



SPECIAL ISSUE ARTICLE

# Predictive analytics and governance: a new sociotechnical imaginary for uncertain futures

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## Abstract

In an era of global sanitary, economic and ecological crisis, beliefs in the predictive power of artificial intelligence (AI) progressively penetrate the legal and political spheres, in search of new ways to anticipate and govern the future. In this context, it is critical to understand the idiosyncratic nature of the interplay between governance and algorithmic logics of prediction. This contribution discusses how the association between governance and AI makes the future knowable in the present and shapes a programmatic way of formalising, justifying and deploying action in the here and now. We focus on three principles of institutional mobilisation in the face of uncertainty and indeterminacy: precaution, pre-emption and preparedness, each of which is affected by the use of AI relying on so-called ‘real-time predictions’. Drawing from risk theory and Science and Technology Studies, we argue that the current convergence between AI and governance is shaping a new sociotechnical imaginary, promoting a distinctive conception of life and of the future in the age of the Anthropocene.

**Keywords:** artificial intelligence; governance; predictive analytics; STS; AI and law; uncertainty

## 1 Introduction

Contemporary algorithmic devices are establishing themselves as essential methods for the optimisation of decision-making processes and anticipating risks. Whether based on conventional statistical modelling systems or artificial intelligence (AI) and machine-learning algorithms, these systems foster the belief in the possibility of anticipating the future and reducing the complexity of life. They seemingly do so by providing reliable projections of future unfoldings. Arguably, their functional capacities reveal a striking feature of our age: an obsession with prediction and anticipation of the future.

Innovations in the field of AI are spreading from the body to the world, permeating many aspects of contemporary human life (Adams *et al.*, 2009). These include health, communication, education, economic activities and beyond, and arguably allow both the private and public sectors to optimise decision-making. In this paper, we are not so much concerned with dissecting a particular sector, but rather preoccupied with teasing out some overarching themes inherent in the use of these technologies in decision-making.

Technologies such as predictive modelling, machine learning and data mining facilitate the analysis of past and present data to make predictions about the future. In this paper, we use the term ‘predictive analytics’ to refer to these technologies (Finlay, 2014). Modern discourse on predictive analytics, whether in the fields of journalism, politics, hard sciences or humanities, often resorts to a semantics of *magic* or *divination*, identifying algorithms as the oracles of our contemporary societies: ‘The modern oracles of our networked digital age are Big Data and data analytics .... They provide a targeted look into the crystal ball’ (Romeike and Eicher, 2016, p. 168; Baker and Gourley, 2015; Timms, 2017).

We increasingly expect AI to solve the world's biggest challenges: treating chronic diseases, predicting pandemic and epidemic outbreaks, reducing fatality rates in traffic accidents, fighting climate change and fostering sustainable development (European Commission, 2020b). Beliefs in predictive analytics thus progressively penetrate the legal and political spheres. In this contribution, our main objective is to reflect on contemporary beliefs in the divinatory power of digital technologies (Lazaro, 2018) in the broad domain of governance.

Taking these 'apparently irrational beliefs' seriously (Sperber, 1982) requires understanding how the association between governance and AI makes the future knowable in the present (*epistemic practices*) (Cetina, 1999), shaping a programmatic way of formalising, justifying and deploying action in the here and now (*normative logics*). The contemporary debate surrounding AI is dominated by the analysis of risks and human rights impacts of algorithmic systems (such as the violation of privacy, problems of discrimination or lack of transparency) (Council of Europe, 2020; European Commission, 2019). The literature on the risks inherent to biases and the implications of AI for individual consent is growing alongside awareness of the complexity of the challenges posed by the technology for protection of individual rights (Andreotta *et al.*, 2021). In this paper, we take a complementary approach. We are conducting a review of a large body of literature spanning a number fields and drawing together what we understand to be constitutive threads of a complex tapestry depicting the impact of predictive analytics on governance.

We acknowledge that tackling 'governance' as a theme means casting the net very wide. However, an overarching theme of governance, in whatever form or setting, is its preoccupation with providing direction and exercising control over entities. As such, we suggest that governance is particularly invested in shaping the future. It is important here to distinguish between prediction and anticipation, the former being but one modality of the latter. For example, law, a key instrument of governance, can be described as a discrete mode of anticipation (Ost, 1999).<sup>1</sup> Law does not predict but, through a variety of rules, is a vector of anticipation and serves as a guide. It operates as a cognitive and pragmatic resource as well as a constraint. This supports the co-ordination of human actors between themselves and with the world. It is thus essential to grasp the idiosyncratic nature of the progressive convergence between governance (particularly legal) and algorithmic anticipatory logics in order to move beyond a risk-based approach and appreciate in full the impact of the use of predictive analytics on the governance of 'what is not and may never happen' (Massumi, 2007).

A growing body of literature has emerged in recent years to examine the nuts and bolts of 'algorithmic governance' (Cantero Gamito and Ebers, 2021; Danaher *et al.*, 2017; Gritsenko and Wood, 2022; Kalpokas, 2019) or 'algorithmic regulation' (Yeung, 2018). These are identified as analytical constructs developed in scholarship to unpack 'the role of algorithms as a mode of social coordination and control' in concrete contexts of application (Ulbricht and Yeung, 2021, p. 18). In an ideal dialogue with this literature, we come at the topic from a different angle. Drawing from Science and Technology Studies (STS) (Cole and Bertenthal, 2017), we argue that the current convergence between algorithmic technology and governance is shaping a new *sociotechnical imaginary*, promoting a distinctive conception of the future in the age of the Anthropocene. Sheila Jasanoff defines sociotechnical imaginaries as follows: 'collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology' (Jasanoff and Kim, 2015, p. 25).

<sup>1</sup>An argument can be made that such overlap exists between governance and law that the distinction, conceptually, is minimal. This is particularly true where one accepts the conclusions of Bruno Latour who refers to law as an ambivalent phenomenon, both institutional and pragmatic: *law as an institution* (legislation, regulation, governance) and *law as a practice* ('law in action', adjudication) (Gutwirth, 2013; Latour, 2009). However, we will not be making these arguments here and will maintain the analytical distinction whereby law is an instrument of governance. A parallel suggests that 'law in action', beyond its technical adjudication, embraces the broader spectrum of its 'life' beyond the black letter of legal rules (Friedman *et al.*, 1995). Again, we cannot engage with the complexity of this strand of socio-legal scholarship here, but we acknowledge its potential relevance to our arguments.

This new imaginary appears to be rooted at the heart of an enigmatic synchrony: predictive analytics are fast emerging at a time when the future appears more unpredictable and ungovernable than ever. The cosmology of the modern world is filled with radical threats. To mention but one very recent example, the latest report by the Intergovernmental Panel on Climate Change paints a sobering picture of the planet's future in the face of rising temperatures (IPCC, 2021). As a result, a variety of post-apocalyptic narratives has been flourishing for some time, from collapsology to radical trans-humanism and the most basic survivalism (Chateauraynaud and Debaz, 2019). In this context, new attempts to grasp the future through predictive analytics involve a special kind of 'ontopolitics' (Chandler, 2018) characterised by normative stances about which forms of life are to be valorised and preserved (or not) in order to cope with uncertain futures. Or, in Jasanoff's terminology, governance through algorithms arguably constitutes a peculiar form of co-production, which she defines as 'shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it' (Jasanoff, 2004, p. 3).

Building on an extensive interdisciplinary body of literature, we thus provide a first outline of the emerging sociotechnical imaginary as well as the modalities of its development. We supplement our findings drawing examples from official documents emanating from European institutions devoted to AI and predictive analytics. We do not claim this to be a comprehensive discursive analysis. Rather, the samples are provided instrumentally as qualitative augmentations of descriptive and theoretical propositions (Baxter and Jack, 2008; Stake, 1995). Indeed, official discourses of the state provide a particularly fertile ground to grasp 'the coalescence of the collective imagination with scientific and technological production' (Hajer, 2010, p. 27) and in this context 'law emerges as an especially fruitful site in which to examine imaginaries in practice' (Jasanoff and Kim, 2015, p. 25). We focus particularly on statements in which 'the future' as an abstract category is disclosed and related to (Rieder, 2018). Among the widespread use of broad concepts such as 'prediction', 'prevision' and 'anticipation', we pay particular attention to the pervasive notion of 'real-time', and 'real-time prediction'. This peculiar and counter-intuitive idea is symptomatic of the tensions that characterise a profound dynamic of reconfiguration of the temporalities of our world, stemming from real-time calculations, and affecting the links between past, present and future (Amoore and Piotukh, 2015). This reconfiguration carries significant normative consequences, particularly as regards the valorisation or exclusion of certain forms of life.

The paper is structured in three parts. First, we analyse the contemporary theme of 'real-time prediction' and contextualise the growing popularity of this oxymoron in the context of what we define as 'life as pure contingency'. Second, we discuss the epistemological and normative dimensions of 'governing the future' through predictive analytics. Finally, we sketch the contours of the new *sociotechnical imaginary* that emerges from the convergence between governance and AI. As this paper represents the first step of a broader project on 'AI, Law and the Future', we conclude by setting the scene for future research.

## 2 Real-time predictions of contingent life

### 2.1 From complexity to pure contingency

Whether forged in hard or social sciences, contemporary theories (in Western societies) tackling fundamental questions about life increasingly converge towards conceiving of it as pure contingency as opposed to a system marked by linear and deterministic temporality (Anderson, 2010a). This entails three crucial aspects.

First, life is conceived of in terms of irreducible complexity (Holland, 2014; Morin, 2008). This complexity is among other things the result of a globalised world woven by a multiplicity of heterogeneous flows and connections, embodied in the figure of the 'network'. The governance of complex life revolves around the problem of the relationship between 'good' and 'bad' flows or connections (such as transnational terrorists, personal data, epidemics, etc.). The complexity of life can also be

explained by the infinite nature of its intrinsic risks. For instance, risks tend to exceed the limits of the insurable in two directions: the infinitely small (e.g. biological, natural, health risks related to food consumption) and the infinitely large (e.g. major technological risks or technological disasters) (Ewald, 1993).

Second, life is conceptualised according to the *principle of included middle*. This aspect creates a major problem: the entanglement or ‘heterogenesis of the bad within the good’ (Anderson, 2010a, p. 781), which deviates from the law of non-contradiction. The causes of a disaster are presumed to incubate within life itself, requiring intervention before (or as) the catastrophic process incubates and certainly before it exceeds the threshold of catastrophe. Brian Massumi gives an insightful account of how life and its underlying threats are conceived of today: ‘[t]his is the figure of today’s threat: the suddenly irrupting, locally self-organising, systemically self-amplifying threat of large-scale disruption. This form of threat is not only indiscriminate, coming anywhere, as out of nowhere, at any time, it is also indiscriminable’ (Massumi, 2009, p. 154).

Finally, if life is contingent, the future remains *open* as disasters are themselves emerging phenomena (Christen and Franklin, 2002). The effects or impacts of disasters change and evolve as they circulate. This idea implies that one can take advantage of a crisis to invest and earn money. For example, Michael Lewis has produced a masterful account of the large profits made by certain market players in the lead-up to the Global Financial Crisis of 2007–2008 in his compelling book, *The Big Short* (Lewis, 2011). The uncertainty characterising life is therefore both a promise and a threat to be simultaneously neutralised and nurtured (Amin, 2013). Anticipatory actions based on predictive analytics emerge in a situation in which the very contingency of life generates the occurrence of a threat/opportunity, danger/profit.

These aspects of ‘life as pure contingency’ are particularly noticeable, for example, in the unfolding of the COVID-19 crisis. The phenomenon is complex not only because of its global scale, but also because of the participation of an intricate network of human and non-human actors, including public health responses, asymptomatic virus holders, vaccine discovery and access, and viral mutations. The causes of disaster incubate indiscriminately within life in ways that render certain social and/or cultural lifestyles problematic. Yet, despite the dramatic consequences of the COVID-19 crisis, the future remains open. The effects of the pandemic hint at new opportunities in environmental issues as lockdowns appear to have positively affected the environment. Carbon emissions have reduced due to drops in traffic, power usage and industrial production (Le Quéré *et al.*, 2020). Similarly, the challenges posed by the so-called Delta variant of the original SARS-CoV-2 virus are raising awareness about the importance of adequate ventilation systems in closed indoor shared spaces (WHO, 2021).

In a world permeated by contingency, real-time prediction becomes the tool that allows a fresh injection of control and autonomy (Misuraca *et al.*, 2012). Indeed, despite today’s perception of life as contingent and indeterminate, humans must still engage with it. The yearning for a recovery of control is apparent in the discourse of institutions and experts:

‘Today a growing number of societal challenges (such as climate change, natural disasters, urban planning and pandemics) are not only extremely complex, but also interrelated. Data represents a key raw material to deal with such challenges. The huge amount of data produced every day can reveal real-time information that is critical to understanding patterns of human behaviour and activities.’ (European Commission, 2020a, p. 15)

In a report for the Council of Europe, Karen Yeung points out that there is an intimate link between living in a complex world and the potential value of AI in helping us to govern it. However, she stresses the future challenges that lie ahead for computer science research in this respect:

‘The challenge of devising solutions that will enable us reliably to predict, model and take action to prevent unwanted and potentially catastrophic outcomes arising from the interaction between

dynamic and complex socio-technical systems generates a new and increasingly urgent frontier for computational research.’ (Yeung, 2019, p. 67)

‘Potentially catastrophic outcomes’, ‘complex socio-technical systems’, ‘to predict’ and ‘model’ emerge as key discursive elements of the contemporary bond between the ontology of life as pure contingency and the emerging epistemology of digital devices based on AI.

## 2.2 From conditional future to real time

When reading official documents of European institutions as well as the literature on predictive analytics, one notion keeps surfacing, and its meaning remains uneasy to grasp: ‘real-time’ or ‘real-time prediction’, often presented as one of the key characteristics of AI (Yeung, 2019, p. 22).

For example, the Communication of 24 April 2018 of the European Commission, entitled *Towards a Common European Data Space*, mentions this notion several times (explicitly or implicitly):

‘In manufacturing, real-time sensor data supports predictive maintenance. Data-driven innovation ... can help with crisis management and in developing environmental and financial policies. Sharing research data on the outbreak of epidemics can advance relevant research much faster and contribute to a more timely response. High-resolution satellite data ... contributes to the real-time monitoring of natural water resources to prevent drought or pollution.’ (European Commission, 2018a, p. 2)

To predict in *real time* is a convoluted notion, comprising predicting as time passes, predicting through instantaneous translations of reality, predicting as an immediate adjustment to reality. To *pre-*dict: what meaning is left for the prefix and the term as a whole? Does it still refer to anticipation or merely to a constant adjustment to events? And what is the exact reality of this time called ‘real’ – does it encompass the quantification of its unfolding? This kind of reality would only account for what is happening now and what we grasp from this particular irruption of time. The future would thus be reduced to the actualisation of its imminence and to the digital capture of an almost-already-happening-here-and-now. In other words, ‘what is real is what unfolds in real time’ (Hui Kyong Chun, 2011, p. 96).

*Predicting in real time* sounds contradictory. Even computer scientists acknowledge the ambiguity of the term and the fact that ‘a predictive model cannot be built in “real time” in its true sense’ (Sangireddy, 2015) because it is not possible to predict the here-and-now of what is still becoming.

The expression highlights a confusion between thought and action – a collision between the future and the present. The reality of this time appears to be intrinsic to its conjuration of the future or its ‘de-futurization’ (Esposito, 2011b, p. 180). The future is only the one that has triumphed over countless possible others by becoming actualised, making it entirely subsumed to the present that is emerging while simultaneously forming the object of predictions. This ambition to ‘predict the present’ has led researchers to forge the neologism ‘nowcasting’ to supplement the more conventional ‘forecasting’ (Choi and Varian, 2012; Sanila *et al.*, 2017; Wu *et al.*, 2020).

The promise of real-time prediction has been described as the new avatar of ‘presentism’ (Hartog, 2003) or the domination of a perpetual present. Presentism entails a way of articulating the universal categories of past, present and future entirely subject to the reign of immediacy. It presupposes that our temporal horizon has been invaded by an ‘increasingly inflated, hypertrophied present’, imposing demands of productivity, flexibility and mobility upon us all (Baschet, 2018). This analysis assimilates real-time predictions to a form of alienating injunction, thrusting upon human beings the strict normativity of a life lived for the sake of permanent and vigilant adaptation (Stiegler, 2019). We believe this interpretation to be a simplistic shortcut that neglects to question the conceptual tensions that lie at the heart of ‘real-time prediction’. These tensions, we argue, crystallise a series of reconfigurations that signal a transition towards a more complex and novel *sociotechnical imaginary*.

The salient features of this new imaginary are embedded in the epistemological and normative dimensions discussed in the next sections. In summary, these include a series of reconfigurations of the relationships between (1) *temporality* and *materiality*; (2) *knowledge* and *action*; (3) *subject* and *object*; (4) *the virtual* and *the possible*; and (5) *the past*, *present* and *future*. Before engaging with these reconfigurations, we must discuss the emerging phenomenon of governing the future *through* predictive analytics. This exercise sheds light on two forms of heterogeneity – *epistemological* and *normative* – that are intrinsic to the use of predictive analytics in governance and revelatory of tensions that often remain concealed by virtue of the apparent immediacy of the medium.

### 3 Governance of the future and predictive analytics

The multiplication and increasing prevalence of predictive analysis systems, as well as the legitimacy they are gradually acquiring, put Ulrich Beck's theory into question. Beck described our contemporary world as a *risk society* in which catastrophic, incalculable and uninsurable risks proliferate, to the point that incalculability moulds the transformation of society (Beck, 1992). His analysis shows how the development of technology generates risks, the effects of which are unlimited in time and space, and can affect future generations around the globe. The consequence of incalculability is that modern risks cannot be contained, anticipated or even diverted (Sørensen, 2018).

However, predictive analytics and the 'politics of temporality' they foster (Adams *et al.*, 2009, p. 247) postulate the calculability of all phenomena. These systems aim to establish a predictive score (in the form of a probability or a profile) for any entity (customer, employee, patient, product, machine, etc.) in order to determine, inform or influence organisational processes. The indeterminacy and complexity of life have not defeated the urge to quantify and calculate risks and, more broadly, the probability of events occurring. On the contrary, recent years have arguably brought a shift from a risk society to a *score society* (Citron and Pasquale, 2014).

#### 3.1 Epistemological heterogeneity: constructions of knowledge

The development of analytical tools such as deep-learning algorithms has made it possible to develop 'scores' emerging from immense datasets to identify forms of regularities, patterns or modes of behaviour. These tools create new modes of knowledge acquisition that enable predictions. Far from being neutral and declarative, these predictions shape the future in very visible ways. Reverting again to the notion of 'real-time prediction', we identify further aspects particularly problematic for governance purposes. Indeed, the notion is misleading because it suggests that 'real time' refers to what is *im-mediate* and *un-mediated*. However, this belief 'ignores the formal structure and materiality of the technologies that make real time itself ... possible' (Thomas, 2014, p. 290).

What we call 'real time' is the result of a constant technical mediation involving a structural time lag, which is unavoidable for two reasons. First, time is required for the construction of new datasets, the potential modifications of the analytical model's parameters or the updating of technical infrastructure (Thomas, 2014). Second, time is needed to make newly collected data intelligible and appropriately usable in accordance with the objectives pursued (Kaufmann *et al.*, 2019). This time lag makes the capture of the future incomplete, imperfect and in need of constant readjustment as the data change and the analytical tools evolve. This defeats the magical idea that the processing of information can be concomitant with the event or phenomenon that the information purports to describe.

The mediating role of technical devices also implies that the type of knowledge obtained from predictive analytics varies according to their specificity, with consequences for the ways in which they make the future present. The systems used in predictive policing for example rely on patterns for the identification of future crimes (Benbouzid, 2018). These patterns stem from the association of specific algorithms with equally specific datasets (e.g. a cartography of areas more prone to arrests for violent crimes). Relevance of these patterns varies according to the different algorithmic models used, the data on which they rely and the analytical approaches applied to data collection and

identification. Relevance also depends on human decisions evaluating their possible meaning in the specific context of police activities.

The ability of AI systems to unveil new information hidden within datasets provides them with an aura of ‘epistemological authority’, the apparent unquestionability of which masks the collaborative efforts, methodological options and value judgments involved in identifying patterns (Amoore, 2019). For example, recent research reveals the full extent of the constructive process leading to the emergence of patterns structuring police activity – a process that ‘makes patterns political’ (Kaufmann *et al.*, 2019, p. 684). The complex assemblage of actors, algorithms, theories and decisions that contribute to the emergence of patterns (Ananny, 2015) signals their intrinsically normative dimensions (Winner, 2020): they formalise conceptions of crime that are themselves based on specific ideas about how to govern it.

This type of analysis not only debunks the alleged neutrality of AI systems; it also breaks with representational schemes that narrow the complexity and richness of experience in favour of abstract formalisms or questionable reifications. In contrast, what emerges is the importance of teasing out the plurality of forms of knowledge that can be inferred from AI systems (Kaufmann *et al.*, 2019, p. 680) – what we call *epistemological heterogeneity*. Predictive practices therefore do more than just gather the knowledge that is necessary to know the future: they enable performative operations that establish the presence of the future in different ways (Aykut *et al.*, 2019).

This epistemological heterogeneity questions the type of rationality that predictive analytics are based upon. Early modern rationality rests on the notion that the human observer occupies an external, neutral and objective position with respect to the world they are studying (Esposito, 2011a; Latour, 2002). The distinction between a knowable subject and a knowable object is ill-equipped to discern the self-referential circularities of predictive or oracular logics<sup>2</sup> – that is, the consequences that the actions of the observer and the act of observing itself have on events (Barad, 2007). For instance, a recent analysis of the 2008 Global Financial Crisis has highlighted how the ‘models being used to forecast future developments in the markets have not taken into account the extent to which current predictions would affect the future’ (Esposito, 2011a, p. 16).

Additionally, in the context of predictive analytics, even linear relationships of cause and effect are transformed through retroactive loops (Hofstadter, 2008) by virtue of which desired effects end up becoming originating causes that are difficult to control (Esposito, 2011a, p. 15). Paradoxically, the development of devices capable of performing complex tasks through reflexive processes, similar to those of humans, makes predicting the effects of predictive systems increasingly hard (European Commission, 2018a). This (rather ironic) tension is apparent in a recent report of the Council of Europe on advanced digital technologies. The report highlights the extreme difficulty of making accurate predictions about the long-term effects of the digital revolution (European Commission, 2018b), as well as the great complexity of these technologies:

‘[m]achine learning and deep learning systems become progressively complex, not only due to the availability of data, but also due to increased programming complexity. As a result, these systems are subject to three types of vulnerability: first, increased programming complexity increases the propensity of these systems to generate stochastic components (i.e. make mistakes); secondly, this complexity opens the door to a wide range of adversarial attacks; and thirdly, the unpredictability of their outputs can generate unintended yet highly consequential adverse third party effects (‘externalities’).’ (European Commission, 2018a, p. 21)

Contemporary digital technologies are therefore just as likely to provoke new crises as they are to help us solve existing and emerging ones (Hui Kyong Chun, 2011, p. 92). In this context, we must question

<sup>2</sup>In these, the observer is located within the world they observe and are subject to its inescapable principles. This is wonderfully illustrated by the myth of Oedipus and its self-fulfilling prophecy: the observer who wants to escape the prediction announced by the oracle contributes to its realisation (Rosset, 2012).

the assumption, inherent in current European (but arguably global) policy discourse, that complexity necessarily requires new ways of governing based on predictive analytics' performances.

### 3.2 Normative heterogeneity: logics of action

Once a score is calculated or a pattern identified, a spectral reality takes shape. Made present in the here and now through the analysis of past data, the uncertain future becomes almost palpable and visible. Anticipation of the future is a form of 'generative truth' that requires a transition from knowledge to action and eventually imposes itself as a 'moral imperative, a will to anticipate' or an 'injunction' of sorts (Adams *et al.*, 2009, p. 254; Andersson, 2018, p. 30).

The authority of predictive practices – whether in the form of machine-learning algorithms or ancestral divinatory rites – is thus not only epistemic (Vernant *et al.*, 1974, p. 10). It is also *normative* as it both requires and justifies the deployment of certain logics of action in the here and now. Alongside the strictly predictive function, providing legitimate grounds for decision-making is integral to the role of predictive practices. In this respect, digital signals have replaced divine signs. Governance is done by numbers (Supiot, 2015), but numbers have the same function as the omens of the past: to immunise decision-making against failure. Of course, the quantification of risk does not always prevent bad outcomes and cannot provide a guarantee or insurance against an uncertain future. But regardless of success or failure (Chandler, 2016), it serves as a justification for action. Although it cannot make the future *really* foreseeable or the world *really* controllable, it can provide the means to act *as if* it did.

It has been observed that 'the unknowability of complex life itself comes to constitute the rationality of its governance' (Chandler, 2014, p. 58), which also ends up taking very complex detours. AI can serve different logics of anticipatory action, prompting diverse initiatives for the prevention, compensation, preparation or adaptation to the emergence of a specific future. An examination of the plurality of logics of action leads to the identification of more or less coherent ways of justifying and carrying out political or legal interventions in the present. Crucially, these are not necessarily aimed at neutralising the future before it occurs. Taking into account this *normative heterogeneity* enriches an analysis too often limited to an indictment of the inhibiting pre-emptive powers of 'algorithmic governmentality' (Rouvroy and Stiegler, 2015).

The institutional governance of complex life is performed through a number of normative principles that pursue different logics of action and require different interventions in the here and now. These are revelatory of different ways of anticipating uncertain futures. From an analytical standpoint, AI systems can support at least three distinct logics of action: (1) precaution; (2) pre-emption; and (3) preparedness (Anderson, 2010a).

The *logic of precaution* involves situations in which the risk or threat has been identified and demands action before the damage becomes irreversible. The precautionary logic is probably the best known because it has been established as a legal principle over the course of the past decades at both the national and international levels. In February 2000, the European Commission outlined the essential characteristics of the principle (now enshrined in Art. 191 TFEU):

'Whether or not to invoke the precautionary principle is a decision exercised where scientific information is insufficient, inconclusive, or uncertain and where there are indications that the possible effects on the environment, or human, animal or plant health may be potentially dangerous and inconsistent with the chosen level of protection.' (European Commission, 2000, p. 7)

At the heart of the precautionary principle is the idea that, in the face of uncertainty, the occurrence of a potentially catastrophic event and its impact on different forms of life must be prevented. The impossibility of determining the exact probability or severity of a potentially catastrophic event should not prompt decision-makers to refrain from taking preventative action. Recourse to the precautionary principle therefore presupposes a particular 'epistemic situation', which is one of uncertainty (Guillaume, 2012, p. 494): the impact of a situation on the environment or human health may be



probable, but the probabilities are unknown – or, more broadly, the potentially hazardous effects of a phenomenon, product or process have been identified but the scientific assessment does not allow for an exact determination of the risk of harm (Bourguignon, 2015).

Much of the debate on AI and the precautionary principle to date has focused on a precautionary approach *to* AI and how this could potentially stifle technological progress. The fear is that an excess of precaution by public authorities will hinder innovation, thus creating unnecessary obstacles to the fulfilment of AI's potential (Castro and McLaughlin, 2019). However, an analysis of relevant policy documents suggests this fear is unwarranted. For example, the recent EU 'White Paper on Artificial Intelligence' (European Commission, 2020c) does not mention the precautionary principle at all, and no concession is made for the possibility of a precautionary approach *to* AI. Conversely, the potential of AI-powered predictive analytics is heavily relied upon for varied purposes including the prevention of diseases, climate change mitigation, etc. Scepticism towards precaution as a logic is of course not new (Clarke, 2005; Sunstein, 2002). What is interesting here is the apparent paradox inherent to AI, which refracts precautionary attempts while at the same time it is increasingly embedded in large-scale preventative actions. Indeed, in contrast with rule-makers' hesitancy in applying precaution *to AI as an object of regulation*, the use of predictive analysis systems *for precautionary purposes* is establishing itself in a number of areas.

Perhaps the most obvious example is the environmental sphere, where predictive analytics improve understanding of a series of phenomena as complex as climate change or the evolution of biodiversity (Hallgren *et al.*, 2016; Hampton *et al.*, 2013). Experts in these fields emphasise the need for massive data collection, from disparate sources, over a long period of time and on a large spatial scale, in order to better grasp the characteristics of these phenomena and take action.<sup>3</sup>

The *logic of pre-emption* takes preventative action one step further. It prompts action prior to any formation and identification of a real threat, which is considered *in the abstract* as likely to have considerable impact. Recourse to this logic implies a different 'epistemic situation': no longer one of uncertainty, but one of ignorance. Pre-emption is aimed at cases in which both the impacts of a potential situation on society and their probabilities are unknown. In this sense, while the precautionary logic can be said to react to 'known unknowns', the pre-emptive logic entails the neutralisation of risks *before* knowledge of their potential even consolidates: 'unknown unknowns' (Massumi, 2007; Rasmussen, 2004).

It may appear paradoxical or oxymoronic that predictive analytics would be used to inspire pre-emptive action since, by definition, their predictions are based on known and existing data, in contrast with the ignorance that inspires the pre-emptive logic. Yet, reliance on predictive analytics for pre-emptive purposes has become increasingly common in the fight against crime and terrorism, in particular through 'predictive justice' (McCulloch and Wilson, 2015). Based on profiling and risk analysis, this process of neutralisation aims at anticipating individuals' capabilities, intentions or desires in order to intervene by structuring the possible scope of their action. In other words, '*pre-emptive predictions* are intentionally used to diminish a person's range of future options' (Kerr and Earle, 2013, p. 67, emphasis in original). For this reason, this form of algorithmic governance predominantly focuses on the predispositions of individuals, as evidenced by the establishment of profiles or scores, evaluating the potential for dangerousness, failure or fallibility.

This new mode of governance has been described as emblematic of our contemporary 'societies of clairvoyance' (Neyrat, 2010). Increasing recourse to this logic of action signals how our societies nurture a very limited and problematic relationship with the future: they foster an actuarial and pre-emptive temporality that crushes the present into predetermined courses of action (Mantello, 2016;

<sup>3</sup>There is a deeply shared conviction that climate modelling powered by big data, while not a 'silver bullet', will allow governments to soften the blow of climate change and prevent some of its consequences. For example, the potential of predictive analytics has been described as capable of a 'sustainability revolution' (Herweijer and Ramchandani, 2018) as well as improving local biodiversity and conservation efforts (Norouzzadeh *et al.*, 2018).

Neyrat, 2009).<sup>4</sup> In Europe, the use of pre-emptive logic in the context of predictive justice has been problematised with a particular focus on the threat to individual rights (such as privacy, or the GDPR protection against fully automated decision-making) (Jansen, 2018; Lynskey, 2019; Williams and Kind, 2019). Less attention has been dedicated to the broader collective implications of accepting ‘clairvoyance’ as a method of governance. When the logic shifts away from prevention in its traditional sense to embrace a pre-emptive turn, ensuing measures equally change in nature. The focus moves from causes to intervene ‘on the information and physical environment of individuals’ to prevent certain things or actions from being actualised or even possible (Rouvroy and Stiegler, 2015, p. 125).

The key tenet of this mode of governance is the connection between traditional approaches to risk assessment, based on a risk-utility calculus, and the notion of ‘clairvoyance’, provided by predictive analytics, which refutes the ontological uncertainty of future events in favour of a more reassuring form of artificially designed determinism.

Finally, the *logic of preparedness* is engaged at a different point in the timeline, when a particular event is either unfolding or producing its impact on life. Much like precaution, the logic of preparedness is designed to be applied to ‘epistemic situations’ in which threats are neither calculable nor controllable. Unlike precaution however, preparedness does not prescribe the avoidance of a threatening event. Rather, it ‘assumes that the occurrence of the event may not be avoidable and so generates knowledge about its potential consequences’ (Lakoff, 2017, p. 19).

The logic of preparedness and that of precaution represent the two ends of the same paradox. The *worst case scenario* is perceived as something to be avoided at all costs while, at the same time, it is understood as fundamentally unavoidable. In this sense, the two logics are ‘increasingly joined’ to inspire ‘operational criteria of response’ (Aradau and Van Munster, 2008, p. 30).

Preparedness engages simultaneously speculative and reactive dimensions. The aim is to be prepared for the worst as if its devastating consequences were already present. To make a disaster fictitiously occur in the here and now requires an artificial projection into a state of emergency to formulate potential responses to the crisis (imaginatively) at hand. In this sense, preparatory logics tend to rely upon resilience (Zebrowski, 2013), as well as crisis management planning and the protection of vital infrastructures for society (Collier and Lakoff, 2015). Specifically, they require taking into account the various phases of initial rescue operations (e.g. medical triage, evacuations, provision of food and water supplies), as well as initial actions to be taken in the immediate aftermath of the event generating the crisis to minimise its consequences.

The use of predictive analytics in the context of preparedness and crisis management is increasingly common, whether for the purpose of monitoring epidemics (Jayalakshmi and Anuradha, 2017; Raza, 2020; Zeng *et al.*, 2021) or mitigating the impacts of a humanitarian crisis (Raymond and Al Achkar, 2016) or natural catastrophe (Yu *et al.*, 2018). In these contexts, AI systems are supposed to provide and help maintain high levels of ‘situational awareness’, which in turn are necessary to ensure adequate response to the emergency (Mehrotra *et al.*, 2013).

Preparing for the worst entails the capacity to respond adequately once the worst materialises. Thus, preparedness also engages the response phase in the aftermath of a crisis, which necessitates the deployment of appropriate reactions constantly alive to mutating circumstances. In this very specific context, the expression ‘real-time prediction’ carries understandable value and meaning, as algorithmic devices are able to inform reactions ‘live’ while a disastrous event is unfolding:

‘Big Data analysis in real time can identify which areas need the most urgent attention from the crisis administrators. With the use of the GIS and GPS systems, Big Data analysis can assist the right guidance to the public to avoid or move away from the hazardous situation. Furthermore, analysis from prior crisis could help identify the most effective strategy for responding to future disasters.’ (Dontas and Dontas, 2015, p. 480)

<sup>4</sup>In criminal law, the pre-emptive logic triggers a threefold phenomenon: (1) the shift from the category of act to that of intention; (2) the emergence of linguistic avatars of terrorism (such as ‘dangerousness’) as predisposition to crime; and (3) the adoption of laws acting on these predispositions.

Given the characteristics of predictive analytics, it is unsurprising that their deployment in the context of preparedness has followed increasing levels of securitisation of potential threats, and health threats in particular. A progressive expansion of the scope of biosecurity governance and regulations, both globally and at the European level, has been recently highlighted (Dijkstra and De Ruijter, 2017; Roberts, 2019). The availability of modern algorithmic devices is exacerbating the levels of permanent surveillance and data collection practices that the logic of preparedness is inherently capable of generating, as it is dependent on them. With the rise of predictive analytics, the logic of preparedness, originally conceived to ready societies for the unknown, paradoxically entrenches pre-existing experiences as the sole source of preparatory inspiration, thereby limiting the range of action.

While we cannot exclude the possibility that there may be more, *precaution*, *pre-emption* and *preparedness* constitute three major logics of action that predictive analytics can serve. It is possible and necessary to separate these logics from an analytical standpoint, yet it is equally crucial to appreciate that they can be juxtaposed or used in conjunction in the course of attempts to apprehend complex phenomena. These principles can operate in pairs. For example, precautionary and preparatory logic can operate in tandem in the face of emerging health threats.<sup>5</sup> Similarly, it is conceivable that matters of public order may prompt authorities to combine pre-emptive with preparatory actions. It is also possible to observe a simultaneous deployment of all three logics of action by public authorities as attested by the European policies for the collection and use of Passenger Name Records (PNR) data in the context of anti-terrorism and trans-border criminal laws (European Commission, 2011).

In an early working paper on the topic, the European Commission explicitly refers to three potential uses of PNR data: ‘reactive’, ‘in real time’ and ‘proactive’. The paper insists on the necessity for combining different logics of action in the use of the data:

‘The combined pro-active and real-time use of PNR data thus enable law enforcement authorities to address the threat of serious crime and terrorism from a different perspective than through the processing of other categories of personal data: as explained further below, the processing of personal data available to law enforcement authorities through existing and planned EU-level measures such as the Directive on Advance Passenger Information, the Schengen Information System (SIS) and the second-generation Schengen Information System (SIS II) do not enable law enforcement authorities to identify “unknown” suspects in the way that the analysis of PNR data does.’ (European Commission, 2011, p. 12)

PNR data can be used *reactively* in the context of criminal investigations for the purpose of disentangling networks after a crime has been committed – thus falling within the logic of preparedness. It is equally crucial to use PNR data *in real time* upon arrival or departure of identified passengers to observe or arrest individuals before a crime is committed, because it is about to be or is in the course of being committed – therefore encompassing both the precautionary and preparatory logics. Finally, the Commission’s working paper underlines the specific utility of using PNR data by reference to predetermined evaluative criteria in order to identify individuals without criminal records. PNR data can then be used *pro-actively* to further develop analytical benchmarks and evaluative criteria for assessing passengers prior to their arrival or departure – thus following a pre-emptive logic.

The complex discussion of *epistemic* and *normative heterogeneity* developed in this section prompts us to interrogate, in the final part of the paper, the significance of this modern conjunction between predictive analytics and governance practices from a broader societal perspective.

<sup>5</sup>E.g. the successful (to date) public health countermeasures enacted by the governments of Australia and New Zealand to face the COVID-19 pandemic, while initially inspired by a logic of preparedness, have become increasingly informed by a logic of precaution – if not pre-emption with blanket border closures.

## 4 A new sociotechnical imaginary?

### 4.1 Governing through real-time predictions

The association between predictive analytics and governance strives to make the future knowable in the present (*epistemic practices*) and shapes a programmatic way of formalising, justifying and deploying action in the here and now (*normative logics*). We argue that this convergence is shaping a new *sociotechnical imaginary* – to paraphrase Jasanoff: a collectively held, institutionally stabilised and publicly performed vision of a desirable future, animated by shared understandings of social life and social order attainable through advances in science and technology. We now interrogate its scope and limits.

This emergent vision is not quite institutionally stabilised and yet it is increasingly performed in the public sphere. It enshrines a capricious and indomitable future that is always indeterminate, unpredictable and complex, requiring permanent taming and, in some cases, total neutralisation. We have seen that ‘real-time’ predictions are the providential tools for the task: anticipatory techniques allowing humans to regain a measure of control and autonomy in a contingent world. The convergence between algorithmic and politico-legal logics is in this sense both the result and the vector of the new imaginary (Jasanoff, 2015, p. 26).

As discussed, predicting in real time is counter-intuitive. Conceptually, this expression uncovers many contradictions and tensions inherent in current predictive practices. These tensions perform a profound reconfiguring role that sketches the contours of the new *sociotechnical imaginary*. We identify five critical ones:

- 1 The idea of real-time prediction reconfigures *the relations between temporality and materiality*, the (im)mediate and the mediated. The sparkling velocity of big data and the immediacy of real time render technology invisible and distract from the materiality of predictive analytics. Through a process of ‘blackboxing’ (Kallinikos, 2002) or ‘camouflage’ (Dubey and de Jouvancourt, 2018), the apparently *immediate result* obliterates the *mediating role* of technology (Verbeek, 2016) and all the material work and significant time involved in algorithmic modelling, data cleansing, system testing, etc.
- 2 The idea of real-time prediction blurs *the relations between knowledge and action* because it implies that following the digital traces of a phenomenon in real time is tantamount to acting on the phenomenon itself. The time of observation and the time of action merge into an epistemic trap, prompting people to believe that knowledge about a phenomenon or behaviour provides normative guidance on how to act in its face. Big data generates a different type of ‘knowledge’ than ordinary science. Based on correlations, it is ‘more akin to the translation or interpretation of signs rather than ... understanding chains of causation’ (Chandler, 2015, p. 836). Can the performativity of a score or profile justify action without adequate understanding of the multiplicity of causes behind a phenomenon?
- 3 The idea of real-time prediction questions *the distinction between subject and object*, and more specifically between a predicting subject and a knowable object. These predictions do not operate in accordance with modernist rationality because they follow an oracular logic of self-referential and self-fulfilling circularities, where the observer is located inside the world under observation and subject to its principles. This requires taking into consideration the consequences that the actions of the observer and the acts of observing and predicting themselves have on events. The self-fulfilling nature of predictions is of course not new and has been discussed in sociological literature for decades (Merton, 1948). It is the fact that predictions seemingly occur in ‘real time’ that exacerbates these tendencies, which are indeed inherent to the very idea of predicting.
- 4 The idea of real-time prediction blurs *the distinction between the virtual and the possible*. As real time points to ‘real world’ events, real-time predictions only relate to what is *possibly* happening as it has already happened. By identifying correlations from past regularities, this kind of prediction reduces the real to the possible and overlooks the virtual dimension of life and its

multiple potentialities. Giles Deleuze has discussed that the virtual is not opposed or alternative to the real. Virtual is what exists potentially and can materialise through actualisation. Thus, the *virtual* differs from the *possible* in that it is not predetermined and is therefore unpredictable and responds to an open multiplicity of variables from which one or more forms of actualisations may emerge (Deleuze, 2013).

- 5 The idea of real-time prediction reconfigures *the links between the past, the present and the future*. Because these predictions rely exclusively on past regularities, the future made present in the here and now is impoverished and reduced to a mere repetition of the possible, of what has already happened at least once. In this sense, predictive analytics end up ‘reducing the future to the past, or, more precisely, to a past anticipation of the future’ (Hui Kyong Chun, 2011, p. 92). Additionally, predictions are no longer made with a view to anticipating today what could happen in the future: they are made to anticipate right now what immediately comes next. The temporal unit radically changes with real-time predictions – it shrinks and therefore modifies the notions of short-, medium- and long-term.

These reconfiguring tensions are moulding the transition towards the new imaginary, which appears eminently characterised by the ‘necessity of continuous adaptation to the world in its emergence’ (Chandler, 2016, p. 410). However, this way of envisioning the future has important limitations, particularly given its role in inspiring normative logics of action.

#### 4.2 Pluralising the future

The first limitation of the emerging imaginary relates to the issue of epistemological heterogeneity and requires questioning the place occupied by predictive analytics among other anticipatory techniques. If governance practices yearn to address a purely contingent life, to what extent can or should they rely on data-driven science and quantified future visions? The question involves the hierarchical place of ‘algorithmic governance’ vis-à-vis radically different modes of anticipatory knowledge such as foresight (Cazes, 1986), imagination (Engélibert, 2019) or performance (Anderson, 2010b). As the epistemological authority of quantified knowledge gains momentum in the era of big data, the risk is a move towards a future monopolised by data-driven science with reduced normative options. This is problematic because reliance on a multiplicity of anticipatory techniques (Aykut *et al.*, 2019) is essential for alternative ‘visions of desirable futures’ to be contested, negotiated or reconciled by different actors. Maintaining plurality is critical to preserve an ‘ecology of futures’ (Michael, 2017) within which policy-makers, lawyers, experts, stakeholders and citizens can navigate and make decisions to face the adversities of a contingent life.

The analysis of the normative logics of action above is revealing of the need for this plurality. Let us take *preparedness* as an example. The very idea of this logic of action is to accept the inevitability of the unknown, and prepare for its aftermath. But this necessarily requires a measure of *imagination* as a mode of anticipation. Where the operation of the logic is subsumed within the crushing limitations of correlative patterns identified in existing datasets – even where these are updated in real time – the normative force of the logic changes in nature. When deploying preparatory action becomes inextricably tied to a predictive score, the logic arguably ceases to be one of *preparedness* and becomes one of *adjustment*. A risk inherent to allowing a data-driven monopoly of anticipation is therefore an involution of normative logics of action projected towards unknown futures into a data-directed adjustment to emerging presents – the continuous adaptation Chandler refers to. This prompts us to raise a strong caveat against the hegemony of quantification in governance, and argue instead for decision-making processes that rely on a diversity of ‘arts and technologies of imagining the actionable future’ (de Goede and Randalls, 2009, p. 860). The inability of predictive scores to *imagine* beyond set patterns and therefore capture the unexpected is well exemplified by the failure of the ‘hundreds of AI tools’ developed to ‘catch’ COVID-19 (Heaven, 2021).

In this regard, a report drafted by a group of foresight experts and addressed to the European Commission in 2015 rightly insists on the need for a ‘co-production of knowledge’ in a context of radical uncertainty:

‘In an era of big data, some are optimistic that real-time data mining combined with continued increases in computational power and speed will enable more reliable predictive modelling. However, being able to run the modelling process faster and deliver more detail does not guarantee better outcomes. Achieving this requires the worlds of theory and practice to be effectively bridged in a co-production of knowledge. In the foresight philosophy of non-deterministic, still emerging and open multiple futures, this bridging needs to be done in a way that effectively grapples with problematic situations or enables the management of unprecedented large-scale transitions in the context of unpredictability and uncertainties.’ (Wendeling, 2015, p. 31)

Crucially, a combination of diverse anticipatory techniques would have the ability to balance out one of the intrinsic weaknesses of predictive analytics – their conservative or reactionary nature. Emerging as it is from correlative patterns in past data, the future deduced from predictive analytics is one that makes it impossible to apprehend the new, the abnormal or the spontaneous: a future that ignores the *virtual* and reduces itself to the *possible* (Deleuze, 2013). This inevitable characteristic leads us to reflect upon the second major limitation of the new *sociotechnical imaginary*: the uncertain fate of forms or modes of life that do not conform to dominant the sociopolitical model. Indeed, visions of a desirable future are ‘animated by shared understandings of forms of social life and social order’ (Jasanoff and Kim, 2015, p. 4). This raises three questions: (i) Which conceptions of (social) life and (social) order are involved in the new imaginary? (ii) Are they truly shared and by whom? (iii) Which normativity is associated with these conceptions or, in other words, how do they valorise (or not) certain forms of life – particularly ‘non-conforming’ ones?

Answering these questions requires a firm grasp of the constructivist nature of predictive practices. Indeed, these practices can only claim to possess knowledge about the future because they inherently imply specific ways of defining what counts as the real world, along with its various constituents (Holbraad, 2013). In this sense, predictive practices can be described as ‘demiurgic’ (De Boeck and Devisch, 1994) as they shape the world by bringing about the presence of the future in the here and now. This demiurgic power makes people and things exist in a certain way: it is a process of ‘institution’ (Castoriadis, 1975) or ‘instauration’ of persons and things – a process that allows existence to gain reality (Lapoujade, 2017, p. 73; Souriau, 1939).

In the face of their intrinsic link to the *possible*, which drastically limits their ability to address novelty or abnormality, the process of instauration performed by predictive analytics opens itself to questions, particularly with regard to the way algorithmic governance contributes to forging and valorising certain forms of life (human or non-human) to the detriment of others. Indeed, consubstantial to any recognition or instauration of some form of life is a reflex of *immunisation* towards others, deemed expendable because of their difference or abnormality. This type of reflex generates a form of ‘immunopolitics’ (Esposito, 2008) that translates into indifference, discrimination or even alienation:

‘we can get a sense of how anticipatory action (re)distributes the relationship that lives within and outside liberal democracies have to disaster. To protect, save and care for certain forms of life is to potentially abandon, dispossess and destroy others.’ (Anderson, 2010a, p. 791)

Large-scale manifestations of this process of immunisation are surfacing in a multitude of domains. Two recent books, both evocatively titled *The Uncounted* (Cobham, 2020; Davis, 2020), develop the theme of underrepresentation of marginalised groups in datasets spanning economic welfare, demographics and public health (with a particular focus on the fight against HIV/AIDS). A further example is the progressive emergence of a ‘digital welfare state’ in which social protection and assistance are data-driven and digital technologies are used for diverse purposes, including ‘to automate, predict,

identify, surveil, detect, target and punish' (Alston, 2019b, p. 4; Madden *et al.*, 2017). The recent Dutch case involving the system SyRI (System Risk Indication) is very instructive in this regard as it is one of the first examples of successful litigation against the governmental use of a digital tool in the context of welfare provision (*de Rechtspraak*, 2020; Gantchev, 2019).

Although the exact technology used in SyRI has not been publicly released, this automated system allows the Dutch central and local governments to identify risks of social security fraud. Processing data from a range of datasets relating to education, credit-worthiness, health insurance, welfare benefits, etc., SyRI provides an opaque risk-assessment modelling to identify whether individuals are worthy of investigation for potential fraud and unlawful claims under (and/or non-compliance with) legislation.

Since its adoption in 2014, SyRI has been under scrutiny by several non-governmental organisations and other interest groups, which filed a lawsuit in 2018. This was due to serious concerns about the specific targeting of people from low socio-economic backgrounds and other vulnerable groups such as immigrants and ethnic or religious minorities. It is now apparent that SyRI was disproportionately focusing on 'difficult neighbourhoods', further undermining their reputation and that of their inhabitants (Leijten, 2020; Vervloesem, 2020). The use of SyRI raises critical issues both in terms of procedural fairness and human rights – be it the right to privacy or the right to social security. Philip Alston, the UN the Special Rapporteur on extreme poverty and human rights, submitted a brief as *Amicus Curiae* in the case, in which he makes several remarks about the potential detrimental impact of the use of systems like SyRI:

'The use of digital tools to pursue welfare fraud is ... not a neutral development, but part of a partisan political trend. In this environment, welfare recipients, especially those who receive non-contributory assistance designed to assist the poorest in society, are regularly depicted as second-class citizens intent on defrauding the state and the community. In such an atmosphere ... digital tools are being mobilized to target disproportionately those groups that are already more vulnerable and less able to protect their social rights.' (Alston, 2019a, p. 7)

In February 2020, the District Court of The Hague held that the SyRI legislation violated Article 8 of the European Convention on Human Rights (ECHR), which protects the right to private and family life. The court's reasoning focused chiefly on the issue of privacy and on the proportionality of SyRI's interference with private life. Surprisingly, the issue of discrimination and the stigmatisation of the poor and recipients of social benefits, put forward by the plaintiffs and discussed by Alston, received little attention. Yet, this dimension is crucial as SyRI had been demonstrably used to disproportionately target groups of already vulnerable individuals, with serious impact on their rights and no due process. The case is all the more interesting as it reveals how predictive analytics can cause social unfairness beyond the sensitive categories explicitly identified and protected by the law (Timan and Grommé, 2020). This is troublesome, particularly in the current 'move to predicting risk instead of the ex post enforcement of rules violations' (Alston, 2019b, p. 19) – a move that animates the increasing reliance on predictive analytics in the context of governance practices inspired by the normative logic of actions analysed above.

These reflexes of immunisation, which exclude certain groups or forms of life deemed intrinsically suspect or pernicious, are symptomatic of 'the inequality of the value of lives' (Fassin, 2018, p. 32) in the digital age. Thus, as governance and algorithmic logics keep converging, a fundamental question remains open: how to avoid entrenching indifference for forms of life neglected by dominant socio-political models – in other words, how to develop 'novel and less exclusive cosmologies' (Chateauraynaud and Debaz, 2019, p. 132). Any positive answer will require safeguarding a plurality of anticipatory techniques as a necessary premise for alternative 'visions of desirable futures' to emerge.

## 5 Conclusion

In this paper, we have problematised contemporary beliefs in the miracles of big data and the divinatory power of AI with reference to the implications of such beliefs for the anticipatory aspirations of governance practices. By way of conclusion, we suggest the contours of what we understand to be the necessary objectives of future research.

The link between access to knowledge and the ability to govern the future is inevitably determined by our relationship to the real and our recognition of its qualities, which may vary between times and epochs, and from culture to culture, as ‘anticipation is a regime of being in time’ (Adams *et al.*, 2009, p. 247).

The ways in which we describe reality or ‘the state of the world’ are critical for two reasons. The first is to elucidate our comprehension of how societies operate and organise themselves to anticipate the future; the second is to reveal the cosmologies, the worldviews that lie at the heart of these descriptions (Reith, 2004). Analysing modes of anticipation allows us to understand the means by which a certain imaginary frames and represents alternative futures, links the past to the future, enables or hinders action and naturalises specific ways of contemplating possible worlds.<sup>6</sup>

This process is not merely of epistemological consequence for the ways in which reality is represented through emerging means of knowledge. In a world in which life is envisaged and understood in terms of pure contingency, the challenge of governing extreme complexity gains a specific *ontological* dimension. The issue ceases to be that of ‘knowing more’ about a certain reality and turns into delimiting ‘what is to be known’ (Chandler, 2014, p. 50).

Awareness of the ontological dimensions of anticipatory logics deployed in governance and predictive analytics is critical to grasp the profound meaning of any truth-claim posited by the association between the two. By claiming to possess knowledge about the future, these logics necessarily imply specific modes of defining what matters, what does not and what can be legitimately regarded as constituting part of the world. In this sense, prediction is indeed a ‘project of world making’ (Andersson, 2018, p. 23).

The logics of anticipation enshrined in the association between predictive analytics and governance thus aspire to make the future present in the here and now and, in so doing, impose themselves as world-shaping instruments, fostering specific ways of instaurating people and things. ‘Instauration’ however comes at the price of ‘immunisation’, which can occur as distantiation, detachment or complete indifference towards forms of life that are not afforded any credit or value. Therefore, future research on the assemblage between governance and AI must consider the fate of those forms of life that do not adapt, do not align or even actively resist dominant sociopolitical models. The risk is otherwise for the assemblage to crystallise into an exclusive mode of protection of life aligned to and acknowledged by these models (Schinkel, 2011).

As masterfully put by Jenny Andersson, the fundamental problem that we have today vis-à-vis the future is not the passage from progress to crisis, as some believe. It is rather the challenge of managing a potentially infinite plurality of futures and of moulding a society that is truly plural, where access to the widest spectrum of modes of engagement in and with the world is genuinely open.

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<sup>6</sup>The link between past and future can take different forms depending on the normative logic under consideration. The precautionary principle involves a future that manifests itself in the form of an *absence* (it is not yet here and we do not know what its impact will be); with the principle of pre-emption, the future is apprehended in the form of *imminence* (it is about to happen and we must act immediately before it does); finally, with the principle of preparedness, the future is characterised by its *presence* (the worst is happening and we must respond appropriately).



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