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Chapter 2

Algorithms, Conventions and New Regulation Processes

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Introduction: Algorithmic Governance

Contemporary societies are data worlds. Digital devices, software and the Internet transform individuals' lifeworlds, personal communication, the economy (i.e., production processes, distribution and consumption), banking and credit, health care and health care insurance, public and private transport, law and the judicial system, policing and surveillance, social media and mass media and other private as well as public spheres into computerized realities and digital data. This transformation is grasped with notions (and buzz words) such as "datafication", "data revolution" or "big data" (Mayer-Schönberger and Cukier, 2013; Kitchin, 2014; Mejias and Couldry, 2019; Peeters and Schuilenburg, 2021). Although many user interfaces and representations on displays of digital devices (as smart phones, wearables, notebooks) are organized and offered in a non-numeric visual form (as images), the underlying data form is numerical. Nowadays, huge amounts of numerical data are generated, stored and analyzed mainly by big Internet companies, who detect behavioral patterns and exploit these to gain profits (Mayer-Schönberger and Cukier, 2013). In many countries, national security agencies gather data to track citizens' activities or to detect crime (*The Economist*, 2016; Botsman, 2017).

The notion of "big data" was originally invented to label amounts of data, which can no longer be stored on single computers ("volume"), which are produced and analyzed continuously ("velocity") and which vary in data formats ("variety"; Lazer and Radford, 2017). The notion of big data has become a present marker in public debates for utopian perspectives of data-driven innovations and economic progress (Mayer-Schönberger and Cukier, 2013; Mayer-Schönberger and Ramge, 2018) as well as for dystopian perspectives of surveillance and the control of individual behavior (Zuboff, 2019).

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Related to notions as big data is the term algorithm, which has long been established in computer sciences. In fact, algorithms are "ordinary" parts of contemporary ways of living; they are ubiquitous in digitized societies. "Digital technology is enabled as much by its hardware, the physical components that make up computers and digital devices, as by its software, the programs that run on it. The backbone of programs are the algorithms that they implement" (Louridas, 2020: xiv).[1]

However, algorithms have become an issue in the social sciences, but also as a public discourse element too (Steiner, 2012; Pasquale, 2015; Beer, 2016, 2017; O'Neil, 2016; Eubanks, 2017; Burrell and Fourcade, 2021). The reason is that the power of big data unfolds only when it can be accessed by computer networks, which apply algorithms to detect patterns, and to automatically generate evaluations, predictions as well as decisions. More and more algorithms are applied to make important decisions, which affect everybody's everyday life. And many of these decisions can have negative and illegitimate effects, promote different forms of social inequality and result in unfair life chances (Fourcade and Healy, 2013; Eubanks, 2017; O'Neil, 2016). And it is this combination of big data and algorithms which enables its outreach of power effects to more and more domains and the emergence of new governance effects and governance forms:

> We are living in the midst of a significant transformation of our lives, and while it is an incredible time and place to be in, we must be wary of the effects that come along with it. Mind-boggling amounts of data are generated regarding our daily actions with algorithms processing and acting upon these data to make decisions that manage, control, and nudge our behavior in everyday life. The use of algorithms not only expands the possibilities of current control and surveillance, but also introduces a new paradigm characterized by an increased rationality of governance, a shift in the functioning of power, and closure of decision-making procedures. We can refer to this by using the term 'algorithmic governance' – the replacement of human, legible and accountable judgements with 'black-box' algorithms […]. Algorithmic governance is central to the functioning of public and private organizations. For instance, police forces use them to predict where, when and by whom crimes are more likely to be committed […]. In criminal justice, algorithms are used to predict future dangerousness of defendants and convicts […]. Marketeers use algorithms to analyze consumer audiences from online search queries, credit card

> purchase data, and behavioral data […]. Government agencies are turning towards algorithms to, among other things, identify welfare fraud, deliver public services, allocate regulatory oversight resources, and assess risks in child protection […]. Taken together, algorithms, machine learning and artificial intelligence form the new digital infrastructure of our society.
>
> (Peeters and Schuilenburg, 2021: 1/3/4)[2]

It is evident that algorithms are based on norms and normative decisions, on programmers' values and principles, how to quantify and how to categorize events, persons or objects (Desrosières, 2008; O'Neil, 2016). As Peeters and Schuilenburg (2021: 4) emphasize, "algorithms can only exist in a stable environment of standardized codes and classifications", categories and quantifications are their "input" and (in many applications) also their "output". Algorithmic governance therefore can be conceived of as the power to classify and quantify persons, objects and events on the basis of social conventions how to categorize and to quantify. These classifications and quantifications are articulated by different words such as "scoring", "sorting", "ranking", "rating", "status determination", "clustering", "risk assessments" etc., and they all imply an evaluative and valorizing effect. These classifications and quantifications are in fact measurements, which are themselves built up on norms, values and – more broadly conceived – on societal rationalities and institutional logics. And algorithms themselves entail normative decisions and value-based criteria (as criteria, how to optimize or when to end the calculation).[3] This is not an argument to discredit or to dismiss measurements and algorithms, which both are inevitable in modern societies. But the argument points to the need to scrutinize the link between measurements, algorithms and values as well as its effects.

For sociology, the analysis of power effects, released and advanced by datafication, measurement and algorithms is of core importance – as notions like "social power of algorithms" (Beer, 2017) or "algorithmic power" (Lash, 2007; Peeters and Schuilenburg, 2021) highlight. But different additional positions and perspectives should be included in the analysis of the relation between datafication, measurement, algorithms on one side and society, power effects and governance on the other side. (1) It is important not to restrict the analysis to the power effects only, but to open the black box of measurement and algorithmic calculation itself. (2) Also, sociological analysis has to recognize the plurality of data worlds, of normative orders and value systems, which influence datafication, measurement and algorithmic governance. (3)

Therefore, it is important not to assume coherent power effects and to include non-intended and countervailing power effects, resistance and social critique too. (4) Finally, if processes of datafication and algorithms are to be evaluated from a sociological point of view, there is a need to relate them to collective action and to common goods and to ask how datafication and algorithms enhance capacities and enable agency to approach social problems, to improve living conditions as well as social participation and in general to advance societies.

In this contribution, the black box of these measurements is conceptually approached by relying on the institutionalist approach of *economics and sociology of conventions* (EC/SC). Also, this approach offers a pluralist perspective on data worlds, in which algorithms are differently developed, evaluated and applied.

In the next section ("Economics of Convention – Quantification, Algorithms and the Common Good"), the approach of EC/SC is introduced. Then the notion of data worlds is introduced ("The Plurality of Data Worlds and Data Regulation"). These worlds allow a differentiation that enables an analysis framework for algorithmic regulations to be developed ("Analyzing Algorithmic Regulations: Critique in Situations of Uncertainty"). Finally, the contribution applies the conventionalist framework to different examples of algorithmic norm setting and enforcement ("New Regulators – New Perspectives on Regulatory Processes").

Economics of Convention – Quantification, Algorithms and the Common Good

EC/SC was originally developed in France in the analysis of socio-economic categories and official statistics but spread out to become an interdisciplinary and international neopragmatist institutional approach (Storper and Salais, 1997; Boltanski and Thévenot, 2006; Eymard-Duvernay, 2006a, 2006b; Diaz-Bone and Salais, 2011; Diaz-Bone, 2018). The most widely known model of conventions was worked out by Luc Boltanski and Laurent Thévenot (2006), who identified the industrial convention, the market convention, the domestic convention, the convention of renown and the convention of inspiration. These conventions are deeper logics of quality assessment, but also for the critique and justification of worth. One neopragmatist core element is EC/SC's awareness of the link between facts and values, which is the link between norms and measurements (Desrosières, 2008, 2014; Diaz-Bone, 2016, 2017, 2019; Diaz-Bone and Didier, 2016; Diaz-Bone and Horvath, 2021). Measurements are therefore not

impartial representations of a foregoing reality. Conventions are not understood as customs or traditions, but as institutional logic on how to interpret, evaluate and valuate (or valorize) persons, objects and events. As the convention theorist Alain Desrosières (2008: 10) stated: "to quantify is to implement a convention and then to measure". It is these measurement conventions which bring in the link between facts and values. EC/SC has argued that convention-based measurements can be evaluated by studying how they enable measurements, which enable collective action aiming for a common good. Measurement conventions are not only agreements about measurement procedures, but as Figure 2.1 shows, they are also agreements about the ontologies of what is to be measured, i.e., entities to be classified or to be quantified (Centemeri, 2012).

For EC/SC, measurement conventions are embedded in statistical chains, which are built by situations, in which different actors are involved in the production of data (Desrosières, 2000, 2009, 2011). Statistical chains (or statistical production chains) are characterized by a division of labor and can be burdened by differently applied conventions, which are mobilized by different actors. The notion of algorithm is different to the notion of statistical chains at first glance, because algorithms are built up by sets of calculative steps to proceed a designed task. Statistical chains can also be conceived of a series of steps, but in many cases, the whole chain cannot be planned and governed by one rational or one actor only and the chain is distributed (Diaz-Bone, 2016, 2017). But, as Dourish (2016) has argued, the elements or calculative steps of algorithms can be distributed too. Kitchin (2017) has pointed to the fact that algorithms are linked to other algorithms and

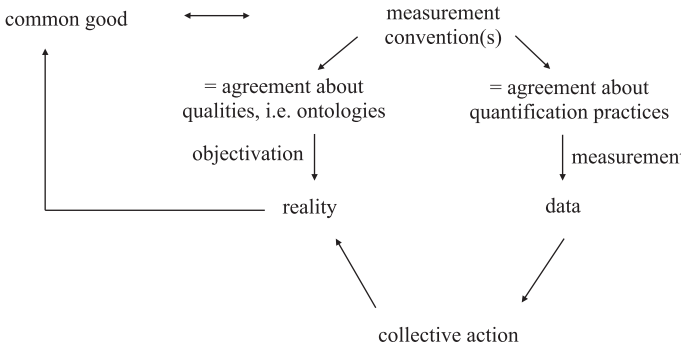

Figure 2.1 Measurement conventions.

build up "algorithm systems". All in all, the consequence is that data and algorithm-based data analysis is distributed in networks of computers, organizations and persons – as in many big data analyses. This way, calculative changes, incoherencies and problems of data quality and adequacies can emerge in algorithmic procedures too.

The Plurality of Data Worlds and Data Regulation

Another pragmatist core notion is that of "worlds". In EC/SC, this notion is applied to the plurality of "data worlds" (Diaz-Bone et al., 2020; Diaz-Bone and Horvath, 2021). In these data worlds different orders of worth and quality conventions (Boltanski and Thévenot, 2006) are combined and serve as rationalities for the evaluation of standards and data quality, but also for the link between data production, distribution and analysis on one side and specific common goods on the other side. Different data worlds can be identified as ideal types, which are characterized by different combinations of these orders of worth and quality conventions. In Western countries, these data worlds coexist and can be conceived of as different institutional rationalities, which are the blueprints for real organizational settings. The data worlds of official statistics, of academic science, of the civic data worlds are the most visible ones. Another data world is the big data world, whose algorithms and practices of data analysis are mainly invisible. This set of mentioned data worlds does not claim to be a complete one, but it has been useful so far to serve for contributions to a sociology of social research.[4] And these worlds are in transition for different reasons. One reason is the tension between them, because in many situations these actors from some of these data worlds criticize practices, standards and effects of other data worlds. Another reason is that these data worlds cannot rely equally on data generating infrastructures, such as Internet platforms, and are influenced in different ways by new technologies, such as artificial intelligence and intense development and usage of algorithms. Some of these data worlds can be briefly sketched.

The oldest data world is the *academic science data* world, which can be clearly identified with universities and research institutes. Here, the industrial convention and the convention of inspiration are most influential. The academic data world aims to generate new methods and knowledge to improve technologies (most visibly with engineering and computer sciences) as well as to advance mankind. This data world influenced the following ones, but still sticks to its claim to be impartial and not to legitimize itself with economic or

public engagements. The data world of *official statistics* emerged in the course of the last one and a half centuries. It co-emerged with industrialization and the development of statist bureaucracy. Official statistics is in most countries based on specific law, which equipped the institutions of official statistics with a high degree of legitimacy and power. Official statistics data worlds can rely on public administration as data generating and data sorting infrastructure. It delivers data reports and publishes indicators with a long-term orientation and with a high degree of visibility.

The official statistics world is mainly structured by the industrial and the civic conventions and has long aimed to support but also to legitimate state policies. In its beginnings, official statistics was oriented mainly toward state administrations but it reoriented more and more toward national and international publics. One reason for this was the critique of the civic society, which claimed for a more public service orientation of official statistics. The *civic data world* can be conceived as emerging from social movements, non-governmental organizations (NGOs) and other civic actors and civic agencies, which collect and generate data to report on social issues and to build up empirical evidence for their claims. The civic data world is mainly influenced by combinations of the civic convention, the industrial convention, the domestic convention and the network convention. This world aims to engage for civilian's participation and its identity is based essentially on forging a countervailing power against private and administrative forms of governance as well as to build up agency and critical capacities on data and data transparency. A more recent form of engagement is data activism, wherein scientists and civic actors cooperate to detect unfair and illegitimate forms of data-based governance, identify unintended and irrational consequences of software and algorithms and work on the application of algorithms to support civilian engagements (Milan and van der Velden, 2016; Didier, 2018).[5] Also, organizations in this civic data world try to critically scrutinize algorithms applied to civilians and public issues and claim for transparency and public deliberation of algorithms.[6] Initiatives such as "open source", "open data", "open science" (Kitchin, 2014; Baack, 2015) or "citizen science" (Franzosi and Sauermann, 2014; Kitchin, 2014) can be regarded as part of this data world as well as engagements to build up more flexible and more adequate data infrastructures to generate data, which is useful for public agency (Lane, 2020a, 2020b).

The *big data world* is in some important respects different from the official statistics data world and the civic data world, because it exploits the privatized access and control of big data generating

infrastructures as Internet platforms and data markets. Also, data analysis is run by intensely applying advanced techniques such as developing new algorithms and applying machine learning techniques and artificial intelligence (Mayer-Schönberger and Cukier, 2013). Another characteristic is that its techniques, algorithms and data analytics are not only handled as private companies' assets, but these devices are also opaque and invisible to the public. Although companies from the big data world (most notably Google) provide free services to the public, this data world is criticized by the civic data world for the opacity of its algorithms and the privatization of its huge amounts of data. It is an open (and contested) question whether the big data world does aim for a common good. Evidently, the companies aim for profit in this data world. Even if all data worlds have to apply algorithms (e.g., in statistical data analysis software), it is the big data world which is criticized for aiming to analyze and to influence individuals' behavior (Zuboff, 2019).

Nowadays, one can find new alliances between these sketched worlds and also combinations. For example, more and more state departments apply advanced algorithms and big data analytics to detect criminal behavior or to survey their citizens. But it is also state departments which align with civic agencies and NGOs to enhance public capacities to understand algorithms, their effects of public life and to advance public concerns.[7] Actors from the civic data world, the academic science data world and the official big data world try to form coalitions to implement new data infrastructures as alternatives to the privately owned Internet platforms (Kitchin, 2014; Owen-Smith, 2018; Lane, 2020a, 2020b).

Analyzing Algorithmic Regulations: Critique in Situations of Uncertainty

The totality of rules and regulations to which people are exposed in digital contexts can be explained by the dynamics of conventions, rights and normative systems. As has been shown, these norms are partly visible, but partly hidden in technical contexts. The entanglement of different areas of society in which norms are set and in which shifts in norm-setting occur has led to a complex structure of regulators that is quite difficult to grasp at times. Formal law is set by states, digital platforms are regulated in their terms and conditions and normative ideas are inscribed in codes and algorithms. Especially in recent years, the debate around these issues has led to a number of regulatory projects, transparency efforts and clarification of responsibilities.

To understand how actors try to cope with *black boxes*, different normative approaches and new technologies, it is critical to distinguish between different coordinative goals and ideas of the public good. These are factors that come to play amongst different actors in – and coalitions between – data worlds during efforts of reshaping data structures and establishing transparency and accountabilities in a world that seems to be dominated by logics of commercial big data companies and their opaque deployment of algorithms.

A key to understanding the critical capacities (Boltanski and Thévenot, 1999) of such actors and therefore the encounter of normative and justificatory differences is the situational visibility of algorithmic decision-making (ADM) processes, be it in situations of content moderation on platforms or algorithmic decisions in public administrations. Whenever an actor is noticeably affected by such a decision, situations of uncertainty and critique may be observable.

Taking the examples of content moderation and other surfacing ADM processes as an observable and therefore criticizable[8] part of algorithmic regulation, the described logics of data worlds and the EC/SC approach allow for casting light on the complex dynamics of algorithmic regulation and help reveal functionalities, necessities and justifications amongst the involved actors.

The emergence and the power of the big data world and the economically driven large-scale usage of data in commercial contexts made private companies establish ADM processes as a *conditio sine qua non*.[9] Especially digital content-platforms brought the use of big data to perfection. Self-conceptualized as neutral places where people meet and interact, large amounts of individual and general data were collected and analyzed to improve both user experiences and advertisement. Here, the opacity of algorithms is very high, and users usually won't be aware of sorting algorithms, the categorizations and quantifications that strongly shape their experience online.

Established and approved in micro targeting, advertising services and categorization, ADM also appeared to be the perfect choice when interventions on content and users were no longer viable (Gillespie, 2020). Broadly labeled as *content moderation*, all interventions toward media, text or observable interactions of users have in common that they constitute direct and at least partially visible interventions on users and their actions online (Gillespie, 2020; Gorwa et al., 2020).

Even though there have always been intrinsic motivations for companies not to have certain content[10] on their platforms, when it later came to questions of copyright (Perel and Elkin-Koren, 2016: 484) or speech restrictions (Heldt, 2019: 3–4), the urge to moderate

content on a larger scale came – generally speaking – mostly from external pressure by governments and the civil society. Platforms found themselves in a tension between different ideas of public good that were brought to them externally. Together with their very own ideas of restricting certain content, a complex environment of moderating and regulating regimes was established on most of the large platforms for user-generated content such as Facebook, Twitter, YouTube or Instagram (Gorwa et al., 2020: 6) but also in search engines and intermediaries like payment service providers (Tusikov, 2017: 22–25).

> That platforms operate their moderation practices under a complex web of nebulous rules and procedural opacity renders situations […] even more challenging, with governments and others clamoring for tighter controls on some material, and other members of civil society demanding greater freedoms for online expression […].
>
> (Roberts, 2018)

The problematic notions of online content moderation are just one of several examples, where ADM processes (with their hidden values and normativities) are directly interwoven with concrete ideas of norms and norm enforcement. When it comes to governmental decisions, as in public administration or organizational procedures like human resource management, the use of big data approaches offers easy, scalable and reliable solutions but remains linked to the problems of opaque norms, values and measurements within automations.

Such situations where actors are notably affected by algorithmic decisions could generally be grasped as *situations of uncertainty* for different actors. Herein, a plurality of requirements and logics of regulation, measurement conventions and automation culminates in situations where algorithms may still operate opaquely but not unseen in their outcomes. On an individual level, human attention might first and foremost be paid by the moderated user, whose tweet, YouTube video or Facebook post was blocked, deleted or labeled as problematic (Myers West, 2018), by a citizen who was denied a public service (Allhutter et al., 2020) or an employee who was dismissed (Soper, 2021). On a larger scale, the outcomes of content moderation or other problematic automated decisions are situationally structured as well (Barthe et al., 2013: IV) and may come to the attention of platform operators, government officials or NGOs. It is important to mention that the neopragmatist notion of situation does not only cover configurations

occurring in simultaneous moments and places, but also distributed, stretched and interrupted constellations in which actors coordinate their actions (Diaz-Bone, 2011: 49).

EC/SC has mobilized situations of uncertainty as observation points, where actors are confronted with situations that require a conscious decision, which must be justified with a reference to a specific kind of common good usually linked to conventions. As such situations of norm enforcement do not only affect actors of the big data world but also single users, the state and the civil society, other justifications than those from the mere big data logic, must be brought up. This causes an epistemological breaking point that could be utilized as a potential bottle opener for some of the opaque logics that are hidden within algorithmic *black boxes.* As such situations however won't be able to explain the hidden norm-based quantifications and classifications within ADM processes entirely, they offer a leverage point to force engaged actors to justify their actions.

As big data has brought the usage of algorithmic regulation and automated decision-making to a standard in regulating, moderating and sorting large amounts of data, the promises of *objective, fair* and *reliable* data-based decisions convinced not only commercial actors but also governments. With their history in official statistics (Desrosières, 2009, 2011) and an interest in both enforcement and efficiency (Engstrom et al., 2020: 22), governmental actors are principally open to the employment of similar approaches of decision-making, often directly offered by private companies (Engstrom et al, 2020: 7). Mainly structured by the industrial convention and the civic convention, the market convention (as in the big data world) is less applicable in bureaucratic situations. Nevertheless, problems of training data quality, incoherencies and classificational errors persist. Such problems may be marginalized and less problematized in commercial contexts but are of greater importance and target of *critique* within legally defined boundaries of public administration. States are usually subjected to greater demands and duties for transparency and accountability than private firms. Also, these transparencies enable actors from the civil society to criticize and intervene in state-driven projects.

Actors from the civic data world have not yet distinguished themselves through the extensive use of ADM processes on their own, but their expertise and their common good-related goals such as freedom, nondiscrimination and equality are important when it comes to initiating criticizable situations on a large scale. NGOs collect single-case reports and workout reports, e.g., on structural discrimination, biases and in transparencies, both in private and public application areas.

Meanwhile, an important source of justification for such critique often comes from a data world that is at the same time involved in developing the technical foundations and, because of its profound knowledge, is also aware of their limitations and problems. Unlike the big data world, the academic science data world is strongly interested in epistemological knowledge and less in the (commercial) usability of knowledge. Trained in theories and philosophy of science, the implication of falsifications and epistemology, academic data scientists are an important source of critique when it comes to tackling the very base of big data (Kitchin, 2014, 2017; Symons and Alvarado, 2016), promoting the idea of critical data studies in science (Iliadis and Russo, 2016) and education (Pangrazio and Selwyn, 2021) or even pointing out the linkage between norms and measurements (Desrosières, 2008, 2014; Diaz-Bone 2016, 2017, 2019; Diaz-Bone and Didier, 2016; Diaz-Bone and Horvath, 2021). Despite a greater access to and understanding of the structure of algorithms (Zweig et al., 2018; Krafft et al., 2021), this kind of academic critique also relies on *situations of uncertainty*, even though they are intentionally brought to light by researchers to challenge platforms and governments:

> To hold software service and platform providers accountable, it is necessary to create trustworthy, quantified evidence of problematic algorithmic decisions, e.g., by large-scale black box analyses.
> (Krafft et al., 2021: 143)

When it comes to algorithmic regulation, data worlds are entangled in a complex constellation of reciprocal critique and sometimes find themselves in processes of norm setting or duties to enforce norms – depending on their different capabilities to regulate. But how does critique in situations of uncertainty shape actual regulatory regimes and how do actors coordinate and justify their actions in this regard? The next section will bring this issue to life by examining selected empirical phenomena in which ADM processes are applied.

New Regulators – New Perspectives on Regulatory Processes

While successfully pursuing goals of data-driven business such as surveillance, ad targeting and general data collection, big data actors found themselves as regulators on their own and de facto enforcers of legal and other external norms. Using often opaque and therefore hardly criticizable automation, several areas of the digitalizing society are affected by new and not thoroughly overviewable regulatory

processes. There is more than just a duality of regulators – state and big data actors – who determine the regulatory environments that users, citizens, employees or customers are confronted with in digital everyday life. It is the complex interplay between data worlds and those who act and react within them who justify, criticize, evaluate and develop not just technically but more importantly convention-based. Situations of uncertainty provide a leverage point to observe such action, coordination and critique.

The proposed scheme to analyze new regulatory areas and processes by mobilizing the critical capacities of actors within data worlds and the conventions they rely on promises worthy insights into several areas of algorithmic regulation. The following five are a cursory account of some of them, with suggestions which situations of uncertainty do or may come up and how critique is made possible and justified by ideas of common goods. This should provide an overview of how broad and widespread both the usage of ADM processes and the potential of its convention-based analysis are.

1 *Big-data platforms and the enforcement of copyright and speech regulations* are the most notable examples when it comes to the large-scale enforcement of legal norms by online service providers. Uncertainty may occur for users who post or upload disputably (il)legal content. At the same time, there is uncertainty (e.g., for rights holders) on whether they get royalties for copyrighted materials (Leistner and Metzger, 2017) or for those who are addressed by disputably offensive speech (Heldt, 2019). As the big data world tended to justify their automated moderation decisions on copyright and hate speech (Gorwa et al., 2020: 6) from an industrial convention, critique is mainly fueled by civic data world actors, e.g., NGOs, but also the scientific data world come from a civic and domestic convention. As algorithms are currently said to come to their limits in borderline cases (Elkin-Koren, 2017), such as sampling, quotes or satirist or pastiche content, state regulators, e.g., in Europe, started to force platforms to install ex post of human-based out-of-court resolutions (European Commission, 2020; Cauffman and Goanta, 2021: 12–13; Quintais and Schwemer, 2021: 16) and ex ante possibilities to pre-flag, e.g., fair-use content (Metzger and Senftleben, 2020: 128). This could be grasped as an endeavor to enable transparency for outcomes of algorithmic decisions and to enable and inform users to act in such uncertain situations. At the same time, in a similar ex post fashion, Facebook

installed its own widely discussed (Douek, 2019; Klonick, 2019; Golia, 2021) *oversight board* to criticize, evaluate and oversee its own actions in an alleged independent manner. Such an action acknowledges the need for insights, critique and control, but does, as critics put it, not adequately answer questions on independent control.

2 The vast amounts of regulatory power do also come with their own uncertainties as *big data platforms and enforcement regarding child sexual abuse imagery and terroristic content* illustrate. As there is no dispute on the common good of not wanting to have such content available, questions of the borders' enforcement and surveillance come up and must be justified. After successfully developing and implementing automated recognition systems for abuse imagery such as *PhotoDNA* (Farid, 2018) or terrorist content such as the *Shared Industry Hash Database* (Gorwa et al., 2020: 2), there may be uncertainties and need for justifications for online service providers where to technically stop surveilling and how to handle different qualities of nonbinding requests from governmental officials, binding court decisions (Fisherman, 2019: 90) and soft requests from the civic society (Bursztein et al., 2019: 1). Such delicate topics are also a source of uncertainty for civic actors as NGOs who criticize surveillance but agree with the goal of removing abuse imagery and terrorist material (Perez, 2014).

3 While the cases mentioned above have their restrictions legally defined, there are socio-normative conflicts within the big data world, e.g., *ethically driven disputes between porn platforms and payment services* where platforms regulate in different but highly impactful ways that are partially dispatched from legal questions. The repeatedly surfacing conflict (Tusikov, 2021: 73–74) between payment service providers such as PayPal, Visa or Mastercard and porn platforms, most notably Pornhub, revolving around the accessibility of payment options for users and actors and vice versa the availability of user-uploaded, unverified content. Incidents such as the suspension of payments or the instant deletion of over ten million nonofficial videos by Pornhub in 2020 (Kastrenakes, 2020) showcase the enormous regulatory power such platforms have, especially in grey areas of society (Tusikov, 2021: 75–76). This conflict is coined by reciprocal uncertainty whether it is ethically justifiable to offer payments for adult content or whether pornography business models for both actors and platforms could prevail.

4 As examples 1–3 illustrate the potential of big data actors as important regulators and enforcing actors, another impactful and critical application field of ADM is *public administration and the usage of big data technologies*. As mentioned, public administrations that are connected to the world of official statistics and therefore classifications of citizens are structurally open for the application of big data-driven sorting and decision-supporting algorithms that either directly stem from private big data companies (who often exclusively have the data required to offer certain services) or are developed under comparable premises and conventions. While administrative acts underlie more explicit public accountabilities and formal law, ADM systems are more and more in use by state agencies (Engstrom et al., 2020). Critical questions in regard to accountability and explainability are crucial in democratically controlled administrative processes:

> When public officials deny benefits or make decisions affecting the public's rights, the law generally requires them to explain why.
>
> (Engstrom et al., 2020: 7)

The hurdles for an implementation of such technologies appear higher, which is mainly due to the strong civic convention and the common good of a nondiscriminatory and transparent democracy. In such cases, formal law simultaneously functions as a coordinative framework and a guardrail for those who implement. That critique from external actors from the academic or the civic data world remains crucial, is shown by several cases, e.g., where authorities have used prediction algorithms in Austrian job centers (Allhutter et al., 2020), language recognition programs in German asylum processes (Keiner, 2020) or privately run person-based technologies in predictive policing in Canada (Robertson et al., 2020: 47–50) that sparked public critique and controversy and forced actors to justify their actions. Situations of uncertainty come up amongst those who are affected by such decisions, e.g., when assessments are wrong or predictions are discriminatory or biased. In the course of public outcry, uncertainty emerges for public administrators who have to justify the use of such technologies without (sometimes) being fully capable of seeing through the opaque interior of both databases and algorithms.

5 The last of the five application areas is at the very intersection between commercial, formally legal and civic logics and an interesting outlook on further challenges of ADM. Legal tech is an

intersection between big data and legal norms. Legal tech describes the application of big data technologies on legal services. Even though the large-scale use of legal tech is still in its early stages, here different dynamics are observable than in the other areas mentioned above. As legal tech is *per definitionem* strongly interwoven with legal norms, there is no notion of ex post interference of law with existing business models as in the mere big data world, but law itself becomes a target of applying such logics. Turned this way, law and big data ADM seem to be made for each other. Both appear to rely on a logical, structural framework where step-by-step transformations from data into outputs are made (Pasquale, 2019: 1). Since the beginnings of computer technologies, law has been subject to (usually academic or political) endeavors of cybernetics and digitization (Salami, 2017). With commercial approaches and ADM technologies, the digitization of only seemingly simple legal processes such as legal forms, contract generation or contesting speeding tickets (Pasquale, 2019: 12–18; Hähnchen et al., 2020: 631) started to become a business model.

The big data world again promises efficient, precise and scalable automations that find fruitful soil amongst commercial branches of legal administration such as law firms and lawyers (Hartung et al., 2018). Academic scholars discussing the potential of legal automation use their insights in both legal and computational processes to confront big data promises with critique from civic and domestic conventions that point out not just misconceptions of the formal logics of legal syllogisms (Pasquale, 2019; Hähnchen et al., 2020) but general uncertainties for legal professionals, clients and plaintiffs who may face typical imprecisions, opacities, simplifications or even biases that come with ADM (Engstrom and Gelbach, 2020: 1024). The common good of due process and the specially protected attorney-client relationship could hardly be upheld when big data scalability and automation are central coordinative goals (Pasquale, 2019: 60).

With these five exemplary fields of application in mind, EC/SC's perspective view on regulatory configurations and their situational settings casts a light on the intertwining of state and private regulation, as both of them are more and more enforced by ADM processes and therefore dominated by big data logics and their inherent conventions. While those processes come with contested yet often convincing promises of objectivity, efficiency and scalability, their opacities and lacking accountabilities become an emerging problem for otherwise well-established controlling mechanisms.

Critique and reciprocal justifications, brought up by directly involved actors or actors capable of overseeing larger contexts, depend on information and clarification. The approach of utilizing situations of uncertainty to formulate critique and demand justifications helps to identify not only existing conflict points but shows strikingly how necessary it is to have constant accountabilities not just in a legal but also a social manner. As unsolved problems with biases, discrimination, erroneous decisions and the blending of commercial and common good goals show, the important mechanisms of critique and justification are weakened when observability is either impossible or optional and only occasionally admitted.

Notes

1 Technically seen, an algorithm is a finite set of calculative steps, which are organized in an ordered sequence (that allows a selection of steps and/or loops) and which transforms a data input in an output. An algorithm is realized as a code sequence in a programming language, i.e., software (Louridas, 2020: 19/23/26).
2 The term "algorithmic governance" was introduced by Müller-Birn et al. (2013); see, for a sketch of this notion and its genealogy, Katzenbach and Ulbricht (2019).
3 As O'Neil therefore has stated, algorithms can be conceived as "an opinion formalized in code" (O'Neil, 2016: 49).
4 See for more details Diaz-Bone et al. (2020) and Diaz-Bone and Horvath (2021).
5 See, e.g., the movement of "Statactivisme" in France (Bruno et al., 2014; Didier, 2018), "MyData" in Finland (Lehtiniemi and Ruckenstein, 2019) or "DataKind" in the USA.
6 One example is "Algorithm Watch", see https://algorithmwatch.org/en/
7 One example in Germany is Civic Coding, see https://www.civic-coding de/
8 In the sense of critics by enlightened actors as Boltanski (2011) describes it.
9 Even mass-scale human decisions as in *click working content moderation* is deeply embedded in preceding algorithmic or AI sorting and deciding what is to be displayed to the human moderators. For Facebook, see, e.g., Vincent (2020).
10 Such as pornography, violent content or spam.

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