The Conduit between Technological Change and Regulation

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Abstract

This article discusses how the law has approached disparate socio-technological innovations over the centuries. Precisely, the primary concern of this paper is to investigate the timing of regulatory intervention. To do so, the article makes a selection of particular innovations connected with money, windmills and data storage devices, and analyses them from a historical perspective. The individual insights from the selected innovations should yield a more systematic view on regulation and technological innovations. The result is that technological changes may be less momentous, from a regulatory standpoint, than social changes.

1 Introduction

The capacity of regulation to respond to the legal issues presented by new technologies is not an unknown topic. While socio-technological innovations tend to open new possibilities once introduced, they might also challenge pre-existing regulatory paradigms. Throughout history, questions concerning the design of optimal regulation have repeatedly emerged in reaction to a radical transformation in society, which may be due to multiple factors such as morality and technology. The discussion on whether and how the law shall reflect these changes dates back over 2,000 years. This introductory article to the present special issue of Erasmus Law Review intends to discuss how the law has approached disparate socio-technological innovations over the centuries. The primary concern is to investigate the timing of regulatory responses. By doing so, we enter in the realm of regulation and technology, thus setting the conceptual framework for the other articles in the issue.

Legislatures and courts usually require a certain amount of time to handle the various challenges brought about by technology. This time period is necessary to acquire any relevant information about the legal issues posed by the new innovations. The length of time needed for this operation should depend on the risks and complexity of innovation. Yet, it seems that other factors are deemed more influential: it is commonly argued that the law responded in the past more slowly than it does at present. The printing press may serve as an illustrative example. It was invented in Europe around 1439. It allowed printed books to move across borders and started the era of mass communication. But despite its disruptive potential, it took a long time before responses to legal issues began to emerge. This was partly due to the slow pace of distribution and the difficulty of monetising the product.

In the twenty-first century, however, innovation and technological changes move at a much more rapid pace. Significant and impactful advances are secured almost daily as a consequence of digitalisation. In today’s globalised world, innovations appear to follow each other not only in quick succession, but also on a larger scale than ever before. For example, WhatsApp killed the SMS revenues of the telecom sector within a single quarter. SMS itself had been a novel technology only a couple of years before its demise. Similarly, technologies such as blockchain, currently still in their infancy, are widely expected to disrupt long-established markets. Globalisation and digitalisation, in combination with technology, have created a new socio-technological context. The emergence of new technologies often launches

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1. With the term ‘law’, we refer to the law that exists at a specific point in time and that is implemented as such by courts or enforcement bodies. 

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3. The article looks at the regulatory responses to technological change after the fact. The ex post view therefore coincides with the stages of innovation and diffusion. Academic research usually divides technological innovation into three stages: invention, innovation and diffusion. See e.g. J.A. Schumpeter, Theory of Economic Development (1934). Yet, legal scholars tend to perceive the stage of diffusion as different from technological innovation per se. See on this point e.g. N.A. Ashford, C. Ayres & R.F. Stone, ‘Using Regulation to Change the Market for Innovation’, 9(2) Harvard Environmental Law Review 419 (1985). See infra Section 2.

discussions on emerging legal (and moral) issues. For instance, the creation of new tools for Internet users, such as social networks, has brought out digitally expressed ‘hate speech’ and ‘fake news’ as well as many other collateral problems. Legislatures and courts are therefore called to tackle the legal issues at stake in a quick and orderly fashion. Besides, the cross-border aspect of current technological changes may exacerbate this problem. This has also been the case for Google and its search support when a U.S. District Court annulled (within the U.S. soil) a Canadian court’s judgment that had directed the tech giant to stop displaying certain references to pirated products.5

Against this background, our contribution attempts to answer if law has approached socio-technological changes in a uniform manner. Put slightly differently, we consider if different types of socio-technological change may entail a different rate of regulatory intervention once the technology starts yielding negative externalities. To do so, the article circles on particular innovations connected with money, windmills and data storage devices and analyses them from a historical perspective. The individual insights from the selected innovations should yield a more systematic view on regulation and technological innovations.

The article is structured as follows. Section 2 advances the backbone proposition and theoretical approach of this article. We present technological changes as a part of social change, which has some distinctive problems. Section 3 analyses the development of regulations on particular technologies from a historical perspective. While Section 4 develops some concluding observations in the context of regulating technologies, the last part (Section 5) provides an account of the (other) articles making up this special issue.

2 Technology as a Facilitator of Social Change

The term ‘technology’ has elicitied a great deal of interest among scholars from disparate disciplines, such as philosophy, sociology and law. ‘Technology’, which is still a fuzzy concept,6 emerged not so long ago. Although the word entered the English language in the seventeenth century, its use became frequent and regular only in the early decades of the twentieth century.7 As proof to this, Figure 1 graphically displays how use of the word ‘technology’ only increased significantly in the 1930s. Similarly, the same word started appearing regularly in the EU parliamentary debates only in the last five years.8

The enmeshment of technology and law is thus quite recent.9 Debates in the sphere are commonly framed as some variant of the question ‘how to regulate technolo-

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5. See e.g. Google v. Equustek Solutions Inc., 2017 SCC 34, (2017) 1 S.C.R. 824. In such a legal challenge, the technology company Equustek Solutions filed a lawsuit against Datalink Technology Gateways. The accusation was to sell products belonging to Equustek, thus misappropriating inter alia its trade secrets. Google was therefore required to remove Datalink websites from its search results, both in Canada and globally. Yet, the U.S. District Court for Northern California granted Google an injunction to prevent enforcement of the Canadian Court order in the U.S. territory. For the U.S. Direct Court’s judgment see Google LLC v. Equustek Solutions Inc., 2017 WL 5000834 (N.D. Cal. Nov. 2, 2017).

6. There is no single definition of technology. For the purpose of this article and in line with previous literature, we employ the definition provided by Schon: ‘any tool or technique, any product of process, any physical equipment or method of doing or making, by which human capability is extended’. See D. Schon, Technology and Change: The New Heraclitus (New York: Delacorte Press) (1967), at 1.


9. One may note that before ‘technology’ gained popularity, these discussions were couched in different terms – e.g. manufacturing, useful arts and invention. See Schatzberg, above n. 7.
Technology is regarded, in other words, as a rationale for regulation. As soon as a technological innovation takes place, it is expected that regulators should intervene to regulate it. Such a view may, however, fail to fully capture the meaning of technological change. Technological changes enable people to broaden their usual field of action and, as such, may have different consequences for law and the organisation of society. For example, the invention of e-mail and the Internet offered the opportunity to communicate with other individuals over long distances and in real time. Yet, for regulation to be necessary, the use of e-mails must raise legal issues – salient for certain individuals in the society, which cannot be solved by established legal frameworks. From an ex post view, technology becomes a rationale for regulation only once it involves a societal disturbance.

While technology offers individuals enhanced technical capabilities, it cannot determine historical outcomes by itself. Taking that view on technology leads us to perceive technological change as “one type of social change”. Social change generally refers to the idea of a society moving forward by evolutionary means to secure people’s interests in a multiplicity of forms. Social change can be driven by a wide array of forces, including inter alia behavioural changes or shifts in cultural beliefs. The Industrial Revolution and the feminist movement both exemplify this tendency. It follows that technological change has some features that are distinct from those of social change. Technological change influences the course of social development. However, taken in isolation, it is not a reason to change the law. The social change brought about by technological developments might require a modification of the pre-existing legal framework. Technological changes are therefore less momentous, from a regulatory standpoint, than are social changes. Nevertheless, it seems that legislatures are sometimes urged to intervene solely because of the occurrence of technological change. For example, autonomous vehicles are not yet widespread but there are several attempts to regulate them. Legal scholars have pinpointed a couple of reasons behind this tendency. First, technological change may occur faster than social change. The variation in rates of technological and social changes may generate a sense of unfamiliarity with the new technology, ultimately putting greater pressure for legal intervention. Secondly, the issues raised by technological changes are perceived as more objective – not tainted by any a priori ideological vision – and accordingly easier to regulate. However, the quest for a speedy regulatory response often results in disenchantment: it seems that law fails to keep pace with rapidly evolving technology. This narrative puts the time factor in the spotlight. Law, the argument runs, should be more effective and responsive in handling the challenges posed by technological innovations in anticipation of social change. In order to delve into this inquiry, one may ask whether law has approached various types of socio-technological changes in the same manner over the years. The ex post view we adopt forces us to consider the time period that coincides with the stages of innovation and diffusion of the technological change, thus excluding the ex-ante fear-driven legislation. If this analysis shows a heterogeneity in the rate of regulatory responses, it becomes necessary to identify what particular socio-technological changes should be addressed first. Based on these assumptions, the following section intends to examine the regulatory responses to selected innovations.

References:
11. Please see the definition provided at n. 6.
12. Some legal issues that may arise vary from managing certain risks to protecting individuals’ rights. Besides, we are not considering the regulatory capture option.
13. W.E. Bijker and J. Law, Shaping Technology/Building Society: Studies in Socio-technical Change (Cambridge: MIT Press) (1992), at 20-22. A societal disturbance can also result from the identification of potential undesirable consequences triggered by the technological change. That is to say, for a societal disturbance to exist, it is not necessary to have the actual occurrence of negative consequences.
18. For example on the civil liability for damages caused by robots, including autonomous cars, see e.g. Report with recommendations to the Commission on Civil Law Rules on Robotics, European Parliament Committee on Legal Affairs (2017), 6-8, 12, 16-18, available at: www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML +REPORT+A8-2017-0005+0+DOC+PDF+V0/EN (last visited 28 January 2019); on the product liability regarding the vehicles and its software, see e.g. State of Michigan Bill Number 58 663 (2013).
19. See Moses, above n. 14, at 600.
3 Historical Instances of Particular Innovations

3.1 Preliminary Remarks
There is a virtually endless list of historical instances when socio-technological change has prompted regulatory responses. Selecting representative responses is a tall order. To begin with, we do need particular innovations that have triggered regulatory responses by the legislatures and courts, both in the past and in the present. For the purpose of this article, we focus on money, windmills and data storage devices. These rubrics were selected for several reasons. Technology is an integral part of all of them: windmills and data storage devices are technological innovations per se, whereas money has been significantly affected by developing technologies over time. Contemporary electronic money can even be considered a pure technology, in the same mould as windmills and data storage devices. In addition, the selection of the three subjects allows us to consider regulatory responses from a fairly wide spectrum of legal fields, ranging from private law to administrative law. Specifically, monetary technology triggered the development of commercial laws (as well as laws of financial systems). Windmills prompted changes in administrative and environmental law. Lastly, data storage devices touch upon civil and consumer law. We do not, however, aim to provide an exhaustive list of regulatory responses from a fairly wide spectrum of legal fields, ranging from private law to administrative law. Specifically, monetary technology triggered the development of commercial laws (as well as laws of financial systems). Windmills prompted changes in administrative and environmental law. Lastly, data storage devices touch upon civil and consumer law.

We do not, however, aim to provide an exhaustive list of all the regulatory responses that have occurred within the three rubrics. Our examples instead show facets of legal responses resulting from or triggered by technological developments. Since law responds to socio-technological change in a way that impinges upon disparate interests, it is important to confine ourselves to a fairly limited set of regulatory patterns. The selected examples in which regulation approaches the legal issues posed by new technologies will serve as a point of reference for further research.

3.2 Money
Before proceeding to the analysis of its specific regulatory responses, a definition of money shall be provided. According to Ferguson, money is a medium of exchange which has the advantage of eliminating inefficiencies of barter, a unit of account, which facilitates valuation and calculation; and a store of value, which allows economic transactions to be concluded over long periods as well as geographical distances.

The physical object that symbolises money has changed over the centuries. Coins circulated in the Ancient Mediterranean world. However, coins cannot be considered the only precursors of today’s money. While clay tokens were popular a long time ago in ancient Mesopotamia, banknotes have been in circulation since the seventh century. The twentieth century triggered the development of an electronic store of monetary value, known as e-money. More recently still, cryptocurrencies such as Bitcoins entered the ‘market’. These developments triggered regulatory responses, and it is on those facets of regulation that we focus here.

Regulation has traditionally focused on remedying asymmetries of information that pertain to standards of value. Such an approach was common since the early medieval times. For instance, several penal laws from that time advert to compensation payments in precious metals for the commission of various felonies. In addition, regulations about coins often included technical requirements – that is, type, shape and weight – as well as the methods of production. The 1580 Mint Ordinance of the Polish King Stefan Batory is a striking example. This authoritative decree specified all the necessary requirements for the production of coins, as well as the type, stamp, weight of metals, ranks of craftsmen and systems of contracting between the Crown and local mints. Setting these technical requirements can be seen as one response to emerging legal problems, such as the unification of governance systems on the Polish and Lithuanian lands as well as tax payments. It also facilitated local and international trade because the standardised monetary value increased certainty in transactions and prevented the activities of profiteers working against the interests of local traders.

Similarly, the modern coinage system operates by designating specific objects as money. As a consequence, those objects acquire a specific value. The designation process thus happens through regulation. Regulation identifies certain means of payment that can serve as money. Bringing as an example the current monetary system of Poland, the relevant regulation states that złoty and grosz, which are operating in coins and banknotes, are the currency signs of the Republic of Poland. The National Bank of Poland, on the basis of further implementing provisions, issues banknotes and coins according to certain technical requirements. Similarly, Poland regulates electronic money, which can be

23. One may also note that some of the selected rubrics, and namely money and data storage devices, relate to the other articles in this issue. The importance of historical framing helps to observe and understand the techno-legal debates of the past and present, their developments and directions.
27. Cryptocurrencies reflect an encrypted value, existing not as a paper money or coins but as strings of digital code. For more see A.M. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies (Newton: O’Reilly) (2004).
States are therefore urged to address these rising legal banknotes with standardised security features, thus ben-
ing, in the end of the eighteenth century, the Nether-
deemed a digital representation of value and not legal
regulation of standards for securities preventing forger-
ies. From a historical perspective, these standards
already developed in ancient Rome where, in the third
century BCE, coins were produced with serrated edges.
For the same purpose, China introduced a concession
for brass and established state printing-houses using
specific colour printing, rich designs and official stamps
in the Middle Ages. Similar solutions can be found in
Europe: under the aforementioned Polish Mint Ordin-
ance, coins were exclusively produced in casted mints.
Each mint had its assayer responsible for the
supervision of a production process and the mainte-
nance of the quality of coins. Assayers were personally
liable for any failure to observe the regulations.
In modern times, banknote security printing started
when, in the end of the eighteenth century, the Nether-
lands began using in-house designs and engravings for
music types. This and further technological develop-
ments such as colour printing, 3D devices, watermarks
and holograms have led regulators to introduce techno-
logical standards. In the Eurozone, the European Cen-
tral Bank and National Central Banks are the only agen-
cies responsible for the issue of currencies. More specif-
ically, they are entitled to introduce new series of euro
banknotes with standardised security features, thus
benefiting from advances in banknote technology. The
intertwine ment of fiat currencies, technology and law
facilitates the safety of the transactions by providing a
regulatory response to the developments occurred in
technology. It can be seen from this sketch that monetary regulation
has grown hand in hand with technological and social
changes, both in the past and in the present. Regulation
– which can encompass both the development of new
rules and the adaptation of the existing ones – comes
into play as soon as new objects or means of payment
are widely accepted into circulation. In this way, the
law recognises the growing usage of different means of pay-
ment, institutionalising them by setting regulatory
frames such as the ones on issuance and turnover. In
that sense, regulation seems an outcome based on actual
results (effective social change) rather than a simple
forecast (the occurrence of a technological change).

3.3 Windmills

The harnessing of wind power is a technology that has
started developing in eastern Persia thousands of years
ago. These primitive wind devices were then followed
by (vertical) windmills on the Dutch and Mediterranean
territories in the fourteenth century. At that time, the
primary function of these windmills was to pump water,
mill grain, and drain land. In the nineteenth century,
the high rate of technological progress spurred the
development of new turbines, a new type of windmills.
Both windmills and wind turbines have been rather
popular in certain areas of the globe. Nevertheless, their
use caused environmental disturbances that have
required a regulatory response. It seems therefore
appropriate to look a little more closely at the develop-
ment of the corresponding legal frameworks.
Windmills are inherently embedded in the landscape of
the Netherlands. Windmills equipped with water-lift-
ing technology have been integrated in the Dutch drain-
age system since the fifteenth century. In other words,
windmills were one of the effective tools to combat
against demanding environmental conditions and con-
tinuous threat of floods. Thus, although the construc-
tion of these drainage windmills was rather costly for an
ordinary farmer, windmills spread around all the areas
affected by poor drainage.

32. Ustawa z dnia 19 sierpnia 2011 r. o usługach płatniczych Dz.U. 2011 Nr
199 poz. 1175 t.j.
33. For more see R. Houben and A. Snijers, ‘Cryptocurrencies and Block-
chain: Legal Context and Implications for Financial Crime, Money Lau-
ndering and Tax Evasion’ – European Parliament Study Requested by the
 cmsdata/150761/TAX3%20study%20on%20cryptocurrencies%20and
%20blockchain.pdf (last visited 6 December 2018).
34. Art. 1(26) Ustawa z dnia 1 marca 2018 r. o przeciwdziałaniu praniu pie-
niędzy oraz finansowaniu terrorizmu Dz.U. 2018 poz. 723 t.j.
35. M. Zajęcki, ‘Regulacje prawne dotyczące monet i pieniędzy papierowe-
g w dawnych Chinach’, in P. Wilinski, O. Krajniak & B. Guzik (eds.),
36. Tyminiencki, above n. 29, at 52-54.
stra (eds.), The History of Information Security (London: Elsevier)
38. Decision of the European Central Bank of 19 April 2013 on the denomi-
nations, specifications, reproduction, exchange and withdrawal of euro
For more about the construction of the first mill devices see R.L. Hills,
11-17.
41. For more see Hills, n. 39, at 115-236.
42. M. Reuss, ‘Learning from the Dutch: Technology, Management, and
Water Resources Development’, 43(3) Technology and Culture 465, at
466 (2002).
43. A. Kajiser, ‘System Building from Below: Institutional Change in Dutch
Water Control Systems’, 43(3) Technology and Culture 521, at 530
(2002). Besides, consider that a large part of the Dutch territory is
potentially threatened by flooding.
44. J. de Vries, The Dutch Rural Economy in the Golden Age, 1500-1700
the construction of windmills, a framework for financing, building and
operating windmills was also devised. For more see Kajiser, above n. 43,
at 536.
However, the large number of windmills built had a detrimental impact on the water balance at a regional level. More specifically, windmills were lifting an excessive amount of water into the so-called boezem. By doing so, there was an actual danger that the surrounding farmlands would be flooded. A 1444 decree of the water authority of Delfland exacerbated this problem because it stipulated that drainage windmills would operate whenever there was sufficient wind. This situation led to legal disputes concerning the appropriate water level in the boezem. The debate was particularly lively between ‘highlanders’ and ‘lowlanders’ due to their differing interests vis-à-vis the water levels. As a result, the regional water authorities decided to intervene from both technical and legal standpoints. With regard to the former, they increased the capacity of sluices. As to the latter, the regional water authorities started issuing windmill permits, thus assuming more power and responsibilities. In line with this new approach, a 1562 decree of the Delfland water authority set a fixed water level in the boezem.

The modern usage of windmills’ descendants – wind turbines – is aimed at the production and supply of energy. Popularised in the nineteenth century, wind turbines have become a common mean of producing energy in the twentieth century. Wind turbines, like drainage windmills, can influence the neighbourhood both positively and negatively. In fact, these turbines are not only an energy source but also a cause of potential disturbances.

The Netherlands launched a large-scale programme for the development of wind turbines in the 1970s. Although these policies were also promoted to enhance renewable energy deployment, local planning for wind farms revealed to be problematic. Specifically, locals tend to view wind farms with hostility due to environmental concerns, especially noise. Accordingly, it appeared that certain (social) standards had to be set in order to ensure acceptable noise levels. Dutch authorities began adopting environmental regulations for wind turbines a few years after the inception of the programme. The most recent standards indicate that the noise caused by wind turbines should be restricted to a maximum of 47 dB Lden and 41 dB Lnight at any noise-sensitive location.

In both the Middle Ages and the 1970s, regulatory responses were not contemporaneous to technological change. More precisely, regulation aimed at responding to environmental disturbances of windmills and wind turbines resulted only after the use of the technological development became widespread. The technology per se was insufficient to trigger regulatory intervention. As in the case of money, regulation emerged because of issues raised by the widespread use of windmills (social change) rather than by the creation itself (technological change).

### 3.4 Data Storage Devices

The collection and aggregation of information has always driven improvements in social welfare. Collecting data has yielded evidence of historical events, as well as the discovery of the origins of certain customs and practices. Data were originally passed on through storytelling, songs and dances, which were also testimonies of local culture and belief. As time passed, writing and storage technologies have vastly expanded our society’s ability to store and disseminate information. This has been recognised to serve various state’s and societal needs, especially in the era of digitisation. Nevertheless, the related risks have not escaped regulators’ attention. Collecting and storing data for public purposes has been common practice for centuries. Public registers, in particular, have been an integral part of state organisation. Public registers served the political system. Cadasters were kept for taxation purposes. One of the oldest examples dates to ancient Rome. Registers with data...
– which were collected manually – were used to produce an inventory of lands and people. Accordingly, the population was classified into different social classes depending on income level. In August’s period, all the citizens were required to declare size and types of crops, as well as property income. The unified capitastrum (known then as catastrum) became the basis for taxation.

The use of inventories for public purposes continued into the Middle Ages. An efficient collection of public receivables required the use of increasingly formalised registers. These registers reflected the various fiscal burdens on citizens. The use of registers made it possible to prevent fraud and enhance enforcement. In Poland, registers indicated tax obligations imposed by the King on particular states. The owners were obliged to pay levies, both regular and extra regular.

In the fifteenth and sixteenth century, the extraordinary land tax (poradline) was calculated on the basis of the register from 1578. Registers were carried out also when the Crown was acquiring new territories. For example, in 1650, a special register (abiurata) was issued. It indicated the number of declared land possessions belonging to the population of Smolensk, which had been annexed from the Russian Empire in the Time of Troubles.

A special regulation concerning registers per se started only in the eighteenth and nineteenth centuries. Poland, after the collapse of the Polish-Lithuanian Commonwealth, was divided between three countries, these being Habsburg Austria, the Kingdom of Prussia, and the Russian Empire. Each of these countries has started to implement their administration on the occupied territories. For example, the Kingdom of Prussia established a fixed register of land and real estate taxes in an 1867 act. This was followed by a land register ordinance aiming at the further standardisation of registers in 1872.

In the past, the main purpose of registers had been to itemise lands and people in order to bring benefits to the state. Modern registers serve different functions. Past research considers digitisation as the main driver of change. The state has recognised the benefits of technology by explicitly regulating the various electronic procedures that may be relevant for its citizens. An example may be Article 61(3a) of the Polish Code of Administrative Procedure. Similarly, Article 14 indicates that public authorities in charge of public registers that use ICT systems must meet the minimum criteria established for any ICT system. It is therefore possible to observe that the use of regulation is primarily aimed at meeting the needs of private citizens.

Data storage devices have developed considerably in the last centuries. However, regulation was only introduced when social conditions began to change. Again, technology per se was not sufficient to trigger any regulatory action. Conversely, the combination of technological change and social factors contributed to the development of new data storage regulation.

### 4 Concluding Remarks

The previous section considered historical responses of legal systems to changes in technology and, ultimately, society. It showed that competent institutions have employed different regulatory means for dealing with technological changes. However, a common pattern can be identified: legal intervention often follows social change. It seems that legislatures will not offer regulatory responses in every instance of technological change after the fact. For the expense of regulation to be justified, it is necessary for technological change to trigger social change, and further that the pre-existing legal framework cannot accommodate the social change.

There is thus no correspondence between the rate of technological change and the intensity of regulatory responses. On one hand, it is possible for new innovations to be distributed around the globe in hasty fashion due to globalisation and the advantages of modern-day life. On the other hand, governments and courts often struggle to provide speedy legal responses. Adapting old legal structures to new situations is sometimes insufficient. For regulation to be effective, some time must lapse between the innovation and the resultant change in social organisation. Then regulators have two main choices. Firstly, they can steer the evolution of rules.
alongside the development of technologies. This would allow the adaptation of the existing legal rules to new legal problems – this being the case of adapting the rules to changing features of money and public registers. Secondly, the regulator can devise new rules responding to new characteristics of technologies and related legal questions – this being the case of administrative rules regarding the usage of early windmills.

5 The Special Issue

This introductory article has started discussing how regulatory responses may not immediately follow the technological change after the fact. We did not aim to provide any definitive answer to that question. The intention was to instead present technological change as a part of social change. The current article has not, however, discussed any substantive regulatory efforts. That is the task that each of the articles in this issue takes up. More precisely, these articles will isolate specific issues raised by technology and compare them vis-à-vis existing regulatory frameworks. This type of operation requires a keen eye as well as employing, if needed, innovative approaches. In fact, regulatory adaptation may also necessitate from traditional forms of regulation.69 The further articles of this special issue purport to do so.

The special issue consists of (another) four articles discussing legal approaches to socio-technological changes. These socio-technological changes are broadly connected with digitisation and the operation of the Internet. Some of the phenomena that are discussed in those articles are not new. However, digitisation has caused them to acquire new meanings and cause new problems. In all the remaining four contributions, the authors consider how law could or should approach socio-technological changes.

The article of Katharina Kaesling discusses enforcement mechanisms in social networks. The author tackles the well-known problem of hate speech and defamation and presents it in a new context involving a technological change. A technological change refers here to online social networks (e.g. Facebook) where hate speech or defamation can ‘go viral’. As a result, the uncontrollable distribution goes beyond the control of the statement creator. Kaesling notices that this also goes beyond the capabilities of public policy makers. Accordingly, they need to rely on private entities.

Staying in the field of humans’ online outputs, but turning more to the previously discussed data storage, the articles of Alessandro El Khoury and Joanna Mazur bring the problem of personal data and the right to information regarding automated decision-making solutions using personal data. Both articles contribute to describing social changes connected with people moving in the online reality and thus losing their anonymity. In this regard, the articles are based on the analysis of certain aspects of General Data Protection Regulation (GDPR). El Khoury discusses the binary notion of personal data and highlights its limitations in the GDPR. Mazur, on the other hand, brings limitations of GDPR by focusing on privacy protection in regard to the right to explanation. Like Kaesling, both authors highlight the contingent inability of public policy makers to draft timely, effective legal responses to socio-technological changes.

While the previous articles aim at analysing the situation of an individual in digital reality, Morshed Mannan brings in some aspects of worker cooperatives becoming a part of the digitised world. Mannan explores how organisational innovations can draw from blockchain projects and potentially facilitate the growth of worker cooperatives. The article of Mannan, similarly to the previous three, indicates the necessity of a continuous assessment of innovations, which cannot be detached from the context in which they occur. In other words, a proper understanding of the new technology would allow to better address the emerging legal issues.

69. Marchant, above n. 21.