Dundee Student Law Review, Vol. 5(1+2), No.2

AI-"Agents": to be, or not to be, in the legal domain†

Francesco Cavinato[a] – Federica Casano[b]

AIE and Law

Recent technological developments have led to an algorithmic society where artificial intelligence entities[1] (hereinafter, AIEs) have moved into different fields of the human society[2] such as medicine, engineering and economy. Legal disciplines have been involved as well, especially in private law, where they have obtained such a special interest in autonomously executing the bargaining, formation and the performance of contracts. However, human users often have no knowledge of the exact terms of the contract, or even that a contract is being made.[3]

† An earlier version of this paper was awarded the third place at the "Artificial Intelligence Legal Issues International Paper Competition" promoted and organized by the William and Mary Law School - Center of Legal and Court Technology (VA, USA) and published on its website at https://legaltechcenter.openum.ca/files/sites/159/2018/04/3.-AI-Agents_to-be-or-not-to-be-in-legal-domain.pdf. It was also presented at the last Critical Law Society Conference "Metamorphosis and Law" (University of Kent, Canterbury, UK). An update has been due to recent developments in the EU system and legal scholarships.

[a] Alma Mater Studiorum – University of Bologna School of Law (Italy), JD LL.M Candidate

[b] Alma Mater Studiorum – University of Bologna School of Law (Italy), JD LL.M Candidate; Tilburg University School of Law (The Netherlands), LL.M. Candidate

[1] For a general perspective on AI, see Ryan Calo, 'Artificial Intelligence Policy: A Primer and Roadmap' (2018) 3(2) University of Bologna Law Review 180. At the first stage of our paper, we will use the terms artificial intelligence and autonomous systems interchangeably, although they have different scopes and meanings. Indeed, for this current purpose, the technical nuances are largely irrelevant. The alternative synonym "autonomous technologies" deals with classical Artificial Intelligence, Machine Learning algorithms, Deep Learning and connectionist networks, generative adversarial networks, mechatronics and robotics. However, we want to suggest for a deeper insight on autonomous systems- Thomas Burri, 'The Politics of Robot Autonomy', (2016) 7(2) European Journal of Risk Regulation, 341.

[2] Even though "Some leading technologists and futurists in Silicon Valley recently named artificial intelligence an existential threat to humanity and called for answers to the ethical and legal questions it raises"- Thomas Burri, 'Free Movement of Algorithms: Artificially Intelligent Persons Conquer the European Union's Internal Market', in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence*, (Edward Elgar, 2018), 538.

[3] Emad Abdel Rahim Dahiyat, 'Intelligent Agents and Contracts: Is a Conceptual Rethink Imperative?' (2007) 15(4) Artificial Intelligence and Law, 375.

AIEs are both hardware and software entities that perform tasks in ways that are "intelligent":[4] indeed, they are not just programmed for a single and repetitive motion but they can adapt to do more (and in a better way) by adapting to different situations and contexts. Nevertheless, they are able to understand languages, recognize pictures, solve complex problems by themselves and learn[5] as they go along[6] without constant supervision (e.g. machine learning[7]). Their decision-making process is usually based on symbolic reasoning, analyses of the user's behaviour, experience, data acquisition and it is characterized by a heuristic[8] approach.[9] Differently from the human mind which depends on the Johnson-Laird's mental model theory[10] and often falls into biases, AIEs can not only remove the deductive fallacies in reasoning but they can increase the decision-making process through the conditional probability (Bayes' theorem). Furthermore, they are able to set up an inductive reasoning reducing both decisional conflicts and cognitive dissonances.

[4] Besides the different attempts to define intelligence across psychological branches (cognitive, behaviourist, dynamic, Piagetian), as well as its intuitive conceptualization by the common sense ,"… if we attempt to dig deeper and define it in precise terms we find the concept to be very difficult to nail down… Intelligence involves a perplexing mixture of concepts, many of which are equally difficult to define." Shane Legg and Marcus Hutter, 'Universal Intelligence: A Definition of Machine Intelligence' (2007) 17 Minds and Machines 391. An interesting approach to intelligence which allow to get closer to AI structure (especially neural networks) is the "symbol system" approach, that is "…the ability of human beings to use various symbolic vehicles in expressing and communicating meanings distinguishing human beings sharply from other organisms."- see Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (3rd edn, Basic Books 2011), 26.

[5] Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (3rd edn, Pearson, 2016), 1-5, 36-40, 64-69, 693-850.

[6] Namely, they "…will collect information without an express instruction to do so, select information from the universe of available data without direction, make calculations without being told to do so, make recommendations without being asked and implement decisions without further authorization… [they] will truly execute their decisions with real data in a complex networked environment, and will affect real world events"- Curtis E.A. Karnow, 'Liability for Distributed Artificial Intelligence' (1996) 11(1) Berkeley Technology and Law Journal 147, 152-153.

[7] Especially this type of AIEs are dissimilar from traditional analytics: indeed, they modify the underlying constitutive algorithm according to data which they have previously processed. As output, they learn new schemes of information.

[8] A complex and innovative mix of "strategies using readily accessible information to control problem-solving processes in man and machine" by using approximate algorithms- Judea Pearl, *Heuristics: Intelligent Search Strategies for Computer Problem Solving* (Addison-Wesley, 1984) 3. Regarding the AI context, heuristic is a function that (based on trade-off criteria such as optimality, completeness, accuracy and time) ranks alternatives in search algorithms at each branching step based on available information to decide which branch to follow. In these terms, the "heuristic search remains as a core area of artificial intelligence. The use of a good search algorithm is often a critical factor in the performance of an intelligent system. As with most areas of AI, there has been steady progress in heuristic search research over the years. This progress can be measured by several different yardsticks, including finding optimal solutions to larger problems, making higher quality decisions in fixed size problems, handling more complex domains including dynamic environments with incomplete and uncertain information, being able to analyze and predict the performance of heuristic search algorithms, and the increasing deployment of real-world applications of search algorithms"- Weixiong Zhang, Rina Dechter and Richard E. Korf, 'Heuristic Search in Artificial Intelligence' (2001) 129 Artificial Intelligence 1.

[9] Fabio Bravo, *Contrattazione Telematica e Contrattazione Cibernetica* (Giuffrè Editore, 2007), 196-209.

[10] Philip Johnson-Laird, 'Mental models and human reasoning.' (2010) 107(43) *Proceedings of the National Academy of Sciences* 18243.

Also, from the emotional point of view, AIEs are getting closer to emulating[11] human beings. Indeed, emotions play an important role in making a human being as an intelligent being: they are considered in decision making process as well as they should be "…embedded within the reasoning process when we try to model human reactions, especially ….when they may affect other people's behaviour".[12] Even though several studies have demonstrated that emotions have evolved at the same time as intelligence, their conceptualization is not unique to biological organisms and researchers try to incorporate them in agent's[13] design. In other words, they try to provide AIEs which deal with complex and critical tasks system with emotional competences;[14] thereby they could be "…more friendly to the user and its responses will be more similar to human behaviour".[15]

Again, in terms of subjectivity, AIEs can adequate their "behaviours" in order to set up a pragmatic version of the social contract theory by means of their deep-argumentative skills as well as its "semi-ethic" approach to sensitive circumstances in multi-agents,[16] autonomous and human-robot interaction contexts.

In addition to the autonomy, the agents have other characteristics such as coordination and communication making this field very helpful to represent a being by a software system. Especially the argumentative skills might lead to a practical reasoning model in AI: "…justifying actions (as opposed to beliefs) as the mechanism by which an agent seeks to bring about particular desired goals".[17]

---

[11] "…From improving human-machine interaction and achieving empathy, to providing machines with cognitive shortcuts for rational thinking, emotions could be a key element in building a coherent system of thought capable of organizing several kinds of knowledge. This could provide a way to finally pass the Turing test or to provide a smooth transformation of the human nature when we finally merge with the machines"- Mariana Goya-Martinez, 'The Emulation of Emotions in Artificial Intelligence: Another Step into Anthropomorphism', in Sharon Y. Tettegah and Safiya Umoja Noble (eds), *Emotions, Technology, and Design* (Academic Press, 2016) 171.

[12] Juan Martìnez-Miranda and Arantza Aldea, 'Emotions in human and artificial intelligence', (2005) 21(2) Computers in Human Behavior 323, 323.

[13] 'An agent is a computer system that is situated in some environment, and that is capable of autonomous action in this environment in order to meet the design objectives'- ibid, 332.

[14] For more details on emotional intelligence in general, see Daniel Goleman, *Emotional intelligence* (Bantam Books 1995).

[15] Namely, the Affective Computing- Martinez-Miranda (n.12), 330. Selecting those emotions that will be really useful to their tasks.

[16] Especially in dialogue-based approaches to deciding argument acceptability: e.g. negotiation is being presented and treated as a persuasive argumentation process. "A number of important themes have emerged from such treatments of inter-agent negotiation as an argumentation driven persuasive dialogue: the rationalisation of individual agent contributions as stages in a goal-directed plan; the study of logic-based language formalisms in terms of both syntactic (e.g. the manner in which agents represent contributions to debate, proposals, goals they seek to bring about, etc.) and semantic (e.g. how an agent's perspectives are affected by particular contributions as negotiation progresses) aspects; the development and analysis of formal agent oriented dialogue games; the consideration of comparative criteria for differentiating and classifying dialogue mechanisms, etc."- Trevor J.M. Bench-Capon, Paul E. Dunne 'Argumentation in artificial intelligence' (2007) 171 Artificial Intelligence 619, 630.

[17] ibid.

As we have tried to explain, AIEs can surely represent an interesting attempt to combine the human cognitive and social skills into a non-human being[18] and their properties are stimulated in all environments in which they are currently positioned. In commerce, for example, such entities are commonly used by consumers, to reduce costs when searching products, and by companies, to manage their internal affairs and relations with suppliers and consumers. The result is they turn to AIEs to conclude contracts on their behalf; or to bring about mergers of companies after comparing two or more contractual proposals, or resolve conflicting clauses, revoke unfair contract terms; or, again, to settle disputes in different mediation and arbitration systems towards binding judgements.

Given all of that, the fundamental question however remains whether or not AIEs can actually be party to a contract, party to a trial or be an arbitrator. What is the legal status of AIEs in our legal systems? What is their legal capacity?[19] Can they be recognized as a party? And if so to what extent and with what effects? Can we bestow legal subjecthood upon these entities such that they become a party rather than mere object in relation to which a property right is exercised? Who is accountable if, for example, damages are suffered by a third party to a contract concluded or performed by an AIE? Unfortunately, no satisfactory solution has been adopted by national or international legal systems. The EU law is currently silent on this point,[20] with the E-Commerce Directive's article. 9 providing only for '…legal effectiveness and validity [of contracts] made by electronic means…',[21]

[18] Maximizing the first and selecting the second ones. For the human rationality, we refer to Simon's bounded rationality theory- Herbert A. Simon 'A Behavioral Model of Rational Choice' (1955) 69(1) The Quarterly Journal of Economics 99.

[19] In order to avoid any ambiguity on these terms we want to specify them in accordance with the Italian Civil Code and European legal tradition: "legal subjecthood" consists of the eligibility to be the holder of rights and duties and it is bestowed upon every human from the moment of their birth as well as to any associations, corporates and foundations. "legal capacity" means the capacity to perform legal acts and it is limited to (1) people who turned eighteen (in Italy) and have not been incapacitated; (2) it is being conferred to all non-human legal subjects which manage their affairs by means of their representatives. A third category "legal personality" is being conferred to some non-human subjects (corporations, recognized associations and foundations) which have got special conditions in terms of liability. It follows that the legal subjecthood does constitute a subset to legally modify rights and duties contain in the legal subjecthood by valid acts. It is worth pointing out that "The concept of legal personality is shared by all Western legal systems. Even though the concept is ubiquitous, the meaning of legal personhood has been a relatively peripheral topic in jurisprudence for a while, with the exception of corporate personhood." Visa A.J. Kurki, 'Why Things Can Hold Rights: Reconceptualizing the Legal Person', in Visa A.J. Kurki and Tomasz Pietrzykowski (eds) *Legal Personhood: Animals, Artificial Intelligence and the Unborn* (Springer, 2017), 69. So, we can identify two main ontological categories in legal subjecthood: "physical person" and "legal person". If any human being is a physical person, not all non-human legal subjects are legal persons.

[20] It is worth considering that the European Council of October 2017 invited "…the Commission to put forward a European approach to artificial intelligence" (EU Council, 'Conclusions – 19 October 2017' http://data.consilium.europa.eu/doc/document/ST-14-2017-INIT/en/pdf). The European Parliament made wide-ranging recommendations on civil law rules on robotics and the European Economic and Social Committee has also issued an opinion, especially by ensuring an appropriate ethical and legal framework, based on the Union's values and in line with the Charter of Fundamental Rights of the EU. This includes forthcoming guidance on existing product liability rules, a detailed analysis of emerging challenges, and cooperation with stakeholders, through a European AI Alliance, for the development of AI ethics guidelines by the European Group on Ethics in Science and New Technologies.

[21] Council Directive (EC) 31/2000 on electronic commerce [2000] OJ L178/1, art. 9.

while the EU Draft Common Frame of Reference (DCFR)[22] makes no mention at all to the legal relevance of the acts and statements of AIEs. However, the European Parliament has recently raised similar questions and has pushed the EU Commission to initiate legislation: the EU Parliament notably has stated that "e-personhood of artificial intelligence and autonomous systems needed to be explored".[23] Differently, the US UCITA[24] and article 12 of the UN Convention on the Use of Electronic Communications in International Contracts[25] recognize only the validity and enforceability of legal acts carried out by automated message systems, even if not revised by any natural person.

On the basis of the above, it seems the blame for damage caused by the artificial entity lies with its user, intolerably broadening the scope of objective liability even within contractual responsibility. As a consequence of the heavy burden imposed on the user, all the economic advantages gained from the use of AIEs in terms of efficiency and speed would be lost, undermining any interest in technological development and progress. To avoid this, suitable legal evolution is required, based on a clear understanding of the characteristics of the AIEs.

Apparently, the main reason why it is not appropriate to make the user accountable and liable is because he is totally unable to directly control, predict or prevent the AIE's decisions. This is because AIEs "…have the cognitive ability to act not only according to their in-built knowledge and rules, but also according to their own experience".[26] However, as we have written above, cognitive computing confers on the software-machine-agent the capacity to learn, reason, and understand, process and use normal human language, as well as giving it visual and dialectic abilities.[27] With such capabilities, AIEs, especially in collective contexts,[28] can make bids at auctions, negotiate, work out the best price,[29] as well as trade on the user's behalf,[30] in ways that go beyond their previous past

[22] Commission, 'Principles, Definitions and Model Rules of European Private Law, Draft Common Frame of Reference (DCFR)' Outline Edition Sellier (2009).
[23] Burri (n.2) 538.
[24] UCITA, Section 107 (d), 1999. Uniform Computer Information Transaction Act. Online: http://www.law.upenn.edu/bll/ulc/ucita/ucita01.htm, with last revisions and amendments 2001, as available on January 6, 2004.
[25] United Nations Convention on the Use of Electronic Communications in International Contracts (adopted 23 November 2005, entered into force 1 March 2013) 2898 UNTS 1.
[26] Dahiyat (n.3), 377.
[27] Michael Wooldridge, 'Intelligent Agents' in Gerhard Weiss (ed), *Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence* (MIT Press, 1999), 27-35.
[28] In multi-agent systems (MAS), in fact, "…each agent is an intelligent system that solve a specific problems. All these agents work together, communicate, collaborate and negotiate among them to achieve the common goals." Martìnez-Miranda (n.12), 324.
[29] For example, the eBay system, where a bidding agent place bids on the user's behalf at the lowest possible increments- Dahiyat (n.3), 377.
[30] For example, in the area of electronic stock trading, dealing not only with the price, but also warranties, shipping service, returns, and payment clauses- ibid.

function of simply communicating the humans party's will. In other words, while a *nuncius* is just a passive tool in human hands by means of which the user expresses his personal consent, AIEs can act autonomously, not automatically, determine contractual terms. As a result, thinking of AIEs as mere messengers and still pretending to deem the user as fully accountable in the event of damages arising, would be inaccurate and patently unfair. Indeed, the user's actual influence on the AIEs' decisions is minimal and usually not consciously given.[31] It is the will of the AIE that is conveyed when it acts as representative of the user, creating a will that derives from the user's request, and is the product of a semi-formal logic process based on probabilities, self-constructed knowledge and experience that results in the creation of a special kind of will that aims to satisfy its assigned function. For these reasons, we believe that the AIE can be considered as having an intention[32] and if they can plan, act, monitor, observe, and learn, then, they may act deliberately.[33] Fabio Bravo's research shows that such entities have an intention that can be regarded as analogous to our own, even though still different. AIEs' systems generally know the domain within which they act and apply semi-formal logic inferences,[34] simulating a common reasoning,[35] with the ability even to reformulate the stated objective. Moreover, just like humans, their reasoning usually employs non-systematic heuristic[36] approaches in order to avoid combinatorial explosions[37] that would be the outcome of rigid

[31] Bravo (n.9).

[32] We especially consider the studies on "agent-oriented systems" developed by Rao and Georgeff- "One such architecture views the system as a rational agent having certain mental attitudes of belief, desire and intention (BDI), representing respectively, the information, motivational, and deliberative states of the agent. These mental attitudes determine the system's behaviour and are critical for achieving adequate or optimal performance when deliberation is subject to resource bound"- Arnald S. Rao and Michael P. Georgeff 'BDI Agents: From Theory to Practice', in Victor Lesser (ed), *Proceedings Of The First International Conference On Multiagents Systems* (AAAI Press 1995), 312.

[33] It "…means performing actions that are motivated by some intended objectives and that are justifiable by sound reasoning with respect to these objectives. Deliberation is any computational function required to act deliberately…[AIEs] facing a diversity of environments, a variety of tasks and a range of interactions cannot be prepro-grammed by foreseeing at the design stage all possible courses of actions they may require. These [AIEs] need to perform some explicit deliberation. In short: autonomy plus diversity entail the need for deliberation." Félix Ingrand and Malik Ghallab 'Deliberation for autonomous robots: A survey' (2017) 247 Artificial Intelligence 10, 10.

[34] Bruce Aune, 'Formal Logic and Practical Reasoning', in Robert Audi (ed), *Action, Decision and Intention* (Springer, 1986), 301-320

[35] Bravo (n.9), 202.

[36] In terms of its consistency, although "perceptions about inconsistent heuristics are wrong. …inconsistent heuristics have many benefits. Further, they can be used in practice for many search domains…many recently developed heuristics are inconsistent". Ariel Felner *et al*, 'Inconsistent Heuristics in Theory and Practice' (2011) 175 Artificial Intelligence 1570, 1571. Then, it is remarkable to point out that a meta-heuristic approach has been establishing due to the development in approximate search methods for solving complex optimization problems. Ibrahim H. Osman and James P. Kelly, 'Meta-Heuristics: An Overview' in Ibrahim H Osman and James P Kelly (eds), *Meta-Heuristics: Theory and Applications* (Springer, 1996), 2.

[37] In a few words, it is the problem that the number of combinations that one has to examine grows exponentially, so fast that even the fastest computers will require an exceptional amount of time to examine them, limiting the ability of computers to solve large problems. In other words, "…the amount of work that a programme needs to do to solve the problem seems to grow at an explosive rate, due to the possible combinations it must consider"- Ben Coppin, *Artificial Intelligence Illuminated* (Jones & Bartlett Learning, 2004), 57.

application of deductive logic and brute-forced search algorithms, selecting the most likely satisfactory strategies with respect to the real world. Thus, they go beyond rigorous logic in order to solve combinatorial optimization problems[38] in the daily life. Accordingly, AIEs also act by means of intuition and trial and error, using pre-learned knowledge, and direct and indirect experience (acquired from observance of user's attitudes).[39] For this reason, we may entertain the idea that even an AIE can make a mistake, as people do, by not choosing the most economical favourable option, due to the presence of a bad external influence that justifies its new choice.[40]

In the light of all this, we wish to demonstrate that there is nothing absurd in postulating a close similarity between the human brain and AIE circuitry. It cannot however be denied that AIEs do not have formal ontology of this kind, but are driven by semi-formal ones that are closer to natural languages that produce the same external behaviour as people, destined to bridge the gap between themselves and humans in the future. To us, it seems that their thinking differently from human beings does not mean that it is not thinking that is going on.[41] Therefore, AIEs should not be regarded as distinct from and opposing our intelligence, but rather as its clear manifestation and representation within a physical entity created by human beings.[42]

[38] "Combinatorial optimization is the mathematical study of finding an optimal arrangement, grouping, ordering, or selection of discrete objects usually finite in numbers."- Eugene Lawler, *Combinatorial Optimization: Networks and Matroids* (Courier Corporation, 2001) 1.

[39] Nevertheless, they solve ambiguities in word meanings, finding analogies between things, making logical and nonlogical inferences, resolving inconsistencies in information up to engaging in a coherent discourse with a person using natural language and building internal models for representation of newly acquired information.

[40] Lawler (n.38) 201-209.

[41] "'Can a machine think?' is meaningless, and that it should be disposed of and replaced by a more precise formulation of the problems involved (a formulation such as a set of questions about the imitation game and machine-capacities) what finally emerges is that Turing does answer the " meaning less " question after all, and that his answer is in the affirmative and follows from his conclusions concerning the capabilities of machines which might be successfully substituted for people in the imitation game context." Keith Gunderson, 'The Imitation Game' (1964) 73 Mind 234, 235. In the original Turing's piece of work: "If the meaning of the words "machine" and "think" are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, "Can machines think?" is to be sought in a statistical survey such as a Gallup poll." Alan M. Turing 'Computing Machinery and Intelligence' (1950) 59 Mind 433.

[42] Alessandro di Caro, *Pensare ex machina – Alan Touring alla prova* (Aracne, 2016).

Taking due account of all these aspects, we studied alternative theories supported by the EU Parliament[43] which has also examined AI innovations in ensuring "…an appropriate ethical and legal framework…",[44] while seeking an answer to the legal questions we have posed.

AIEs as seen by the Law

When we deal with AI technologies in the legal domain, we have to reflect on their ontology, with regards to legal perspectives.

Since the second half of the last century and especially in recent years, many theories[45] emerging from diverse legal backgrounds, have resulted in an increasing trend towards justifying the attribution of identity in law to AIEs by means of a pragmatic approach with AIEs' structural features (*i.e.* interaction, autonomy and adaptation) and their affirmative impact in current legal systems (common or civil law families). Leaving aside expectations suited to Sci-Fi scenarios,[46] there has been growing awareness that the "…increasing autonomy and even 'intelligence' of [AIE's] behaviour impact on the complexity of legal systems, by altering the basis on which the principles of human responsibility and accountability are traditionally grounded".[47] This common perspective has necessitated a legal evaluation of what is meant by intention and by consciousness as regards AIEs'

[43] The European Council of October 2017 stated that the EU needs a sense of urgency to address emerging trends such as AI "while at the same time ensuring a high level of data protection, digital rights and ethical standards" and invited "the Commission to put forward a European approach to artificial intelligence". The European Parliament made wide ranging recommendations on civil law rules on robotics and the European Economic and Social Committee has also issued an opinion on the topic. European Parliament Document, European Parliament Resolution with Recommendations to The Commission on Civil Law Rules on Robotics [2017] P8_TA 0051 (2015/2103(INL)); EESC opinion on AI (INT/806-EESC-2016-05369-00-00-AC-TRA). Especially its paragraph 59f where it is stated that "[c]reating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently".

[44] Based on "…the Union's values and in line with the Charter of Fundamental Rights of the EU. This includes forthcoming guidance on existing product liability rules, a detailed analysis of emerging challenges, and cooperation with stakeholders, through a European AI Alliance, for the development of AI ethics guidelines" developed by the European Group on Ethics in Science and New Technologies- Communication From The Commission To The European Parliament, The European Council, The Council, The European Economic And Social Committee And The Committee Of The Regions, 'Artificial Intelligence for Europe', COM/2018/237 final.

[45] Joanna Bryson, Mihailis Diamantis and Thomas Grant, 'Of, for, and by the People: the legal lacuna of synthetic persons.' (2017) 25 Artificial Intelligence & Law 273, 275.

[46] Maybe, thanks to the current information revolution that touches the destiny of human beings and society, robots might succeed humans causing their extinction. Hans Moravec, 'The Universal Robot', in Timothy Druckrey (ed), *Ars Electronica: Facing the Future* (MIT Press 1999) 116-123. Is it such an apocalyptic prophecy or a hyperbolic statement? Again, it seems quite similar to what Stephen Hawking said about this topic in his last book "Brief Answers to the Big Questions"- Stephen Hawking, *Brief Answers to the Big Questions* (Bantam, 2018), 183-196.

[47] Ugo Pagallo, 'Three Roads to Complexity, AI and the Law of Robots: On Crimes, Contracts, and Torts' in Monica Palmirani *et al* (eds), *AI Approaches to the Complexity of Legal Systems. Models and Ethical Challenges for Legal Systems, Legal Language and Legal Ontologies, Argumentation and Software Agents* (Springer, 2012), 50.

behaviour, and applying these to the ontological foundations of criminal, contractual and tortious conduct.

While the criminal law systems have led to a *cul-de-sac*[48] in this regard, the role of AIEs as a special object of contract and current presence as *de-facto* agents (representatives)[49] in commercial affairs and negotiations has, incredibly enough, however emerged. So, in accordance with this legal tendency, modern technology has allowed AIEs to gain a kind of intentional foothold that "…represents usually the only possible viewpoint to explain and foresee the behaviour of complex entities that can act teleologically…".[50] Its result has been an artificial intention called DOI (Digital Object Identifier) which can be explained through declarative (and hypothetically, performative) act with the same *ratio* as human action.

Faced with this *status-quo*, there has been substantial reappraisal of agency and legal personality by a wide range of scholarship[51] in terms of the subsumption of legal paradigms and interpretation, as well due consideration of the parties' expectations for fair regulation of these matters. Four AIE agent models can be considered, with reference to Wettig and Zehender's approach,[52] namely:

1) Treating agent declarations simply as computer declarations,[54] referring to the DOI of the agent's owner;
2) Managing AIEs as hybrid party to a contract, endowed only with contractual capacity but not legal one;

[48] Due to the "…increasing unpredictability and autonomy of robotic behavior…" they hurt and prevent the core principle of any criminal systems namely imputability as well as "…causation and reasonable foreseeability"- ibid, 52.
[49] *i.e.* when it states his own DOIs on behalf and with the mandate of another person.
[50] Pagallo (n.47), 48.
[51] Among others, Francisco Andrade *et al*, 'Contracting Agents: Legal Personality and Representation' (2007) 15 Artificial Intelligence and Law 357.
[52] "Four different approaches to classify the agent declaration deserve further elaboration as possible solutions to this question: 1. The 'traditional approach' – agent declarations as computer declarations. 2. The 'modern approach' – ascribing a legal personality to an agent. 3. The 'historical approach' – contractual capacity without legal capacity. 4. The 'progressive approach' – the 'electronic person' Steffen Wettig and Eberhard Zehender, 'A Legal Analysis of Human and Electronic Agents' (2004) 12(1-2) Artificial Intelligence and Law 111, 122-127. Although this classification was formulated with the respect to German law, it is very useful to manage the different nuances of the legal subjectivity applied to the debate on AIE's ontology.
[54] The order is electronically produced with the help of an autonomous computer program and is conveyed electronically.

3) Based on Karnow's observation,[55] to create a new ontological term (*tertium genus*) that lies somewhere between the natural and the legal entity:[56] on this assumption, it could acquire a determined and special legal personality as an e-Person[57] with more limited liability;
4) Directly attributing legal personality to the AIE basing on the current law: so, "…the agent possibly states its own DOI, and so that the rights and obligations of an effective contract could apply to it".[58]

The above approaches embrace two different methods for analysis of law, involving two different theoretical and legal backgrounds: 1 and 4 take an analogical pathway, based on the completeness and the auto-integration of a rigid legal system permitting only an internal dynamic. This *modus operandi* is typical of European civil law, mostly with a centralized, top-down law-making process, coupled with bottom-up interpretative input. Conversely, models 2 and 3 offer a more flexible and dynamic approach to emerging problems which require a reactive and creative solution in law, now mostly adopted in common law countries but established in ancient Roman law.[59]

Starting with model 1, particularly, it embodies an unwarrantedly strict interpretation of computer declarations, while the analogy in model 4 has to comply with its own epistemological boundaries (*eadem ratio*): that is to say AIE would neither be a natural person nor either a legal entity (not including "artificial persons" arising from the aggregation of human beings).[60]

In our opinion, both of these are in error methodologically.

[55] "The legal system thinks it knows how to handle unpredictable systems. When mistakes are made, one simply traces back the vector of causation to the negligent human agency that caused the error. Then, in theory, one sues that agency for damages and is made whole. The sins of omission and of commission are just as subject to legal condemnation as negligence, recklessness, intentional malfeasance or other human culpability." Karnow (n.6), 154.

[56] In US law, for example Shawn Bayern, 'The Implications of Modern Business–Entity Law for the Regulation of Autonomous Systems' (2016) 7(2) European Journal of Risk Regulation 297.

[57] Namely, "…artificially intelligent persons a state may create by legislative fiat…" Burri (n.2), 537; however, '…the legal personification of robots does not represent a necessary condition for the acknowledgement of new forms of accountability and contractual responsibility for [them]." Pagallo (n.47) 57.

[58] Wettig (n.52).

[59] "… in today's society of the twenty-first century constant tension is evoked from the conflict between two different concepts relating to the activity of the court in the sphere of making the law complete (the free and bounded approach of a judge towards the application of law, specifically with regard to the filling-in of gaps in the law)."- Tomáš Havel, 'Praetorian Law: A Contribution to the Beginnings of Legal Sociology' (2015) 5(3) The Lawyer Quarterly 212, 215.

[60] Consequently, AIEs cannot have any kind of ownership of its DOI: it not possible to consider it as representative of the agent's owner. Although there are kinds of liability of the representative without representative authority in many legal systems this would not seem to be applicable due to the absence of legal capacity; furthermore "…the electronic agent as a contracting party is useless to the third party as long as it cannot incur a liability in a material way." Wettig (n.52), 125. The same conclusion as before if considering the agent as a minor.

For their part, models 2 and 3 would indicate the route legal science should always maintain, by deconstructing concepts to rearrange their fragments[61] with the aim of establishing effective law.

There is a new awareness that AIEs do not simply make computer declarations inasmuch as they are able to move "independently in heterogeneous computer networks".[62] The result is the migration of the "…code and data (action) from the owner's computer to another one where the first does not have any influence on it".[63] So, under these circumstances some scholars have evoked a gap[64] in Civil legal systems, while others have identified a category of concrete cases which need legal regulation by means of current legal arrangements applied with flexibility and creativity in both legal families.

Indeed, Shawn Bayern from Florida State University has demonstrated how current company law (i.e. LLC) in the US can be applied to the effect of "…bestowing legal personality on any kind of autonomous system"[65] (i.e."artificial intelligence company"). Through a legal fiction,[66] an AIE

---

[61] It looks like what Jhering said about the Roman Law techniques: "...sa méthode de dissolution et de décomposition…". Rudolf von Jhering, *L'esprit du droit romain dans les diverses phases de son développement* (Vol. 2, Marescq Aîné 1853), 6.

[62] Wettig (n.52), 112.

[63] ibid, 113.

[64] For example, Bryson (n.45). Generally known as a lacuna, namely "…the lack of any regulation for a concrete case…"(translated) Mario Jori-Anna Pintore, *Manuale di teoria generale del diritto* (G. Giappichelli Editore, 1995), 222; or a "…missing rule…to solve a dispute…" (translated)- Norberto Bobbio, *Contributi ad un dizionario giuridico* (G. Giappichelli Editore 1994) 89; or again "…an omission of a complete and concrete solution for a certain legal problem". However, a better definition which suggests its epistemological problems might be " 1. *Au sens large, manque ou déficience quelconque affectant la solution juridique d'un problème particulier. 2. Au sens stricte, sorte d'incomplétude, état d'un système normatif qui n'est pas complet, c'est-à-dire 'ne contient pas de propositions définissant le statut déontique d'un cas déterminé', alors que cette présence était attendue*."- André-Jacques Arnaud, *Dictionnaire encyclopédique de théorie et de sociologie du droit*, (LGDJ, 1993) 335. However, this concept would seem a bit strange, logically: indeed, there is not a touchstone by which a legal system might be judged as complete, because legal rules have got a constitutive (namely, illocutionary) feature in setting up their system: "…the feature that mostly differentiate [sic] performative speech acts from informative speech acts is the capacity of performative speech acts to change the state of the world…"- Lorenzo Fiorito, 'On Performatives in Legal Discourse' (2006) 19 Metalogicon 101, 103. So, saying that there is a lacuna, it's simply a nonsense statement. What is commonly said about the completeness and the coherence in legal systems reflects a kind of representative verbal summary of problems of analogy and antinomies: therefore, it may be converted into a hermeneutic problem to justify a decision. So, we suggest that there are not lacunas in legal system inasmuch if a rule of conduct would not emerge through the interpretative process (literal, systematic, analogical) conducted by the judge, it simply doesn't exist as legal rule, being a result of a legal irrelevance established by the Legislator.

[65] Based on Bayern's "process-agreement equivalence principle" it would be recognized that "…at least as a matter of conceptual logic, a legally enforceable agreement may give legal significance to arbitrary features of the state of any process (such as an algorithm or physical system) by specifying legal conditions satisfied by features of that state. As an example, a simple bilateral contract may make an obligation conditional on the output of a computer program…. The principle that a process and an agreement can correspond to one another takes this example a step further: it recognizes that a sufficiently broad agreement can allow essentially unlimited legal influence for an arbitrary process." Shawn Bayern, 'The Implications of Modern Business–Entity Law for the Regulation of Autonomous Systems' (2015) 19 Stanford Technology Law Review 93, 99.

[66] By 'legal fiction' (lat. *Fictio legis*) we mean an intellectual activity by legal scholars and legislators between analogy and extensive interpretation under semantic approach. Especially "…the legal fiction is an artificial device of law which

might thus come to 'inhabit' a company' and consequently "it factually gains all the legal capacities the law and the founding document endow the company with. [then]…in a second step, the founders of the company withdraw from it, leaving the artificial intelligence in existence 'within' the company and no longer under the control of the founders".[67]
Instead, on the EU side, some researches have pointed out that national laws of some EU states offer similar options to develop AIE's person from their current legal systems.[68]

In our opinion, however, a change in legal paradigms is imperative, with respect to its instruments, values and a balancing between human interests: a circumstance which explains an omission of a complete and concrete solution for a certain legal problem, after a legal interpretation process based on interpretation rules unanimously accepted. So, if AIEs participate in "…fixing the contents of a declaration…[and not] conveying the DOI's of other persons",[69] a reconsideration of their legal status is necessarily required.[70]

Considering all above, model 2 tries to improve current legal system identifying firstly what AIE is in legal terms, and secondly it may be combined with an historical interpretation[71] of ancient slaves' status[72] in those Athenian and Roman legal systems which established western legal culture,

---

is employed for a variety of purposes [and a millennial history]. It entails a deeming of something to be true which is known not to be true. The point of the deeming is to treat x as if it were y in order to achieve a desired legal purpose. To wit, the legal fiction of 'the personality' of the corporation is a critical piece of legal artifice to achieve the ends of commerce: it is a necessary legal device which critically depends on a legal sense of as-ifness. But the device of corporate personality relies on the idea that the corporation will be treated as if it were a person; and the person which it is treated as being is also a construction, for human beings, as legal persons, are equally constructions of law."- Ngaire Naffine, 'Legal Persons as Abstractions: The Extrapolation of Persons from the Male Case', in Visa A.J. Kurki and Tomasz Pietrzykowski (eds.), *Legal Personhood: Animals, Artificial Intelligence and the Unborn*, (Springer, 2017) 16. So, legal fiction both "conceits of the legal imagination" and "…a specific legal technique"…to give any rule of law a wider, or narrower, ambit than it would have if applied non-fictitiously, while at the same time preserving the rule's original form and the meaning of its terms" Lon Fuller 'Legal Fictions' (1930) 25 Illinois Law Review 344 and Kenneth Campbell, 'Fuller On Legal Fictions' (1983) 2(3) Law and Philosophy 339, 365, respectively.

[67] Burri (n.2) 539.

[68] "…under UK law the legal feasibility of the [Bayern's] construction cannot categorically be excluded. German and Swiss law, meanwhile, do not easily accommodate Bayern's idea. They are predicated in one form or another on natural persons' continuous involvement in legal persons. The idea also emerged that the legal form of a Foundation, under Swiss law or German law, would be an ideal vessel when some control is to be retained over the artificial intelligence, in accordance with the idea of a controlled artificially intelligent company." ibid. 7

[69] Wettig (n.52), 125.

[70] Although with different purposes, see Bryson (n.45), 273.

[71] What we mean as historical interpretation is a *species* from the *genus* "interpretation in the broad sense" namely the intellectual process on historical material (customs, rules passed down by oral and written tradition). See Emilio Betti, *Teoria Generale dell'Interpretazione* (Vol. 1, Giuffrè 1955) 802. Through the legal interpretation it tries to add something to the original content introducing a new expressive result: this process is conducted by the subject (*interpretans*) who is in front of the object (*interpretandum*) by means of the "bond of subordination". See Emilio Betti, *Diritto, Metodo, Ermeneutica. Scritti Scelti* (eds. Giuliano Crifò, Giuffrè 1991) 367-391.

[72] In the same way as slaves in the past, robots do not have legal personality inasmuch as they are considered the object of their owners' rights (rather than of producers and designers).

as a whole. Indeed, slavery was widely practiced in both of these societies so as it has been considered "…not merely an *historical* category …but a *dogmatical* element…":[73] a "…constant imaginative presence in the classic world".[74] Formally, slaves were treated as things (*res mancipi*) and belonged to master's assets. However, their place in society remained in a sort of ontological limbo: although they were without any rights, they could have performed some valid legal acts, especially in commercial affairs. This condition in which the whole legal subjecthood and capacity did not run in the same way, conducted to slave's "imperfect reification"[75] between nature and law conferring to him a limited control of his assets as well as a limited contractual freedom with his master and third parties. Doing so, if the majority of slaves undoubtedly "…toiled under harsh and exploitative conditions, at best performing routine and repetitive domestic and agricultural labour for the benefit of their masters, some of them were able to acquire skills, to obtain business knowledge, to develop valuable contacts…"[76] in commercial agreements conducted by their masters. In these regards, both Athenian and Roman legal systems often recognized slaves as "persons"[77] endowing him with a special commercial subjecthood and a *de facto* legal capacity: however, they had completely different approaches in order to manage and conceptualize this condition through the instrument of legal fictions: such legal adaptations have demonstrated that these ancient legal systems tried to develop mechanisms to close significant gaps between societal reality and their traditional juridical principles on slavery and citizenship.

Roman law tried to maintain a double track by allowing a co-existence between the ancient civil law (based on a logic of property and centrality in relationships by personal dependence) and those structures and principles established by new models of circulating rights in rem. In Athenian law[78] instead, "scholars have long recognized the «leading role» of slaves in the commercial activity

[73] Emil Reich, *Graeco-Roman institutions, from antievolutionist point of view: Roman Law, Classical Slavery, Social Conditions* (Parker & co., 1890), 46.
[74] William Fitzgerald, *Slavery and the Roman Literary Imagination* (Cambridge University Press, 2000), i.
[75] Emanuele Stolfi, *Studi sui «libri ad edictum» di Pomponio II. Contesti e pensiero* (LED Edizioni Universitarie 2002) 395 ss.
[76] Edward Cohen, 'Overcoming Legal Incapacities at Athens. Juridical Adaptations Facilitating the Business Activity of Slaves', in Uri Yiftach and Michele Faraguna (eds.), *Legal Documents in Ancient Societies VI. Ancient Guardianship: Legal Incapacities in the Ancient World*, (EUT Edizioni Università di Trieste 2017) 129.
[77] "The notion of the person (Lat. *persona*) stems from the word *prosopon*. This term referred to a mask in Greek (and Roman) theatre and its application in philosophy came somewhat later since we cannot find any trace of it in Ancient philosophy. It was initially utilised in Roman law but Roman jurists did not equate the word persona with the word *homo*. To this day the notion of the person in law (the physical person and the legal person) has a technical character". Bartosz Brożek, 'The Troublesome 'Person', in Visa A.J. Kurki, Tomasz Pietrzykowski (eds.), *Legal Personhood: Animals, Artificial Intelligence and the Unborn* (Springer, 2017), 4. Some scholars possibly borrowed from the Etruscan *phersu*, which means "mask" as well.
[78] A different perspective on slaves "role" points out that the Greek culture refused to establish "… a slave economy …[because of] … a constant danger of an uprising by hostile slaves eager to seize control of the state from their

of fourth-century BCE Athens, at that time the preeminent entrepôt of the eastern Mediterranean":[79] it allowed to slaves living independently (*douloi khôris oikountes*) "…to conduct their own businesses, establish their own households, and sometimes even to own their own slaves – with little contact with, and most importantly, virtually without supervision from their owners."[80] while paying to them fixed sums periodically (*apophora*). Furthermore, there are many examples of slaves who were engaged in business (especially, in maritime business and banking) who "…entered into contracts with free persons (Dem. 34.5-10), lent substantial sums to customers (Dem. 34.6), received repayment of large amounts on behalf of other lenders (Dem. 34.23, 31)".[81] It is worth considering that Athenian law was very sensitive to improve practical solutions to solve problems involving slaves who were acting in commerce: even though in a first stage "Contracts entered into with his express or implied authority would clearly bind the master, Greek law finding no difficulty in accepting the concept of representation through agents, passive as well as active, slave or free, without feeling it necessary to draw the distinctions which make the Roman law of agency so intricate".[82] The slave's formal legal incapacity was (initially) overcome by a free use of intermediaries, guarantors and generally representatives[83] who permitted "…businessmen [e.g. slave entrepreneur] lacking juridical capacity to effectuate through third parties acts and practices that would otherwise have been legally impossible – constituted for Athens a remarkable legal innovation, responsive to the economic and social needs of fourth-century in the Attic".[84] Subsequently, the legal system disregarded legal incapacity because of the legal status, (practically) allowing some slaves to "operate their own business in Agora…, could directly enter into legally enforceable contracts, [be] personally liable for legal transgression without reference to their master…"[85] and "…litigat[ing] in his own name as a principal in the Athenian courts [when *dikai emporikai* were claimed]".[86]

masters…[Anyway] slaves were incapable of acquiring property for themselves…[and] we know little about the master's position with regard to the contractual obligations entered into by his slaves without his knowledge, and whether he could nullify them for practical purposes by taking over such property as had been in the slave's hands….”- Walter Jones, *The Law and the Legal Theory of the Greeks: An Introduction* (Oxford University Press, 1956) 278, 282.

[79] Cohen (n.75), 128.

[80] ibid.

[81] ibid, 130.

[82] Jones (n.77), 283.

[83] "Athenian law, precisely because it had not developed rigorous systems of juridical requirements for the creation of obligations, was able easily to give legal effect through representatives even to commitments that might not be undertaken directly by principals – provided that the representatives themselves had the capacity to effectuate those undertakings."- Cohen (n.75), 137-138.

[84] ibid, 136.

[85] ibid, 131; See also, Ronald Stroud, *An Athenian Law on Silver Coinage*, (1974) 43(2) Hesperia 157, 181-182, lines 30-32.

[86] ibid, 131; the latter circumstance was really impressive for the Athenian law which was being adapted to the needs of commerce: indeed, it "…allowed slaves full court access, as parties and as witnesses where «standing» was accorded

Differently, the slave's "status" in Rome was less advanced than in Athens especially in terms of right to bright legal proceedings, but it was very sophisticated in developing master's agency contract and its representative inflections through several fictious elements[87] (*actiones adiecticiae qualitatis*) into their mindset (*aktionenrechtliches Denken*).[88] Although it was conceived hundreds of years later from Athenian experience, the traditional fundaments concern the socio-ontological distinction between master and slave stayed out of sight in all legal development:[89] slaves did not acquire any formal legal personhood both substantial and procedural as well as any legal capacity was legitimated by a master's order to perform acts (*iussum*). The Roman Civil Law (*ius civile*) did not admit that a master (*dominus*) could be held responsible for the debts caused by his slave: any negotiation instructed by slaves could produce only natural obligations, so, remaining irrelevant in legal context. Surely, this circumstance restricted a development in those commercial negotiations that required a complex system of reciprocal obligations upon the parties (e.g. synallagmatic contracts) representing at the same time, an inequal legal protection reserved to masters, only. However, several slaves were often being involved in commercial affairs by their masters who considered their personal abilities, commercial skills and knowledge in business.[90] Doing so, masters began to endow slaves with a *peculium:*[91] this set of assets (borrowed from masters) covered the rights and obligations arising from slave ownership aiming to a "…balance between protecting masters from excess liabilities arising from the activities of errant slaves, and affording counterparties the reassurance that it was safe to transact with slaves, with the final obligation being enforceable".[92] This legal framework represented a way to strengthen and foster commercial relationships[93] as well as streamline for transferring rights in rem and that slaves *de facto* could have controlled their own property. So, "…where a slave was involved in commerce, his *peculium* could be considered analogous to working capital (and a capital requirement for the market risk of the third party who

without regard to the personal status of litigants…" in accordance with "…fundamental Athenian legal principle that a party to an action must personally present his case in court.."- ibid, 134.

[87] Ando Clifford, 'Fact, Fiction, and Social Reality in Roman Law', in Maksymilian Del Mar and William Twining (eds), *Legal Fictions in Theory and Practice* (Springer, 2015).

[88] See, Heinrich Honsell, *Römisches Recht* (Springer, 2002), 84.

[89] See, Emanuele Stolfi, 'La Soggettività Commerciale dello Schiavo nel Mondo Antico: Soluzioni Greche e Romane' (2009) 2 Teoria e Storia del Diritto Privato 1.

[90] Most of them were acquired through warfare (e.g. every major war of conquest from the Monarchical period to the Imperial period, as well as the Social and Samnite War). Generally, slaves might be employed at highly skilled jobs and professions by means of their previous education.

[91] Namely, the "peculium profecticium" (Iust. Cod., III,28, de inoff. Test.,37,1). On slave's status Ulp. 17 ad Sab. D. 7.1.68 pr.. This was a fund held by the slave as his own exclusive possession or for his own private use but legally belonging to his master. Generally, on concept of peculium Ulp.29 ad ed. D. 15.1.5.4, Cels. 6 dig. D. 15.1.6 e Ulp. 29 ad ed. D. 15.1.7 pr.-1. 7 ad Sab. D. 15.1.4 pr., 2.

[92] Pagallo (n.47) 54.

[93] Although neither a formal Roman nor Athenian commercial law existed.

assumed the credit risk). While in theory the *peculium* belonged to the master, it was regarded for most practical purposes as belonging to the slave*"*.[94] Correspondently, the Praetorian law[95] also developed a rule allowing a contracting party to enforce judgments against the *peculium*, especially when the transaction was unauthorized or forbidden by the master (*dominus*):[96] the *actio de peculio*[97]. It "…allowed the *dominus* [master] to be sued to the extent of the value of the *peculium* at the time of judgment under contracts or debts entered into by the slave",[98] as well as it set up a wide range of master's liabilities[99] in commercial affairs conducted by slaves. Thus, masters could engage slaves in commercial affairs in terms of mere *nuncius*, representative or agent. This legal circumstance encouraged "…masters to use slaves as business managers, because the masters' liability was limited to the value of the *peculium*, and it encouraged people to transact with slaves because of the perceived security of the *peculium"*.[100]

This digression is helpful in that it broadens the viewpoint of model 3, which simply considers the reality of the phenomenon, the pragmatic nature of law and its performative language,[101] which is able to create social ontologies[102] as a balanced instrument of social control and felicity.[103] It provides for legal e-personality while stating that the new legal ontology should be created with special legal capacity and pre-conditioned contract capacity: a new mask for a new subject in legal transactions. So, taking advantage especially from the Roman perspective, an introduction of limited

---

[94] Pagallo (n.47), 54.

[95] [The Praetor conceived many adaptions] "to meet through representational innovations the business requirements of a far-flung empire with considerable overseas commerce. [He] introduced various *actiones* – alien to Roman conceptualization but essential to commerce – viz. the *actio de peculio*, the *actio institoria*, and the *actio exercitoria*". Cohen (n.75), 137.

[96] Lit. *falsus procurator*, as well as when slaves' declaration exceeds master's directives without ratification.

[97] D.14.1.5.1, D. 15.1, 15.2, Gai. 4.72, whereas in the Gloss tradition it is being considered as part of the "*actiones adiecticiae qualitatis*" in terms of subjective transposition. In such *formulas*, in fact, the Praetorian law operated a legal *fictio* by substituting the slave's name in the *condemnatio* with the master's one.

[98] See Andrew Katz, 'Intelligent Agents and Internet Commerce in Ancient Rome'(*Society for Computers and Law*, 15 October 2008) <https://www.scl.org/articles/1095-intelligent-agents-and-internet-commerce-in-ancient-rome> accessed 20 April 2019.

[99] Depending on the role of master in affair: his knowledge, willingness or specific order in negotiation.

[100] Katz (n.97).

[101] "The use of performatives in legal discourse is motivated by an institutional context which requires a clear indication of the force of the utterance. According to Austin (1962) and Searle (1989), explicit performatives are direct speech acts which state unambiguously the force of the utterance by means of a performative speech act verb." Fiorito (n.63) 102.

[102] Firstly, the concepts of person and personhood, themselves.

[103] Following Austin's theory "… it is not useful to ask whether performative utterances are true or not, rather one should ask whether they work or not, that is, the act is accomplished when the state of the world changes following the utterance. A performative that works is called felicitous and one that does not is infelicitous. In order for them to work, such performatives must satisfy the social conventions governing the giving of orders, the naming of a ship etc. Austin calls these enabling conditions for a performative felicity conditions. These social conventions supporting performatives, show that there is a difference between performatives that are highly institutionalized, or even ritual, requiring a complicated and very explicit support, as is the case of a judge pronouncing sentence, and less formal acts like notifying, thanking, warning etc." Fiorito (n.63) 102.

funds (assets) for the personal accountability of AIEs may be an interesting suggestion,[104] which could be solved by providing an extension by an evolutionary analogy of the Roman *peculium.*[105] The rights and obligations established by AIE as legal agent could indeed be satisfied by its own portfolio[106] through a 'digital *peculium*' provided by the owner himself or by an insurance company. This could ensure that people would not be ruined by AIE's decisions and that counterparties "…would be protected when carrying out business with them".[107]

Furthermore, it would be an interesting and useful legal instrument in order to (logically):

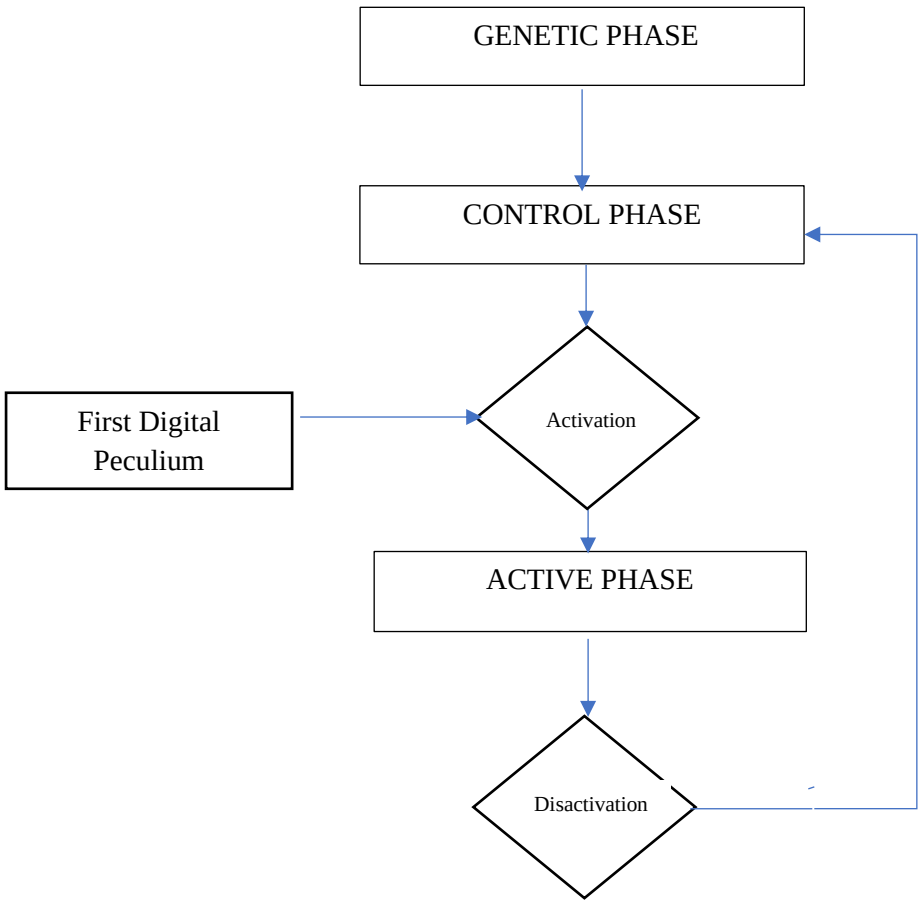
- enhance by the legal system to clearly identify the status of the non-human entity which a part is contracting with;
- provide its essential information;
- be able to manage contingent-liability which was dynamically updated each time a transaction was completed with an agreed maximum exposure negotiated as part of the transaction.

Finally, this scheme could also be applied to AIE's for the regulation of future liability in tort, although it might require an adaption in single cases.

Summarizing and clarifying what we are going to suggest, a workflow represents the e-person model in both logical and chronological orders, below.

[104] Among others, Katz (n.97)
[105] Furthermore, in just the same way as slaves engaged in trade in and outside Rome, AI entities may be involved directly in relationships with humans in the digital market as their agents, making decisions which will affect the rights of their masters. Even though this model is legally inexact, it is worthy of attention as prerequisite to model 3.
[106] Without this element, '…the electronic agent possibly would be liable in principle but claims practically cannot be realized against it and liability falls back on the agent's owner.' Wettig (n.52) 128.
[107] Pagallo (n.47) 54.

E-person model



GENETIC PHASE: an AI entity is created by a producer; it is simply an object (although, sometimes immaterial: e.g. software);

CONTROL PHASE: the AI entity is being managed by his user(s). Contract with producer (property, partnership, loan) or adverse possession.

ACTIVATION: when the AI is activated, the legal system recognizes it as e-person with limited legal personhood and legal capacity (however, "controlled" / "uncontrolled" AIE's features have to be taken into account). A subsequent enrolment of AI into a State's register may be provided. Thus, user(s) provide either directly or by means of an insurance company the "first" digital *peculium* to AIE (a free security lodgement for third parties). At this stage, e-person contracts with user as its agent or representative at different levels (on the basis of user's orders), different liabilities (joint and several or sectorial liability) and different contexts (authentication systems, trust networks, HRI).

Procedural personhood may be recognized only in compulsory joinder, only.

The digital peculium is being increased by user(s)' payments to the AIE (creditor) at the final stage of this phase; nevertheless, it may be necessarily decreased by user(s)' lodgement withdrawal and eventually by AIE's liability.

DISACTIVATION: the AI entity goes back to being an object (control phase) and it will be manage by its user(s), if they are the owner(s), or simply returned to producer. Its digital peculium has been increased or decreased by previous payments: this reflects the AIE's business intrinsic value in order to be considered by future users.

Hamlet's Dilemma and Legal AIEs

The Darmouth Summer Research Project took place in 1956 and it is generally considered the event which established AI as a field: "There was no agreement on a general theory of the field and in particular on a general theory of learning. The field of AI was launched not by agreement on methodology or choice of problems or general theory, but by the shared vision that computers can be made to perform intelligent tasks".[108] Learning, searching, networking, game playing and reasoning are simply a few results that AIEs have acquired since 1956 through a wider implementation of languages and cognition.[109] Such attempts documented significant accomplishments in AI over the past half century. At the same time, many technical[110] and ethical[111] problems have been raised since its foundation, with unexpected social consequences,[112] as well as interdisciplinary perspectives. Indeed, as we have seen, intelligence is neither simply the ability to solve problems or create products nor it stands for a "frame for a finalised thinking", but it requires an evaluation within one or more cultural settings. In these terms, AIEs' technological development remains controversial.

[108] James Moor, 'The Dartmouth College Artificial Intelligence Conference: The Next Fifty Years', (2006) 27 AI Magazine 87, 87.

[109] "Different research areas frequently do not collaborate, researchers utilize different methodologies, and there still is no general theory of intelligence or learning that unites the discipline." ibid, 88.

[110] Concerning the correct approach on AI (logic or probability based), the psychological versus pragmatic paradigm debate and how natural language processing is now statistical natural language processing.

[111] "The approach of AI algorithms toward more human like thought portends predictable complications. Social roles may be filled by AI algorithms, implying new design requirements like transparency and predictability. AIs with sufficiently advanced mental states, or the right kind of states, will have moral status, and some may count as persons—though perhaps persons very much unlike the sort that exist now, perhaps governed by different rules. And finally, the prospect of AIs with superhuman intelligence and superhuman abilities presents us with the extraordinary challenge of stating an algorithm that outputs superethical behaviour." Nick Bostrom and Eliezer Yudkowsky, 'The Ethics of Artificial Intelligence' in Keith Frankish and William Ramsey (eds), *Cambridge Handbook of Artificial Intelligence* (Cambridge University Press, 2004), 334.

[112] The Multiple Agent Systems are used to simulate human societies to analyse macro-societies (collective behaviour). This is a multi-disciplinary approach where social science, psychology and cognitive science theories are implemented in a multi-agent environment.

Nowadays, however, robots are everywhere. Machine learning support us in daily life, but non-human autonomous systems are not directly legal persons under current legal systems.[113] Thus, thinking about the being or not being of AIEs represents not only a debate for AI-specialists but it is such a great chance to deal with a new issue in current legal scholarship[114] (following a *de jure condendo* approach) as well as a further opportunity to rediscover one of the most interesting rational instrument into law making-process (by studying in deep a *de jure condito* perspective): the legal fiction. Correspondently, it allows us to face up with some of the most typical questions in legal theory, namely the completeness and the self-referentiality of a legal system[115] combining them with the "deep essence of Law" that is its "spontaneity". Finally, it could offer a sensitive example about the relation between law and technology as well as it requires a re-thinking in terms of methodological approach on legal phenomenon under an interpretative point of view.

This would support recognition of them as e-Persons (or synthetic persons), namely non supra-individual entities without any foundational contract. We describe AIEs in ontological terms as new agents within the legal domain.[116] Doing so, by revaluating traditional legal fundaments[117] and especially the notion of *peculium*, the legal system might assure relevant accountability of contracting AIEs, protecting the reliance on these by counter-parties and facilitating e-trade.[118] Besides further mechanisms of distributing risk through insurance models, or authentication systems,[119] it would offer a means of implementing regulation to solve practical problems associated with the use of AIEs as autonomous parties without discouraging technical developments on the one hand, or financial transactions on the other. The solution, if sustained, could not only answer both theoretical and

[113] "The ascription of personhood of both kinds is a normative determination of the law. The lawmaker makes it on the basis of certain considerations that it finds relevant for deciding whom to grant the capacity to be assigned legal rights or duties" Tomasz Pietrzykowski, 'The Idea of Non-personal Subjects of Law', in Visa A.J. Kurki, Tomasz Pietrzykowski (eds.), *Legal Personhood: Animals, Artificial Intelligence and the Unborn*, (Springer, 2017) 50.

[114] "Under these circumstances, the law may hesitate to make a simple assignment of responsibility. It is not clear what the law will, or should, do when artificial intelligences make mistakes, thereby damaging property, causing monetary losses or killing people." Karnow (n.6) 154.

[115]" … it is possible to conclude that law has contended with and still does contend with the problem of how to regulate social relationships in the most faithful normative way" Havel (n.58), 215.

[116] "Namely, it is believed to be helpful in promoting some kinds of human good more effectively than in the event that all rights and duties were attributed solely to individual human beings. In this sense, the "interests" of juristic persons emanate from the actual interest of the people involved in their operation. Thus, the reasons why law confers personhood to juristic persons are essentially different to those for which it is conferred on human beings." Pietrzykowski (n.112), 49-50.

[117] "Et à mon avis c'est cepen dant ce premier travail qui réellement décide de la valeur du droit romain, et auquel la science postérieure est redevable des fondations solides et résistantes sur lesquelles elle n'a fait que continuer l'édifice." Jhering (n.60) 9.

[118] It is worth mentioning that a supposed counterargument in order to criticize an AIE's personhood has been based on the complexity and the liability issue of the Anglo-saxon Trust model- 'Robotics Openletter 'Open letter to the European Commission' (*Robotics Openletter, 2018)* <http://www.robotics-openletter.eu/> accessed 30 September 2018. However, the *digital peculium* might obviate to such objection.

[119] See, Katz (n.97).

philosophical[120] questions relating to the recognition of and the role of such agents within the economic and legal systems, but also provide practical applications for contract law, even beyond the areas of agency and representation.[121] Then, it might be represented as an attempt to offer an answer for ethical gaps in terms of "hard enforcement mechanism".[122]

Therefore, our proposal tries to overcome this issue, following the main characteristics of AIEs: a recognition of a *tertium genus* between the classical civil law categories,[123] based on the model[124] of personhood[125] and a pragmatic approach, could provide us with a usable and long term solution, quite flexible to adjust to evolutions in technology. This does not mean a legal fiction,[126] but

[120] We know about the different conceptions of 'person' (classical, psychological and ethical) and different competing theories on them, such as the descriptive and the axiological views. Nevertheless, several philosophers dealt with the concept of person and its inflections (among others, Boethius, Kant, Locke, Bentham). However, we agree with Brożek's perspective where "…in law there appears a technical notion of the person which does not correspond with any philosophical notion of the person. As a result, the risk of equivocation arises, in particular in cases when we mix legal and philosophical discourse… when utilising the concept of the person, one needs to bear in mind its many dimensions, both philosophical and legal." Brożek (n.76) 10.

[121] We refer to particular kinds of contracts (*i.e.* from art. 1268 to art. 1276 of Italian Civil Law Code) by which a person (*i.e.* an AIE) intervenes replacing one of the parties (*i.e.* the user) in his/her obligation, though specific discussions on the *peculium* system application may arise.

[122] "A handful of companies dominate the emerging AI industry. They are going to prefer ethical standards over binding rules for the obvious reason that no tangible penalties attach to changing or disregarding ethics should the necessity arise" Calo (n.1), 188.

[123] As famously said by Gaius (Gai. Inst. 1,8 and Gai, I, 91-12, II, 1-2, III, 88), law (lat. *de iuris divisione*) concerns either persons or actions or things (lat. *personae, res, actiones*). Again, "The present form of juridical humanism is based on the dualistic division of reality into persons and things. Personhood is identified with the capacity to have rights and duties. Unless qualified as a person attributed with such capacity, one can only be an object of rights and duties held by others. Human beings are "natural" (or physical) persons, while all other kinds of collective organisational units may be "juristic" persons if a given legal system designates them as entities capable of having rights or duties of their own."- Pietrzykowski (n.112), 51. It would be worth studying in deep the current crisis of traditional legal categories of Civil law, re-discovering the original ones (especially, persons and things): see, Agnati Ulrico, '«Persona iuris vocabulum» Per un'interpretazione giuridica di «persona» nelle opere di Gaio' (2009) 9 Rivista di Diritto Romano <https://www.ledonline.it/rivistadirittoromano/allegati/dirittoromano09agnati.pdf> accessed 10 April 2019; Christian Baldus, 'I Concetti Di Res In Gaio Tra Linguaggio Pragmatico E Sistema: Il Commentario All'editto Del Praetor Urbanus', in Gianfranco Purpura (ed.), *Del Dipartimento Di Storia del Diritto Universita' Di Palermo* (Volume LV, Giappichelli 2012) .

[124] "Contemporary Western legal systems are based on a set of philosophical assumptions that include the anthropocentric image of the world in which human beings occupy an exceptional position… Law based on humanistic assumptions [i.e. juridical humanism] so conceived may also allow for other, artificial legal persons, such as corporations, municipalities or churches. However, they are just a legal tool to let the organised collective cooperation of human persons pursue some of their needs or goals. Granting them the status of a separate holder of rights and duties is based on instrumental reasons."- Pietrzykowski (n.112), 49.

[125] "It would, therefore, be an ahistorical illusion to believe that juridical humanism in its present form is an eternal and the only possible foundation of legal systems. Nor are there any reasons to regard its current shape as a kind of ultimate end of a long evolution in which the proper account of personhood in law has finally been found out."- ibid, 50

[126] "This use of the term 'legal fiction' therefore calls attention to the manufactured nature of this legal concept. It reminds us that lawyers are responsible for this invention. And it also calls attention to the fact that there is a deliberate falsehood – a treatment of something as legally true though empirically it may not be true. Its empirical falsehood is noted and then deemed legally irrelevant: for legal purposes, it will be true. Law is populated, in this view, by beings that are the positive creations of law. They are legal artefacts, created by the endowment of rights and duties. As lawyers, we are all trained to view people in this way and there are important reasons for retaining this legal outlook." Naffine (n.65), 17

a new established ontology[127] in law: it is not the use of legal techniques to manage a current rule of law. Rather, we have tried to fix a problem by combining in a creative way some legal arrangements from the Western legal tradition by means of interpretive techniques.

Given all of that, in order to make the *tertium datur* approach work, the boundaries of the legal literature should be escaped, embracing and embodying law and regulations. The attention given to the matter by both the EU Parliament[128] and the EU Commission[129] may represent an encouraging institutional awareness of the scale and importance of the phenomenon, differently from many legal experts'[130] perspectives by which "…it would be inappropriate, ideological, nonsensical and non-pragmatic to introduce such a legal status."[131]

We are aware that only national law determines when an entity becomes both a natural and legal person,[132] while a legal person created on the basis of national law can consequently rely upon EU law, notably the fundamental market freedom of establishment.

We know that both formal and substantial difficulties may arise having this solution widely accepted, therefore we suggest a couple of hypothetical legal scenarios and their approaches, in accordance with the current international and trans-national legal systems. The international perspective concerns either WTO agreements or general multilateral open treaties, thus reflecting a

---

[127] "I hope that the above considerations show clearly that the concept of the person is troublesome. It comes with different philosophical meanings; it serves as a technical device in the legal discourse; and it can be associated with no unique and universal cognitive contents." Brożek (n.76) 12.

[128] European Parliament Resolution (n.43).

[129] In April 2018, the EU Commission outlined its future strategy to address artificial intelligence and "…the capacity of artificial intelligence to bear rights and duties – 'electronic personality' in the Parliament's parlance – goes unmentioned." In order to review the EU legislation for liability risks arising from artificial intelligence. Thomas Burri, 'The EU Is Right to Refuse Legal Personality for Artificial Intelligence' (*Euractiv*, 31 May 2018) <https://www.euractiv.com/section/digital/opinion/the-eu-is-right-to-refuse-legal-personality-for-artificial-intelligence/> accessed 30 September 2018. However, it doesn't mean a complete refusal to the "e-Person" model: indeed, the EU Commission stated that the "artificial intelligence may raise new ethical and legal questions, related to liability or potentially biased decision-making. New technologies should not mean new values. The Commission will present ethical guidelines on AI development by the end of 2018, based on the EU's Charter of Fundamental Rights, taking into account principles such as data protection and transparency, and building on the work of the European Group on Ethics in Science and New Technologies. To help develop these guidelines, the Commission will bring together all relevant stakeholders in a European AI Alliance. By mid-2019 the Commission will also issue guidance on the interpretation of the Product Liability Directive in the light of technological developments, to ensure legal clarity for consumers and producers in case of defective products". European Commission, 'Artificial Intelligence: Commission Outlines a European Approach to Boost Investment and Set Ethical Guidelines' IP/18/3362 <http://europa.eu/rapid/press-release_IP-18-3362_en.htm> accessed 30 September 2018.

[130] See, Robotics Openletter (n.117). It is worth mentioning that following an open selection process, the Commission has appointed 52 experts to a new High-Level Expert Group on Artificial Intelligence (AI HLEG). They will have to support the implementation of the European strategy on Artificial Intelligence through the elaboration of recommendations on future-related policy development and on ethical, legal and societal issues related to AI, including socio-economic challenges. The AI HLEG will interact with AI Alliance improving its work.

[131] Even though a "regime that refuses to recognize autonomous systems at all may, similarly, limit the social potential of such systems"- Bayern (n.55), 96.

[132] Case C-369/90 *Micheletti and Others v Delegación del Gobierno en Cantabria* [1992] ECR 1992 I-4239, para. 10; Case C-135/08 *Rottman v Bayern* [2010] ECR 2010 I-1449, para. 39.

peer-to-peer approach of States legislative process. Instead, the second one deals with the EU legal framework (art.56 TFEU) where the "freedom of Algorithms" may be included within the shared competences in the internal single market (art. 4 TFEU): especially into the European Digital Single Market Strategy[133] (EDSM), where the development of an environment stimulating investments in AI has been identified since the beginning as a priority to be tackled. Following these leanings, some legislative *ad-hoc* proposals are currently being discussed by the EU co-legislator; nevertheless, the European Digital Progress Report gives an in-depth assessment of how the EU and Member States are progressing in their digital development and identifies potential steps to help improve national performance in digital. This circumstance explains a top-down approach of the EU Member States legislative process. Furthermore, another final suggestion, which we call an *extra-ordinem* proposal would include flexible EU soft-law[134] acts (art.288 TFEU – recommendations), which would interweave within the EU Member States *status quo* legislations in order to invite the EU Member States to adopt the e-Personhood.[135] By this way, in the EU for example, the existing DCFR[136] could be modified in such a way as to regulate the recognition of a new third kind of legal personality. This would be an exciting first step towards achieving broadly supported provisions on the subject in the projected European Civil Code, so as to improve a potential "free movements of algorithms" in the EU internal market. Under these circumstances the concept of e-Personhood[137] could be introduced across national legal borders as a unified and standard way of dealing with the obstacles of electronic

[133] "The European Union (EU) should have a coordinated approach to make the most of the opportunities offered by AI and to address the new challenges that it brings. It can capitalise on: … the Digital Single Market. [:] Common rules, instead of a patchwork of national laws, for example for data protection and free flow of data in the EU, cybersecurity, connectivity, help companies to do business." COM/2018/237/1 final.

[134] Namely, "…rules of conduct that are laid down in instruments which have not been attributed legally binding force as such, but nevertheless may have certain (indirect) legal effects, and that are aimed at and may produce practical effects". Linda A.J. Senden, 'Soft Law And its Implications for Institutional Balance in The EC' (2005) 1(2) Utrecht Law Review 79, 81. A better definition might be "…rules of conduct which find themselves on the legally non-binding level (in the sense of enforceable and sanctionable), but which according to their drafters have to be awarded a legal scope, that has to be specified at every turn and therefore do not show a uniform value of intensity with regard to their legal scope, but do have in common that they are directed at (intention of the drafters) and have as effect (through the medium of Community legal order) that they influence the conduct of Member States, institutions, undertaking and individuals, however without containing Community rights and obligations" Borchardt G. and Wellens K., 'Soft Law in European Community law' (1989) 14(5) European Law Review 267, 285. For a brief hermeneutical perspective, Francesco Cavinato, 'Soft Law e Topografica Giuridica', Filodiritto (Filodiritto, 16 February 2018) <https://www.filodiritto.com/articoli/2018/02/soft-law-e-topografica-giuridica.html> accessed 19 November 2018. In accordance with the European Paper on European Governance (2001) it has been an increasing recourse to soft-law instruments in EU courts whereby "the Courts treat soft law as an integral part […] of the body of European norms ..." contributing to the creation of legal hybrids.

[135] This would lead to an indirect top-down approach of the EU Member States legislative process. Instead, we are cautious and even somewhat sceptical to whom who say that "…a regime that relies solely on public bodies (like legislatures) to grant legal-entity status may react too slowly to technological change, and it may raise questions about precise degrees of autonomy that the law is currently ill-equipped to answer."- Bayern (n.55) 96.

[136] DCFR (n.22).

[137] "The decision as to who or what should count as a person in law may substantially differ in particular legal systems, as well as in different epochs" Pietrzykowski (n.112) 51.

commerce, especially where no clear legislation has yet been forthcoming from national institutions.[138]

Conclusions

Such an overture could overcome the legal and conceptual difficulties that emerge from all the current doubts and concerns that surround "thinking machines",[139] which obscure their recognition in a developed Human-Robot Interaction,[140] and their full acceptance in our current society. What we have discussed above is far from encompassing a final and descriptive definition of the scopes and limits of AIE's in the legal domain considering the multi-level legislative approaches, their multi-sectorial legal instruments as well as their concrete applications in both public and private law. Meanwhile, we are sure that the human essence is not easily overlooked in the current technological development in terms of ontogenetic difference between human and non-human being; moreover, recognizing a legal AIEs' status in terms of personhood does not represent a kind of anthropocentric[141] suggestion in order to equate humans with AIEs.[142] Perhaps AIEs might emulate the human brain, but they will not be able to summarize neither the human mind in a set of algorithms nor the human soul as mixed elaborate perceptions: as Shakespeare wrote "We are such stuff / as dreams are made on".[143]

[138] That is "…their ability to serve as legal "containers" for autonomous systems, such as computer programs or robots. Put simply, LLCs [limited liability companies] and possibly other modern business forms are flexible enough to permit a phenomenon that most commentators have traditionally considered impossible: effective legal status (or "legal personhood") for nonhuman agents without fundamental legal reform". Bayern (n.55) 94.

[139] Di Caro (n.42).

[140] Séverin Lemaignan *et al*, 'Artificial Cognition for Social Human–Robot Interaction: An Implementation' (2017) 247 Artificial Intelligence 45.

[141] "This anthropocentric attitude is questioned, especially within the framework of practical ethics. This critical approach, which may be generally called posthumanistic, tries to raze the humanistic order to eliminate humans as the ultimate aim and main criterion of every value ascription." Rafał Michalczak, 'Animals' Race Against the Machines' in Visa A.J. Kurki and Tomasz Pietrzykowski (eds.), *Legal Personhood: Animals, Artificial Intelligence and the Unborn*, (Springer, 2017), 91.

[142] "The concept of the person is the product of a community of thinkers responsible for this term and they address other like-minded persons within that community. It is important to notice who has been responsible for the term: who is permitted to play the legal language game at its highest levels. The concept of the person has particular legal and moral and political work to do; it is symbolic and expressive." Naffine (n.65) 24

[143] Completely "We are such stuff/as dreams are made on, and our little life/is rounded with a sleep" William Shakespeare, The Tempest, IV, 1, 1887-88. 'The Tempest: Entire Play' <http://shakespeare.mit.edu/tempest/full.html> accessed 4 December 2018.

So, our nature, only, allows us to wonder[144] in front of the reality, revealing its meaning and rediscovering our humanism[145] in the current Digital Era.

[144] "The reason is, my dear, that, apparently, Theodorus' guess about your nature is not a bad one, for this experience is very much a philosopher's, that of wondering. For nothing else is the beginning (principle) of philosophy than this…"- Plato, 'Theaetetus' in Seth Benardete (trans). *The Being of the Beautiful: Plato's Theaetetus, Sophist and Statesman* (University of Chicago Press, 1986), 155c-d.

[145] "Language is the house of being. In its home human beings dwell. Those who think and those who create with words are the guardians of this home…. Thinking does not become action only because some effect issues from it or because it is applied. Thinking acts insofar as it thinks. Such action is presumably the simplest and at the same time the highest because it concerns the relation of being humans."- Martin Heidegger (Frank Capuzzi (trans)), 'Letter on "Humanism" (1946)' in Martin Heidegger (William McNeil(ed)), *Pathmarks* (Cambridge University Press, 1998), 239.