



Review Article

Technology law as an emerging field of legal practice: its relationship with traditional branches of law

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Abstract

In a world of increasing civilization, innovation, and inventive voyages, technology has transformed the way we interact with one another, although the pace of technological growth varies across different continents. Theologically, technology can be traced back to ancient Babylon. Technology plays a crucial role in various aspects of daily life, including communication, education, household chores, healthcare, and transportation. Technology law is one of the emerging and most in-demand fields of the legal profession today. You may not have heard about it, but technology law helps keep you and your information safe. It also ensures a fair and competitive marketplace for sellers and buyers and may provide answers to some of modern society's most complex questions, particularly those relating to robotics and artificial intelligence. Technology law is important because technology increasingly shapes how we live, work, communicate, conduct business, and exercise our rights. As innovation develops faster than traditional legal frameworks, technology law provides the rules necessary to ensure that technological advancement remains responsible, secure, and respectful of fundamental rights. The emergence of rules and regulations governing the development, deployment, and use of technology is broadly referred to as technology law. There is, however, no single definition that exhaustively captures its scope. Technology law encompasses, inter alia, areas such as data protection and privacy, Finance, cyber security, intellectual property, telecommunications, competition law, Environmental law (climate law) and human rights law. It is therefore noteworthy to draw a distinction between technology law and other branches of law, even though it often intersects with them.

Introduction

The rise of technology brings huge benefits for businesses, consumers, entrepreneurs, and pretty much anybody who has a message they want to share with the world. However, it also creates an entirely new set of problems and ethical dilemmas [1]. For example, new technologies mean that we can arrange our finances while sitting in a train station café or send holiday snaps halfway around the world to our friends and family back home. However, with so much of our information floating around in the digital space, we automatically become more vulnerable to hackers, potential fraudsters, and commercial negligence [2]. This is where technology law comes into play. Although its remit is expanding all the time, technology law is primarily concerned with building the framework for the collection, storage, dissemination, and use of information

in the digital space. Technology law also focuses, inter alia, on intellectual property rights, finance, software licensing, data protection, cyber security, telecommunications, and the technicalities of software design and climate technology [3].

Technology law is, in many respects, sui generis, given its intersection with several established branches of law. It is not confined to a single area of legal practice but cuts across various fields, including intellectual property, contract law, financial regulation, environmental law, human rights, and data protection. It is important because technology increasingly shapes how we live, work, communicate, conduct business, and exercise our rights. As innovation develops faster than traditional legal frameworks, technology law provides the rules needed to ensure that technological advancement remains responsible, secure, and rights-respecting. The enormous

benefits of technological innovation, however, come with an important caveat: technological advancement without adequate legal and regulatory safeguards may create new avenues for the violation of rights, insecurity, fraud, and injustice.

Donald Trump introduced the term ‘fake news’ into our vocabulary during his 2016 presidential campaign. While there was nothing particularly original about pointing out media bias, the subsequent fascination with ‘fake news’ revealed how a large section of the public no longer trusts mainstream media sources. But what happens when we can no longer distinguish between what is fake and what is real? Well, we might find out sooner than we would like. A few months ago, an unnamed software developer designed an AI neural-network audio programmer that mimicked the voice of Dr. Jordan Peterson, a Canadian psychology professor who writes and speaks about free speech issues and the state of academia today. The ‘deep fake’ software allowed users to make Peterson say whatever they wanted, with worrying consequences. While it is still possible to spot the difference between the real and the fake Peterson, the similarities are startling. What is more, these kinds of technologies are still in their infancy, and who knows where they might lead us? If ‘deep fake’ technology becomes indistinguishable from reality, then whoever controls the technology could wield an enormous and terrifying amount of power. Such power must therefore be subject to appropriate legal and regulatory checks [4].

Ultimately, it is important because it seeks to balance technological innovation with human rights, security, accountability, justice, and the public interest. It therefore serves as a legal mechanism for ensuring that technological advancement does not outpace the principles and safeguards necessary for a just and orderly society [5–26].

Conceptualising technology law

Technology law may broadly be understood as the body of legal rules, principles and regulatory practices governing the development, deployment, use and consequences of technology. The definition is deliberately broad because technological systems affect multiple areas of social life and therefore generate legal consequences across different fields. It would, however, be inaccurate to regard technology law as a completely autonomous body of law with a fixed subject matter. Unlike property law, which traditionally concerns relationships relating to property, or contract law, which regulates legally enforceable agreements, technology law does not revolve around one uniform legal relationship. Its subject matter is technological activity and its consequences.

This explains why technology law is often described as interdisciplinary. A technology lawyer may deal with contractual arrangements for software licensing, intellectual property ownership, privacy compliance, cyber security obligations, financial regulation, telecommunications licensing, artificial intelligence governance or regulatory investigations. The legal rules applied in each situation may originate from different areas of law. The term “emerging field” should therefore not be interpreted to mean that every component of technology

law is new. Many of its constituent doctrines are established. What is emerging is the increasingly specialized practice of applying these doctrines to technologically mediated activities and developing new legal responses where existing rules are inadequate. This distinction provides a more coherent basis for understanding the relationship between technology law and traditional branches of law. Technology law does not necessarily displace traditional law; instead, technological developments create new factual circumstances in which traditional legal principles must operate. The relationship can therefore be represented as follows: Technological development → new activities and risks → application of existing legal principles → identification of regulatory gaps → adaptation or development of legal rules. This process is central to the evolution of technology law.

Technology law and data protection and privacy law

Technology law and data protection and privacy law are closely related, but they should not be treated as identical concepts. Data protection law specifically regulates the collection, processing, storage, use, transfer and disclosure of personal data and establishes safeguards for individuals whose information is processed. Privacy law, depending on the jurisdiction, may encompass broader interests relating to personal autonomy, private life, confidentiality and protection against unjustified interference. Technology law, by contrast, is broader. It encompasses technological activities that may have little or no direct connection with personal data, including software licensing, electronic commerce, telecommunications infrastructure, artificial intelligence, digital evidence and aspects of technology-related intellectual property. The relationship is therefore best understood as one of intersection rather than hierarchy. Technology creates the conditions under which data can be collected, processed and analyzed on an unprecedented scale. Social media platforms, online retailers, financial institutions and digital service providers may process information relating to identity, location, behavior, preferences and transactions. The legal problem is consequently no longer merely whether information exists, but whether the collection and subsequent processing of that information is lawful, proportionate, transparent and sufficiently protected. Artificial intelligence intensifies this problem. An AI system may depend upon enormous datasets for training or operation. This creates questions concerning the lawful basis for processing, data minimization, purpose limitation, transparency and the use of sensitive information. The problem demonstrates an important limitation of purely descriptive approaches to technology law: technological capacity can develop more rapidly than the legal assumptions upon which regulation was constructed. The relationship is also significant because privacy is not merely an economic interest. It may implicate fundamental rights. Technological surveillance, facial recognition, biometric identification and behavioral profiling can affect personal autonomy and private life even where no traditional physical intrusion occurs. Accordingly, data protection law performs a dual function. It facilitates legitimate data driven innovation by establishing conditions under which data may lawfully be processed, while simultaneously restricting practices that may

expose individuals to unjustified surveillance, discrimination, manipulation or other forms of harm. The critical question is therefore not whether technology should be permitted to process personal information. Rather, it is under what legal conditions such processing should occur, what safeguards should apply, and who should bear responsibility when those safeguards fail.

Technology law and cybersecurity

Cyber security and data protection are related but conceptually distinct. Cyber security principally concerns the protection of systems, networks, devices and information against unauthorized access, disruption, destruction or compromise. Data protection, by contrast, focuses on the lawful processing and protection of personal information. Technology law provides the broader regulatory environment within which both operate. The relationship becomes particularly apparent in the context of data breaches. An organization may have a legal obligation to protect information, but compliance cannot be achieved through legal rules alone. Technical safeguards such as encryption, authentication, access controls, and security monitoring and incident-response systems may be necessary to satisfy legal and regulatory obligations. This creates an important interaction between legal obligation and technical implementation. The law may establish a duty to protect information, while cyber security determines, at least in practical terms, how that duty can be implemented. Cyber security also raises questions of criminal law. Hacking, ransom ware, phishing, identity theft and unauthorized access may constitute criminal offences under applicable legislation. Yet cybercrime presents enforcement difficulties because conduct may occur across several jurisdictions, evidence may be entirely digital and offenders may conceal their identities through sophisticated technological means. This exposes one of the major limitations of territorially organized legal systems. A cyber-attack can originate in one country, target infrastructure in another, affect individuals in a third and involve digital assets located across several jurisdictions. Traditional territorial approaches to criminal jurisdiction may therefore encounter practical difficulties. Technology law must consequently engage with questions of jurisdiction, evidence, international cooperation and enforcement in addition to substantive liability. There is also a regulatory question concerning corporate responsibility. When a company suffers a cyber-attack, the mere occurrence of the attack does not necessarily establish legal fault. The relevant question may be whether the organization adopted reasonable security measures, complied with applicable legal requirements and responded appropriately after discovering the breach. The relationship between technology law and cyber security is therefore not merely protective. It is also allocative: it determines who bears responsibility for technological risks, what standard of care applies and what consequences should follow when digital security obligations are breached.

Technology law and intellectual property law

Intellectual property law predates contemporary technology law, but technological development has fundamentally

altered the manner in which intellectual property is created, distributed and infringed. Copyright, patent, trademark and related doctrines remain important to technological innovation. Software, for example, may attract copyright protection, while certain technological inventions may qualify for patent protection where the applicable legal requirements are satisfied. Trademarks may protect signs associated with technology products and services.

The relationship, however, extends beyond protection of technological inventions. Digital technology has reduced the cost and increased the speed of reproducing and distributing intellectual works. A copyrighted work can be copied and disseminated globally almost instantaneously. This creates enforcement problems that did not exist at the same scale in a predominantly physical economy. Artificial intelligence presents an even more difficult challenge. AI systems may generate literary, artistic, musical or other outputs, raising questions concerning authorship, ownership and infringement. At the same time, AI systems may be trained using large quantities of existing copyrighted material, generating disputes concerning the relationship between technological development and existing intellectual property rights. These questions reveal a deeper tension between innovation and exclusivity. Intellectual property law seeks to provide incentives for creation and innovation by granting legally enforceable rights. Excessive protection, however, may restrict access to information, technological experimentation and subsequent innovation. Technology law therefore operates at the point where these competing interests meet. It must accommodate technological development without rendering intellectual property rights ineffective, while also avoiding an intellectual property regime so restrictive that it impedes legitimate innovation.

The challenge is consequently not simply to determine whether technological content is “protected” but to determine how traditional intellectual property principles should operate when creation, reproduction and distribution are increasingly automated and digital.

Technology law and financial law

Technological development has transformed financial services through mobile banking, electronic payments, digital wallets, automated financial systems, online lending, block chain-based systems and other forms of financial technology. The relationship between technology law and financial law is therefore increasingly important. Financial technology operates within an existing regulatory environment involving licensing, consumer protection, anti-money-laundering requirements, electronic transactions and financial supervision. Technology introduces additional concerns relating to data protection, cyber security, and algorithmic decision-making and digital identity.

One important issue is the legal recognition of electronic transactions. Traditional contract law was developed around principles such as offer, acceptance, intention and consideration.

Digital transactions do not necessarily undermine these principles, but they change the manner in which agreement is formed, authenticated and evidenced. Electronic signatures, automated transactions and algorithmic systems therefore require the law to determine whether conventional contractual principles remain adequate and what evidential standards should apply. Artificial intelligence introduces another dimension. Financial institutions may use automated systems for credit assessment, fraud detection and other decision-making processes. If an algorithm produces discriminatory or erroneous outcomes, questions arise concerning transparency, accountability and liability. The central issue is therefore not whether financial technology should be regulated. The more difficult question is how regulation can protect consumers and maintain financial stability without imposing requirements that unnecessarily prevent technological

Technology law and competition law

Technology law and competition law are closely interconnected because technological innovation can significantly influence how businesses compete in the marketplace. Technology law provides the legal framework for regulating technological activities, digital platforms, data, artificial intelligence, electronic transactions, and other emerging technologies, while competition law seeks to promote fair competition and prevent practices that distort or restrict competition in the market. One major area of interaction is the regulation of dominant technology companies. Digital markets can enable a small number of companies to acquire substantial market power because of network effects, large amounts of data, strong brand recognition, and technological advantages. Competition law therefore becomes relevant where a dominant technology company uses its position to exclude competitors, impose unfair conditions, or restrict consumer choice.

Technology law also intersects with competition law through data and digital platforms. Access to large quantities of data can provide technology companies with a competitive advantage. Consequently, the manner in which companies collect, control, and use data may have implications beyond privacy and data protection; it may also affect competition. For example, exclusive control over valuable datasets may make it difficult for smaller competitors to enter or compete effectively in a market. Another important relationship concerns mergers and acquisitions in the technology sector. The acquisition of an emerging technology company by a larger corporation may eliminate a potential competitor or strengthen the acquiring company's market position. Competition authorities may therefore examine such transactions to determine whether they could substantially reduce competition. Ultimately, technology can facilitate anti-competitive practices. Algorithms, automated pricing systems, and digital platforms may potentially be used to coordinate prices, discriminate between consumers, or restrict access to markets. This creates the need for competition rules to adapt to technological developments and address the challenges that may arise from the increasing use of technology in commercial activities.

Technology law and human rights law

Human rights law is often regarded as a fundamental body of law concerned with the protection of human dignity and fundamental freedoms. A Latin maxim presupposes that holmium cause omen is constitute est.: the law is established for the sake of human beings. Thus, technology should ultimately serve humanity rather than undermine the rights it is meant to advance. Technology law is a body of legal rules for regulating the development and use of technology, while human rights law protects the dignity, freedoms, and fundamental rights of individuals. As technology becomes increasingly integrated into everyday life, the relationship between these two areas of law continues to expand.

One major area of interaction is the right to privacy. The widespread collection and processing of personal information by governments, businesses, social media platforms, and other organizations create concerns about surveillance, unauthorized access, and misuse of personal data. Technology law, particularly data protection and privacy regulations, seeks to establish rules for the lawful collection, processing, storage, and disclosure of personal information, thereby supporting the human right to privacy. Technology also affects the freedom of expression. Social media and digital platforms have provided individuals with unprecedented opportunities to express opinions, share information, and participate in public discourse. However, issues such as online censorship, content moderation, internet shutdowns, and government surveillance may affect the exercise of this right. Technology law must therefore strike a balance between regulating harmful online activities and preserving legitimate freedom of expression.

Finally, there is the right to equality and non-discrimination. Artificial intelligence and automated decision-making systems are increasingly used in areas such as employment, banking, healthcare, education, and law enforcement. Where these systems rely on biased data or flawed algorithms, they may produce discriminatory outcomes. Technology law can therefore play a role in ensuring that technological systems are developed and deployed in ways that respect equality and human dignity.

Technology law and climate law

There is a clear distinction between technology law and climate law; neither term is ambiguous. The emergence of technology has opened Pandora's Box to the world. Despite the damage caused by technological advancement, there remains hope, like the butterfly, that technology will become one of the major strategies for mitigating and adapting to the effects of climate change.

As time passes, more climate solutions will increasingly rely on technological interventions. For this to become a reality, certain lifestyle changes will be necessary. For instance, houses may increasingly be powered by wind and solar energy, while transportation will become electrified, thereby promoting the reduction of carbon emissions. As the critical global warming threshold of 2°C becomes an increasingly pressing concern, the

technological toolbox required to facilitate the transition away from fossil fuels will become increasingly important. Just as the butterfly represents hope or a promise of transformation, the technologies of the future will depend on enhanced energy efficiency; scaled-up renewable energy, including modern bioenergy, solar photovoltaic and geothermal energy; electrification to replace most direct fuel uses; as well as emerging technologies involving hydrogen fuels and negative-emission technologies, inter alia.

Finally, there is a question of which laws will need to be amended to accommodate the expansion of climate-friendly technologies and what potential effects such amendments may have on values such as equity and human rights. There is also a need to encourage pact sent servant in the development and implementation of climate-friendly regulations. Technology law should therefore aim to respond to these questions by promoting a climate-friendly position founded on sustainability rather than encouraging activities that increase carbon emissions. Nevertheless, technology law continues to serve as a butterfly, "a symbol of hope", for present and future generations.

Conclusion

Technology law has become an indispensable aspect of the modern legal system because technological advancement continues to transform virtually every aspect of human life. From data protection and cyber security to intellectual property, competition, human rights, artificial intelligence, and digital transactions, technology has created legal questions that traditional laws alone may not adequately address. Technology law therefore serves as a bridge between technological innovation and legal regulation, ensuring that innovation develops within the boundaries of law, ethics, accountability, and justice. More importantly, technology law should not be perceived merely as a mechanism for restricting technological advancement. Rather, it provides the legal certainty necessary to encourage responsible innovation while protecting individuals, businesses, and society from the risks associated with emerging technologies. Uri societies, ibis jus; where there is society, there is law. As society becomes increasingly digital, the need for laws capable of responding to technological realities becomes inevitable. The importance of technology law lies in its ability to ensure that technology remains a tool for human progress rather than an instrument of exploitation, discrimination, insecurity, or violation of fundamental rights. The future of technology will continue to evolve, and so must the law that governs it.

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