds) (n 4) 522.

\(^{118}\)Ibid. See the discussion on pages 533–38.

\(^{119}\)Tjerk Timan, Maša Galič and Bert-Jaap Koops, ‘Surveillance Theory and Its Implications for Law’ in Brownsword, Scotford and Yeung (eds) (n 4) 731.

\(^{120}\)Ibid 731.

\(^{121}\)Ibid 743.
public and private spaces; it is ‘intrinsically hybrid’.122 This ubiquity or pervasiveness of surveillance requires a nuanced and varied regulatory approach (from column five).123 The threats or risks (from column three) associated with ubiquitous surveillance are understated in the chapter but include threats to individual privacy and private places and the right to ‘a space relatively immune to undesired or uncontrolled surveillance’.124 Timan, Galić and Koops argue that ‘the law has so far engaged with surveillance only in a superficial and piecemeal fashion’.125 They suggest the need for a ‘flexible and forward-looking approach’126 to regulation of surveillance that ‘protects an abstract space around persons as they live their lives regardless where they are’127 (again, not a specific, but a more general approach based on elements in column five). They point out that these regulatory frameworks must address ‘the challenges of converging, hybrid surveillance infrastructures and assemblages both in their context-dependent specificity and in their cumulative effect on citizens/consumer–individuals’.128 While this chapter emphasised the theory of surveillance over the regulatory response, it still, dissected using the menu approach, fits within the rubric of technology law.

10. Conclusion

Reviewing the papers in the Handbook individually illustrates how each, in its own way, coheres with the menu approach and can be said to be ‘in’ or ‘about’ technology law. However, this process also illustrates that there is coherence in technology law more broadly. Rather than being a quaking quagmire, or the law of the horse, technology law is shown to be remarkably structured. Admittedly, the field is broad and contains a diverse number of topics, perspectives, and approaches. But this does not preclude a methodological approach that binds the threads of the technologies and their various applications and regulatory responses together. Applying the menu approach, carefully selects and weaves these threads to form a coherent and more clearly defined understanding of technology law. Constructing the field in this manner creates a bedrock for further discussion and debate on and about technology law.

That further debate should reach the point of consensus among the participants in the field. If a level of consensus can be reached on a methodological approach such as the one outlined in this paper, then we can conduct further empirical research on more definitive contours of technology law. This will certainly take a broad approach and will continue to develop as technologies

122Ibid 747.
123Ibid 745.
124Ibid.
125Ibid 744.
126Ibid 748.
127Ibid 745.
128Ibid 749.
also develop. In this we can be comforted by the words of Smith who noted that:

Regardless of how well-developed a classificatory system is, it would be extreme hubris to think the task is or could ever be finished: this conclusion is equivalent to asserting we know all there is to know about the subject. No one supposes this is true of our knowledge of the natural world; it is even less likely to be true of our knowledge of a social phenomenon, such as law, that is itself changing over time.129

Let the tournament begin!

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129Stephen A Smith, ‘Taking Law Seriously’ (2000) 50 University of Toronto Law Journal 241, 245.
## Appendix

| Technology | Application | Threat/Risk/Benefits | Critical lens | Regulatory approach |
|------------|-------------|---------------------|---------------|---------------------|
| 3D Printing | Accessibility | Chaos theory | Code | Consumer feedback |
| AI – Machine learning, Computer vision, natural language processing | Competition | Comparative law | | |
| Any thing by which human capability is extended | Cultural/ institutional/ social impact | Complexity | Decisions – including judicial | |
| Biotechnology | Dignity | Contract law | Delegated legislation | |
| Cyber technology | Economic efficiency/ wealth | Criminal law | Design | |
| Information technology | Employment | Doctrinal analysis | Do nothing – Collingridge dilemma | |
| Nanotechnology | Environment/ nature/ sustainability | Feminism | Duties | |
| Neuro-technology | Ethical | Human rights | Fines | |
| Nuclear technology | Existential | Law and Economics | | |
| Robotics | Fairness | Marxism | Legislation, Treaties/ conventions | |
| Medicine, Health, Genomics | Innovation | Property | Litigation | |
| Nature – Environment/ Food, water | Justice | Social Justice | Negotiation | |
| Neural interface/ bionics | Liberty/Equality/ Happiness | Socio Legal studies | Norms | |
| Population, reproduction and family | Norms | Surveillance studies | Nudging | |
| Public safety and security | Ownership/ property | Tort | Pronouncements | |
| Quantum computing | Power relations/ economic, political, global power | Responsive regulation/risk-based regulation | | |
| Robotic vision, touch, strength, precision | Privacy | | | |
| Surveillance/Biometric data collection | Rights | Self-regulation | | |
| Trade, Commercial transactions, employment | Safety/Security/ Health | Soft law | | |
| War | | | | |