Regulation & Governance

Regulation & Governance (2021) doi:10.1111/rego.12387

Why and how does the regulation of emerging technologies occur? Explaining the adoption of the EU General Data Protection Regulation using the multiple streams framework

Nihit Goyal

Faculty of Technology, Policy and Management, Delft University of Technology, Delft, The Netherlands

Michael Howlett

Department of Political Science, Simon Fraser University, Burnaby, British Columbia, Canada

Araz Taeihagh

Lee Kuan Yew School of Public Policy, National University of Singapore, Singapore

Abstract

Why and how the regulation of emerging technologies occurs is not clear in the literature. In this study, we adapt the multiple streams framework – often used for explaining agenda-setting and policy adoption – to examine the phenomenon. We hypothesize how technological change affects policy-making and identify conditions under which the streams can be (de-) coupled. We trace the formulation of the General Data Protection Regulation to show that the regulation occupied the legislative agenda when a policy window was exploited through policy entrepreneurship to frame technological change as a problem for data privacy and legislative harmonization within the European Union. Although constituencies interested in promoting internet technologies made every effort to stall the regulation, various actors, activities, and events helped the streams remain coupled, eventually leading to its adoption. We conclude that the alignment of problem, policy, politics, and technology – through policy entrepreneurship – influences the timing and design of technology regulation.

Keywords: European Union, General Data Protection Regulation, multiple streams framework, policy entrepreneurship, policy innovation, technology regulation.

1. Introduction: The regulation of emerging technologies

In their classic article on disruptive innovation, Bower and Christensen (1995) defined disruptive or emerging technologies as those that initially find application "at the bottom of a market," but move rapidly to the top of the market to displace incumbent businesses. These first-order disruptions on a single industry or market can also cause second-order disruption, altering "social interactions and relationships, organizational structures, institutions, public policies, and (sometimes) the physical environment" (Schuelke-Leech 2018). This effect of emerging technologies on existing commercial and regulatory arrangements has been illustrated by the cases of ride-sharing and social media (Kietzmann *et al.* 2011; Li *et al.* 2018). However, why, how, when, and in what form the regulation of emerging technologies occurs remains unclear.

This is not to say that the topic has not received any attention. The literature provides several explanations for the phenomenon. These range from functional logics to interest group theories, new institutionalism, and ideational change (Hood 1994; Black *et al.* 2006). Illustratively, Thatcher and Sweet (2002) used several theories to explain the regulation of electricity and telecommunications in the European Union (EU). Or, more recently,

Correspondence:Nihit Goyal, Faculty of Technology, Policy and Management, Delft University of Technology, Delft 2628 BX, The Netherlands. Email: nihit.goyal@tudelft.nl

* Conflict of interest: There are no conflicts of interest.

Accepted for publication 6 February 2021.

Tzur (2019) explained the regulation of Uber in the United States using interest-based theories. These scholars admit, however, that "single theories" offer a partial explanation for technological regulation and contend that integrating multiple theories can provide a better account of the phenomenon.

In this study, we focus on an explanation for policy change found in the policy sciences, derived from the work of Kingdon (1995) and his multiple streams framework (MSF). Initially proposed to explain agenda dynamics in health and transportation policy in the United States, this framework has since been adapted to examine policy formulation and decision-making in a variety of policy areas around the world (Zahariadis 1996; Zahariadis 2003; Cairney & Jones 2016). The MSF is appropriate for this study as, by incorporating the role of framing, ideas, institutions, and entrepreneurship in policy-making, it promises to uncover the interaction of structure, agency, and contingency in the regulation of emerging technologies. An examination of technological regulation from this perspective can, in turn, benefit the MSF as the role of technologies within the framework has significant scope for development.

Following recent literature, we incorporate a technology stream in the MSF to model the dynamics of technology development and its influence on policy-making (Voß 2007; Elzen *et al.* 2011; Goyal 2019; Goyal *et al.* 2019; Goyal & Howlett 2019). We apply this modified framework to the case of regulation of emerging information communication technologies through the General Data Protection Regulation (GDPR) in the EU. As a case of technology regulation despite significant lobbying and opposition, the GDPR presents an opportunity to examine the interaction among forces that affect the regulatory process. Further, the regulation has high policy significance as it is likely to have a long-term effect on the regulation of personal data not only in the EU but around the world (Ryngaert & Taylor 2020).

This article is structured as follows. In Section 2, we develop the theoretical framework for the study. Subsequently, we briefly describe policy-making in the EU (Section 3). In section 4, we present the research design. Section 5 shares the key findings from the case. In Section 6, we discuss the implications of this research and conclude the article.

2. Theoretical framework: Conceptualizing technology regulation using the multiple streams framework

2.1. The multiple streams framework

Kingdon (1995) conceived agenda-setting as the result of interactions among three relatively independent problem, policy, and politics streams in the multiple streams framework. The problem stream represents perceptions of societal conditions based on indicators, focusing events, and policy feedback. The policy stream depicts the evolution of policy alternatives as they undergo "mutations" and "recombinations" based on selection criteria such as technical feasibility, financial viability, and value acceptability. The politics stream models characteristics such as interest group activities, party ideologies, and the public mood, which influence the ability and willingness of governments to take action. Kingdon (1995, p. 122) argued that problems are placed on the policy agenda when the three streams are "ripe" and "policy entrepreneurs" exploit "windows of opportunity" to "couple" (or align) the streams and move the process forward.

Subsequent research has extended the framework to study other stages of the policy process, including policy adoption (Zahariadis 2003). This process has, however, resulted in variations in the architecture of the framework. Zahariadis (1992), for example, conceived the transition from agenda-setting to decision-making to be smooth, but Herweg *et al.* (2015) posited the need for a "decision window" and policy entrepreneurship to move the process from one stage to the next. Meanwhile, Howlett *et al.* (2015) introduced a process stream and a program stream to depict additional activities during policy adoption and policy implementation, respectively. Goyal and Howlett (2020) have proposed that these variants can be reconciled – in a typical policy setting – by synthesizing the process and the program within the politics stream and the policy stream, respectively.

Recent work has also paid more attention to agency within the framework, conceptualizing the role of different actors and entrepreneurs within each stream (Goyal *et al.* 2019). Mukherjee and Howlett (2015) have proposed that epistemic communities – network of professionals with relevant expertise at the science-policy interface (Haas 1992) – support the development of the problem stream while instrument constituencies – a collective involved in the creation and diffusion of specific policy alternatives (Voß & Simons 2014) – create a

supply push in the policy stream (see also Herweg 2016a). Further, they posit that advocacy coalitions – a group of people with shared policy preferences and coordinated behavior (Sabatier 1988) – work primarily in the politics stream to advocate for their preferred policy option. Also, Knaggård (2015) and Herweg *et al.* (2015) have emphasized that entrepreneurship can play a role in the problem stream and the politics stream as well, especially during decision-making (see also Roberts & King 1991).

2.2. Introducing technology into the multiple streams framework

Policy-making can drive technological innovation, which can further lead to more policy activity. Hoppmann *et al.* (2014), for example, found that – in the case of feed-in tariff policy in Germany – policy change was often driven by unforeseen technological development in solar photovoltaic technologies, which was in turn caused by earlier policy intervention. A better understanding of the complex interdependencies between the two is, therefore, important for explaining and facilitating technological governance (Schmidt & Sewerin 2017). The original multiple streams framework, however, did not conceptualize the influence of technological change on the policy process explicitly. While technological disruption can be modeled as an exogenous influence on the streams, such an approach does not recognize the co-evolutionary relationship between policy-making and technological innovation.

To overcome this limitation, research in science & technology studies has adapted the multiple streams framework by introducing a technology stream (Voß 2007; Elzen *et al.* 2011). This stream depicts the context and activities that contribute to technological innovation, such as research, prototype development, patenting and licensing, establishment of a business venture, market creation, and technology transfer (Goyal 2019; Goyal *et al.* 2019). Its evolution is supported by technology constituencies (Goyal & Howlett 2018), who share an interest in promoting technological diffusion and, toward that end, might exercise influence on policy-making (Raven *et al.* 2016). Therefore, the activities of these constituencies can directly or indirectly shape not only technological trajectories but also policy and regulatory trajectories (Prpić *et al.* 2015; Goyal & Howlett 2019). These constituencies have wide membership – comprising technologists, manufacturers, suppliers, service providers, users, lobby groups, political actors, and academics – which might overlap with that of actors such as epistemic communities, instrument constituencies, and advocacy coalitions. However, what binds members in this constituency together is the primary objective of increasing penetration of the technology regardless of its specific application – not knowledge about a societal problem (epistemic communities), advancement of a specific governance arrangement (instrument constituencies), or beliefs surrounding a policy issue (advocacy coalitions) (Voß & Simons 2014; Goyal & Howlett 2018, 2019). Consequently, the specific focus, mode, and the timing of their activities are likely to differ from those of other actors.

The principal activities and potential actors involved in each stream are summarized in Table 1.

2.3. Linking technological change and regulation using the multiple streams framework

Through both context and agency, the technology stream can affect each stream of the MSF independently. First, consider the problem stream. Technological adoption and use change the underlying economic, environmental, and social conditions. Such changes may be considered "problematic" when policy attention is focused on their adverse effect on society. Illustratively, indicators on greenhouse gas emissions have constantly highlighted the role of fossil-fuel technologies in contributing to climate change and supported the framing of "dirty energy" as a policy problem (Tomain 2011). Similarly, focusing events can also play a role in changing the perception of technology. The Fukushima Daiichi nuclear disaster, for example, reversed the momentum gained by nuclear energy

Table 1 The four-stream variant of the multiple streams framework

Stream	Principal activities	Likely actors involved
Technology	Technology development and diffusion	Technology constituencies (Goyal & Howlett 2018)
Problem	Problem definition and framing	Epistemic communities (Haas 1992); News media
Policy	Policy alternatives creation and diffusion	Instrument constituencies (Voß & Simons 2014)
Politics	Advocacy on a policy issue	Advocacy coalitions (Sabatier 1988)

as an alternative to fossil-fuel technologies and brought the issue of safety to the fore (Stoutenborough *et al.* 2013).

In the context of emerging technologies, the ripening of the problem stream is affected by two other factors. Typically, the societal impact of emerging technologies is marked by high epistemic uncertainty. Technology assessment – a systematic consideration of the societal implications of technological change – has been proffered as an approach for reducing uncertainty and facilitating technology governance (Vanclay *et al.* 2013). Here, actors such as epistemic communities can play a key role in creating and disseminating policy-relevant knowledge. Illustratively, NanoTrust, an Australian governance network, focused on the discourse of scientific expertise to facilitate pre-emptive risk management of nanotechnologies (Rose & Gazsó 2019) while a Science, Technology, and Innovation foresight network in Russia performed "horizon scanning" and technological evaluation to inform policy-making (Ena *et al.* 2017). Still, depending on the stage of technological development, it may not be feasible, or even possible, to significantly reduce uncertainty and demonstrate reliability (Kalra & Paddock 2016). This can accentuate contestation in problem definition or prioritization, preventing the ripening of the problem stream.

Also, public acceptance of technology influences the framing of technology as a problem or as a solution. Public acceptance, in turn, is determined by the perceived benefit, cost, and risk associated with the technology (Domenech & Sauri 2010). While this is affected by psychological, social, and cultural characteristics (Gaskell *et al.* 2005; Renn & Benighaus 2013), it is also marked by attitudinal uncertainty and openness to change (Satterfield *et al.* 2013). Public opinion of technology is influenced by perceived expert credibility, benefit–risk framing, degree of consensus, and medium of communication (Ho *et al.* 2010; Lachapelle *et al.* 2014). Here, experts, news media, and nongovernmental organizations can also activate the problem stream (Weaver *et al.* 2009; Helliwell *et al.* 2019), especially in the case of a public controversy or regulatory crisis (Demortain 2008; Boyd *et al.* 2013). Based on this discussion, we hypothesize:

Hypothesis 1a (H1a): If technological change influences problem definition by modifying underlying societal conditions, the problem stream is more likely to be ripe for coupling.

Hypothesis 1b (H1b): Technological regulation is less likely when epistemic uncertainty and public (un)acceptance of technology prevent coupling, or contribute to decoupling, of problem and technology.

Second, consider the policy stream. Technological disruption can influence the creation and implementation of policy alternatives. Bamberger (2010), for example, highlights the phenomenon of "automation of compliance" in industries such as finance and information technology, as evidenced by the exponential growth of the market for "governance, risk, and compliance" services, software, and systems. Similarly, Arner *et al.* (2017) document the effect of "RegTech" on regulatory monitoring, reporting, and compliance following the financial crisis of 2008. In fact, Yeung (2018) anticipates the rise of "algorithmic regulation" due to the emergence of Big Data, ubiquitous computing, and cloud storage. More fundamentally, instrument constituencies or technology constituencies might even position the technology as (a key component of) a governance or policy solution (Goyal & Howlett 2018), thereby framing low technology adoption as the policy problem (Sylvester *et al.* 2009).

In the context of emerging technologies, creation or identification of regulatory alternatives that meet selection criteria – such as technical feasibility, financial viability, and value acceptability – can be especially challenging (Edwards 2014). The prospects of novel technologies are simultaneously influenced by developments in several policy areas and competing technologies (Wirth & Markard 2011). The balance between innovation on the one hand and oversight, accountability and transparency, on the other hand, can be difficult to establish (Ducas & Wilner 2017; Lim & Taeihagh 2019); too little regulation and too much regulation can both be counterproductive (Miller & Tucker 2009; Perino & Requate 2012). Further, in areas of high-technology, regulators might face an epistemic barrier in assessing regulatory design and compliance (Braman 2010; Downer 2010). As a result, policy ideas might require more time for "softening up," potentially necessitating an anticipatory, iterative approach to regulation (Boon *et al.* 2015). Based on this discussion, we hypothesize:

Hypothesis 2a (H2a): If technological change enhances the viability of a specific policy alternative, the policy stream is more likely to be ripe for coupling.

Hypothesis 2b (H2b): Technological regulation is less likely when selection criteria prevent coupling, or contribute to decoupling, of policy and technology.

Finally, consider the politics stream. Technological change might aid or threaten party or government ideology, leading to regulation of some technologies and in some policy areas but not in others. Chang and Berdiev (2011), for example, found that left-wing governments were more likely to enact regulation in electricity and gas. Similarly, Lacharite (2002) described the effort by the Chinese government to control the flow of "illegal" and "undesirable" information on the internet. Moreover, technological change can affect public participation in the regulatory process. Information technology and social media, in particular, can "digitize government" and change the way in which regulatory process is conducted (Coglianese 2004; Picazo-Vela *et al.* 2012). Further, technology constituencies can also exploit their technological capabilities to reduce the transaction cost of collective action and mobilize their users into an advocacy coalition (Taeihagh 2017; Tzur 2019).

In the context of emerging technologies, determining or accommodating the balance of interests can be challenging. Disruptive change can quickly draw several interests to this stream. Advocacy coalitions – possibly in coordination with, or comprising members of, technology constituencies (Wesseling *et al.* 2015) – influence the process through defensive and proactive strategies. While in some situations pro-technology coalitions may band together, in others anti-technology coalitions may form to build pressure on the government (Bernauer & Meins 2003). Further, depending on the market structure, actors supporting incumbent technologies may mobilize to advocate for regulation that hinders or supports emerging technologies (Stenzel & Frenzel 2008; Smink *et al.* 2015). In such an environment, the absence (or ineffectiveness) of an advocacy coalition can result in unfavorable regulatory outcome (Harborne & Hendry 2012). Based on this discussion, we hypothesize:

Hypothesis 3a (H3a): If technological change enhances the ability or willingness of the government to act, the politics stream is more likely to be ripe for coupling.

Hypothesis 3b (H3b): Technological regulation is less likely when the balance of interests prevents coupling, or leads to decoupling, of politics and technology.

3. Policy-making in the European Union: Institutional ambiguity and regression towards the status quo

As an economic and political union of 27 member-states, the EU comprises a variety of institutions for governance. The European Commission is its executive branch, responsible for proposing legislation, implementing policies, and managing administrative activities. For this purpose, the Commission is divided into several directorate-generals, each consisting of a cabinet headed by a Commissioner. While the Commission has the authority to place an issue on the EU agenda, it has a limited role in decision-making (Ackrill & Kay 2011). Consequently, in the literature, it has been compared to the policy entrepreneur (Cram 2001; Ackrill *et al.* 2013).

Legislative authority rests with the European Parliament and the Council of the EU. A proposal by the Commission must be approved by both for enactment into EU law. Although the European Parliament is composed of directly elected representatives, policy position within the Parliament is more likely to be determined based on national affiliation than on party affiliation (Herweg 2016b). Meanwhile, the Council comprises a government minister from each member state and its composition varies depending on the policy area. This dispersion of legislative authority can increase the power of interest groups during policy-making (Eising 2009; Rozbicka & Spohr 2016).

The Court of Justice is the judicial branch of the EU, responsible for interpreting EU law and ensuring its uniform application. As the cases on which the Court adjudicates represent certain problem framings, the judgments of the court, in effect, contribute to the development of the policy stream by creating new policy alternatives or softening existing ones (Nowak 2010). While in some situations the effect of the ruling might be limited to the case at hand, in other situations it can have a broader impact on EU policy-making. Nowak (2010), for example, showed that the influence of the rulings of the court on political decision-making depended not on their legal content but on the availability of policy windows and the endurance of policy entrepreneurs.

This "rough" institutional morphology – involving numerous, autonomous loci of authority – is more likely to create friction and favor status quo (Jones & Baumgartner 2005; Zahariadis 2008). In such an environment, a longer policy window – such as one opened by an unpredictable event – is more likely to result in regulatory change (Blankenau 2001; Saurugger & Terpan 2016; Zahariadis 2016). In fact, Zohlnhöfer *et al.* (2016) have proposed that entrepreneurial strategies – such as concessions and package deals – might be necessary during a decision window to push for policy adoption.

4. Research design: Tracing the emergence of technological regulation

We apply the theoretical framework developed above to the case of the GDPR in the EU. The GDPR represents a case of regulation of emerging technologies – in a complex, multilevel governance context – despite significant contestation from various constituencies, including powerful technology businesses. The case is, therefore, appropriate for uncovering the different actors and activities involved in the policy process. Further, as several studies have provided an account of the regulation based on explanations such as technological change, interests, institutionalism, and policy entrepreneurship (Burri & Schar 2016; Moulonguet 2016; Rossi 2018; Hildén 2019; Kalyanpur & Newman 2019; Laurer & Seidl 2020), a study of the GDPR is apt for investigating whether the MSF can go further and provide a more complete explanation for the formulation and the adoption of the regulation.

The data for this study were collected primarily from secondary literature and news reports. First, we identified relevant articles in the literature through the following query on the Scopus database: (("data privacy" OR "data protection") AND "EU" AND "regulation"). While this search returned nearly 500 publications, we identified only those that were about the policy-making process relevant for our analysis. Subsequent publications were identified by scanning the references of relevant articles. Second, we retrieved relevant news reports through a search for "General Data Protection Regulation" on the Nexis Uni database. This search returned approximately 1,000 articles corresponding to "legal news," "magazines & journals," "newspapers," and "web-based news."

We analyzed the data using process tracing, an analytic method based on the reconstruction of the chain of events in a process (Morgan 2016). To do so, we parsed through the text and coded activities, events, and contexts based on their principal stream. For example, a description of emerging technologies was categorized under the technology stream, while the effect of such technologies on the general society was categorized under the problem stream. Similarly, activities or events pertaining to the development of regulatory alternatives were classified under the policy stream and those involving the authoritative role of Commission, the Parliament, and the Council – including advocacy by various actors at these venues – were classified under the politics stream. Subsequently, we arranged the data temporally to understand the sequence of events and reconstruct the policy process.

5. Findings: The formulation and adoption of the GDPR

5.1. Placing the regulation on the legislative agenda

Before the GDPR, data privacy in the EU was governed based on the Data Protection Directive (DPD). Adopted in 1995 by the EU, the DPD established a regulatory framework to protect individual privacy without hindering the movement of personal data within the EU (European Union 1995). The DPD set out the circumstances and principles under which personal data can be lawfully processed and transferred; recognized the rights of individuals in accessing, controlling, and obtaining information about their data; and called on member states to monitor the application of the Directive within their territories through independent, public data protection authorities. The paradigm for regulating personal data spread to over 30 countries and influenced data protection globally (Ryngaert & Taylor 2020). However, balancing the dual objectives of protecting the right to privacy and establishing an internal digital market proved challenging, especially with constant social and technological change (Robinson *et al.* 2009; Lynskey 2013).

When deliberations on the DPD began in 1990, the information technology revolution was still in its infancy. Soon after, several information and communication technologies diffused rapidly, leading to multiple disruptions

in data collection, data processing, cross-border data transfer, and data storage. Emerging technologies included the world-wide web, online search engines, automated surveillance, mobile and wireless telephony, social networking, and cloud computing, amongst others (Froomkin 2000). Websites, for example, used "cookies" or small pieces of text to understand users' interests, preferences, and behaviors. While these contained personal data, they were stored on the host computer (i.e., the website did not need physical equipment in the EU) and were not related to the user's offline identities (Moerel 2011b). Similarly, the growth in smart mobile devices and wireless communication enabled digital location mapping through a combination of data flows that were difficult to trace (Cuijpers & Pekárek 2011). Also, cloud computing operated on a different paradigm than traditional computing and cloud service providers were mostly neutral intermediaries with little knowledge of the data they processed or stored, including whether it was private or public (Kuan Hon *et al.* 2011). Technological change, and the practices of technology constituencies, posed a problem for upholding the right to privacy (Jørgensen & Desai 2017).

Data protection authorities of member states, who were responsible for enforcing the DPD, diverged in their application of the DPD in the face of technological change and other policy priorities such as health research and national security (Levi & Wall 2004; Townend 2010). This variation in interpretation of the Directive led to fragmented, improper implementation (Moerel 2011a). Critics argued, for example, that member states such as Ireland attracted investment by adopting a lenient approach in implementing the Directive (Kalyanpur & Newman 2019). Further, in a systematic analysis of the implementation of the DPD, Erdos (2015) found "a total lack of even minimal harmonization" within the EU in the case of exemptions permitted under media expression as well. This lack of harmonization – and its compliance cost for businesses – was framed as a problem that necessitated a regulatory change (European Commission 2012a, 2012b).

The legal and regulatory instruments incorporated in the initial proposal of the GDPR were developed over time. Key tenets of the proposal, such as the right to data protection and the right to privacy, were already a part of the DPD. The GDPR sought to strengthen these through the requirement for explicit user consent, increased responsibilities on both controllers and processors, and territorial reach beyond the EU (Alhadeff *et al.* 2012; Burri & Schar 2016). A "one-stop shop" scheme was proposed to reduce jurisdictional ambiguity and lessen administrative burden on business in case cross-border data transfer. The controversial "right to be forgotten," which allowed the data subject to revoke consent for data processing and storage, was an extension of the "right to erasure" in the DPD (European Union 1995). Meanwhile, the "right to data portability" – which gave the user the right to obtain personal data from the data controller and, if desired, transmit it to another controller – was a "mutation" from competition law, consumer protection law, and intellectual property rights (Burri & Schar 2016; De Hert *et al.* 2018).

An instrument constituency of data protection authorities played the role of a policy entrepreneur in developing the GDPR in the policy stream. This constituency had, in fact, successfully utilized its expertise, networks, and resources to push for the DPD despite widespread resistance against the Directive (Newman 2008). As a result of that legislation, data protection authorities were established in all member states and the institution of "Article 29 Working Party" (WP29) was created to ensure uniform application of the DPD (European Union 1995). The WP29 was instrumental in the insertion of data protection in the EU Fundamental Rights Charter and in the Treaty of Lisbon (Laurer & Seidl 2020). Moreover, Laurer and Seidl (2020) found that several new instruments of the GDPR – including data protection by design, the accountability principle, and the creation of the European Data Protection Board – had their origin in the proposal made by the WP29 in its 2009 opinion to the Commission.

The inclusion of the right to data protection in the Treaty of Lisbon created the legal basis for the GDPR and opened an agenda window in politics stream (Kuner 2012). Given the dual objectives of the DPD, its review (and reform) entailed institutional ambiguity and could have been overseen by either the Directorate General for Internal Market or the Directorate General for Justice and Consumer Rights. The latter seized the opportunity to reform of the Directive after the ratification of the Treaty of Lisbon (Laurer & Seidl 2020). Justice Commissioner Viviane Reding played the role of a political entrepreneur and initiated another review of the DPD in May 2009 (Laurer & Seidl 2020). Subsequently, the Commission managed to include an evaluation of the data protection regulation in the agenda of the Stockholm Program in December 2009 (European Council 2009). Despite facing significant lobbying from businesses (Atikcan & Chalmers 2019), in January 2012, Commissioner Reding was

successful in pushing a more consumer-centric draft of the GDPR through the Commission and moving it to the legislative process (Hildén 2019).

5.2. Decision-making on the regulation

Several actors were directly or indirectly involved in the legislative process to influence the design of the GDPR. Most prominently, technology constituencies supporting the use of information and communication technologies attempted to decouple each stream from the technology stream to influence policy formulation and decision-making.

To decouple the problem stream from the policy stream and the technology stream, the benefits of information technologies for society and the uncertainty regarding the consequences of the regulation were highlighted throughout the decision-making process. Groups such as "Software Technology Outreach" had long countered the privacy argument by highlighting the role of information technologies in providing context-aware services, such as medical care for the elderly and the vulnerable (Levi & Wall 2004). In coordination with technology companies such as Google and Facebook, the American Chamber of Commerce to the EU warned that the GDPR would make EU less favored for doing business and, thereby, worsen investment, trade, and livelihoods creation in the region (PracticeView Database 2012). Also, the medical community expressed concern that the legislation would restrict the sharing of patient information and adversely affect research on medicine and public health (Farrar 2014). The government of the United Kingdom, which was especially uncomfortable with the draft proposed by the Commission, even argued that provisions such as the right to be forgotten would impinge on the freedom of the media and potentially even promote terrorism (Chorley 2014).

The effort to decouple the problem stream and the technology stream was aided by high public acceptance of information technologies. The younger generation, especially, had grown up using the internet, mobile, and web technologies in their daily lives and, to a large extent, accepted the risks associated with them (Tene 2011). Even older people were generally willing to forgo privacy for the ease of use and value-added services provided by these emerging technologies (Levi & Wall 2004). Illustratively, a survey conducted by the Commission, before the release of the draft GDPR, on attitudes on data protection in the EU had revealed that even though two-thirds of internet users were concerned about releasing personal data, a comparable number considered it to be a part of modern life (European Commission 2011). Technology constituencies were nearly successful in side-lining the issue of data protection; privacy advocates feared that the GDPR was being significantly "watered down" (Rossi 2018). In June 2013, Reding, by then the Vice President of the European Commission, stated: "The absolute red line below which I am not prepared to go is the current level of protection as laid down in the 1995 Directive" (European Commission 2013).

Even as the future of the regulation seemed increasingly uncertain, a focusing event altered the dynamics of the problem stream. Soon after the statement by Reding, the Guardian and the Washington Post published classified information leaked by Edward Snowden, showing that the US National Security Agency and the UK General Communications Headquarters had the ability to directly collect customer information from US service providers such as Apple, Facebook, Google, Microsoft, and Yahoo (Gellman & Poitras 2013). These "Snowden revelations" received widespread coverage and news articles concerning data privacy increased manifold for a sustained period (Rossi 2018; Kalyanpur & Newman 2019). Moreover, they altered elite perception regarding the safety of their own data and led to a change in the discourse on the GDPR (Baker 2013a; Laurer & Seidl 2020). This, in combination with other high-profile data breaches, ensured that the problem of data protection remained on the policy agenda (PracticeView Database 2014a).

Technology constituencies also sought to decouple the policy stream and the technology stream. Arguably, this was most evident in the case of the "right to be forgotten" (Colón 2013). The regional director of Facebook, for example, contended: "we have concerns about the workability… Our worry is that it will take up resources and would not be effective" (Bowcott 2013). Similarly, the Industry Committee of Parliament opined that this provision was "impractical" (Baker 2013b). Others also questioned the value acceptability of this right due to its interference with freedom of expression (Woollaston 2014b). While Reding offered the assurance that the "right to be forgotten" would be assessed along with freedom of expression, health information, and public administration(Bowcott 2013), questions regarding its viability remained.

In May 2014, an intervention by the European Court of Justice softened the regulatory instrument. In a case filed by a Spanish citizen against Google Spain, the Court ordered the search engine to remove, upon request, search results containing private, sensitive data unless the information was in public interest (Woollaston 2014b). Despite its protest against the judgment, Google did not have a legal alternative and started working out the procedure for implementing the decision (SPIEGEL International 2014). Before the end of the next month, the search engine had begun complying with "legitimate" requests for removal or search results from its websites (Griffiths 2014; Dathan 2016). Other search engines, such as Bing and Yahoo, too followed suit (Woollaston 2014a). The Court, therefore, enhanced the viability of the regulation by establishing legal principles and limiting the scope for political bargaining (PracticeView Database 2014b; Laurer & Seidl 2020).

In the politics stream, technology constituencies and advocacy coalitions participated actively to shape the regulatory outcome. In the European Parliament, for example, nearly 4,000 amendments to the GDPR were proposed (TendersInfo 2013). Even though these proposals came from a variety of channels to indicate widespread opposition, most of them were reportedly filed at the behest of the "Silicon Valley giants" (Rossi 2018). Internet companies had been largely successful in the negotiation until the "Snowden leaks" turned the tide and enabled data privacy advocates to delegitimize the influence of multinational businesses on EU policy-making (Kalyanpur & Newman 2019). The entrepreneurship of the committee on Civil Liberties, Justice and Home Affairs – especially its rapporteur, Jan Albrecht – was instrumental in facilitating consensus on the compromise text of the GDPR and shifting the focus to the Council (TendersInfo 2013; Laurer & Seidl 2020).

The proposal for the GDPR had received a "cool reception" even in the Council (Vandystadt 2012). The Council provided a venue for "domestic" businesses, such as publishing and telecommunications. "Incumbent" telecommunication businesses were governed by the stricter 2002 ePrivacy Directive (European Union 2002). They highlighted the discrepancies between that regulatory regime and the GDPR, and called for stricter regulation on online data privacy (O'brien 2012; TendersInfo 2012). Welcoming the approval of the Parliament to the GDPR, they called on the Council to deliver a consistent, innovation-friendly, and technology-neutral legislation (TendersInfo 2014). The CEO of Deutsche Telekom, for example, stated: "We want a level playing field with Internet companies. We don't want to push them into regulation, but if they're out of regulation, we want to be out of regulation" (Wood 2015). Meanwhile, businesses in broadcasting and publishing and digital marketing lobbied for changes in several provisions of the GDPR (Belfast Telegraph 2013; Hildén 2019).

Partially due to influential business interests and partially due to implied loss of sovereignty over data protection (Bowcott 2013; Oltermann 2013), Germany, Ireland, Sweden, and the United Kingdom were the most vociferous in their opposition to the GDPR (Hildén 2019; Laurer & Seidl 2020). While the increase in public pressure due to the Snowden revelations changed the dynamic to some extent, the Council continued to witness intense bargaining on the design of the regulation (Belfast Telegraph 2013; SPIEGEL International 2014). The effort to ensure that the politics remained coupled with the policy and the technology required significant changes in the GDPR (Hildén 2019). This was evident, for instance, in the modification to the "one-stop shop" principle during the legislative process. The Commission had argued that, in case of a cross-border dispute, this mechanism would significantly reduce compliance cost for businesses and pave the way for a digital single market. However, rather than confer all supervisory authority to the member state in which the main establishment of the regulatee was located, the Council settled for a "partial general approach" that would allow the concerned data protection agencies to arrive at joint decision within the European Data Protection Board (Panichi 2014; PracticeView Database 2014c).

6. Discussion and conclusion: The (de-)coupling of streams influences the timing and design of technology regulation

Although it is widely acknowledged that novel technologies can "disrupt" governance, why and how their regulation emerges has received less attention in the literature. In this study, we used a four-stream variant of the MSF – incorporating the technology stream to model the dynamics of technological development – for conceptualizing this phenomenon. Specifically, we posited that technological change can contribute to the ripening of the problem stream (H1a), the policy stream (H2a), and/or the politics stream (H3a). Further, technological regulation is likely to occur when the four streams remain coupled to overcome the challenges of epistemic uncertainty

and varying public acceptance in the problem stream (H1b), unclear policy viability in the policy stream (H2b), and the evolving balance of interests in the politics stream (H3b).

We applied this framework to examine the adoption of the GDPR in the EU, a case of regulation of emerging information and communication technologies despite high contestation and lobbying across the board. The findings indicate that technological innovation, in part, led to the fragmentation of the data privacy regime in the EU by increasing ambiguity in the application of the DPD and contributed to the framing of lack of harmonization as a policy problem (supporting H1a). Meanwhile, the instrument constituency of WP29 advanced the concept of data protection in the policy stream and developed the design of the GDPR. Its policy entrepreneurship was key in recognition of data protection as a fundamental right in the Treaty of Lisbon, which created the legal basis for the GDPR. This opened a window of opportunity that was seized by the European Commission, specifically Justice Commissioner Viviane Reding, to propose a draft of the GDPR and place it on the legislative agenda.

During the legislative process, technology constituencies sought to decouple the technology stream from the policy-making streams. In the problem stream, actors exploited epistemic uncertainty and relatively high public acceptance to supplant the narrative of data privacy with those of commerce and trade, freedom of expression, and scientific research (supporting H2a). This effort was nearly successful until the "Snowden revelations" increased issue salience and led to re-prioritization of data protection as the problem. Further, in the policy stream, technology constituencies raised concerns regarding the viability of the GDPR, especially the "right to be forgotten" (supporting H2b). An unfavorable judgment by the European Court of Justice, however, left them with little choice and helped "soften" the regulatory idea. Finally, in the politics stream, working with advocacy coalitions, technology constituencies adopted various tactics to convey the impression that opposition to the regulation was widespread (supporting H3b). Here, the support for the reform from telecommunication companies helped the cause of data privacy advocates while the preeminent position of the Council enabled domestic businesses and member states to strongly influence regulatory design.

This research shows that the MSF is useful for explaining the creation of the GDPR regime. Although several studies have traced the formulation and adoption of the GDPR, they have presented an incomplete picture of the policy process. Rossi (2018), for example, highlighted the role of the "Snowden revelations" in increasing issue salience and empowering data privacy advocates. Relatedly, Kalyanpur and Newman (2019) argued that this "salience shock" delegitimized business interests and blunted "foreign corporate power." In contrast, Laurer and Seidl (2020) offered an institutionalist perspective of the regulation. Hildén (2019), also, showed that the Snowden incident influenced the dynamics in the Parliament more than the Council, where domestic businesses and public interest dominated the conversation. A multiple streams analysis highlighted the contingent nature of these perspectives and provided a more complete account of the interaction between structure, agency, and chance in the process.

The inclusion of the technology stream enhances the analytical power of the MSF. The case of the GDPR shows that the influence of technology (and technological change) cannot be confined to any one stream and spans problem, policy, and politics. Where technology is largely static, this effect of technology on policy-making can be considered as exogenous. However, in contexts involving emerging technologies, such as approach undermines the interaction between technology dynamics and policy dynamics, and the ensuing co-evolutionary relationship between the two. The technology stream can model technological developments more accurately and help understand the source, substance, and timing of their influence on each stream.

Further, in their quest to promote the diffusion of technologies, technology constituencies play diverse roles in the policy process. While technology constituencies backing emerging information and communication technologies sought to stall and alter the regulation, constituencies representing "incumbent" telecommunication companies supported a strict data protection regime. Through different strategies and coalitions these actors influenced the policy process and shaped the eventual output. Future research should examine different types of interactions among incumbent and emergent technology constituencies in the technology stream and study how these dynamics influence the policy-making streams and policy-technology co-evolution.

Acknowledgments

Araz Taeihagh is grateful for the support provided by the Lee Kuan Yew School of Public Policy, National University of Singapore through the TRC grant.

DATA AVAILABILITY STATEMENT

Research data are not shared

References

Ackrill R, Kay A (2011) Multiple Streams in EU Policy-Making: The Case of the 2005 Sugar Reform. *Journal of European Public Policy* 18(1), 72–89. https://doi.org/10.1080/13501763.2011.520879.

Ackrill R, Kay A, Zahariadis N (2013) Ambiguity, Multiple Streams, and EU Policy. *Journal of European Public Policy* 20(6), 871–887. https://doi.org/10.1080/13501763.2013.781824.

Alhadeff J, Van Alsenoy B, Dumortier J (2012) The Accountability Principle in Data Protection Regulation: Origin, Development and Future Directions. In: Guagnin D, Hempel L, Ilten C, Kroener I, Neyland D, Postigo H (eds) *Managing Privacy Through Accountability*, pp. 49–82.Palgrave Macmillan, London. https://doi.org/10.1057/9781137032225_4.

Arner DW, Barberis J, Buckley RP (2017) FinTech, RegTech, and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business* 37(3), 371–413.

Atikcan EÖ, Chalmers AW (2019) Choosing Lobbying Sides: The General Data Protection Regulation of the European Union. *Journal of Public Policy* 39, 1–22. https://doi.org/10.1017/S0143814X18000223.

Baker N (2013a) EU Data Privacy Laws Will Snag More U.S. Companies. *Compliance Week*, 16 Jul. Available from URL: https://www.complianceweek.com/eu-data-privacy-laws-will-snag-more-us-companies/3912.article

Baker N (2013b) EU Set to Adopt More Stringent Data Privacy Laws. *Compliance Week*, 21 May. Available from URL: https://www.complianceweek.com/eu-set-to-adopt-more-stringent-data-privacy-laws/3953.article

Bamberger KA (2010) Technologies of Compliance: Risk and Regulation in a Digital Age. *Texas Law Review* 88(4), 669–739.

Belfast Telegraph (2013) *PM Counters EU Data Protection Bid*, 24 Oct. Available from URL: https://www.belfasttelegraph.co.uk/business/news/pm-counters-eu-data-protection-bid-29697833.html

Bernauer T, Meins E (2003) Technological Revolution Meets Policy and the Market: Explaining Cross-National Differences in Agricultural Biotechnology Regulation. *European Journal of Political Research* 42(5), 643–683. https://doi.org/10.1111/1475-6765.00099.

Black J, Lodge M, Thatcher M (2006) *Regulatory Innovation: A Comparative Analysis*. Cheltenham, England: Edward Elgar Publishing.

Blankenau J (2001) The Fate of National Health Insurance in Canada and the United States: A Multiple Streams Explanation. *Policy Studies Journal* 29(1), 38–55. https://doi.org/10.1111/j.1541-0072.2001.tb02073.x.

Boon WPC, Aarden E, Broerse JEW (2015) Path Creation by Public Agencies – The Case of Desirable Futures of Genomics. *Technological Forecasting and Social Change* 99, 67–76. https://doi.org/10.1016/j.techfore.2015.06.038.

Bowcott O (2013) Britain Seeks Opt-out of New European Social Media Privacy Laws. *The Guardian*, 4 Apr. Available from URL: https://www.theguardian.com/technology/2013/apr/04/britain-opt-out-right-to-be-forgotten-law

Bower JL, Christensen CM (1995) Disruptive Technologies: Catching the Wave. *Harvard Business Review*

Boyd AD, Liu Y, Stephens JC *et al.* (2013) Controversy in Technology Innovation: Contrasting Media and Expert Risk Perceptions of the Alleged Leakage at the Weyburn Carbon Dioxide Storage Demonstration Project. *International Journal of Greenhouse Gas Control* 14, 259–269. https://doi.org/10.1016/j.ijggc.2013.01.011.

Braman S (2010) The Interpretation of Technical and Legal Decision-Making for the Internet. *Information, Communication & Society* 13(3), 309–324. https://doi.org/10.1080/13691180903473814.

Burri M, Schar R (2016) The Reform of the EU Data Protection Framework: Outlining Key Changes and Assessing their Fitness for a Data-Driven Economy. *Journal of Information Policy* 6, 479–511. https://doi.org/10.5325/jinfopoli.6.2016.0479.

Cairney P, Jones MD (2016) Kingdon's Multiple Streams Approach: What Is the Empirical Impact of this Universal Theory? *Policy Studies Journal* 44(1), 37–58. https://doi.org/10.1111/psj.12111.

Chang CP, Berdiev AN (2011) The Political Economy of Energy Regulation in OECD Countries. *Energy Economics* 33(5), 816–825. https://doi.org/10.1016/j.eneco.2011.06.001.

Chorley M (2014) Terrorists Are Trying to Use Google "Right to Be Forgotten" Law to Cover Up Their Trials in "Censorship by the Back Door," Warns Culture Secretary. *MailOnline*, 14 Nov. Available from URL: https://www.dailymail.co.uk/news/article-2830082/Terrorists-using-right-forgotten-cover-trials-European-courts-created-censorship-door.html

Coglianese C (2004) Information Technology and Regulatory Policy – New Directions for Digital Government Research. *Social Science Computer Review* 22(1), 85–91. https://doi.org/10.1177/0894439303259890.

Colón M (2013) The Influence of Overseas Reforms. *SC Magazine*, 1 Mar. Available from URL: https://www.scmagazine.com/home/security-news/2-minutes-on/the-influence-of-overseas-reforms/

Cram L (2001) Whither the Commission? Reform, Renewal and the Issue-Attention Cycle. *Journal of European Public Policy* 8(5), 770–786. https://doi.org/10.1080/13501760110083509.

Cuijpers C, Pekárek M (2011) The Regulation of Location-Based Services: Challenges to the European Union Data Protection Regime. *Journal of Location Based Services* 5(3–4), 223–241. https://doi.org/10.1080/17489725.2011.637081.

Dathan M (2016) Google Will Now Hide Content Removed Using The "Right to Be Forgotten" Ruling from ALL Versions of its Search Engine. *MailOnline*, 11 Feb.

De Hert P, Papakonstantinou V, Malgieri G, Beslay L, Sanchez I (2018) The Right to Data Portability in the GDPR: Towards User-Centric Interoperability of Digital Services. *Computer Law and Security Review* 34(2), 193–203. https://doi.org/10.1016/j.clsr.2017.10.003.

Demortain D (2008) From Drug Crises to Regulatory Change: The Mediation of Expertise. *Health Risk & Society* 10(1), 37–51. https://doi.org/10.1080/13698570701782437.

Domenech L, Sauri D (2010) Socio-Technical Transitions in Water Scarcity Contexts: Public Acceptance of Greywater Reuse Technologies in the Metropolitan Area of Barcelona. *Resources Conservation and Recycling* 55(1), 53–62. https://doi.org/10.1016/j.resconrec.2010.07.001.

Downer J (2010) Trust and Technology: The Social Foundations of Aviation Regulation. *British Journal of Sociology* 61(1), 83–106. https://doi.org/10.1111/j.1468-4446.2009.01303.x.

Ducas E, Wilner A (2017) The Security and Financial Implications of Blockchain Technologies: Regulating Emerging Technologies in Canada. *International Journal* 72(4), 538–562. https://doi.org/10.1177/0020702017741909.

Edwards KT (2014) Methods of Legitimation: How Ethics Committees Decide Which Reasons Count in Public Policy Decision-Making. *Social Science & Medicine* 113, 34–41. https://doi.org/10.1016/j.socscimed.2014.04.043.

Eising R (2009) *The Political Economy of State-Business Relations in Europe: Interest Mediation, Capitalism and EU Policy Making*. Oxon, England: Routledge.

Elzen B, Geels FW, Leeuwis C, van Mierlo B (2011) Normative Contestation in Transitions "in the Making": Animal Welfare Concerns and System Innovation in Pig Husbandry. *Research Policy* 40(2), 263–275. https://doi.org/10.1016/j.respol.2010.09.018.

Ena OV, Chulok AA, Shashnov SA (2017) Networking for Sustainable Foresight: A Russian Study. *Technological Forecasting and Social Change* 119, 268–279. https://doi.org/10.1016/j.techfore.2016.05.014.

Erdos D (2015) European Union Data Protection Law and Media Expression: Fundamentally off Balance. *International and Comparative Law Quarterly* 65(1), 139–183. https://doi.org/10.1017/S0020589315000512.

European Commission (2011) *Special Eurobarometer 359: Attitudes on Data Protection and Electronic Identity in the European Union*. Available from URL: http://ec.europa.eu/public_opinion/archives/ebs/ebs_359_en.pdf

European Commission (2012a) Impact Assessment Accompanying the Document Regulation of the European Parliament and of the Council on the Protection of Individuals with Regard to the Processing of Personal Data and on the Free Movement of Such Data (General Data Protection Regulation) and Directive of the European Parliament and of the Council on the Protection of Individuals with Regard to the Processing of Personal Data by Competent Authorities for the Purposes of Prevention, Investigation, Detection or Prosecution of Criminal Offences or the Execution of Criminal Penalties, and the Free Movement of Such Data. *Commission Staff Working Paper SEC(2012)72/F1*.

European Commission (2012b) *Proposal for a Regulation of the European Parliament and of the Council on the Protection of Individuals with Regard to the Processing of Personal Data and on the Free Movement of Such Data (General Data Protection Regulation)*. Available from URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52012PC0011

European Commission (2013) *Vice-President Reding's intervention during Justice Council Press Conference*, 6 Jun Available from URL: http://europa.eu/rapid/press-release_SPEECH-13-514_en.htm

European Council (2009) *The Stockholm Programme – An Open and Secure Europe Serving and Protecting the Citizens*. Brussels, Belgium: European Council.

European Union (1995) Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the Protection of Individuals with Regard to the Processing of Personal Data and on the Free Movement of Such Data. *Official Journal L*, 281, 0031–0050.

European Union (2002) Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector (Directive on Privacy and Electronic Communications). *Official Journal L*, 201, 37–47. Available from URL: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32002L0058

Farrar J (2014) *Sharing NHS Data Saves Lives; EU Obstruction Will Not*, 14 Jan.

Froomkin AM (2000) The Death of Privacy? *Stanford Law Review* 52(5), 1461–1543. https://doi.org/10.2307/1229519.

Gaskell G, Ten Eyck T, Jackson J, Veltri G (2005) Imagining Nanotechnology: Cultural Support for Technological Innovation in Europe and the United States. *Public Understanding of Science* 14(1), 81–90. https://doi.org/10.1177/0963662505048949.

Gellman B, Poitras L (2013) U.S., British Intelligence Mining Data from Nine U.S. Internet Companies in Broad Secret Program. *The Washington Post*, 7 Jun. Available from URL: http://www.washingtonpost.com/investigations/us-intelligence-mining-data-from-nine-us-internet-companies-in-broad-secret-program/2013/06/06/3a0c0da8-cebf-11e2-8845-d970ccb04497_story.html

Goyal N (2019) *Promoting Policy Innovation for Sustainability: Leaders, Laggards and Learners in the Indian Electricity Transition*. Doctoral Dissertation, National University of Singapore. Available from URL: https://scholarbank.nus.edu.sg/handle/10635/166349

Goyal N, Howlett M (2018) Technology and Instrument Constituencies as Agents of Innovation: Sustainability Transitions and the Governance of Urban Transport. *Energies* 11(5), 1198.

Goyal N, Howlett M (2019) Who Learns What in Sustainability Transitions? *Environmental Innovation and Societal Transitions* 34, 311–321. https://doi.org/10.1016/j.eist.2019.09.002.

Goyal N, Howlett M (2020) Making Sense of the Babble of Policy-Making: A General Framework of the Policy Process. In: Capano G, Howlett M (eds) *A Modern Guide to Public Policy* (pp. 78–92). Cheltenham, England: Edward Elgar Publishing.

Goyal N, Howlett M, Chindarkar N (2010) Who coupled which stream(s)? Policy entrepreneurship and innovation in the energy–water nexus in Gujarat, India. *Public Administration and Development*, 40:(1), 49–64. http://dx.doi.org/10.1002/pad.1855

Griffiths S (2014) Google Starts Removing Search Results: Tech Giant Now Warns Users When Links Are Deleted under The "Right to Be Forgotten" Rule. *MailOnline*, 26 Jun. Available from URL: https://www.dailymail.co.uk/sciencetech/article-2670600/Google-starts-removing-search-results-Tech-giant-warns-users-links-deleted-right-forgotten-rule.html

Haas PM (1992) Introduction: Epistemic Communities and International Policy Coordination. *International Organization* 46 (1), 1–35.
Harborne P, Hendry C (2012) Commercialising New Energy Technologies: Failure of the Japanese Machine? *Technology Analysis & Strategic Management* 24(5), 497–510. https://doi.org/10.1080/09537325.2012.674671.
Helliwell R, Hartley S, Pearce W (2019) NGO Perspectives on the Social and Ethical Dimensions of Plant Genome-Editing. *Agriculture and Human Values* 36(4), 779–791. https://doi.org/10.1007/s10460-019-09956-9.
Herweg N (2016a) Clarifying the Concept of Policy-Communities in the Multiple-Streams Framework. In: Zohlnhöfer R, Rüb FW (eds) *Decision-Making under Ambiguity and Time Constraints: Assessing the Multiple-Streams Framework*, pp. 125–145.Colchester, England: ECPR Press.
Herweg N (2016b) Explaining European Agenda-Setting Using the Multiple Streams Framework: The Case of European Natural Gas Regulation. *Policy Sciences* 49(1), 13–33. https://doi.org/10.1007/s11077-015-9231-z.
Herweg N, Huß C, Zohlnhöfer R (2015) Straightening the Three Streams: Theorising Extensions of the Multiple Streams Framework. *European Journal of Political Research* 54(3), 435–449. https://doi.org/10.1111/1475-6765.12089.
Hildén J (2019) *The Politics of Datafication: The Influence of Lobbyists on the EU's Data Protection Reform and Its Consequences for the Legitimacy of the General Data Protection Regulation*. Helsinki, Finland: Publications of the Faculty of Social Sciences.
Ho SS, Scheufele DA, Corley EA (2010) Making Sense of Policy Choices: Understanding the Roles of Value Predispositions, Mass Media, and Cognitive Processing in Public Attitudes Toward Nanotechnology. *Journal of Nanoparticle Research* 12 (8), 2703–2715. https://doi.org/10.1007/s11051-010-0038-8.
Hood C (1994) *Explaining Economic Policy Reversals*. Buckingham, PA: Open University Press.
Hoppmann J, Huenteler J, Girod B (2014) Compulsive Policy-Making—The Evolution of the German Feed-in Tariff System for Solar Photovoltaic Power. *Research Policy* 43(8), 1422–1441. https://doi.org/10.1016/j.respol.2014.01.014.
Howlett M, McConnell A, Perl A (2015) Streams and Stages: Reconciling Kingdon and Policy Process Theory. *European Journal of Political Research* 54(3), 419–434. https://doi.org/10.1111/1475-6765.12064.
Jones BD, Baumgartner FR (2005) *The Politics of Attention: How Government Prioritizes Problems*. Chicago, IL: University of Chicago Press.
Jørgensen RF, Desai T (2017) Right to Privacy Meets Online Platforms: Exploring Privacy Complaints against Facebook and Google. *Nordic Journal of Human Rights* 35(2), 106–126. https://doi.org/10.1080/18918131.2017.1314110.
Kalra N, Paddock SM (2016) Driving to Safety: How Many Miles of Driving Would It Take to Demonstrate Autonomous Vehicle Reliability? *Transportation Research Part A – Policy and Practice* 94, 182–193. https://doi.org/10.1016/j.tra.2016.09.010.
Kalyanpur N, Newman AL (2019) The MNC-Coalition Paradox: Issue Salience, Foreign Firms and the General Data Protection Regulation. *Journal of Common Market Studies* 57, 448–467. https://doi.org/10.1111/jcms.12810.
Kietzmann JH, Hermkens K, McCarthy IP, Silvestre BS (2011) Social Media? Get Serious! Understanding the Functional Building Blocks of Social Media. *Business Horizons* 54(3), 241–251.
Kingdon JW (1995) *Agendas, Alternatives, and Public Policies*, 2nd. New York, NY: Longman.
Knaggård Å (2015) The Multiple Streams Framework and the Problem Broker. *European Journal of Political Research* 54(3), 450–465. https://doi.org/10.1111/1475-6765.12097.
Kuan Hon W, Millard C, Walden I (2011) The Problem of "Personal Data" in Cloud Computing: What Information Is Regulated? – The Cloud of Unknowing. *International Data Privacy Law* 1(4), 211–228. https://doi.org/10.1093/idpl/ipr018.
Kuner C (2012) *The European Commission's Proposed Data Protection Regulation: A Copernican Revolution in European Data Protection Law*. Bloomberg BNA Privacy and Security Law Report (2012), Issue. Available from URL: https://ssrn.com/abstract=2162781
Lachapelle E, Montpetit E, Gauvin JP (2014) Public Perceptions of Expert Credibility on Policy Issues: The Role of Expert Framing and Political Worldviews. *Policy Studies Journal* 42(4), 674–697. https://doi.org/10.1111/psj.12073.
Lacharite J (2002, Jul) Electronic Decentralisation in China: A Critical Analysis of Internet Filtering Policies in the People's Republic of China. *Australian Journal of Political Science* 37(2), 333–346. https://doi.org/10.1080/10361140220148188.
Laurer M, Seidl T (2020) Regulating the European Data-Driven Economy: A Case Study on the General Data Protection Regulation. *Policy & Internet* . https://doi.org/10.1002/poi3.246.
Levi M, Wall DS (2004) Technologies, Security, and Privacy in the Post-9/11 European Information Society. *Journal of Law and Society* 31(2), 194–220. https://doi.org/10.1111/j.1467-6478.2004.00287.x.
Li Y, Taeihagh A, de Jong M (2018) The Governance of Risks in Ridesharing: A Revelatory Case from Singapore. *Energies* 11 (5), 1277. https://doi.org/10.3390/en11051277.
Lim HSM, Taeihagh A (2019) Algorithmic Decision-Making in AVs: Understanding Ethical and Technical Concerns for Smart Cities. *Sustainability* 11(20), 5791. http://dx.doi.org/10.3390/su11205791.
Lynskey O (2013) From Market-Making Tool to Fundamental Right: The Role of the Court of Justice in Data Protection's Identity Crisis. In S Gutwirth, R Leenes, P. de Hert, Y Poullet, (Eds.), *European Data Protection: Coming of Age*, pp. 59–84. Dordrecht: Springer. https://doi.org/10.1007/978-94-007-5170-5_3.
Miller AR, Tucker CE (2009) Privacy Protection and Technology Diffusion: The Case of Electronic Medical Records. *Management Science* 55(7), 1077–1093. https://doi.org/10.1287/mnsc.1090.1014.
Moerel L (2011a) Back to Basics: When Does EU Data Protection Law Apply? *International Data Privacy Law* 1(2), 92–110. https://doi.org/10.1093/idpl/ipq009.
Moerel L (2011b) The Long Arm of EU Data Protection Law: Does the Data Protection Directive Apply to Processing of Personal Data of EU Citizens by Websites Worldwide? *International Data Privacy Law* 1(1), 28–46. https://doi.org/10.1093/idpl/ipq004.

Morgan KJ (2016) Process Tracing and the Causal Identification Revolution. *New Political Economy* 21(5), 489–492. https://doi.org/10.1080/13563467.2016.1201804.
Moulonguet M (2016) *What drives the European Parliament? The Case of the General Data Protection Regulation*. Bruges Political Research Papers 47/2015.
Mukherjee I, Howlett M (2015) Who Is a Stream? Epistemic Communities, Instrument Constituencies and Advocacy Coalitions in Public Policy-Making. *Politics and Governance* 3(2), 65–75. https://doi.org/10.17645/pag.v3i2.290.
Newman AL (2008) Building Transnational Civil Liberties: Transgovernmental Entrepreneurs and the European Data Privacy Directive. *International Organization* 62(1), 103–130. https://doi.org/10.1017/S0020818308080041.
Nowak T (2010) Of Garbage Cans and Rulings: Judgments of the European Court of Justice in the EU Legislative Process. *West European Politics* 33(4), 753–769. https://doi.org/10.1080/01402381003794605.
O'brien KJ (2012) Angry Birds and Others Collect Data on App Users. *International Herald Tribune*, 29 Dec.
Oltermann P (2013) Britain Accused of Trying to Block EU Data Protection Law. *The Guardian*, 27 Sept.
Panichi J (2014) Ministers to Discuss Data-Protection Compromise. *European Voice*, 27 Nov. Available from URL: https://www.politico.eu/article/ministers-to-discuss-data-protection-compromise/
Perino G, Requate T (2012) Does more Stringent Environmental Regulation Induce or Reduce Technology Adoption? When the Rate of Technology Adoption Is Inverted U-Shaped. *Journal of Environmental Economics and Management* 64(3), 456–467. https://doi.org/10.1016/j.jeem.2012.03.001.
Picazo-Vela S, Gutierrez-Martinez I, Luna-Reyes LF (2012) Understanding Risks, Benefits, and Strategic Alternatives of Social Media Applications in the Public Sector. *Government Information Quarterly* 29(4), 504–511. https://doi.org/10.1016/j.giq.2012.07.002.
PracticeView Database (2012) *TechWeek Europe: US Department of Commerce Involved in Lobbying to Change EU Data Protection Regulation*, 15 Oct.
PracticeView Database (2014a) *Could the Strength of Your Privacy Policy Be One of Your Biggest Selling Points in 2014?*, 27 Mar.
PracticeView Database (2014b) *Data Protection – Entering the "Post-Regulatory" Age*, 8 Sept.
PracticeView Database (2014c) *EU Council Agrees on Partial General Approach to General Data Protection Regulation*, 18 Dec.
Prpić J, Taeihagh A, Melton J (2015) The Fundamentals of Policy Crowdsourcing. *Policy & Internet* 7(3), 340–361.
Raven R, Kern F, Verhees B, Smith A (2016) Niche Construction and Empowerment through Socio-Political Work. A Meta-Analysis of Six Low-Carbon Technology Cases. *Environmental Innovation and Societal Transitions* 18, 164–180. https://doi.org/10.1016/j.eist.2015.02.002.
Renn O, Benighaus C (2013) Perception of Technological Risk: Insights from Research and Lessons for Risk Communication and Management. *Journal of Risk Research* 16(3–4), 293–313. https://doi.org/10.1080/13669877.2012.729522.
Roberts NC, King PJ (1991) Policy Entrepreneurs: Their Activity Structure and Function in the Policy Process. *Journal of Public Administration Research and Theory* 1(2), 147–175.
Robinson N, Graux H, Botterman M, Valeri L (2009) Review of the European Data Protection Directive. *Rand Europe*.
Rose G, Gazsó A (2019) Governing Nanosafety in Austria – Striving for Neutrality in the NanoTrust Project. *Technological Forecasting and Social Change* 139, 23–31. https://doi.org/10.1016/j.techfore.2018.06.024.
Rossi A (2018) How the Snowden Revelations Saved the EU General Data Protection Regulation. *International Spectator* 53 (4), 95–111. https://doi.org/10.1080/03932729.2018.1532705.
Rozbicka P, Spohr F (2016) Interest Groups in Multiple Streams: Specifying Their Involvement in the Framework. *Policy Sciences* 49(1), 55–69. https://doi.org/10.1007/s11077-015-9227-8.
Ryngaert C, Taylor M (2020) The GDPR as Global Data Protection Regulation? *AJIL Unbound*, 114: 5–9. https://doi.org/10.1017/aju.2019.80.
Sabatier PA (1988) An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein. *Policy Sciences* 21(2/3), 129–168.
Satterfield T, Conti J, Harthorn BH, Pidgeon N, Pitts A (2013) Understanding Shifting Perceptions of Nanotechnologies and Their Implications for Policy Dialogues about Emerging Technologies. *Science and Public Policy* 40(2), 247–260. https://doi.org/10.1093/scipol/scs084.
Saurugger S, Terpan F (2016) Do Crises Lead to Policy Change? The Multiple Streams Framework and the European Union's Economic Governance Instruments. *Policy Sciences* 49(1), 35–53. https://doi.org/10.1007/s11077-015-9239-4.
Schmidt TS, Sewerin S (2017) Technology as a Driver of Climate and Energy Politics. *Nature Energy* 2, 17084. https://doi.org/10.1038/nenergy.2017.84.
Schuelke-Leech BA (2018) A Model for Understanding the Orders of Magnitude of Disruptive Technologies. *Technological Forecasting and Social Change* 129, 261–274. https://doi.org/10.1016/j.techfore.2017.09.033.
Smink MM, Hekkert MP, Negro SO (2015) Keeping Sustainable Innovation on a Leash? Exploring Incumbents' Institutional Strategies. *Business Strategy and the Environment* 24(2), 86–101. https://doi.org/10.1002/bse.1808.
SPIEGEL International (2014) *EU Court Ruling a Victory for Privacy*, 20 May. Available from URL: http://www.spiegel.de/international/business/court-imposes-right-to-be-forgotten-on-google-search-results-a-970419.html
Stenzel T, Frenzel A (2008) Regulating Technological Change – The Strategic Reactions of Utility Companies Towards Subsidy Policies in the German, Spanish and UK Electricity Markets. *Energy Policy* 36(7), 2645–2657. https://doi.org/10.1016/j.enpol.2008.03.007.
Stoutenborough JW, Sturgess SG, Vedlitz A (2013) Knowledge, Risk, and Policy Support: Public Perceptions of Nuclear Power. *Energy Policy* 62, 176–184. https://doi.org/10.1016/j.enpol.2013.06.098.
Sylvester DJ, Abbott KW, Marchant GE (2009) Not Again! Public Perception, Regulation, and Nanotechnology. *Regulation & Governance* 3(2), 165–185. https://doi.org/10.1111/j.1748-5991.2009.01049.x.

Taeihagh A (2017) Crowdsourcing, Sharing Economies and Development. *Journal of Developing Societies* 33(2), 191–222. https://doi.org/10.1177/0169796X17710072.
TendersInfo (2012) *Belgium: GSMA and ETNO Call for EU Data Protection Reform to Protect Consumers and Industry*, 17 Oct.
TendersInfo (2013) *Belgium: LIBE Committee Vote Backs New EU Data Protection Rules*, 23 Oct.
TendersInfo (2014) *United Kingdom: GSMA Urges European Parliament and Member States to Reach Rapid Agreement on Consistent and Innovation-Friendly Data Protection Rules*, 13 Mar.
Tene O (2011) Privacy: The New Generations. *International Data Privacy Law* 1(1), 15–27. https://doi.org/10.1093/idpl/ipq003.
Thatcher M, Sweet AS (2002) Theory and Practice of Delegation to Non-Majoritarian Institutions. *West European Politics* 25 (1), 1–22. https://doi.org/10.1080/713601583.
Tomain JP (2011) *Ending Dirty Energy Policy: Prelude to Climate Change*. Cambridge, England: Cambridge University Press.
Townend D (2010) Privacy, Health Insurance, and Medical Research: Tensions Raised by European Data Protection Law. *New Genetics and Society* 29(4), 477–493. https://doi.org/10.1080/14636778.2010.528194.
Tzur A (2019) Uber Über Regulation? Regulatory Change Following the Emergence of New Technologies in the Taxi Market. *Regulation & Governance* 13(3), 340–361. https://doi.org/10.1111/rego.12170.
Vanclay FM, Russell AW, Kimber J (2013) Enhancing Innovation in Agriculture at the Policy Level: The Potential Contribution of Technology Assessment. *Land Use Policy* 31, 406–411. https://doi.org/10.1016/j.landusepol.2012.08.004.
Vandystadt N (2012) Reding Willing to Be More Flexible on Three Points. *EuroPolitics*. Available from URL: http://www.library.coleurop.pl/intranet/documents/ep/2012/ep4517_29oct2012.pdf
Voß J-P (2007) *Designs on Governance: Development of Policy Instruments and Dynamics in Governance*. Twente, Netherlands: University of Twente.
Voß JP, Simons A (2014) Instrument Constituencies and the Supply Side of Policy Innovation: The Social Life of Emissions Trading. *Environmental Politics* 23(5), 735–754. https://doi.org/10.1080/09644016.2014.923625.
Weaver DA, Lively E, Bimber B (2009) Searching for a Frame News Media Tell the Story of Technological Progress, Risk, and Regulation. *Science Communication* 31(2), 139–166. https://doi.org/10.1177/1075547009340345.
Wesseling JH, Farla JCM, Hekkert MP (2015) Exploring Car Manufacturers' Responses to Technology-Forcing Regulation: The Case of California's ZEV Mandate. *Environmental Innovation and Societal Transitions* 16, 87–105. https://doi.org/10.1016/j.eist.2015.03.001.
Wirth S, Markard J (2011) Context Matters: How Existing Sectors and Competing Technologies Affect the Prospects of the Swiss Bio-SNG Innovation System. *Technological Forecasting and Social Change* 78(4), 635–649. https://doi.org/10.1016/j.techfore.2011.01.001.
Wood N (2015) Telco CEOs See Urgent Need for Privacy, Data Security. *Total Telecom*, 2 Mar. Available from URL: https://www.totaltele.com/489160/Telco-CEOs-see-urgent-need-for-privacy-data-security
Woollaston V (2014a) Microsoft's Bing Follows in Google's Footsteps and Starts Removing Links under The "Right to Be Forgotten" Ruling. *MailOnline*, 17 Jul. Available from URL: https://www.dailymail.co.uk/sciencetech/article-2695984/Microsofts-Bing-follows-Googles-footsteps-starts-removing-links-right-forgotten-ruling.html
Woollaston V (2014b) The Right to Be Forgotten Online: EU Court Rules Google Must Remove Personal Data from Search Results on Request. *MailOnline*, 13 May.
Yeung K (2018) Algorithmic Regulation: A Critical Interrogation. *Regulation & Governance* 12(4), 505–523. https://doi.org/10.1111/rego.12158.
Zahariadis N (1992) To Sell or Not to Sell? Telecommunications Policy in Britain and France. *Journal of Public Policy* 12(4), 355–376.
Zahariadis N (1996) Selling British Rail: An Idea Whose Time Has Come? *Comparative Political Studies* 29(4), 400–422. https://doi.org/10.1177/0010414096029004002.
Zahariadis N (2003) *Ambiguity and Choice in Public Policy: Political Decision Making in Modern Democracies*. Washington, DC: Georgetown University Press.
Zahariadis N (2008) Ambiguity and Choice in European Public Policy. *Journal of European Public Policy* 15(4), 514–530. https://doi.org/10.1080/13501760801996717.
Zahariadis N (2016) Delphic Oracles: Ambiguity, Institutions, and Multiple Streams. *Policy Sciences* 49(1), 3–12. https://doi.org/10.1007/s11077-016-9243-3.
Zohlnhöfer R, Herweg N, Huß C (2016) Bringing Formal Political Institutions into the Multiple Streams Framework: An Analytical Proposal for Comparative Policy Analysis. *Journal of Comparative Policy Analysis: Research and Practice* 18(3), 243–256. https://doi.org/10.1080/13876988.2015.1095428.

