

# Emerging Trends in 21st Century Legal Regulation

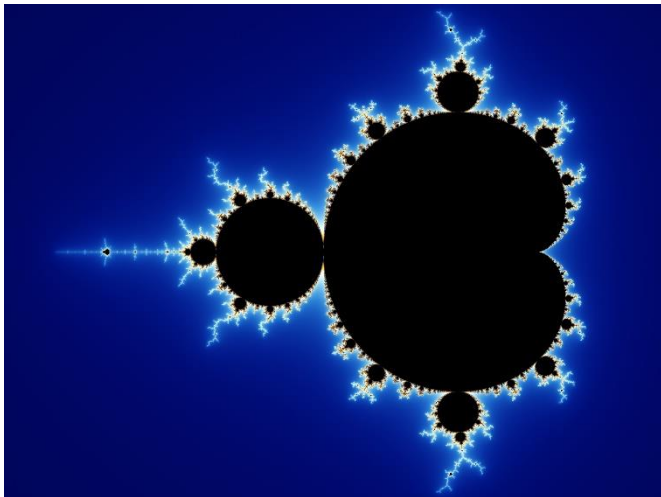
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## Assembled ramblings of Brendan Guildea B.L.<sup>1</sup>

The auspicious phrase “technology law” encompasses a full list of rapidly emerging and developing areas of legal practice, including:

- Data Protection
- Intellectual Property
- Company law
- Contract law
- Criminal law
- Private International Law (Conflict of Laws)
- Employment law
- Law of Confidentiality
- Competition/anti-trust
- Consumer law

Each of these contain several complex disciplines or sub-topics, leading to a Mandelbrot-like configuration where the closer one looks at a legal problem the more complicated it becomes.



*High level view of the Mandelbrot set.*



*Zoom at 1.25E548*

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<sup>1</sup> It is hoped that this paper will form part of the published materials arising from the 2019 World Legal Summit. Therefore, all rights are reserved.

There are differences in substantive & procedural<sup>2</sup> law between jurisdictions which add further complications for companies with a presence in multiple jurisdictions (i.e. every single online company). Therefore, any law office purporting to offer a complete service for the needs of any online business is either lying or ignorant to the scale of the sprawling legal landscape. (We are not sure which is worse.)

The eternal cat and mouse dance between law and technology rages on. In general, there is a perception that U.S. law leads the world on the definition and regulation of emerging technologies, whereas the E.U. champions individual rights and mitigates the pervasive power of large corporate entities.<sup>3</sup> If any lawyer is asked the question “will this be legal in 5 years’ time”, the answer is now less reliable than the ancient Roman practice of haruspicy.<sup>4</sup>

And then there is the language barrier between technically competent IT personnel and their legal team.<sup>5</sup> On this point, one is reminded of the Tower of Babel, where the project to build the world’s greatest building was frustrated when the builders lost the ability to communicate. A primary goal of the World Legal Summit is to bridge the gap between lawyers and technologists, and we hope that by the end of today, the lawyers will understand something new about the technologies their clients use and the technologists will understand that lawyers are not quite lazy fat cats.

This paper is intended to give technologists insight into the law-making process, as it applies to modern technology law issues. Then we will set out two advanced technical concepts, and how these might trigger a call for legal regulation. Finally, we have included some external links for reference regarding today’s three topics (which will certainly grow this side of 5p.m.).

## How to make law?

As a warm-up exercise, let’s look at the original text of section 11 of the Locomotive Act 1861:

It shall not be lawful to drive any Locomotive along any Turnpike Road or public Highway at a greater Speed than Ten Miles an Hour, or through any City, Town, or Village at a greater Speed than Five Miles an Hour; and any Person acting contrary hereto shall for every such Offence, on summary Conviction thereof before Two Justices, if he be not the Owner of such Locomotive, forfeit any Sum not exceeding Five Pounds, and if he be the Owner thereof, shall forfeit any Sum not exceeding Ten Pounds.

What amendments are needed to bring this up to date for Irish roads today? Instead of having a magic marker, to implement reasonable changes as they are required, Western democracies need to adhere to the rule of law while updating the law. While there is no singular simple process to bring about change, in general:

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<sup>2</sup> Even where the substantive law is the same (e.g. with GDPR), the procedural differences (governed by the law of the Court, *lex forum*) mean that lawyers are not permitted to offer formal legal advice in neighbouring countries.

<sup>3</sup> Those in the West live in a complicated time where the influence of the U.S. and E.U. might be diminishing regarding the setting of a gold standard on any legal issue.

<sup>4</sup> We refer to the current debate on the regulation of crypto currencies and distributed ledger based technologies.

<sup>5</sup> We would not be surprised if, in 20 years’ time, there was a formal legal-technical translation qualification offered by leading Universities.

1. There is a vision for a particular change.
2. This change is implemented by some branch of government (legislative, executive or judiciary).
3. The new law is enforced.

It is possible that the law-making process has itself grown incapable of effectively governing technology. (That is one of the big questions for this and the next generation of lawyers.) However, working with what we have, here are some notes that will illustrate the kind of 'movements' that give rise to a change in the law.

### **Internal Vertical A: Bottom-up**

Local governments are driven to pass by laws to govern the specific needs of their community. This is the most direct form of governance and can respond quickly to changing needs.

### **Internal Vertical B: Top-down**

A decision might be taken at an Executive level which gives rise to legislation, imposed across a large jurisdiction (e.g. Federal law in the U.S., EU Regulations). These laws have the authority and full backing of all branches of government and are often rigorously enforced to bring about swift change.

### **Stakeholder influence/lobbied law**

Sometimes a high-profile working group or report will inspire change in the law. These can be public, private or hybrid groups.

### **Jurisdiction to jurisdiction (external influences)**

International law has a major influence on e-commerce. The first three types of legal change (above) have a corresponding international element.

- The law in a single country might be adopted worldwide without the intervention of any Treaty. This is called a horizontal legal development.
- The law of a single country might be converted into a Treaty and then enforced worldwide (up-down regulation).
- A series of bi-lateral treaties might give rise to a consensus on what the law ought to be, and the law is developed that way.<sup>6</sup>
- A single meeting of world leaders or a congress of experts might adopt a Treaty which becomes domestic law (top-down).

### **Judge-made law**

Judges in common law jurisdictions play an important role in interpreting and applying existing legislation, often with some surprising results.<sup>7</sup>

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<sup>6</sup> See, the history of the international copyright treaty, Berne Convention, which developed from a series of bi-lateral treaties.

<sup>7</sup> *Maximillian Schrems v Data Protection Commissioner* [2014] IEHC 310 (Hogan J). This decision resulted in a reference to the European Court of Justice (as it was then) and brought an end to the safe harbour data agreement with the U.S.

## Executive orders/regulations

There is a 'magic marker' in some technical areas of law, where primary legislation (e.g, the Data Protection Act) gives a law-making power to a senior member of government (a Minister or the Data Protection Commissioner). This delegation of power can give rise to complications, where the statutory instrument of a Minister is challenged. Also, there is a limit to the *extent* of a change in the law permitted. The level of a fine can be passed by secondary legislation, but the substance of the offence cannot.

Secondary legislation provides Western legal systems to respond swiftly to external changes, but is limited in terms of scope.

## Contrast with the writing of a computing language

By contrast, IT people adopt a utilitarian approach to their tools. If better product comes along, it can<sup>8</sup> be purchased/rolled-out. Programming languages serve as an excellent comparison with legislation, as there is a large element of things being set in stone: users of Rust, for example, are stuck with certain elements & forms of that language. There is a degree of flexibility (similar to secondary legislation) but at a certain point, an entirely new language needs to be created to cope with new demands.

## Timelines and delays implementing technically appropriate laws<sup>9</sup>

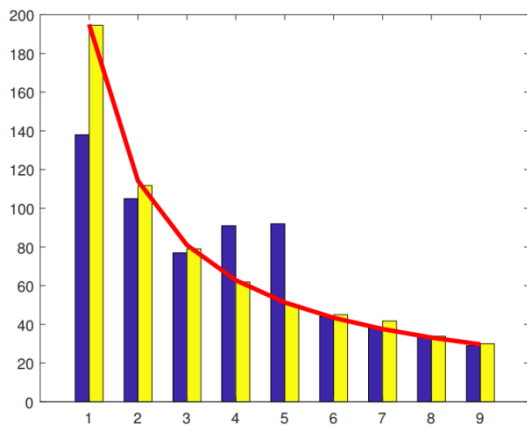
1820	Charles Babbage develops the concept of a machine capable of performing basic numeric calculations. (Never built.)
1936	Alan Turing develops the concept of the 'Turing machine' which is used during WWII to crack the German Enigma encryption device.
1939	Hewlett-Packard is founded by David Packard and Bill Hewlett in a Palo Alto, California, garage
1967	U.S. passes the Freedom of Information Act
1970s	Microsoft, IBM and Apple begin manufacturing personal computers.
1980	OECD Guidelines on data protection
1981	Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data done at Strasbourg on the 28th day of January
1988	Ireland passes its Data Protection Act 1988 (implementing the 1981 Convention)
1989	Tim Berners-Lee invented the World Wide Web in 1989
1994	Number of internet hosts exceeds 1 million.
2000	EC Decision on safe harbor allows transfer of data from EU to U.S.
2002	EU Directive on Privacy and Electronic Communications 2002/58/EC
2004	Facebook founded.
2015	Safe Harbour repealed by ECJ.
2016	US-EU Privacy shield Decision 2016/12500
24 <sup>th</sup> May 2018	GDPR enforcement deadline. Ireland's Data Protection Act 2018 comes into force.

<sup>8</sup> Sometimes, especially in the public sphere, outdated IT systems are not replaced. So, lawyers are not alone in being tardy!

<sup>9</sup> Computer references taken from <https://www.livescience.com/20718-computer-history.html>. Legal history references from: <https://cloudprivacycheck.eu/latest-news/article/a-brief-history-of-data-protection-how-did-it-all-start/>.

	EU published a review of GDPR
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## Technical issue 1: prejudice arising from numbers



$$P(d) = \log_{10}(d + 1) - \log_{10}(d) = \log_{10}\left(\frac{d + 1}{d}\right) = \log_{10}\left(1 + \frac{1}{d}\right)$$

The analysis of 600 numbers from the accounts of a suspect Italian company (in blue), do not cohere to the expected values, per Benford's law (in yellow).<sup>10</sup> Should an application for a search warrant include this data, as well as the raw data?

To what extent should a person's spending change before their bank contacts them directly to check payments are legitimate? How robust does the live analysis of one's spending need to be?

-	0.06817	0.38137	0.201844	0.35496	0.163308	0.027776	33	0
-	0.51978	0.541702	-0.05386	0.112671	-3.76537	-1.07124	1	1
-	0.10031	-0.85538	0.314037	0.378698	-0.00082	0.000629	6.89	0

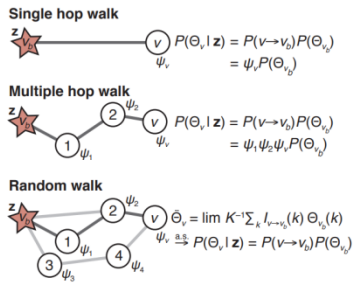
This data looks at the spending behavior of three individuals (the horizontal rows). Time, amount spent and time between transactions is contained in the vertical columns. The resultant output (extreme right column) is that only the 'middle' person is a fraudster. The true account owner needs to be notified and the card cancelled.<sup>11</sup>

There are even equations to determine how 'threatening' somebody's walking style is. This, among other conclusions can be derived from our location and motion data.<sup>12</sup>

<sup>10</sup> From Cerioli & Ors, 'Newcomb–Benford law and the detection of frauds in international trade', *Proceedings of the National Academy of Sciences of the United States of America*, 2 January 2019 116 (1) 106-115; first published December 10, 2018 <https://www.pnas.org/content/116/1/106>. Last accessed 31<sup>st</sup> July 2019.

<sup>11</sup> Taken from <https://www.kaggle.com/mlg-ulb/creditcardfraud/downloads/creditcardfraud.zip/3#creditcard.csv>. Last accessed 31<sup>st</sup> July 2019.

<sup>12</sup> Smith et al, 'Bayesian Discovery of Threat Networks' *IEEE Transactions on Signal Processing* 62(20) October 2014 Available:

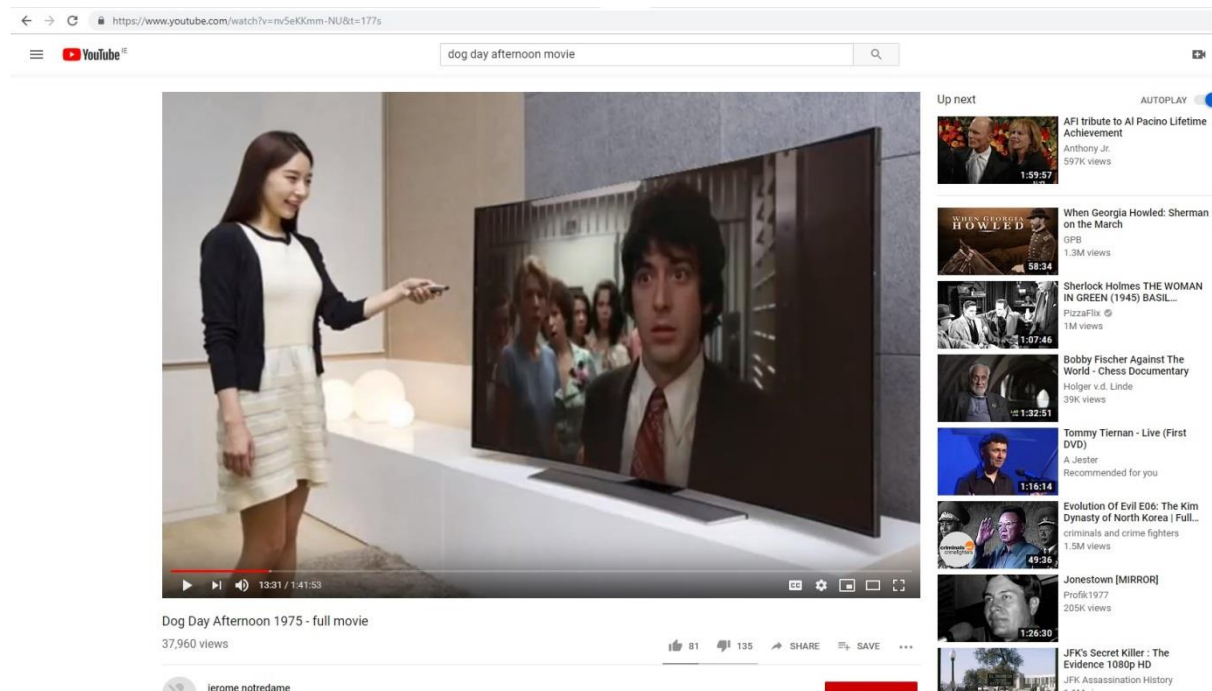


$$\bar{\theta}_v = \lim_{K \rightarrow \infty} \frac{1}{K} \sum_k I_{\text{walk}_{v \rightarrow v_c}^{(k)}} \theta_{v_b_c(k)}^{(k)}$$

## Technical issue 2: data scraping and copyright enforcement

The emergence of copyright societies (like the UK's PRS) in the late 18<sup>th</sup> century gave rise to the principles of 'collective management' which involves the enforcement of civil (IP) law by private companies, in a similar way to the police force enforcing criminal statutes.

Today, automated 'search bots' scour the internet for a schedule of copyright works in the hope of procuring some portion of the resultant royalty/damage award. A comical method of evading detection is depicted here:



Once can understand that the bots might not discern that the distorted portion of the video showing Al Pacino is actually the entirety of the movie, audio included.

Uploaders, downloaders and viewers of copyrighted content can easily circumvent website blocking orders by using a virtual private network, a currently unregulated product.<sup>13</sup> At the time of writing, a counter-technology 'VPN Blocking' is being rolled out.

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<sup>13</sup> Copyright holders might legitimately ask if such technologies themselves should be strictly regulated. See, G. Burton, 'China's government starts issuing fines for VPN use', *The Inquirer*, 8 January 2019 <https://www.theinquirer.net/inquirer/news/3068962/chinas-government-starts-issuing-fines-for-vpn-use>



## Reference materials

### Identity and personal governance

E-commerce Directive 2000/31EC : <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32000L0031>

Text of the GDPR 2016/679: <https://publications.europa.eu/en/publication-detail/-/publication/3e485e15-11bd-11e6-ba9a-01aa75ed71a1/language-en>

### Autonomous machines

E.U. guidelines on trustworthy AI, 8<sup>th</sup> April 2019 <https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai>

### Cyber security and personal data

US-EU Privacy shield Decision 2016/12500 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L.2016.207.01.0001.01.ENG>

ECB Fifth report on card fraud, September 2018: <https://www.ecb.europa.eu/pub/cardfraud/html/ecb.cardfraudreport201809.en.html#toc10>

Andrea Dal Pozzolo, Olivier Caelen, Reid A. Johnson and Gianluca Bontempi. Calibrating Probability with Undersampling for Unbalanced Classification. In Symposium on Computational Intelligence and Data Mining (CIDM), IEEE, 2015

Dal Pozzolo, Andrea; Caelen, Olivier; Le Borgne, Yann-Ael; Waterschoot, Serge; Bontempi, Gianluca. Learned lessons in credit card fraud detection from a practitioner perspective, Expert systems with applications,41,10,4915-4928,2014, Pergamon

Dal Pozzolo, Andrea; Boracchi, Giacomo; Caelen, Olivier; Alippi, Cesare; Bontempi, Gianluca. Credit card fraud detection: a realistic modeling and a novel learning strategy, IEEE transactions on neural networks and learning systems,29,8,3784-3797,2018,IEEE

Dal Pozzolo, Andrea Adaptive Machine learning for credit card fraud detection ULB MLG PhD thesis (supervised by G. Bontempi)

Carcillo, Fabrizio; Dal Pozzolo, Andrea; Le Borgne, Yann-Aël; Caelen, Olivier; Mazzer, Yannis; Bontempi, Gianluca. Scarff: a scalable framework for streaming credit card fraud detection with Spark, *Information fusion*,41, 182-194,2018,Elsevier

Carcillo, Fabrizio; Le Borgne, Yann-Aël; Caelen, Olivier; Bontempi, Gianluca. Streaming active learning strategies for real-life credit card fraud detection: assessment and visualization, *International Journal of Data Science and Analytics*, 5,4,285-300,2018,Springer International Publishing

Bertrand Lebigot, Yann-Aël Le Borgne, Liyun He, Frederic Oblé, Gianluca Bontempi Deep-Learning Domain Adaptation Techniques for Credit Cards Fraud Detection, *INNSBDDL 2019: Recent Advances in Big Data and Deep Learning*, pp 78-88, 2019

Fabrizio Carcillo, Yann-Aël Le Borgne, Olivier Caelen, Frederic Oblé, Gianluca Bontempi Combining Unsupervised and Supervised Learning in Credit Card Fraud Detection *Information Sciences*, 2019