

N.B. This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details. Please cite the original article.

Introduction: From Solving Mechanical Dilemmas to Taking Care of Digital Ecology

Susanna Lindberg
orcid.org/0000-0003-3093-6056

Hanna-Riikka Roine
orcid.org/0000-0001-7959-4611

Abstract

The introduction by the editors aims to present an overview of the ethos of the digital environment, mapping out the scholarly field within which the volume is situated. As such, it lays out the conceptual framework of the book as well as outlines the transformation of the general existential and political situation brought about by the newest digital technologies, including AI. Furthermore, the introduction defines the central concepts used in the volume, such as ethics, ethos, environment(ality), ecology, and digital. It refers to existing theories that frame this discussion, insisting on the necessity of changing ethical paradigms in the context of new technologies. At the end, it presents three principles to summarize the main goals of this book with regard to taking us towards an ethical digital reality.

Traditionally, philosophers as well as specialists of religion and justice have thought that morality and ethics are prerogatives of human beings alone. Whether one advocates virtue ethics, hedonism, consequentialism, deontology, pragmatism or any other of the modern textbook ethical theories, all of them rely on an autonomous, conscious and responsible human subject. From this perspective, technical objects, including machines, appear as *tools* – as *means* of humans' moral actions without inherent moral qualities. If someone is killed, the blame falls upon the person who pulled the trigger, not upon the gun.

It has been argued, however, that technologies are much more than tools, since they innervate the entire lifeworld we live in (Ellul 1964; Feenberg 1999). Modern industrial technologies, in particular, “shape us and our social and ecological world as much as we shape technology” (Sandler 2014, 2). Today we, both as individuals and as societies, are becoming increasingly entangled in environments produced by computation, rapidly developing into complex, self-learning and self-evolving systems. If technical objects are regarded as *systems* or, rather, as constituting entire *environments* instead of being simple tools, technics itself has moral effects (Verbeek 2011). In other words, digitalization shapes not only our material environment but also our *cognitive* and *social* spaces. Does this mean that the *ethical* dimensions of our cognitive and social activity can be computed as well? Interrogations of the morality of technical systems have arisen in the context of a range of systems, from self-driving cars to autonomous weapon systems, in fields of research such as robot ethics (e.g. Lin et al. 2017), and these discussions are being extended to cover all sorts of digital systems. However, it seems to us that the ethical role of technical objects, systems and environments cannot be fully discerned without rethinking the very notion of ethics, even if this goes against the tradition.

The omnipresence of sensitive humanoid robots in science fiction narratives illustrates the ways in which the question of whether machines can be moral agents and even ethical and political subjects preys on our minds. A viewer of films and television series such as *Blade Runner* (1982), *Star Trek: The Next Generation* (1987–1993), *Battlestar Galactica* (2004–2009), *Real Humans* (2012, *Äkta Människor*) or *Westworld* (2016–) might be inclined to grant androids moral rights. However, a viewer speculating on *2001: Space Odyssey* (1968), *The Terminator* (1984) or *The Matrix* (1999) may wonder whether it would be more prudent to prevent the apotheosis of artificial intelligence – or the so-called Technological Singularity (Kurzweil 1990) – before it is too late. It is important to understand, however,

that despite what both fictional and nonfictional mainstream narratives tell us (see e.g. Cave & Dihal 2019), the contemporary machines prompting moral and ethical considerations are not human-faced robots.

The emblematic study of machine morality is the MIT Moral Machine experiment (<http://moralmachine.mit.edu>). The Moral Machine is a public online platform that presents a thought experiment to the user, postulating a self-driving vehicle that encounters a situation in which it is obliged to choose between two actions, both of which result in killing people. The platform then asks the user to respond: how the vehicle should choose? In other words, how should the vehicle be programmed to determine the lesser of two evils? Should the car sacrifice, say, its passenger or a pedestrian? Two law-abiding elderly persons or four jaywalking children? A poor man or a rich woman? And so on. On the platform, everybody can give their opinion on the value of different human lives. Most people appear to find this experiment – which really is merely an online version of the old philosophical trolley problem – fundamentally unsatisfactory and even immoral. Eino Santanen's poem "Should a Self-Driving Car", published in this volume, investigates the cold conclusions of the experiment.

The Moral Machine experiment is insufficient because, in reality, machines function in complex environments that cannot be reduced to a binary choice. It is fundamentally immoral because, by definition, one cannot calculate the greater or lesser value of different people, as human life is an invaluable end in itself. Indeed, science fiction author Isaac Asimov's famous "Three Laws of Robotics" [1] hold a deeper wisdom than the MIT experiment: according to Asimov, a robot should *never* sacrifice a single human being. It can cause a human death by accident, but not by choice. Be that as it may, self-driving cars are being developed and constructed, and they have already encountered lethal accidents. The problem has therefore become a real one instead of being merely theoretical, one that legal

scholars in particular are examining. If a self-driving car kills a person, who should get the blame? The car? Its constructor? The legislator who has given the car a license? Pedestrians who do not abide by the traffic rules? (For a comprehensive study of the juridical status of AI, see Kurki 2019, and for a rich survey of case studies, see Beever, McDaniel, Stanlick 2019.) Finally, what is even more important from the perspective of this volume is that the moral machines of today cannot be limited to objects recognizable as discrete actors and then evaluated by humans – such as the self-driving cars. Instead, we must expand our perspective towards complex human-technical systems that deeply affect what we see and how we see it (cf. Latour 2002).

The most salient features of the contemporary technological environment are not objects like robots and self-driving cars, but the general digital environment of human activity. So-called artificial intelligence – which actually consists of machine learning systems – has also considerably boosted the digital sphere. Yuk Hui defines contemporary digitality lucidly: “By digital objects, I mean objects that take shape on the screen or hide in the back end of a computer program, composed of data and metadata, regulated by structures or schemas” (2016, 1). The digital environment is made of networks that spread beyond the horizon, as well as in their computational substructure that their users cannot see and that most users do not even comprehend. Insofar as machine learning systems do not merely repeat predetermined programs but function on the basis of a recursivity that includes contingency, this impossibility of understanding everything that happens in a system becomes a structural feature of the machine (Hui 2019).

For all these reasons, today’s digital media function as the *unthought* condition of an increasing portion of contemporary life (see Hayles 2017). Such a condition cannot be located in a singular object. It is the very opposite of the human-faced robot: the pervasive “environmentality” (Hörl 2017) of digital technologies is part of our daily life, as not only is

digital media spreading into every other technology, but also humans and computational agents collaborate in networks that no individual subject or group directly controls or manipulates. Such collaboration operates at levels both “beyond” and “below” the scope of human awareness (see Galloway & Thacker 2007, Hansen 2015), thus obscuring the many effects it has on human ethics and justice. These effects are growing so exponentially that they urgently need to be conceptualized within contemporary, technologically developed societies where life is entangled in digital environments even when we are not directly in contact with them by means of digital devices or interfaces.

The aim of this volume is to articulate the ethical and political stakes of contemporary digital reality. It goes almost without saying that they cannot be explained in terms of an ethical theory based on an autonomous, conscious and responsible human subject – or its robotic double. Above all, this book aims at *discovering* and *describing* the ethical and political effects of contemporary digital reality. Only when these are brought forth is it possible to look for solutions. Let us first give a quick overview of the contemporary digital reality and some of its most important ethical and political worries and discontents, which loom behind the articles in this volume.

The Wide World of Computation and its Discontents

The worldwide, albeit unequal, presence of digital technologies has become a given in the contemporary world. While these technologies are known almost everywhere, *access* to them has become a new human right in all but name. Through the rise of the Internet and the World Wide Web, digital technologies have become a major vehicle for participation in both global and local venues. Access Now, an international non-profit group dedicated to an open and free Internet, begins their The Human Rights Principles for Connectivity and

Development, “Internet connectivity is essential for economic, social, cultural, political and civic participation in the digital age” (2016, 2). With falling prices, access to digital technologies – mobile phones, in particular – has gradually become more equal. Currently, it is estimated that about 5 million of the 7.1 billion world population own mobile phones, and they have turned out to be an important factor of access to better living conditions for many people who cannot afford a computer. [2] The increasingly common digitalized commercial services worldwide do not concern only the wealthy: for example, in many African countries and now even in India and Eastern Europe, the originally Kenyan M-Pesa bank, which functions through mobile phones, has provided access to banking services to those who were previously too poor to obtain a bank account. Yet, as the recent “Contract for the Web” initiative started by the inventor of World Wide Web, Tim Berners-Lee, puts it: “Half of the world’s population still can’t get online. For the other half, the web’s benefits seem to come with far too many unacceptable risks: to our privacy, our democracy, our health and our security.” [3] In other words, access to high technology is not the only ethical problem we face today, but its very structure and use presents serious issues.

The architecture of the digital reality presents different kinds of risks. As Bruno Latour (2002) has argued, technical devices are not simply passive recipients of human intentions but rather active agents that change the landscape within which human choices are formulated and carried out. The design of the computational systems that are being implemented everywhere is far from neutral, as these systems determine what the world looks like today. The Internet is an excellent example of a technical device invented for one purpose and then transformed into something entirely different: first designed to facilitate communication among scientists, it then quickly morphed into the Web, and now it has transformed everything from human sociality to entrepreneurship and marketing, as well as social services, public law and administrative justice (Alston 2019, Tomlinson 2019).

Furthermore, the infrastructure of the digital reality is designed by a handful of private enterprises that are mainly interested in their commercial interests, never mind the psychological, social, economic and even political price that individuals and communities end up paying. As Shoshana Zuboff (2019) has shown, relying on numerous concrete examples, digitalized “surveillance” capitalism can cause all sorts of economic exploitation and exclusion, while Bernard Stiegler argues in his *Disbelief and Discredit* series (2011; 2012; 2014a) that digital capitalism can insidiously produce “general proletarianization” and stupidity.

The Web was designed to bring people together and make knowledge freely available, but this noble goal has given way to worries about the privacy of our data and security as well as concerns over social alienation and growing divisions within societies. Personal data about us as individuals, and especially about us collectively, present enormously lucrative opportunities for various actors (Zuboff 2019). Great weight is put on the possibilities of “big data” for generating economic growth as well as enhancing wellbeing through supporting medical research, at the risk of silencing arguments concerned with privacy and autonomy (see Snell 2019). While primarily generated for commercial marketing purposes, citizens’ Internet engagement has provided an exponentially expanding source of data for both political campaigns and foreign disinformation campaigns – as is evident from the Cambridge Analytica/Facebook scandal and its implications for democracy (see Downes 2018). Calls for more ethical handling of personal data by businesses and organizations have become more prominent, and legislation such as the EU General Data Protection Regulation (GDPR) are establishing the legal boundaries for what can and cannot be done with personal data. Moreover, emerging forms of data activism are developing social imaginaries that promote new practices by employing data technology to fulfil the aims of social justice and political participation (Lehtiniemi & Ruckenstein 2019). For instance, MyData, a data

activism initiative originating in Finland, aims to shape a more sustainable, citizen-centric data economy, contrasting with the dominant economic logic embodied by the US data giants and promising to combine the “industry need [for] data with digital human rights” (Poikola et al. 2015).

In his recent report to the United Nations General Assembly on extreme poverty and human rights, human rights lawyer Philip Alston expresses concerns similar to those of the MyData activists. He points out that “governments have certainly not regulated technology industry as if human rights were at stake” (2019, 13) as well as criticizing the fact that governments too readily leave their regulatory responsibilities to big tech – which is not even self-regulated through free market mechanisms as it is a deeply anti-competitive sector. Even when motivated by the best of intentions, “those designing artificial intelligence systems in general, as well as those focused on [the] welfare state, are overwhelmingly white, male, well-off and for the global North.” (Ibid. 22.) These are significant ethical concerns focusing not only on the autonomy and participation of the individual citizens in today’s data-intensive information society, but also on the dominance of a few big technology companies and of a small, relatively homogenous group of people making decisions that affect the lives of everyone.

Yet another well-known problem of the digital reality is the so-called black box effect: whether willed by the designers or not, it will become more and more prominent with the development of machine learning. Sometimes, the functioning of specific algorithms may be opaque to the larger public due to the simple reason that they are trade secrets, owned by huge technology companies responsible for the technological infrastructure that frames and conditions our lives (see Stiegler 2010b). However, even the very structure of the new forms of machine learning may be such that the algorithms develop in ways that are unpredictable to their designers (Hui 2019). This is the fundamental meaning of the black box effect:

machine learning algorithms that process huge amounts of data at great speed, but even more importantly, are capable of developing through feedback, are such that the human users see the input and the output but not what happens in between – in the “black box”. As a result, it may be nigh-impossible to know why and how an automatic decision-making system has arrived at a certain decision. As recent EU and UN reports have pointed out, it is risky to use such procedures in administration because if a machine’s decisions cannot be accounted for or audited, it goes against the law and against the general sense of justice (Villani et al. 2018; Madiega 2019; Alston 2019).

The infrastructure of digital technologies is opaque not only because it is complex: some programs actually produce content as well as influencing our actions, unbeknownst to their human users. In addition to collaborating and sharing the Web with other people, we co-exist with nonhuman computational actors such as bots, whose key feature is not to match, but to exceed human capacity. As Ed Finn (2017) has argued, this is more than a collaboration: a kind of co-identity, as we are adapting ourselves to become more knowable to algorithmic machines. Lately, more and more attention has been directed towards a co-identity of this kind: for example, a recent study suggests that YouTube’s algorithm-driven search and recommendation system appears to “have systematically diverted users to far-right and conspiracy channels in Brazil” (Fisher & Taub 2019), until the far right successfully won the elections. Moving our attention away from, for example, individual human users writing – or moderating – hateful messages towards the larger logics of a system that itself generates, circulates and intensifies such hatred, is already suggested in contributions that attempt to rethink human–machine relations in Internet-based environments (e.g. Ruckenstein & Turunen 2019; see also Roine & Piippo in this volume).

Finally, a question which has attracted less general attention, but which new literary and media studies can help us to understand, is the effect of new technologies on our

very thinking. Not only are digital technologies spreading to areas such as commerce and governance, but our core cultural practices of reading, writing, conversation and thinking are also fast becoming digital processes. In the larger field studying writing and storytelling on the Web, the focus has been on how these environments transform our understanding of compelling narratives – or, narratives that are worth telling – and on the consequent “life-tellings of the moment” (e.g. Georgakopoulou 2017; Page 2018). While these are, of course, topics worth analyzing, we need to go further to conceptualize the changing ethical dimension of writing and reading stories in digital media. Mark B.N. Hansen (2015) has, among others, urged us to recognize how “twenty-first century media” differs from previous forms of media, and to turn away from the equation of experience and content towards the examination of how relations are composed between technical circuits and human experience. This has serious consequences for the concept of authority and the ethical questions tied to this, traditionally understood as individual instead of a collectivity formed by both human and nonhuman actions. Just as our objects of study adapt to us as we interpret them (cf. Finn 2017), this process of adaptation on the various platforms takes the dynamic role in “co-authoring”.

The feedback loop between our actions and the environments adapting to us (such as social media services and various forms of digital art) has been discussed from multiple perspectives. Researchers such as Lev Manovich (2013) have argued for looking beyond media surfaces to the layer of software: While, in physical media, adding new properties means modifying its physical substance, in digital media new properties can always be easily added or even new types of media invented by simply changing existing or writing new software. As a result, it is not enough for us to understand the creation of media as writing text or composing images, but as authoring new processes and designing structures of responsive behaviors (see Wardrip-Fruin 2009; Murray 2011). Lori Emerson’s term of

readingwriting (2014) calls our attention to a similarly fundamental shift in the arts: due to our constant connection to networks, media poetics is fast becoming a practice of writing through the network. This network, in turn, tracks, indexes, and algorithmizes everything we enter into it, thus constantly reading our writing and writing our reading.

Our individual choices cannot necessarily be distinguished from digital environments such as the networks described by Emerson. Algorithms developed by training neural networks on large datasets play an important part in making aesthetic judgments and in keeping us engaged with content through various recommendation and filtering routines. Furthermore, as the algorithms of the cultural interfaces aim to predict what we desire, the feedback loop is tightening to be able to capture what the user wants to see, read and hear before any conscious engagement even takes place. The end point, albeit speculative, of this logic, as suggested by Matti Kangaskoski in this volume, is the futile act of selection beginning to represent individual will and freedom. At this stage of development, however, it is evident that the digital turn constantly affects media poetics and our sense of aesthetics, and that these affects need to be interrogated.

Thinking (and) Computing

If this is what the wide world of computation looks like today, how may we conceptualize it from the philosophical and aesthetic perspectives, then? How may we reformulate ethics, morality and justice in the functions of digital technology?

In order to describe the specific nature of machine ethics, one can start by asking what characterizes machine thinking in general and what differentiates it from human thinking, including moral reflection. For instance, when a machine chooses between two apparently moral options, is its choice based on a moral reflection or does it merely calculate

a rational outcome? When a machine engages in an action, does it act freely or does it only follow the necessary path determined by its programming? With the concepts of classical Enlightenment philosophers such as Immanuel Kant, one should argue that because the machine does not really act and reflect *freely*, we cannot call its action moral in the proper sense of the word. A machine that merely follows its programming and calculates the most profitable outcome cannot be seen as responsible for its actions or guilty of crimes. However, as François-David Sebbah shows in his contribution to this volume through a comparison of Martin Heidegger's theory of technics and Emmanuel Levinas's theory of ethics, the ethical and the technical perspectives are not two different regions of life but two perspectives that fundamentally intertwine – or as Sebbah puts it, they are two “lights” shed on the same world.

In the contemporary digital reality, it is impossible to maintain a straightforward distinction between machine and human thought because today's machines take part in the very process of reflection or replace it altogether, as Susanna Lindberg shows through the example of “sorting algorithms” (which select people for jobs or higher education), and as Anna Longo shows through the case of the computational algorithms used in high frequency trading. Marc-Antoine Pencolé studies the delegation of decisions to automatic processes in the context of Internet communities. These examples also show why the direct identification of machine and human thought can result in irresponsibility and even injustice. While the difference between computation and human thought has thus been displaced and has become less obvious, it is important to rethink the criteria of their difference, as shown in the contributions of Anne Alombert and Daniel Ross. Only if we know how to conceptualize the specificity of the human in relation to new digital environments, can we learn to take better care of these environments together.

As we have already suggested, in order to rethink ethics in the digital world it is important to abandon or at least rethink the current individualist theories of ethics and conceptualize new ways of *taking care* of human beings and their nonhuman environment, as Stiegler (2010b) puts it. Furthermore, as N. Katherine Hayles notes in her contribution to this volume, the foci of traditional ethical frameworks are not appropriate for contemporary, technologically-developed societies: one obstacle is their focus on individuals rather than collectivities; another is the predominant role of “free will”. On the one hand, are people really as free and rational as classical philosophers would expect them to be? Are their actions not conditioned by their technological context – as Hayles has argued already in *How We Became Posthuman* (1999) and Stiegler in his seminal work *Technics and Time I–III* (1998; 2008; 2010a)? On the other hand, if machines do have an effect on moral reality, should this not be taken into account even if their effect is not *intentional* but based on *unthought* influence (Hayles 2017)? We see that machines should be evaluated in moral and juridical terms as soon as they contribute to situations that are experienced in terms of justice and injustice. These include autonomous weapon systems and algorithms used in financial markets, education and recruitment as well as the particularly insidious everyday use of search engines that recycle harmful ideologies, as shown by Joshua Adams in his study of the colonial gaze prevailing in Google Search.

As Hayles suggests, in the current condition an ethics that concerns itself only with humans is simply not adequate for our present situation. Along with Hayles’s formulation of *cognitive assemblage*, the recent revival of *cybernetical* (e.g. Erich Hörl, Yuk Hui), *system-theoretical* (Donella H. Meadows), and *network* approaches (Alexander Galloway & Eugene Thacker), as well as their development into new approaches such as *general ecology* (Hörl) and *hyperobject* (Timothy Morton), suggest that we have begun to understand ourselves, our experiences, and cognitive processes as being embedded in larger

environments. Contemporary, digitalized reality does not appear as a uniform system that integrates humans and nature as simple passive resources, like in the sombre dystopian hypotheses of Martin Heidegger, Jacques Ellul and Theodor Adorno in the middle of the 20th century. Instead, it surrounds and carries us like an environment where we live and in which we also take part actively, although not necessarily consciously.

Today, technology marks the entire environment in such a way that we live in a *technoecology*, as Hörl puts it in his introduction to *General Ecology: The New Ecological Paradigm* (2017) or *techno-nature*, as Susanna Lindberg (2020) puts it. In other words, our relation to nature as well as to ourselves is entirely mediated by technology, as shown for instance by Jean-Luc Nancy in *After Fukushima* (2015) or by Frédéric Neyrat in *Biopolitique des catastrophes* (2008) and *La part inconstructible de la terre* (2016). Therefore, if we do not take technology into account, we cannot understand and evaluate our situation. This does not mean that we can control nature by means of technology— on the contrary, the explosive growth of technology is an essential element in the emergence of technologically provoked *natural* phenomena such as the climate crisis or the sixth mass extinction, which are unwanted and unplanned consequences of the industrial revolution. We cannot control the human being, either, in the manner of a transhumanist dream where man is enhanced into an unprecedented creature invented by himself. Instead, technology, and, digital technology in particular, constitute our ecological niche in a way that needs to be made visible, evaluable and maybe transformable.

The word “ecology” helps us understand how technology surrounds and supports us. Unlike the classical sense of ecology, modern techno-ecology does not constitute only our natural context, but also our *social* and *cognitive environment* (cf. Guattari 2000). The digital environment does not surround us like a culture but rather like a kind of an *infraculture*. While a culture consists of “spiritual” things like significations, meanings and

values, the digital infraculture is made of calculations and software that do not produce values but merely follow algorithmic orders. It does not think but performs non-conscious cognition, as Hayles (2017) puts it in *Unthought*: they make up the unthought that constitutes an independent level of intellectual-like operations between physical processes and conscious thinking. Because non-conscious cognition constitutes our techno-ecological *environment*, it affects our ethical and political situation in the various ways mentioned above.

Because of its effects on the domains of ethics and justice, technology is finally also a political matter. However, it is hardly the object of political evaluation and decision in the way it should be, as human rights lawyer Alston's report, quoted above, has suggested. Bernard Stiegler, in particular, has noted the political character of contemporary technology, especially of digital technologies: today, the technological infrastructure constructed by the GAFAM (short for Google, Amazon, Facebook, Apple, and Microsoft) frames and conditions practically everyone's life. The world they construct is pleasant in many aspects, but its users have neither chosen nor designed it. On the contrary, it shapes them, particularly the youth and the children who grow into it, as Stiegler argues in *Taking Care of Youth and the Generations* (2010b). Contemporary digital reality is primarily constructed in order to profit these enterprises, not to emancipate individuals and communities to do whatever these technologies are virtually capable of enabling us to do. Hence our reality is haunted by what Frédéric Neyrat calls the "zombies and the spectres of the digital" in his article in this volume. He argues that the very structure of digital reality oppresses certain areas of life, while others easily exploit the situation – and where there is exploitation, there will also be rebellion.

The politics of the digital reality transcend most national politics, which is why it is also difficult to discuss them in traditional nation-centered political contexts. Stiegler and Neyrat show how the logic of capitalism mainly runs these politics. However, they also ask

whether they could be run otherwise. Could our contemporary techno-ecology be *cared* for so that it would serve individual and collective freedom and creation above all else? Several contributions to this volume – Roine and Piippo, Mäkelä, Adams, Kangaskoski – investigate different domains of the new digital everyday world consisting of Tweets, Google searches, snapshots and literary interfaces and the like, where new ways of identification and community-building are already at work. New political forms are doubtless being generated in these domains that are very unlike classical political institutions, for they are a curious combination of privacy and vast publicity. These digital communities are places where sense is made, communication takes place, violence is unleashed, and power is exerted. Today they often appear to be unlawful, unruly spaces where traditional politics falls into disgrace. Could they also become spaces of caring for people and of the world?

Possibilities of Ethics in the Digital Infraculture

While questions related to self-driving cars, autonomous weapon systems, or algorithms based on neural networks have received a great deal of attention in the media, the general requirements of ethical life in the contemporary digital reality have not been made sufficiently visible and evaluated. The articles collected in this volume do not intend to fix new moral rules. Such rules would probably not be long-lived, as the digital reality changes so quickly. Instead, the articles point to the need to practice one's moral skills rather than adopting definitive maxims. They invite us to maintain constant vigilance in the ever-changing environment, and to renew moral reflection in the face of unheard-of moral dilemmas. This is how the articles propose to help us to orient ourselves within the new digital infraculture. They distinguish five areas to which one should pay attention when exploring new ethical and political situations.

Firstly, digital technologies shape perception, for they do not just function as mediators, but also change the ways in which we see the world, transforming the spectrum of possibilities within which human intentions and choices are conceived (see Latour 2002, Verbeek 2011). Smartphones increasingly encourage us to relate to ourselves and others through images rather than words. These images are not the instants of naked reality they present themselves as, but are often carefully framed, filtered and fabricated messages. Digital technologies are also used to communicate verbal messages, but they favor short slogans and “reactions” rather than long explications, and they generate new forms of narration. One can hardly place such momentary expressions of self within the framework of moral acts. Nonetheless, they contribute to the formation of a particular kind of ethical character that favors a constructed modular identity – we can call this a fabricated or an artificial self, as well as note its ludic qualities (see Frissen et al. 2015) – rather than the classical ethical virtues of authenticity and sincerity. In her article in this book, Maria Mäkelä shows more exactly how the mechanisms of social media storytelling distil universal truths from arbitrary stories of personal experiences, building on strong moral positioning.

Secondly, digital technologies shape *knowledge*, not only because thinking reflects digital means of expression, but also because an increasing amount of content is being produced by digital means. Sciences and media have adapted to digital tools, and, as Hansen (2015) has argued, our focus has shifted away from past-directed recording platforms and storage toward a data-driven anticipation of the future. Furthermore, as Isabelle Stengers (2000) has shown, science has always reflected the instruments available: contemporary sciences and even humanities lean heavily on the power of computation, computational modelling, and treatment of big data. Today, the distribution of scientific results has also undergone profound transformations. In principle, printed text is disappearing and open access publishing becoming the rule, but at the same time, the problems of access, copyright

and validity are taking new forms. Information and entertainment media have found similar ways to adapt to new technologies. However, if content production and distribution have become easier, so have the production and distribution of degrading images, lies, fakes and malevolent rumors. The realm of illusion has expanded as quickly as the realm of information, if not even more quickly. Today, the problem is not really a lack of information, but the difficulty of judging its reliability. Search engines cannot tell the difference between truth and fake news. Moreover, both search engines and social media platforms are run by algorithms, which have the potential to create echo chambers and isolate users within so-called “filter bubbles”. As a result, instead of discovering new ways of seeing things, the users are repeatedly pushed back upon their old preferences, as algorithms try to predict what we want to see.

Thirdly, digital technologies shape *social relations*, not only because they transform how we show ourselves and see others, but also because they define the scope of a community in a new way. Today, our individual social networks neither simply comprise the group of people we actually share our physical space with nor the ethnical or national community to which we legally belong. Instead, they are much larger, virtually worldwide, networks of people that we are able to reach in a disembodied and ubiquitous manner. The links between these people can be fluid and still count for much. At the same time, the promise of the World Wide Web to connect and open the world is gradually turning out to be another illusion, as it is also misused in commercial and political surveillance and limited by digital walls, such as the ones that are being built around China, Russia, and other nations.

Fourthly, algorithms that affect the formation of a *just society* are being implemented. Well-known examples of the power of algorithms have been provided by, among others, Yuval Noah Harari (2016), Cathy O’Neil (2016) and Éric Sadin (2015). These demonstrate, for example, how algorithms can be used to determine if someone gets a job, a

bank loan, a good insurance, or advanced healthcare. In higher education, algorithms are used in the selecting students. Furthermore, in the court of law, algorithms are used to determine a fitting sanction, for example. Such algorithms can have a huge influence on our lives. As O’Neil has shown, while they are supposed to make evaluation processes more equitable, they can, on the contrary, enforce racial and social biases rather than eliminating them. What is more, when the choice is made by an algorithm and not by a person, the criteria of choice become opaque, and nobody can be held responsible for a contestable choice. If algorithms determine our standing and chances in the society, it is of paramount importance to verify that these algorithms are capable of treating individuals in a fair and just manner, as required in the EU and UN reports quoted above. This may require that instead of entrusting the design of these algorithms to a few specialists, we should open the black boxes of such algorithms and give them over to public debate.

Fifthly, algorithms do indeed run many functions of the *public space*.

Infrastructures such as banking, traffic, and commerce increasingly rely on digital systems. Both in the global North and the global South, more and more states use digital systems in, for example, identity verification (including developing countries such as Kenya or the state of Aadhaar in India), eligibility assessments, calculating welfare benefits and payments, and risk scoring as well as communication between welfare authorities and beneficiaries. This is useful since these systems are cheaper and quicker than human workers, and they make fewer mistakes. However, there are also reasons to be concerned by these systems. Firstly, the systems do what they are programmed to do – but what if they are not programmed well enough? Is the best way to transport goods, for example, calculated only with respect to cost and time, or also with respect to CO2 emissions? Secondly, once such powerful systems are put into operation, it is difficult to dismantle them: like automated stock exchanges, they tend to become an element of reality to which people adapt unquestioningly, instead of being an

object of public debate in the way that laws are. Not only is the technological infrastructure thus automatized, but also public space. This is apparent, for example, when news is generated by artificial intelligence, or when constant polling makes not only consumers, but also citizens, politicians, and policies adapt to queries, rather than debating them and questioning the basis on which they have been created. Lastly, digital systems such as those described above can obviously be used for questionable purposes: probably the tightest state surveillance system in the world is China's social credit system, which uses facial recognition and big data analysis technology in order to regulate social behavior. When digital technologies, including machine learning processes, become the primary means of governance, it is indispensable to look for ways of controlling them democratically. [4]

The Structure of the Volume

This volume was preceded by the conference *Moral Machines? Ethics and Politics of the Digital World*, organized at the Helsinki Collegium for Advanced Studies in the University of Helsinki in March 2019. The conference was an interdisciplinary meeting that turned out to be extremely rich and stimulating, and the editors of this book wish to thank all of its participants once more. Although the interdisciplinary breadth of the conference was needed to bring all these questions to the fore, a good book needs to be more clearly focused, and this is why this book concentrates on the analyses of the ethical, moral and political consequences of digitalization presented in philosophical, literary and media studies.

After this introduction, the book opens with Eino Santanen's poem "Should a self-driving car", originally presented as part of the artistic program of the conference. The section I, "Digital Ecologies Today", includes a contribution from one of the most prominent voices in the field, N. Katherine Hayles. Her article is followed by three sections, each

highlighting a different facet of the main issues at hand, namely, contemporary algorithm-powered media environments and their (largely nonconscious) effects on human users, the delegation of moral decisions to machines and our entanglement with the hidden ethics of digital tools, and the abstract relations between machines and humans, morals and knowledge.

In her article, Hayles contextualizes not only her own work, but also the larger issues tackled by this volume, discussing an ethics that would involve technical actors and take into account the full complexities of human-technical systems. She argues for expanding the concept of species to include digital media as symbionts to humans, as well as for re-visioning species as consisting of three categories that re-define the relation of humans to nonhumans and technical systems. Originally, Hayles's article was to be followed by an article by Bernard Stiegler. Sadly, his untimely death in the summer of 2020 interrupted his work, and also prevented the publication of his article in this volume. Because several articles in this volume refer to Stiegler's original speech, the reader of this volume benefits from knowing that it provided a more somber outlook on modern technology. Like in many of his recent works, he interpreted artificial intelligence as a continuation of the process of the depositing-and-deposing of affective, cognitive, and social functions in technical prostheses: he analyzed this process in the technical terms of "exosomatization of the noesis itself." This is a double process in which, on the one hand, the digital world is more and more our familiar home but, on the other hand, it is traversed by tendencies towards disintegration and entropy. This happens especially when the digital technologies that are, in principle, extraordinary cognitive extensions, are used to produce "artificial stupidity." Against such tendencies, Stiegler called forth counterforces capable of creating new spaces of care: or, in other words, he urged us to create "negentropic localities" against the "entropic tendencies" of the contemporary world. His thoughts are further explained and developed in this volume by

Anne Alombert and Daniel Ross in particular. With all authors, the editors of this volume wish to salute the memory of Bernard Stiegler who was one of the strongest and most original thinkers of the present technological situation, and whose work remains a model of philosophical profundity and social responsibility.

Section II, “The Ethos: Description and Formation”, presents analyses of the contemporary media environment by means of literary studies that face the challenge of virality, algorithmic platforms, and digital interfaces. Maria Mäkelä’s article concentrates on the forms of viral storytelling that can be considered as part of the general storytelling boom of the 21st century from a narrative-analytical perspective, approaching the mechanisms of social media as distilling universal truths from arbitrary stories of personal experiences. She argues that viral phenomena that are particularly narrative in nature build on strong moral positioning, thus collectively producing narrative didacticism and necessitating a postulation of an emergent “narrative agency”. In their article, Hanna-Riikka Roine and Laura Piippo continue to problematize the concept of authorship which has gone hand in hand with the understanding of authoring as a work of distinct agents, failing to acknowledge the ways in which human agency is entangled with more-than-human actors within digital environments. Taking their cue from Hayles’s concept of *assemblage*, they argue for an understanding of platforms as affective environments based on a feedback loop of a kind: they are not only affected by our actions but, in turn, shape and guide our agency.

Matti Kangaskoski’s article examines the logic of cultural digital interfaces and how this logic itself influences literary poetics with the case studies of Instagram poetry and the criteria of the Man Booker Prize from 2011 to 2018. This *logic of selection* tends to appear natural, which allows it to extend to the public sphere as well as the academic and the artistic spheres. Kangaskoski then argues that insofar as the act of selection happens *before* a conscious will or desire has been formed, it almost unnoticeably takes its place as the

affirmation of the algorithmic prediction – with significant implications for our reading. Esko Suoranta’s article, then, discusses a figure originally coined by Hayles to describe the center of the complexities of cybernetic systems, the schizoid android. Through an analysis of two novels, Dave Eggers’s *The Circle* (2013) and Malka Older’s *Infomocracy* (2016), Suoranta updates the figure into what he calls *the schizoid nondroid*, a speculative synthesis of humans and technology as well as information capitalist systems that profit from the collection and modification of behavioral data.

Section III of the volume, “The Ethos: Entanglement and Delegation”, brings together scholars approaching the delegation of moral decisions to machines and our increasing entanglement with digital tools from both philosophical and more practical angles. Philosopher Frédéric Neyrat sheds light on what happens when abstractions, “immaterial” operations, are turned into material, concrete operations that the machines can take charge of. This happens, for instance, when moral decisions are delegated to self-driving cars. He argues that the two-way exchange between the “virtual” and the “actual” is always incomplete and gives rise not only to *the zombies of the digital*, resisting the virtualization of the world, but also to *the specters of the analog*, the potentialities being repressed by the actualization of virtual entities. Susanna Lindberg’s article engages with the ongoing development of machines assuming the role of dispensing justice and takes a critical look at the complicated algorithmic systems that have the function of “just machines.” With the concrete examples of recruitment algorithms, especially those operating admission to higher education, she shows the philosophical grounds for assessing their flaws depending not (only) on bad conceptions, but also on the fact that *just machines* are inevitably also unjust machines – because they are just machines. Marc-Antoine Pencolé’s article further focuses on *the delegation* of a moral or ethical decision to an automaton. With the illustrative example of Wikipedia and of diverse peer-to-peer files exchange communities, he shifts the debate about the morality of “decision-

making” machines towards a discussion of the intrinsic or contextual elements that make the different forms of delegation a successful effectuation of collective norms – or a sheer dispossession of our autonomy.

Anna Longo shows how modern digital technologies have changed economical modeling in far-reaching ways. While classical economics made bets on the rationality of the agents, the predictive algorithms used in automated trading systems undermine the agents’ cognitive capacities and count on the agents’ ignorance. By actively increasing uncertainty, they also increase inequality in new ways that will also call for new political analyses.

Hailing from the field of communication studies, Joshua Adams then argues in his article that digital tools like search engines can reinforce current and historical inequalities. Through his analysis of Google Search results for the term “Ubuntu”, he shows how the search engine incentivizes a kind of *colonial gaze* where prevailing ideas about the democratic potential of the Internet blind users about how these tools privilege the values, beliefs, ideologies, and ontologies of the Western world.

Finally, Section IV of the volume, “The Ethos: Thinking, Computing, and Ethics”, combines philosophical studies of the relations between machines and morals, machines and humans, computational machines and knowledge, and things and humans. François-David Sebbah’s article argues that we should regard technics and ethics as two types of *light*, in the sense that they are two ways of “making appear”. He suggests that the two robust candidates for describing these two lights are Martin Heidegger’s and Emmanuel Lévinas’s descriptions of technics and ethics as modes of revelation, and, through the complicated relations between these two lights, shows how the question of the relation between machines and morals can be examined on this level of abstraction.

Anne Alombert then turns to another relation between the realms of the abstract and the concrete, questioning the notions of *Artificial Intelligence* and *Technological Singularity* in the light of Gilbert Simondon's and Bernard Stiegler's refusal of the abstract analogy between humans and machines. She then argues that, while there is no sense in comparing technical, mechanical, or computational operations to human thought, we need to focus on asking how human culture could take care of artificial, automated and digital milieus so that these technologies can support a new collective intelligence. Daniel Ross shows why the so-called artificial intelligence is not at all an intelligence in the sense of a noetic soul (following Aristotle). By further developing motives from Martin Heidegger (1995), Jacob von Uexküll (2010), and especially Bernard Stiegler, he shows why human – or more precisely “non-inhuman” – noetic soul must be distinguished both from the simply living sentient soul and from the cybernetic operations that may be autopoietic, but that do not for that matter constitute a “soul”.

In the final article of the volume, Lars Botin focuses on the boundaries between things and humans when it comes to thinking, exploring how things think and thoughts become things through the concept of *thinging*. He shows how things are basic to any kind of thinking and how any sort of things propels thinking and reflection, arguing for a view on thinking and action with the purpose of moral and political character.

Three Principles towards an Ethical Digital Reality

At the end of this introduction, we present three principles to summarize the main goals of this book with regard to taking us towards an ethical digital reality:

1. Technology, and digital technology in particular, constitutes our ecological niche in a way that needs to be made visible, evaluable and maybe transformable. At the same

time, the general requirements of ethical life in this increasingly digitalizing niche must be made visible and evaluated. Technological systems, including machine learning systems (AI), cannot act ethically, but they *condition* ethical action by creating the environment in which it takes place.

2. In order to rethink ethics in the contemporary digital reality, we must abandon current individualist theories of ethics: the ethical and political stakes in this reality cannot be explained solely in terms of an ethical theory based on an autonomous, conscious and responsible human subject – or its robotic double. Ethics belongs to the beings who can be obliged, responsible, and guilty: it still makes sense to attribute such duties to humans only, but we should see how their ethical action is unconsciously formatted by algorithmic life and algorithmic governmentality, and how they can be tempted to discharge their ethical duties on algorithmic systems.
3. Access to high technology is not the only ethical problem we face today; the very structure and use of this technology presents issues. We must conceptualize new ways of *taking care* of human beings and the nonhuman environment. We must also find ways to discuss technological structures publicly and democratically, instead of just adapting to them as if they were simply neutral means of politics.

Notes

1. Asimov formulated his laws as early as 1942 in a short story, *Runaway*, that was later included in the collection *I, Robot* (1950). The laws go as follows: A robot may not injure a human being or, through inaction, allow a human being to come to harm. A robot must obey orders given it by human beings except where such orders would conflict with the First Law.

A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

2. UNHCR reports that the most vulnerable populations, refugees, greatly profit from mobile phones not only for keeping in touch with their families but more generally for safety and security (see Kaplan 2018). Another report by UNESCO shows that mobile phones can promote literacy (UNESCO 2014).

3. Contract for the Web (see <https://contractfortheweb.org/>) is a global plan of action to “make our online world safe and empowering for everyone”. Among its principles are goals for governments (such as “Ensure everyone can connect to the Internet”), for companies (such as “Respect and protect people’s privacy and personal data to build online trust”) and for citizens (such as “Be creators and collaborators on the Web”). Its supporters include foundations such as the World Wide Web Foundation and Electronic Frontier Foundations, but also big tech companies such as Google and Facebook.

4. See the special issue of *Multitudes* 2010 / 1 (n° 40) “Du contrôle à la sousveillance.”

References

Access Now. 2016. “Human Rights Principles for Connectivity and Development.” *Accessnow.org*, October 2016, <https://www.accessnow.org/cms/assets/uploads/2016/10/The-Human-Rights-Principles-for-Connectivity-and-Development.pdf>.

Adorno, Theodor, and Max Horkheimer. 2002. *Dialectic of Enlightenment*. Stanford: Stanford University Press.

Alston, Philip. 2019. “Report of the special rapporteur on extreme poverty and human rights.” United Nations General Assembly, distr. 11 October 2019 (A/74/493), <https://undocs.org/a/74/493>.

Beever, Jonathan, McDaniel, Rudy, and Stanlick, Nancy A. 2019. *Understanding Digital Ethics. Cases and Contexts*. London: Routledge.

Cave, Stephen, and Kanta Dihal. 2019. "Hopes and Fears for Intelligent Machines in Fiction and Reality." *Nature Machine Intelligence* 1: 74–78. <https://doi.org/10.1038/s42256-019-0020-9>.

Downes, Cathy. 2018. "Strategic Blind-Spots on Cyber Threats, Vectors and Campaigns." *The Cyber Defense Review* 3, No. 1 (spring): 79–104.

Ellul, Jacques. 1964. *The Technological Society*, trans. John Wilkinson. New York: Knopf.

Emerson, Lori. 2014. *Reading Writing Interfaces: From the Digital to the Bookbound*. Minneapolis: University of Minnesota Press.

Feenberg, Andrew. 1999. *Questioning Technology*. London and New York: Routledge.

Finn, Ed. 2017. *What Do Algorithms Want: Imagination in the Age of Computing*. Cambridge, Ma: The MIT Press.

Fisher, Max & Amanda Taub. 2019. "How YouTube Radicalized Brazil." *The New York Times*, August 11, 2019. <https://www.nytimes.com/2019/08/11/world/americas/youtube-brazil.html>.

Frissen, Valerie, Sybille Lammes, Michiel de Lange, Jos de Mul & Joost Raessens. 2015. "Homo Ludens 2.0: Play, Media, and Identity." In *Playful Identities: The Ludification of Digital Media Culture*, edited by Valerie Frissen et al., 9–50. Amsterdam: Amsterdam University Press.

Galloway, Alexander and Eugene Thacker. 2007. *The Exploit: Theory of Networks*. Minneapolis: University of Minneapolis Press.

Georgakopoulou, Alexandra. 2017. "Narrative/Life of the Moment: From Telling a Story to Taking a Narrative Stance." In *Life and Narrative: The Risks and Responsibilities of Storying Experience*, edited by Brian Shiff, A. Elizabeth Kim, and Sylvie Patron, 29–54. Oxford: Oxford University Press.

Guattari, Félix. 2000. *The Three Ecologies*. Trans. Ian Pindar and Paul Sutton. London and New Brunswick: The Athlone Press.

Hansen, Mark B.N. 2015. *Feed-Forward: On the Future of Twenty-First Century Media*. Chicago: The University of Chicago Press.

Harari, Yuval Noah. 2016. *Homo Deus: A Brief History of Tomorrow*. London: Harvill Secker.

Hayles, N. Katherine. 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. Chicago: University of Chicago Press.

—. 2017. *Unthought. The Power of the Cognitive Nonconscious*. Chicago: University of Chicago Press.

- Heidegger, Martin. 1977. *The Question Concerning Technology and Other Essays*, trans. William Lovitt. New York and London: Garland Publishing.
- Heidegger, Martin. 1995. *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude*. Translated by William McNeill and Nicholas Walker. Bloomington and Indianapolis: Indiana University Press.
- Hui, Yuk. 2016. *On the Existence of Digital Objects*. Minneapolis and London: University of Minnesota Press.
- . 2019. *Recursivity and Contingency*. London: Rowman and Littlefield.
- Hörl, Erich. 2017. “Introduction to General Ecology: The Ecologization of Thinking”. Trans. Nils F. Schott. In *General Ecology: The New Ecological Paradigm*, edited by Erich Hörl and James Burton, 1–74. London: Bloomsbury.
- Kaplan, Ivy. 2018. “How Smartphones and Social Media have Revolutionized Refugee Migration.” *UNHCR Blogs*, 26 October 2018. <https://www.unhcr.org/blogs/smartphones-revolutionized-refugee-migration/>
- Kurki, Visa. 2019. *A Theory of Legal Personhood*. Oxford: Oxford University Press.
- Kurzweil, Raymond. 1990. *The Age of Intelligent Machines*. Cambridge (Ma): MIT Press.
- Latour, Bruno. 2002. “Morality and Technology: The End of the Means.” *Theory, Culture and Society* 19, no. 5–6: 247–260.
- Lehtiniemi, Tuukka & Minna Ruckenstein. 2019. “The Social Imaginaries of Data Activism.” *Big Data & Society* 6, no. 1: 1–12. <https://doi.org/10.1177/2053951718821146>.
- Lin, Patrick, Keith Abney, and Ryan Jenkins. 2017. *Robot ethics 2.0. From autonomous Cars to Artificial Intelligence*. Oxford: Oxford University Press.
- Lindberg, Susanna. 2020. *Techniques en philosophie*. Paris: Hermann.
- Madiega, Tambiama. 2019. *EU guidelines on ethics in artificial intelligence: Context and implementation*. Briefing for European Parliamentary Research Service. PE 640.163, September 2019. https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/640163/EPRS_BRI%282019%29640163_EN.pdf.
- Manovich, Lev. 2013. *Software Takes Command: Extending the Language of New Media*. New York and London: Bloomsbury.
- Meadows, Donella H. 2008. *Thinking in Systems: A Primer*. Ed. Diana Wright. London: Earthscan.
- Morton, Timothy. 2013. *Hyperobjects. Philosophy and Ecology after the End of the World*. Minneapolis & London: University of Minnesota Press.

- Murray, Janet. 2011. *Inventing the Medium. Principles of Interaction Design as a Cultural Practice*. Cambridge, MA: The MIT Press.
- Nancy, Jean-Luc. 2015. *After Fukushima. The Equivalence of Catastrophies*, trans. Charlotte Mandell. New York: Fordham University Press.
- Neyrat, Frédéric. 2008. *Biopolitique des catastrophes*. Paris: Éditions Dehors.
- . 2016. *La part inconstructible de la terre. Critique du géo-constructivisme*. Paris: Seuil.
- O’Neil, Cathy. 2016. *Weapons of Math Destruction*. New York: Crown Books.
- Page, Ruth. 2019. *Narratives Online: Shared Stories in Social Media*. Cambridge: Cambridge University Press.
- Poikola, Antti, Kai Kuikkaniemi, and Harri Honko. 2015. “MyData – A Nordic Model for human-centered personal data management and processing.” Ministry of Transport and Communications, Finland, 2015. <http://urn.fi/URN:ISBN:978-952-243-455-5>.
- Ruckenstein, Minna and Linda Lisa Maria Turunen. 2019. “Re-humanizing the Platform: Content Moderators and the Logic of Care.” *New Media & Society*: 1026–1042. <https://doi.org/10.1177/1461444819875990>
- Sadin, Éric. 2015. *La Vie algorithmique. Critique de la raison numérique*. Paris: L’Échappée.
- Sandler, Ronald L. (ed.). 2014. *Ethics and Emerging Technologies*. London: Palgrave Mcmillan.
- Snell, Karoliina. 2019. “Health as the Moral Principle of Post-Genomic Society: Data-Driven Arguments against Privacy and Autonomy.” *CQ: Cambridge Quarterly of Healthcare Ethics* 28, no 2: 201–214. <https://doi.org/10.1017/s0963180119000057>.
- Stengers, Isabelle. 2000. *The Invention of Modern Science*. Trans. D.W. Smith. Minneapolis: University of Minnesota Press.
- Stiegler, Bernard. 1998. *Technics and Time, 1: The Fault of Epimetheus*. Trans. George Collins and Richard Beardworth. Stanford: Stanford University Press.
- . 2008. *Technics and Time, 2: Disorientation*. Trans. Stephen Barker. Stanford: Stanford University Press.
- . 2010a. *Technics and Time, 3: Cinematic Time and the Question of Malaise*. Trans. Stephen Barker. Stanford: Stanford University Press.
- . 2010b. *Taking Care of Youth and the Generations*. Trans. Stephen Barker. Stanford: Stanford University Press.
- . 2011. *The Decadence of Industrial Societies: Disbelief and Discredit, volume 1*. Trans. Daniel Ross. Cambridge: Polity Press.

- . 2012. *Uncontrollable Societies of Disaffected Individuals: Disbelief and Discredit*, volume 2. Trans. Daniel Ross. Cambridge: Polity Press.
- . 2014a. *The Lost Spirit of Capitalism: Disbelief and Discredit*, volume 3. Trans. Daniel Ross. Cambridge: Polity Press.
- . 2014b. *Symbolic Misery, book 1. The Hyperindustrial Epoch*. Cambridge: Polity Press.
- . 2015. *Symbolic Misery, book 2. The Catastrophe of the Sensible*. Cambridge: Polity Press.
- . 2016. *Automatic Society. Volume 1: The Future of Work*. Cambridge: Polity Press.
- Tomlinson, Joe. 2019. *Justice in the Digital State. Assessing the Next Revolution in Administrative Justice*. Bristol and Chicago: Policy Press Shorts.
- UNESCO. 2014. “UNESCO study shows effectiveness of mobile phones in promoting reading and literacy in developing countries.” *Unesco.org*, 23 April 2014.
<https://en.unesco.org/news/unesco-study-shows-effectiveness-mobile-phones-promoting-reading-and-literacy-developing-0>.
- von Uexküll, Jakob. 2010. *A Foray into the Worlds of Animals and Humans, with A Theory of Meaning*. Translated by Joseph D. O’Neil. Minneapolis: University of Minnesota Press.
- Verbeek, Peter-Paul. 2011. *Moralizing Technology: Understanding and Designing the Morality of Things*. Cambridge: Cambridge University Press.
- Villani, Cédric. 2018. *For A Meaningful Artificial Intelligence. Towards a French and European Strategy*. A mission of the French Parliament 8 September 2017 to 8 March 2018.
https://www.aiforhumanity.fr/pdfs/MissionVillani_Report_ENG-VF.pdf.
- Wardrip-Fruin, Noah. 2009. *Expressive Processing: Digital Fictions, Computer Games, and Software Studies*. Cambridge, MA. and London: The MIT Press.
- Zuboff, Shoshana. 2019. *The Age of Surveillance Capitalism. The Fight for a Human Future at the New Frontier of Power*. London: Profile Books.