Journal of Politics and Ethics in New Technologies and AI

Vol 2, No 1 (2023)

Journal of Politics and Ethics in New Technologies and AI

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doi: 10.12681/jpentai.33299

Journal of Politics and Ethics in New Technologies and AI
Volume 2, Issue 1 (2023)
e-ISSN: 2944-9243

https://doi.org/10.12681/jpentai.33299

RESEARCH ARTICLE

A Public Sphere for AI

Themis Tzimas
Lawyer & Adjunct Lecturer, Department of Political Science, Democritus University of Thrace, Greece.

Abstract

The present article addresses key elements of the unique ontology of AI and argues that these require the expansion of the public sphere, in order to successfully manage the entry of new intelligent actors in legally regulated relationships which are based on the identification of causal connections. In this sense it attempts to link law and political science, given that the governance of any phenomenon or field includes law and in particular the detection, of legally interesting, causal relationships. Regulating such relationships effectively offers legal certainty, which in turn is a fundamental element of effective governance. In our self- evidently, human- centered world, whether we are talking about natural persons, or for legal persons, it is self- evident that there is, in the end, a human hand behind the causal relations with which law is involved. Once other non- human, intelligent actors gradually enter the forefront, these causal relations become further complicated. It is on these complications and their impact that we focus.

Keywords: Artificial Intelligence, Regulation, Intellectual Property, Governance

Introduction

The debate about AI and the different aspects of governance, although it has begun, remains less developed than the significance of the phenomenon justifies. In this article we argue that key elements of the unique ontology of AI require the expansion of the public sphere, among other reasons, in order to successfully manage the entry of new intelligent actors in legally regulated relationships which are based on the identification of causal connections.

It is on this aspect of AI governance, which links law and political science, that the present article focuses on. We also start from the premise that the governance of any phenomenon or field includes law and in particular the detection, of legally interested, causal relationships. Regulating such relationships effectively offers legal certainty, which in turn is a fundamental element of effective governance.

Law, as an aspect of the governance of our relations, is based on the attribution of legal personality, whether to natural persons or to artificial, legal persons. In our self- evidently, human- centered world, whether we are talking about natural persons, or for legal persons, it is self- evident that there is in the

end, a human hand behind the causal relations with which law is involved. Once other, non- human, intelligent actors gradually enter the forefront, these causal relations become further complicated. Complications are caused on the one hand by the difficulty of connecting the concept of creativity, work and responsibility with non-human actors and on the other hand by the fact that both material benefit and punishment or any form of sanction are also adapted to human ontology and action.

The main argument that we present in this article is that the unique ontology of AI requires an expanded public sphere to which on the one hand the autonomous creations will belong, while on the other hand it will be able to function as a compensation scheme for torts arising from the autonomous operation of AI.

We start by referring to certain elements of the ontology of AI, then we move on to examining the importance of causality in achieving legal certainty. We focus on the protection of IP norms and tort law, since they are two obvious areas of law where causality is fundamental, under the prism of AI. On the basis of the above we support the need for an expanded public sphere.

1. The Unique Ontology of AI

In the world of humans, which is the world as we still understand it, and regarding humans, we know reason, intelligence and self- awareness, almost always, when we see it. There is occasionally some degree of uncertainty but in spite of all the ambiguity that emerges under extreme conditions, we easily agree that higher intelligence constitutes the realm of humanity. This is why a complete legal personality and all that flows out of it, is a human privilege.

Artificial Intelligence -AI- is getting closer to changing the fore- mentioned, seemingly, self- obvious fact. The variety of definitions of AI, despite their ambiguity share some common elements: the replication of human thinking, the demonstration of rationality (Ruseell & Norving, 2010), consciousness, self-awareness, language use, ability to learn (Scherer, 2016) or intelligence by computational agents (Poole & Mackworth, 2010) and for some the mere mimicking of aspects of human intelligence (Charniak & McDermott, 1985; Rich & Knight, 1991; Scherer, 2016), are all aspects of the ontology of AI.

The fundamental element of AI is its intellectual autonomy, which is expanding and provides it with the capacity to adapt to novel environments (Omohundro, 2008; Russell & Norving, 2010). This is what makes AI invaluable: the passage from automation, to autonomy. Autonomy means that AI is not the mere outcome of software programming but that it imitates and reproduces the learning procedure

which is followed by humans, through machine-learning, as envisioned by Alan Turing (McCarthy, 2008; Lake et al., 2016).

Alan Turing's approach was that computers could imitate children's minds, methodology and evolution:

> *"[I]nstead of trying to produce a programme to simulate the adult mind, why not rather try to produce one which simulates the child's? If this were then subjected to an appropriate course of education one would obtain the adult brain… There is an obvious connection between this process and evolution…. One may hope, however, that this process will be more expeditious than evolution."* (Turing, 1950, p. 456)

Through the different types of machine learning (Tito, 2017) - i.e. "supervised learning", which "*uses a set of examples with a label informing the algorithm of the expected output*…", "[R]einforcement learning," where "*algorithms learn how to choose between a set of actions to accomplish a task that will maximize some reward*…" and "unsupervised learning" which "…*refers to the problem of designing algorithms which can learn by themselves without any external goal (either a list of labelled examples or rewards) and which would be able to come up with their own goals*" (Righetti, 2016) - and in spite of the challenges that the development of machine- learning faces (Davies & Marcus, 2015), it produces impressive results (Müller & Bostrom, 2016; SAS, n.d.),[1] which sustain the quest of enhanced AI autonomy (Karnow, 2016).

The goal of machine- learning is to achieve in terms of the intelligence of AI, natural- like, evolutionary patterns and therefore to come up with solutions to a wide range of not predetermined, problems, without necessarily having humans in the loop (Bostrom, 2014). It is on such grounds, that AI autonomy is built and evolves. Machine- learning also explains why as AI evolves its nature becomes probabilistic, non- linear, complicated, opaque and therefore unpredictable.

There are two fundamental uncertainties, that machine- learning meets due to the fact that it functions in non- deterministic environment: environment and model uncertainty (Huszár, 2015). Therefore, what AI is expected to be doing is to learn and decide, on the basis of the action with the highest expected utility, in light of the AI system's basic preferences and goals (Bostrom, 2014).

It is this procedure and the goals that it serves, those which push AI towards demonstrating and developing characteristics such as logic as a tool of analysis (Thomason, 2003) - creativity, problem

[1] According to Müller and Bostrom (2016), "*The median estimate of respondents was for a one in two chance that high-level machine intelligence will be developed around 2040-2050, rising to a nine in ten chance by 2075. Experts expect that systems will move on to superintelligence in less than 30 years thereafter*".

solving, pattern recognition, classification, learning, induction, deduction, analogies building, optimization, surviving in an environment and language processing (Hutter, 2010; Hallevy, 2018), cognitive autonomy, intuition and strategic thinking (Camett & Heinz, 2006; Suchman & Weber, 2016; Yanisky-Ravid & Liu, 2018; Hallevy, 2018).

The above -mentioned procedure of AI explains how, since we "trust" a procedure similar to the learning of children, in order to train machines, we necessarily also "accept" the consequences of the "black box effect" in terms of AI behavior and decision- making (UK Government Office for Science, 2015; Castelvecchi, 2016).

While it remains almost impossible to completely predict the evolution of AI autonomy and of machine- learning, we know that AI machine- learning, at large based on artificial neural networks is already surpassing "rules- based programming" (Pyle & San Jose, 2015), which means that it already possesses the capacity to function autonomously from the human programmer and surpass by far human intelligence –*currently*- in narrow, pre-determined areas as well as to evolve and even re-program itself.

The above- mentioned "structure" is what sustains and evolves AI autonomy. On the one hand, as AI autonomy evolves, gradually pushes humans out of the loop, whereas on the other hand provides to AI an expanding variety of aspects of intelligence (Russell & Norving, 2010; Laton, 2017).

Of course, AI has not yet achieved general intelligence.[2] It remains a question whether it will do so. An even more puzzling question is whether it will achieve consciousness and what that means both from an AI and a human intelligence, perspective. Still, regardless of any potential answer to the above questions or setback in the evolution of AI, we are already witnessing -and we will do so even more in the future- AI entities emerging as at least partially, intelligent and autonomous actors, playing a

[2] AI is roughly distinguished between weak AI, where "the computer is merely an instrument for investigating cognitive processes" and strong AI, where "[t[he processes in the computer are intellectual, self-learning processes." Weak AI is called Artificial Narrow Intelligence-ANI- while strong AI is distinguished between Artificial General Intelligence –AGI- and Artificial Super Intelligence-ASI. ANI is already present, whereas AGI and ASI are anticipated or speculated." Although it is with AGI and ASI that a level equal or superior, respectively, to human intelligence will be reached, even now, ANI is already in the course of growing autonomy, in the sense of "…*systems capable of operating in the real-world environment without any form of external control for extended periods of time*." (Urban, 2015; Heath, 2018; Bekey, 2005). AGI is expected to be the "*type of adaptable intellect found in humans, a flexible form of intelligence capable of learning how to carry out vastly different tasks, anything from haircutting to building spreadsheets, or to reason about a wide variety of topics based on its accumulated experience*." (Heath, 2018). In this sense, the lesser that AI is based on programming and the more it is based on experience, the closer it gets to AGI (Moravec, 1976). Super intelligence moves one step further and refers to the exceeding of human intelligence in the sense of "*any intellect that greatly exceeds the cognitive performance of humans in virtually all domains of interest*." (Bostrom, 2014).

crucial role in causal relationships. After all, for AI it is fundamental to be able to adapt to change (Russell & Norving, 2010).

Governance and in its framework, law need to take into account this development and potential of AI. It is in this sense that we must design norms regulating the legally significant causalities, taking into account the existence and the potential evolution of AI as a new type of intelligent actors.

A significant obstacle in terms of the efficiency of any design for the governance of AI is that we need to take into account is that we cannot completely or even proximately in some cases predict the range of forms that AI entities may take as intelligent actors, due both of the technological evolution of AI per se, as well as of our incapacity to understand completely human intelligence, which after all constitutes the basic criterion for the assessment of the evolution of AI.[3]

2. The Causality in Law: IP and Tort Law

The identification of causal relationships constitutes one of the foundations of human reason. In fact, it is at the basis of our ability to draw conclusions both about already known environments and relationships, and about unknown ones. The identification of causal relationships and the reward or punishment on their basis offers for different reasons an aspect of necessary security, crucial both for the effectiveness of the governance of our societies in general, and for the consolidation of legal certainty.

As we saw before, the autonomy of AI marks the entry of new intelligent actors in the context of causal relationships. This condition means that more and different stages compared to what we know as of now, within the legally significant causal relationships intervene until the final result occurs.

Governance and law should therefore plan how to answer a number of questions: what extent of human presence in the loop -if any- is obligatory in the framework of legally valid interactions and relations?

[3] In terms of the significance of AI capacity to replicate human intelligence, as a defining paragon of AI, two contradictory "tests" have been proposed: the one is the so –called Turing Test, which is in fact an imitation game aiming at the identification of intelligent machines. The idea of the test is that if a computer can fool a human judge into making him/her believe that the mysterious interlocutor on the other side is human. The Turing test focuses upon the external manifestation of intelligence as indicator of the emergence of higher of intelligence. The Chinese Room Argument by the philosopher John Searle indicated the possible flaws of the Turing test by trying to prove that AI can manifest capacities of intelligence without actually comprehending the semantics of higher intelligence of human type and without therefore developing the subjective, mental experience of human intelligence (Hern, 2014; Cole, 2020). Both of these tests, as well as the wider discussion about AI are related to the fact that consciousness is notoriously complicated or even elusive until now (Dennet, 1978; Minsky, 1985; Greely, 2018). As long as consciousness remains a privilege of humans our way to identify is more or less "we know it when we see it". Things -will- get even more complicated with AI: even if we see it, are we sure that it is actually there? Can we trust the external manifestation of consciousness, when demonstrated by machines which are created and trained to imitate? (McGinn, 1991; Chalmers, 1996, 2008; Jihnson-Laird, 1983; Frye, 2018).

Should we accept the prospect of legally significant relations and interactions, for example in the legal area under examination in the present article, although not only in this one, with no human presence in the loop? We should always identify a "human hand" that is entitled to the profit or should bear the responsibility? If so, who should that be? The designer of the software? Those harvesting big-data and the "machine-trainers? The owner of the AI entity?[4]

To date, the legal framework has not been able to keep pace with these evolving technologies and their consequences. Among other legal areas, the issues of profitability from AI and of the wider nexus of intellectual property norms, as well as the legal issues of liability are still regulated predominantly, solely under the present, completely, human-centered norms of the era of automation. That creates the potential for legal gaps.

In order to examine how legally significant causalities should be governed, the starting point is to examine how they are regulated in the present. We focus on IP and tort law as they constitute two areas of law which are characteristic of the significance of legal causality.

Intellectual property "*…very broadly, means the legal rights which result from intellectual activity in the industrial, scientific, literary and artistic fields*" (WIPO, 2014). The main goal of intellectual property is the transformation of knowledge into economic value (Manderieux, 2010), because of the practical application of the intellectual activity (WIPO, 2014).

The theoretical foundation of intellectual property norms is the causal link between the work of the creator and the reward for it, as a material motive for further innovative work (Khoury, 2016; Fisher, 2001). Therefore, IP norms' foundation includes both a material and ethical motive, in order for innovativeness and its practical implications to evolve (United Nations, 1975). It is obvious that this causal relationship is important only as long as human labor and innovativeness is rewarded. For any other intelligent actor is pointless.[5] Therefore, in an environment of autonomous, intelligent, non-human beings who will be entitled to such rewards and rights, if any? (Sobel, 2017).[6]

[4] Even this last option can easily turn out to be problematic, considering the previous conversation concerning the possibility of self-replicating AI entities, which essentially may not be owned by anyone.

[5] Parenthetically, there is also the contradictory approach that is built on a wider polemic against patents, mainly because of their lack of social utility (Krauss, 1989; Bethards, 2004; Cohen, 2006; Salzberger, 2006).

[6] To this difficult question, we should take into consideration the fact that according to IP law, an invention in order to be protected under IP law must be specific, which very often contradicts the inexplicability and the unpredictability of AI (Hashiguchi, 2017). Further, it is problematic that inventions in relation to AI mostly refer to the methods and the devices that are designed to carry out mental steps.

When we examine AI applications, even at the level of ANI, which replicate human mental activities we must examine if these activities belong still in the area of automation,[7] being therefore pre-determined by the software designer or fall into the area of autonomy, constituting not pre- designed and unpredictable by humans, applications. There are already cases of creative works conducted by autonomous algorithms, such as for example in music (Shi, 2016; van den Oord et al., 2016), pictures (Mordvintsev et al., 2015) and writing (The Guardian, 2020), as well as cases of expanding autonomy of AI inventions in drug industry among other areas with concrete industrial applications. As Abbott (2016a) wrote, "*Soon computers will be routinely inventing, and it may only be a matter of time until computers are responsible for most innovation.*"

While patent laws have been designed on the assumption that only humans can demonstrate inventiveness (Kim, 2018),[8] creativity and inventiveness are gradually demonstrated by non- human actors as well. Machines even today are considered as merely mediators of human creativity (Burrow-Giles Lithographic Co. v. Sarony, 1884; WIPO, 1979; Apple Computer, Inc. v. Franklin Computer Corp, 1983, as cited in de Cock Buning, 1998). Whenever a machine is endorsed in the procedure of innovativeness, we search for a causal relationship that can be traced back to a human inventor.[9] The actions of a machine are considered as pre- determined and automated by the humanly designed software (Tremblay, 2015; Palace, 2019), which means that the effort then is to attribute rights from innovativeness to a natural or an artificial legal person, often and gradually, regardless of the potential creativity of AI.[10]

[7] This is the prevalent as of now approach, based on the precedent of technologies such as photography, video- games and computers (Burrow-Giles Lithographic Co. v. Sarony, 1884; U.S. Copyright Office, 1965; U.S. CONTU, 1978; Midway Mfg. Co. v. Artic Intern., Inc., 1983; Jaszi, 1992; Grinmelmann, 2016).

[8] Characteristically, the US copyright office back in the year 1956 had determined that the author of any copyrightable work must be human, a position which was reiterated again in relevant, future, cases, in front of both of the courts and of the copyright office. With a similar understanding, when the US patent law was adopted, it was stated in the US Congress that it involved "anything under the sun that is made by man." (Pearlman, 2018). In such a framework, the US Copyright Act, characteristically states that copyright can be granted for an "original work of authorship fixed in any tangible medium of expression", while the relevant Copyright Office has established the "Human Authorship Requirement", according to which, *""[t]o qualify as a work of 'authorship' a work must be created by a human being."* (Pub. L. No. 94-553, 90 Stat. 2541, 1976; U.S. Copyright Office, 2017).

[9] "*Although […] the human input as regards the creation of machine-generated Programs may be relatively modest, and will be increasingly modest in the future [...] nevertheless, a human 'author' in the widest sense is always present, and must have the right to claim authorship in the program.*" Commission (1989, Article 1).

[10] After all, this is what several court decisions have maintained. The Court of Justice of the EU –CJEU- in the "Infopaq case" concluded that regarding author's creation and its patentability, the work must be attributed to the author in order to qualify for such protection. The important elements are the genuineness of the work- not constituting replica of an earlier work- and the subjectivity of the author- i.e. of the creator of the work (Case C-5/08, 2009; Case C-393/09, 2010; Case C-403/08, 2011; Case C-145/10, 2011; Case C-604/10, 2012; Case C-393/09, 2010). See also Case C-403/08 and C-429/08.

Discussions about the material reward for the programmer or the owner of an AI entity, reaffirm the human-centered approach (Bridy, 2012).[11] The attribution of reward to programmers, assumes that the initial software design constitutes the main causal link between the innovativeness and its practical application. The problem in this approach consists in that while the programmer of AI initiates AI evolution, this contribution is not necessarily the main or the sole regarding AI future evolution and actions.

As we already said, machine learning and AI autonomy produce unpredictable and unexpected outcomes (Tanz, 2016; Gilbert, 2017). The initial software design, especially as AI autonomy grows sets in motion a sequence of events which do not always or necessarily constitute the linear outcome of their software design and therefore cannot be attributed to the programmer's initial work, especially up to extent that patent-eligibility would require. Regarding the attribution of economic reward to the owner of the AI system, while that seems more practical, it does not align neither with material reward for labor, nor for innovativeness.

While there is still, many AI applications and acts, which could partially align with our traditional, human-centered, reward schemes, the truth is that they gradually retreat under the weight of AI's expanding autonomy. The problem then with the human- centered approaches is that they overlook the extent and the significance of AI autonomy and demonstration of creativity or of aspects of it by AI.[12]

Creativity, until now is considered as self-evidently human (de Cock Buning, 2016). Contrary to that, we are already witnessing aspects of AI-oriented creativity. AI systems can write their own articles and compose music, design new medicine, play games - potentially the most fundamental demonstration of creative thinking - among different manifestations of creativity. The demonstration of aspects of creativity by AI is already underway and, in this sense, there is inconsistency with current laws (Pearlman, 2018).

The judiciary is in general negative in recognizing patent eligibility for non- human creations, although there is one at least different case; that of Jonathon Koza's AI system' invention- the genetic programming invention- for which however it was eventually, again, the human inventor of the AI system the one who received patent (Keats, 2006).

[11] "*Perhaps the best reason to allocate ownership interests to someone, however, is that someone must be motivated, if not to create the work, then to bring it into public circulation*." (Samuelson, 1986).
"*Contract arrangements between the copyright owner of a computer program and those who use the program to create new works can be relied upon to allocate rights in the works created*." (Goldstein, 2014, § 2.2.2).

[12] Going back to the US Copyright Office (2017, § 313.2), it is characteristic that it states it "*will not register works produced by a machine, that operates randomly or automatically without any creative input or intervention from a human author*." What if such creative input however can be externalized by a non- human actor? DeepMind indicates for example some extent of creativity (Mordvintsev et al., 2015).

On such grounds it is suggested that AI can already produce patentable material (Abbott, 2016a; 2016b). Of course, it is almost impossible to come up with a quantification of creativity, so that we can determine what extent of creativity can lead to a creation that may be considered as patent eligible (Feist Publications, Inc., v. Rural Telephone Service Co., 1991).

The crucial point here however consists in the fact that we can trace the origins of innovativeness, in terms of creativity, not only in humans but gradually in "machines" as well. If creativity can be a characteristic of AI as well, then the most crucial causal connection leading to innovativeness and material profit can be non- human oriented (Ritchie, 2007). Therefore, patent eligible creations can emerge from non-human intelligent actors which make us wonder, whether protection under IP norms for such creations makes any sense (Abbott, 2016a). In fact, once we are talking about creation of non-human origin, the very sense of creativity changes (Sachs, 2016). As stated in the sixty-eighth annual report of the Copyright Office (1965):

> *"[t]he crucial question appears to be whether the "work" is basically one of human authorship, with the computer merely being an assisting instrument, or whether the traditional elements of authorship in the work (literary, artistic or musical expression or elements of selection, arrangement, etc.) were actually conceived and executed not by a man but by a machine*."

As AI autonomy "grows" and automation is surpassed towards autonomy, the causal connection between the mental conception and the industrial application can be projected on AI as well (Pearlman, 2018; Palace, 2019). What such causality would mean in terms of law is that protection of the final creation under IP norms becomes either irrelevant or unfair (Ralston, 2005).

Although there are experts who have argued in favor of the provision of IP norms protection to AI as well (Hristov, 2017), neither material reward nor material motivation are relevant with AI (Samuelson, 1986; Hattenbach & Glucoft, 2015). In fact, the potential speed of AI innovativeness will make us envisage on what innovativeness is and on how non- obvious is (Samore, 2013). As stated by Plotkin (2009), "*Supply every engineer with state-of-the-art artificial invention technology and train them in how to use that technology, and you have effectively boosted the level of ordinary inventive skill in the field*."

In addition, the attribution of IP norms protection to a natural or an artificial, legal person who are not linked to the initial, creative thinking would be unfair since it would provide material advantage

without any causal connection with the creative thinking that led to the industrial application (Patry, 2016).[13]

Rewarding humans for AI creativity is like rewarding parents for their children's creations (Abbott, 2016a); or as the courts in the US concluded, employing someone to invent does not make you an inventor (Abrams, 2009; Plotkin, 2009; Schuster, 2018; Palace, 2019). The problem with an unfair practice is not only that it is unfair but that it builds a cumulative effect in favor of those in power, thus reproducing and magnifying social, economic and political inequalities.

On the basis of the aforementioned developments, it is reasonable to argue in favor of an expanded public sphere, within which AI autonomous entities' creations should be placed (Clifford, 1997). In this sense, AI may emerge as pioneer for a new "wave" of universal access to science, technology and their applications.[14] There is no reasonable ground why anyone among us - natural or artificial legal person- should exclude all others from the profit and the scientific progress that autonomous AI autonomy creates.

The other sideof causality is the one related to liability- within which an obvious area is that of tort law albeit not the only one (Bekey et al., 2011). Liability is raised *"(i) when the product created deviates from its intended design (manufacturing defect), (ii) when the product should have been designed differently to avoid a foreseeable risk of harm (design defect), or (iii) when companies fail to provide instructions or warnings that could have avoided foreseeable risks of harm (failure to warn)."* (Nersesian & Mancha, 2021, p. 66). Tort law applies in cases of dangerous or unreasonable conduct which may be intentional or negligent (Nersesian & Mancha, 2021). Liability, both in general and in relation to tort law is based on the causal relationship between defect caused intentionally or by negligence which constitutes breach of the safety rules, on the one part and damage on the other end (de Bruin, 2016). The important element lies in the existence of a causal connection between the defect and damage (Prosser et al., 1984; MacCoun, 1993).

Again, the evolving autonomy of AI transforms the foundations of the attribution of responsibility: "*the development of more versatile AI systems combined with advances in machine learning make it all but certain that issues pertaining to unforeseeable AI behavior will crop up with increasing frequency and that the unexpectedness of AI behavior will rise significantly*" (Sherer, 2016, pp 359-

[13] The public has no inherent interest in who owns the copyright so long as works are placed into the marketplace. Under this instrumental approach to copyright, "author" is a construct denoting merely the initial owner of all rights. That initial owner may be the actual individual who created the work, but need not be.

[14] The role is to "*serve an essential purpose in democratic society by providing a common reservoir of information upon which an informed citizenry can make choices*" (Erickson, 2010).

60), or to put it in other terms "…*it would be hard to determine whether the precise cause was the operating system or the application (and, if the latter, which application). This analysis is all the more difficult where the software is open source (since no single author is responsible) and the hardware can be easily modified*." (Calo, 2011).

The emergence and evolution of AI makes it increasingly difficult to determine the exact person or entity that must be held liable, due to the different layers which are involved in AI development and its inherent unpredictability (Merchant & Lindor, 2012; Solow-Niederman, 2020). This unpredictability on the one hand constitutes an actual problem in terms of tracing the one responsible -if any- for the harmful AI actions and on the other hand could help those actually responsible evade their responsibilities (Vladeck, 2014). We find ourselves in the difficult (im)balance between not being able to accurately identify the causal relationships leading to the final event raising liability and having to hold liable a probably, ontologically indifferent to any such penalties, non- human entity (Bathae, 2020).[15]

The difficulty emerges from the fact that once other, non- human, intelligent actors are introduced into the causal connection that leads to a specific act or omission, the identification of the responsible person becomes more difficult as humans are pushed away from the loop (Karnow, 1996). Who among the implicated individuals and entities is to be held liable? The programmer, the owner, any other in between or the AI entity per se? (Browne & Harrison-Spoerl, 2008; Knight, 2017; Seseri, 2018).

We need a set of different liability, risk, as well as autonomy factors, clarifying liability for the human behind the AI, in the wider chain of design, ownership and use of AI. At the narrow end of AI, the latter is closer to automation.[16] Therefore, it constitutes more of an "innocent agent" (Solum, 1992). Software designer or the owner of AI could be rather easily identified as those bearing responsibility (Hallevy, 2010). The former is responsible for conducts determined by software defects, where the latter for conducts emerging from harmful use of the AI (Decker, 2014).

However, as we move away from automation, towards autonomy, things become more complicated (Tanz, 2016). AI becomes a superseding cause; that is, "*an intervening force ... sufficient to prevent liability for an actor whose tortious conduct was a factual cause of harm'--of any harm that such systems cause*" (Scherer, 2016, p. 365). In many ways, by adhering to the evolving nature of AI we endorse its potential unpredictability.

[15] By the way, the EU Parliament is trying to come up with new legal regulations, dealing with responsibility from AI as well as with the potential legal personality of the latter (European Parliament, 2017).
[16] Such is the determination of responsibility also, once the malfunction is an outcome of hardware.

From the initial software which aims at creating an evolving algorithm, to harvesting and use of big data, up to the use of such an algorithm in our everyday life as well as in a variety of crucial sectors of public and private life, we accept the interference of an unpredictable -at least partially -actor. The above does not negate the fact that there may be misuse anyway of AI by humans. In such cases and in spite of the difficulties that may emerge, liability can be traced back to a human or human-administered actor. The main point is that the gradual acceptance of AI's role necessarily leads to the acceptance of a society of wider and not only, human- oriented or nature- oriented, risk.

The acceptance of a society of wider risk will certainly have an impact on the rules about liability; however, it cannot lead to a situation of liability vacuum. What we need is to adjust liability to the different levels of AI autonomy. We cannot have an "one size fits all" approach to AI acting in different areas of human conduct and of different autonomy.

A scale of risk factor should be adopted so that liability is designed on the basis of a combination of the area of AI actions and of the level of AI autonomy. For example, AI driving cars, treating patients, participating in wars and guessing our choices in music are not active in areas of identical significance. In the latter case, the presence of human in the loop is not important. In the first three cases, it is on the contrary necessary to have some type of human oversight and monitoring. If the area of AI activity is the one parameter, the other should be the level of AI autonomy.

On the basis of such a combination, a variety of measures can be adopted; some AI applications may be banned for example, whereas other could be subjected to limitations regarding for example the necessary human presence in the loop, the objective responsibility emerging from their use, standards regarding the conduct of machine- learning or the software design, etc.

Therefore, AI liability could be governed and regulated in two ways: the first type would consist in the specific, subjective use of AI, contrary to the specific standards of AI use. The second type would consist in the adoption of an objective threshold of liability on the basis the combination of area and of autonomy of AI. Such regulations of AI-oriented liability can provide necessary legal certainty, since the non- compliance with a system of pre-determined standards will establish clear - or at least clearer - causal relationships (Kowert, 2017).

Still, we will obviously have an expanding area of AI applications which ontologically will be unpredictable and which further will be "predictably unpredictable", meaning that unpredictability will be constituting part of the efficient implementation of AI role. In such a framework, AI may have no

owner and no human in the loop of its decision or the owner may be totally unaware of potentially harmful consequences (Matthias, 2004; Wallach, 2011).

In spite of all potential morns, we will need to accept an extent of higher risk, something that should lead again to the creation of a wide public sphere, funded by AI-generated wealth and compensating damage conducted by AI. (Karnow, 1996). Such a scheme can provide legal certainty, where AI ontology creates uncertainty.[17]

Conclusions

AI remains predominantly non- regulated in spite of its present and future impact on our societies. Even further, the first attempts to govern its evolution are market- oriented regardless of its wider social implications. Social and economic matters- among several others- will continue to emerge and in fact will magnify due to the innovativeness and the wealth which will be produced by AI, as well as because of its harmful impact.

AI could wreak havoc in our legal and governance systems if left unchecked and unregulated. On the contrary a well -designed regulatory system and an efficient public sphere despite not being able to "cure" all of the relevant issues will have the potential to enhance its socially beneficial impact and provide greater legal certainty in an uncertain environment.

The creation of a public sphere where AI – generated inventions and creations will belong will need to be international. This will provide coordination in an inherently universal issue, as the combination of AI and of the cyberspace will transcend national borders.[18] A system of universal reward and of access to compensation schemes can further promote less risk and therefore a more techno- friendly environment.

Eventually, serious decisions must be made with the main being whether we will accept a non- human centered world or not. In the course towards such a direction it is wise to come up with transparent governance and legal norms, regulating the interactions with AI.

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[17] There is also the issue of criminal liability. That is analyzed below in the framework of potential, AI, legal personality.
[18] The right to self-determination in all its manifestations, equality, right to work, trade unions' participation, social security and insurance, adequate standard of living could be promoted more efficiently if such technological developments produce wealth for the wider public, instead for a small number of private companies, in oligopolist terms and economic framework.

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