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Features of Artificial Intelligence and its Regulation

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I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

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Abstract

The evolution of Artificial Intelligence (AI) is a whole new world with infinite possibilities that leads to the creation of new complicated issues to current law systems and raises important legal questions that must be answered. On account of the power, complexity and speed of this revolutionary technology, the society and the industry are calling for a regulation of the sector. This dissertation will try to answer the questions, if actually, is necessary to regulate AI and if so, how artificial intelligence should be regulated. Regulation can be very impactful, though can be very risky. To reach such a result, it is important first to define what is AI by analyzing the concept and the main features of AI. Then we will proceed with the legal issues arising from AI. More specifically the liabilities and the regulatory options. Finally, it will conclude with regulatory proposals. Extensive bibliography will be referred to in order to answer the above-mentioned questions.

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1. INTRODUCTION

The main objective of this dissertation is to analyze how AI should be regulated since it is a relatively new field without any applicable law regulation. In order to achieve this goal and to better understand its use in contemporary times, this dissertation will also attempt to explore the meaning of AI, its importance as well as the history of this concept.

Therefore, the main concepts that will be presented in this dissertation include:

- *Concepts and distinctive features of AI for regulatory purposes.*

Initially, this dissertation will describe the meaning of the AI term. More specifically, the various applications, features and capabilities will be presented. In addition, the actors involved in the process of development, programming and operating AI features will also take part in this study. Moreover, will be analyzed how AI and its subsequent features such as machine learning, gradually play a crucial role to our everyday life. An iconic example is the Siri AI feature that can be found in smart phones, smart cars and recently in smart houses as well. Therefore, it is important to highlight the need for the development of new regulatory policies that will be able to manage the risks and liabilities of such technological instruments, as AI is.

- *Legal Issues innately associated with AI.*

First of all, because of the rapid development of AI, the legal issues that pop up, frequently are related to the first impression. Legal professionals who are dealing with these legal issues are often headed into uncharted territories. As a result, any attempt of defining legally the liability or regulation in the field of AI towards to be over-or under-included. Second, we must understand who is at fault. For instance, is a defect in the program fault? Is an ill-designed algorithm fault? Recently, we had an accident where an autonomous driving car hit a pedestrian. Who are we going to lay blame to? Moreover, in our modern digital life, privacy no longer exists. Many legal conflicts have already arisen from the gathering and distribution of data. Will AI serve as an expert when it is predicting the sexuality of the crime? Sometimes Artificial is more than Intelligence. Many developers insert into AI systems biases, originating from their personal beliefs. For example, an AI system could tend to suggest as less intelligent

women instead of men. This could be a result of a male developer's false perception regarding who is more intelligent male or female.

- *Liability and Regulatory Options.*

An aspect of AI, that is very important, is the liability. By using the term liability, one refers to who will be accountable for when an error occurs. For example, imagine a system that applies machine learning, delivers a medical diagnosis to a person that needs medical care. If this diagnosis is not a proper one, who takes that liability? The patient who wanted to avoid the medical station, decided not to consult a doctor, so that leaves the doctor unharmed. Also, since the autonomous system is constantly learning and relearning as new datasets are created, the manufacturer and developers of such a system may also be let off the hook¹. Legal rights and liabilities have already been given to non-human entities in particular to corporations, like animals in the United States. The so-called "NON-HUMAN RIGHTS PROJECT" has been established for over a decade in US and its goal is to establish non-human rights². As a result, we may see the same happening for machines utilizing AI in the near future.

- *Regulatory proposals.*

We know that law is a human's creation in favor of human. So, how can AI be regulated? One of the first questions that needs to be answered is whether current legal rules can be applied to AI and robotic systems. As AI and robots are happening unpredictably, they need immediate action in order to avoid harmful results. They tend to create numerous unexpected issues. Thus, there is a great possibility that current rules may not fully cover the needs of AI regulation. It is difficult to apply these rules as they are orders that are addressed to specific existing situations.

Two major issues regarding the AI systems are discreteness and opacity. Law already provides means in order to confront them. The discreteness of AI has been faced already, in other industries like Automobiles. Since, it is common to use components manufactured from multiple companies. Long ago, courts have developed rules that

¹ Hussain Z., 'The ABCs of Machine Learning: Privacy and Other Legal Concerns' (Law Practice Today, 14 June 2017) <<https://www.lawpracticetoday.org/article/machine-learning-privacy-legal-concerns/>> accessed 23 October 2018

² Shtengman S., 'Building An International Nonhuman Rights Movement' (Nonhuman Rights Blog, 5 July 2017) <<https://www.nonhumanrights.org/blog/international-work>> accessed 23 October 2018

attributed liability in case of harm deriving from these multiple components. Opacity, on the other hand is something that we have to cope with new methods. It could be reduced either directly by legislation. Which will require publication of the code and specifications of AI systems offered for commercial sale. Or indirectly, through tax incentives or tort standards that limit the liability of companies, which will make their AI systems more transparent³.

So far, our approach has been totally concerned about the legal parts. We can also adopt a technological approach, under which, we will try to understand if AI systems and robots create issues deserving regulation. We should be able to identify AI and robotic applications' categories and to recognize and amount legal needs arising from them. This approach will also affect business and consumer application⁴.

Finally, we will discuss if we can treat AI and robots like distinct and separate personality entities, and if is such the case, what changes should we make in the existing regulations in order to include the new entities. Important steps are already made by The European Parliament Resolution on Civil Law Rules on Robotics⁵.

There have been already some works on this field which deal with how AI systems should be accountable, by letting them explain their decisions. By meaning the system being able to describe in human language how it processed the input it was given and reached to a decision⁶. The work of Petit proposes a way to take into account this externality of autonomous systems, whether this is positive or negative, and index this regulatory response based on the above externality⁷. Also, there are works which debate the trade-offs that should be considered when regulating such a system between the freedom of creation and the problems they should cause, and we have to restrain.

³ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

⁴ Petit N., 'Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications' (2017) Working Paper, Université de Liège

⁵ European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

⁶ Doshi-Velez F. and Kortz M. 'Accountability of AI Under the Law: The Role of Explanation' (2017) Berkman Klein Center Working Group on Explanation and the Law, 1-15

⁷ Petit N., 'Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications' (2017) Working Paper, Université de Liège

2. DEFINITION AND MAIN FEATURES OF ARTIFICIAL INTELLIGENCE

In this chapter, we will try to define at first what is AI, the various definitions many people have given to the term and how it relates to the common intelligence, what is its purposes and its uses and who are the people who create this intelligence.

2.1. Definition of Intelligence

In order to define Artificial Intelligence, first we have to define what exactly is intelligence as a term. Let's see some vocabulary definitions concerning intelligence.

- "The ability to use memory, knowledge, experience, understanding, reasoning, imagination and judgement in order to solve problems and adapt to new situations⁸."
- "The capacity to acquire and apply knowledge⁹."
- "The ability to learn, understand and make judgments or have opinions that are based on reason¹⁰."

You may notice that all the above terms are used to describe intelligence among humans. Humans are the only entities, so far, that possess intelligence and it is not surprising that definitions of intelligence tend to refer to human characteristics¹¹.

2.2. Definition of Artificial Intelligence

The Oxford Dictionary defines artificial intelligence as the "theory and development of computer systems able to perform tasks normally requiring human intelligence".

The most detailed analysis for the definition of Artificial Intelligence has been conducted by Russell and Norvig¹², in whose work they define AI and they organize the various definitions that have been applied into 4 categories:

1. Systems that think like humans
2. Systems that act like humans
3. Systems that think rationally

⁸ *All Words Dictionary* <<https://www.oxfordlearnersdictionaries.com>> accessed 30 October 2018

⁹ *The American Heritage Dictionary* <<https://www.ahdictionary.com/>> accessed 23 October 2018

¹⁰ *Cambridge Advance Learner's Dictionary* <<https://dictionary.cambridge.org>> accessed 30 October 2018

¹¹ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) *Harvard Journal of Law & Technology* 29 (2), 393-398

¹² Russell S. J. and Norvig P., *Artificial intelligence: a modern approach* (Pearson Education Limited 2016), 1-4

4. Systems that act rationally

Today, since we have many applications of AI, even in our everyday life, we tend to adopt the definition that AI is the systems that act rationally. In the same book¹³, the authors define that an AI agent goal is to reach the best result. Or when we are not sure for the result, an AI agent goal is to reach the most expected outcome.

One subfield of AI that has boomed the recent years is Machine Learning. “Machine Learning is the science that renders machines able to learn and act like a human would act. They are also capable of improving their knowledge autonomously, by just interacting with the real world and gathering information and data from these observations”¹⁴.

2.3. History of AI

Computer science is researching the topic of AI since 1940. The first who dived into this field were Vannevar Bush and Alan Turing¹⁵. Soon after, AI became a distinct field¹⁶, and John McCarthy first used the term “artificial intelligence” in 1956¹⁷. In the campus of Dartmouth College was where the first AI research was conducted¹⁸. Actually, the field of AI concerns the study of cognitive processes by exploiting tools and frameworks that apply to computer science¹⁹. The primary goal was to better understand how the human mind works and after accomplishing that, utilizing this knowledge on machines would make human everyday life better²⁰. There was a lot of hype and the people attended that research became the AI research leaders for the after years. At that time, there was a lot of optimism. As the time went, the development was small and slow and in 1970 there was a cut in the AI funding. As a result, at that time governments decided to shut down completely programs and investments during the 1980’s. There were some efforts to gain money from the

¹³ Russell S. J. and Norvig P., *Artificial intelligence: a modern approach* (Pearson Education Limited 2016), 1-4

¹⁴ Alpaydin E., *Introduction to Machine Learning* (Second Edition, 2010) 1-4

¹⁵ McGuire Br. and others, ‘The History of Artificial Intelligence’ (2006) Course Web Service for the University of Washington - Computer Science & Engineering - History of Computing Projects, Washington 4 <<http://courses.cs.washington.edu/courses/csep590/06au/course-projects.html>> accessed 7 November 2018

¹⁶ Rissland E., ‘Artificial Intelligence and Law: Stepping Stones to a Model of Legal Reasoning’ (1990) *The Yale Law Journal* 99, 1957-1958

¹⁷ McGuire Br. and others, ‘The History of Artificial Intelligence’ (2006) Course Web Service for the University of Washington - Computer Science & Engineering - History of Computing Projects, Washington 4 <<http://courses.cs.washington.edu/courses/csep590/06au/course-projects.html>> accessed 7 November 2018

¹⁸ Yudkowsky E., ‘Artificial Intelligence as a Positive and Negative Factor in Global Risk’ in N. Bostrom and M. Čirković (eds), *Global Catastrophic Risks* (Oxford University Press 2008), 37-38

¹⁹ Rissland E., ‘Artificial Intelligence and Law: Stepping Stones to a Model of Legal Reasoning’ (1990) *The Yale Law Journal* 99, 1957-1958

²⁰ *Ibid*

private sector and some scientists also renamed the field to other fancy names like “Pattern Recognition”, “Machine Learning”, but they didn’t have much success. During 1980’s, both the public and the private sector turned their focus to computer revolution²¹. A period, most known as “A.I. winter”, was formed and that led to many scientists believe that this field was doomed to fail²². In the late 1990’s, there was a resurgence in the field of AI and a lot of resources were allocated to it. However, the lack of computing power rendered impossible the use of AI in large scale problems. It was not until the mid-2000’s that AI interest boomed. During that time, machine learning had a lot of disruptive applications to various academia and business fields, aided by the rapid development computer hardware. Nowadays, AI exists in our everyday lives and is expected to bring huge changes in the upcoming years²³. The beginning was with additions to pre-existing technologies, like video-games²⁴ and contextual searches²⁵. The next step was development of new tools, like virtual personal assistants²⁶, home assistants²⁷ and recommendation services²⁸.

2.4. Applications of AI, features and capabilities

Minsky and McCarthy²⁹, considered by most the fathers of AI, described artificial intelligence as “any task performed by a program or a machine that, if a human carried

²¹ McGuire Br. and others, ‘The History of Artificial Intelligence’ (2006) Course Web Service for the University of Washington - Computer Science & Engineering - History of Computing Projects, Washington 4 <<http://courses.cs.washington.edu/courses/csep590/06au/course-projects.html>> accessed 7 November 2018

²² Yudkowsky E., ‘Artificial Intelligence as a Positive and Negative Factor in Global Risk’ in N. Bostrom and M. Čirković (eds), *Global Catastrophic Risks* (Oxford University Press 2008) 38-39

²³ Saxenian A. and others, ‘Artificial Intelligence and Life in 2030’ (2016) One Hundred Year Study on Artificial Intelligence, 18-41

²⁴ Wexler J., ‘Artificial Intelligence in Games: A Look at the Smarts behind Lionhead Studio’s “Black and White” and Where It Can and Will Go in the Future’ (2002) <<https://www.cs.rochester.edu/~brown/242/assts/termprojs/games.pdf>> accessed 8 November 2018

²⁵ Blair H.F., ‘Microsoft Fires Back at Google with Bing Contextual Search on Android’ (PC World, 20 August 2015) <<https://www.pcworld.idg.com.au/article/582584/microsoft-fires-back-google-bing-contextual-search-android/>> accessed 21 October 2018

²⁶ Apple Inc., ‘Apple’s Siri’, <<http://www.apple.com/ios/siri/>> accessed 10 November 2018; Microsoft Corporation, Microsoft’s Cortana, ‘Cortana - Meet Your Personal Assistant’ <<https://www.microsoft.com/en/mobile/experiences/cortana/>> accessed 7 November 2018; Google, ‘Google Assistant - Your Own Personal Google’ <<https://assistant.google.com/>> accessed 25 October 2018; Google, ‘Get to Know Google Home’ (Google) <<https://madeby.google.com/home/>> accessed 25 October 2018; Amazon’s Alexa, (Amazon.com) <<https://developer.amazon.com/alexa>> accessed 10 November 2018; For more information about them, visit: Apple Inc., ‘iOS 10 - Siri’ (Apple) <<http://www.apple.com/ios/siri/>> accessed 30 November 2018; Microsoft Corporation, ‘Cortana - Meet Your Personal Assistant’ (Microsoft) <<https://www.microsoft.com/en/mobile/experiences/cortana/>> accessed 30 November 2018; Google, ‘Google Assistant - Your Own Personal Google’ (Google) <<https://assistant.google.com/>> accessed 30 November 2018; Amazon, ‘Alexa’ (Amazon.com) <<https://developer.amazon.com/alexa>> accessed 30 November 2018

²⁷ Amazon, ‘Echo & Alexa, designed around Your Voice’ (Amazon.com) <<https://www.amazon.com/Amazon-Echo-Bluetooth-Speaker-with-WiFi-Alexa/dp/B00X4WHP5E>> accessed 10 November 2018

²⁸ Popper B. and Welsh A., ‘Tastemaker: How Spotify’s Discover Weekly Cracked Human Curation at Internet Scale’ (2015) The Verge <<http://www.theverge.com/2015/9/30/9416579/spotify-discover-weekly-online-music-curation-interview>> accessed 8 November 2018; Kleinman A., ‘How Netflix Gets Its Movie Suggestions So Right’ (2013) The Huffington Post <http://www.huffingtonpost.com/2013/08/07/netflix-movie-suggestions_n_3720218.html> accessed 7 November 2018

²⁹ McGuire Br. and others, ‘The History of Artificial Intelligence’ (2006) Course Web Service for the University of Washington - Computer Science & Engineering - History of Computing Projects, Washington 4 <<http://courses.cs.washington.edu/courses/csep590/06au/course-projects.html>> accessed 7 November 2018

out the same activity, we would say the human had to apply intelligence to accomplish the task". AI systems are interrelated with human intelligence and they demonstrate abilities like planning, learning, reasoning, problem solving, etc.

AI is more suitable for tasks like solving calculus and playing chess, as these problems are more framed and do not require "common sense" or reasoning, abilities that AI systems are not yet capable of. AI is used in a two-way process. At first, we are trying to understand how human applies intelligence to fulfil a specific task. For instance, when a program designer wants to develop a commercial application that would approve credit card payments, he has first to gain the knowledge from people currently doing this job. Then he has to interview them and grasp the process of how this approval is being conducted. In most cases, the people who are currently working on this field are the only source of gaining this knowledge. When this program designer fully understands the process, he is trying to translate - transfer all this knowledge to a computer program that imitates this process as close as possible. Then, we can create computer programs that act rationally³⁰.

2.5 Applications of AI

In the past decade, the AI has seen a rapid development and many AI applications are considered state-of-the-art in the below fields:

- *Gaming* – Board games that require planning, anticipation and possibilities calculation such as chess, poker, tic-tac-toe, etc., are easily for an AI application to master. In such games, the AI needs to calculate a large number of possible positions based on heuristic knowledge.³¹
- *Natural Language Processing* – AI systems can understand natural language spoken by humans, translate it into written language and communicate back at them.
- *Expert Systems* – Some applications are able to combine information from machines, software and other sources and to provide advices and reasoning to the end users.

³⁰ Russell S. J. and Norvig P., Artificial intelligence: a modern approach (Pearson Education Limited 2016), 1-4

³¹ Alpha Go, <<https://www.telegraph.co.uk/science/2017/10/18/alphago-zero-google-deepmind-supercomputer-learns-3000-years>> accessed 30 October 2018

- *Vision Systems* – AI can now act like human brain and observe and identify pictures and videos. Some of the examples are:
 - The use of a spying airplane as a photographer. In order to use the photographs taken by this airplane to collect information of the space and the maps of the zones.
 - The use of clinical master system by doctors, in order to diagnose the patient.
 - The use of computer software by the police in order to recognize the criminal's face with the stored portrait made by criminologist artist.
- *Speech Recognition* – AI is capable of hearing and comprehending the human language. There are applications that draw what the human is talking instantly. Moreover, the most interesting is that AI can distinguish different accents, filter noise, change voice characteristics, etc.
- *Handwriting Recognition* – The handwriting recognition software is capable of reading the written text by a pen on paper or by a stylus on screen. It can also, recognize the letters shapes and convert them into an editable text.
- *Intelligent Robots* – There are new advances that allow a robot to watch a human's behavior and replicate it. This is called "Imitation Learning" and it is very important as human can set what is the ideal behavior and robots will learn to act in various tasks based on this behavior³².

According to Scherer³³, there are three features of AI which need to be added to a regulatory regime.

The first important feature, which separates the AI systems from earlier inventions, is the ability of the to act autonomously. AI will force comparably disruptive changes to the law. Since, the existing legal system make a huge effort to deal with the augmenting omnipresence of autonomous machines.

The second important feature is the concept of foreseeability. In nowadays application, we may understand that AI actions may be unexpected to the degree that

³² Naik P., 'Importance of Artificial Intelligence with their wider application and Technologies in Present Trends' (2016) - International Journal of Scientific Research in Computer Science, Engineering and Information Technology 1 (3), 57-61

³³ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

we as humans have never thought of. For example, a chess playing AI may make moves that seem odd at a first glance but at the end will lead to winning the game. Finally, the third important feature is how an AI will act and what has caused these actions for the machine (causation). Most humans are not able to analyze and filter all the available information in a specific time, which is a restraint caused by the cognitive ability of the human brain. It is wonderful when we have the AI to be creative or to act something that was unprecedented, but we also want to explain what has caused the machine to act correspondently because in a case of the malfunction, we want to hold someone accountable for these actions. It is important to impose some rules for the unforeseeability of intelligent systems. If an intelligent system causes harm to a victim, and the system's designer is not liable, then it will be difficult for the victim to be compensated for his/her losses³⁴.

³⁴ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

3. LEGAL ISSUES INNATELY ASSOCIATED WITH AI

Nowadays, in our everyday life, we deal with machines even though we do not completely realize it. First of all, most of the smart phones we use nowadays are using Artificial Intelligence. Imagine asking your smartphone random questions (“Hey Siri, what’s the weather today?”) or setting the alarm by telling our device to do so³⁵. In the customer service area, we may chat for a specific problem we have, and in the end we may or may not find out that we were speaking to a machine - bot³⁶. This bot may solve you different questions you have like “What’s the price of the product with code XXX” or “Is the product XXX still available?”. At the end of your chat, you may not realize that, in fact, you were discussing with a machine.

Another concrete example of the change AI has brought in our lives is in the financial sector. We may decide to give our money to a bank in order to invest them and this investing decisions will be finally made by a machine, something that solves the emotional deficit that exists in a human investor³⁷. Also, when you try to apply for a loan through an electronic application form, you may never understand that this application is being evaluated by a machine that takes into account thousands or millions of previous such applications and tries to understand if you fulfil the criteria in order to get the loan.

All the above are examples which already occur in our lives and we do not even understand them. But in order to be protected and to ensure the right applications and the lack of malfunction of all the above machine examples, we have to somehow regulate these machines, the context of their application and maybe set some restrictions to the people who create them.

The issues that innate from AI will have an important impact to the world. More specifically to the society and to the legal systems. As far as the legal systems, some of the legal fields that will be affected by AI evolution are intellectual property rights, competition law, labor law, criminal law, tort law, data protection law etc. The

³⁵ Massaro T. and Norton H., ‘Siri-ously? Free Speech Rights and Artificial Intelligence’ (2015) Nw. UL Rev. 110, 1169-1192

³⁶ Schneider M., ‘Bots, Messenger and the Future of Customer Service’ (2016) TechCrunch <<https://techcrunch.com/2016/05/07/bots-messenger-and-the-future-of-customer-service/>> accessed 8 November 2018

³⁷ World Economic Forum, ‘The Future of Financial Services’ (2015) <http://www3.weforum.org/docs/WEF_The_future_of_financial_services.pdf> accessed 8 November 2018

presence of AI systems is a fact in many fields. Such as in the research, in the products and services. Thus, it is quite sure that will generate complicated legal problems. There are many cases where the already applied regulations can suit the needs of AI regulation. There are already privacy and data protection laws that also apply on AI³⁸. The above-mentioned examples illustrate the current impact of AI. Nevertheless, the evolution of AI is continuous and so AI systems are appropriate in more creative fields also. For example, intelligent machines have the capability to cultivate mechanisms of lying and deceiving; of prospering in an antagonistic ambiance³⁹; of obscuring the contact with other machines⁴⁰; of writing⁴¹; of coding; of painting; and finally of creating scientific theories.

Thus, we can easily understand how many legal issues arises from the development and the use of AI in everyday transactions. Since, AI will have an important impact to the legal world apart from the society itself. More specifically some of the main legal fields that will be affected by AI evolution are intellectual property rights, competition law, labour law, criminal law, tort law, data protection law.

So, it is obvious that even though the existing rules and regulations can apply to AI, as far as general principles and rules are concerned, like the legislation on privacy and data protection that apply on AI⁴², there is definitely a huge legal gap that can lead to serious problems. The existing rules may not apply to AI, which is a disruptive technology that carries important changes in a financial and social level. Especially in AI systems coupled with hardware permitting an interaction with the world, the existing lack of applicable legal rules can provoke legal problems.⁴³

This lack of existing legal rules to be applied to AI systems, creates a legal gap that causes legal uncertainty. For example, in the transportation sector. Driverless automobiles are already designed and constructed, by using AI systems⁴⁴. New legal

³⁸ Regulation 2016/679 of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) [2016] OJ L119/1

³⁹ Grifantini K., 'Robots "Evolve" the Ability to Deceive' (2009) MIT Technology Review <<https://www.technologyreview.com/s/414934/robots-evolve-the-ability-to-deceive/>> accessed 5 November 2018

⁴⁰ Abadi M. and Andersen D., 'Learning to Protect Communications with Adversarial Neural Cryptography' <<https://arxiv.org/pdf/1610.06918v1.pdf>> accessed 30 October 2018

⁴¹ Holmes J., 'AI is already making inroads into journalism, but could it win a Pulitzer?' (2016) The Guardian <<https://www.theguardian.com/media/2016/apr/03/artificial-intelligence-robot-reporter-pulitzer-prize>> accessed 5 November 2018

⁴² Regulation 2016/679 of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) [2016] OJ L119/1.

⁴³ Tiažkijus V., 'Gaps in Labour Law and Their Influence on Flexibility and Stability of the Labour Law System' (2012) *Jurisprudencija* 19 (4), 1551

⁴⁴ Levandowski A. and Kalanick T., 'Pittsburgh, Your Self-Driving Uber Is Arriving Now' (2016) Uber Newsroom <<https://newsroom.uber.com/pittsburgh-self-driving-uber/>> accessed 7 November 2018

issues arise the presence of self-driving car. Unfortunately, the existing regulation has not the resolution⁴⁵. For instance, we need to solve how to give to cars driving permission or how to gauge their security. Consequently, a new regulation must be created to govern the cars system testing and authorization in order to be able to drive on the streets without a human as a driver. Moreover, the establishment of current security regulation is imperative to avoid damages. Such as the damage that can be provoked to a passenger of the car or third parties driven by an AI system⁴⁶. Another issue that arise from the self- driving car is the protection of personal data, as this new technology, manipulates personal data⁴⁷.

A crucial example of the legal uncertainty innated in the use of AI systems is the field of weapons. The so-called autonomous weapons⁴⁸. Governments are creating autonomous robots for military purposes, that can kill⁴⁹. The risk of this creation is enormous, and it raised so many questions that in 2015, an open letter was signed in an International Joint Conference on Artificial Intelligence. More than 1,000 experts in the area, among them Elon Musk and Stephen Hawking, participated to this conference in order to object to military autonomous weapons⁵⁰. The above mention initiative was so risky and crucial that lead to another conference held by the United Nations. More specific in the same year, 2015 took place the Experts Meeting on Lethal Autonomous Weapons Systems in Geneva, organized by the UN to discuss the subject⁵¹.

Apart from the above-mentioned examples, AI provokes so many legal issues that have to be solved, since the current law is not able to resolve. For instance, the liability issues. In particular, who should be liable when a machine with AI technology causes

⁴⁵ Pillath S., 'Automated vehicles in the EU' (2016) Briefing – European Parliamentary Research Service 3, 6-11

⁴⁶ Ibid

⁴⁷ Woodyard C. and O'Donnell J., 'Your car may be invading your privacy' (2013) USA Today <<https://www.usatoday.com/story/money/cars/2013/03/24/car-spying-edr-data-privacy/1991751/>> accessed 8 November 2018

⁴⁸ Brown G., 'Law at cyberspeed: answering military cyber operators' legal questions' in W. Von Heinegg and G. Berutto (eds), *International Humanitarian Law and New Weapon Technologies* (FrancoAngeli 2012), 166-170

⁴⁹ Thierer A., Castillo O'Sullivan A. and Russell R., 'Artificial Intelligence and Public Policy' (2017) Mercatus Research, Mercatus Center at George Mason University, 7-8

⁵⁰ Al-Rodhan N., 'The Moral Code: How to Teach Robots Right and Wrong' (2015) Foreign Affairs <<https://www.foreignaffairs.com/articles/2015-08-12/moral-code>> accessed 30 October 2018

⁵¹ Garcia D., 'Battle Bots: How the World Should Prepare Itself for Robotic Warfare' Foreign Affairs (2015) <<https://www.foreignaffairs.com/articles/2015-06-05/battle-bots>> accessed 25 October 2018

physical damage to someone⁵². Another example is the distribution of the AI merit and its impact on the working part ⁵³.

Even more, we have to answer how the danger of the deployment of untested systems can be avoided; or which must be the standards of training an A.I. system used by public security authorities in order to avoid the negative effects on marginalized groups⁵⁴.

As we have already analyzed in this chapter there are so many legal questions that have to be answered in order to regulate the AI technology. Some legal experts sustain that AI technology has not matured. Since AI technology is changing continuously, we don't have a clear field of what we can regulate⁵⁵. As a matter of fact, is too early to recognize and comprehend the AI potentials and consequences. Therefore, regulating AI may ban the capabilities of this technology. Even worst, we might take the risk of an obsolete regulation. As what we might regulate today could be rapidly become ineffective.

Of course, if we sustain this option, we must not regulate anything. Things change all the time, maybe not so rapidly as technology, but they do change. In the sector of disruptive technology foreseeability and predictability are not applicable. However, AI happens now, it is already being used and commercialized, and we already see its effects. For instance, many studies have been made on the effects of AI in transportation⁵⁶, medicine⁵⁷, data protection⁵⁸ and of course on law⁵⁹. So, regulators can address their attention to the current technology and those that will emerge in the near future. Regulators may not know everything about AI, but neither do they knew everything about the environment or health, when they regulate these sectors. If someone opt to know everything about a subject to regulate it, then by the time of regulation it will be ineffective. Especially when we talk about technology regulation.

⁵² Cole G., 'Tort Liability for Artificial Intelligence and Expert Systems' (1990) 10 Computer L.J.127, The John Marshall Journal of Information Technology and Privacy law, 129-230

⁵³ Saxenian A. and others, 'Artificial Intelligence and Life in 2030' (2016) One Hundred Year Study on Artificial Intelligence, 42-43

⁵⁴ Crawford K. and Calo R., 'There is a blind spot in AI research' (2016) 538 Nature, 311

⁵⁵ Worstall T., 'Exactly What We Don't Need – Regulation of AI and Technology' (2016) Forbes <<https://www.forbes.com/sites/timworstall/2016/10/12/exactly-what-we-dont-need-regulation-of-ai-and-technology/#4385eaf05333>> accessed 8 November 2018

⁵⁶ Sadek A., 'Artificial Intelligence Application in Transportation' (2007) Transportation Research Circular E-C113, 1-6

⁵⁷ Peek N. and others, 'Thirty years of artificial intelligence in medicine (AIME) conferences: A review of research themes' (2015) Artificial Intelligence in Medicine 65, 61-73

⁵⁸ Information Commissioner's Office, 'Big data, artificial intelligence, machine learning and data protection' <<https://ico.org.uk/media/for-organisations/documents/2013559/big-data-ai-ml-and-data-protection.pdf>> accessed 5 November 2018

⁵⁹ Hildebrandt M., 'Law as Information in the Era of Data-Driven Agency' (2016) Modern Law Review 79, 28-30

Therefore, we can regulate AI in an effective way now with the current knowledge of experts. The time to act is now.

4. LIABILITY AND REGULATORY OPTIONS

One of the most important problems that the society must be prepared to solve is the liability issue on AI systems. In other words, society must be able to cope with situation that arise when autonomous AI systems biases rules or causes damages to individuals, property or public goods. This is the price to pay if society wants to enjoy the benefits of AI systems. So, who will be liable for autonomous AI systems?

To evaluate the liability's imputation on AI systems firstly we have to define the liability in its traditional approach, that exists in all the legal systems. Liability is very important in many law sectors. Such as criminal law and contract law. So, in civil, as in common law systems, exists the criminal and the civil liability.

- *Criminal Liability*⁶⁰:

Criminal rules normally require an action and a mental intent, depending of what we have in each case there is a classification as follows⁶¹:

1. Cases where the action is an action and cases where the action is a failure to act.
2. Cases where mental intent requires knowledge.
3. Cases where mental intent requires only negligence ("a reasonable person would have known");
4. Strict liability cases where no mental intent is required.

- *Liability in civil law*⁶²:

According to civil rules and tort law, one is liable for damages caused by his or her own acts. So as a result, is necessary a wrong act by acting or by omitting an action to charge liability to the perpetrator. So, the wrongdoing is defined as a breach of duty of care or omission or fault.

As one can understand traditional approaches of liability (criminal and civil) are inappropriate to deal with autonomous AI systems due to two parameters unpredictability, and causality without legal agency.

To be more specific, we will take as an example an engineered product⁶³. The function of an autonomous AI system is not always predictable, unlike traditional engineering

⁶⁰ Kingston J., 'Artificial Intelligence and Legal Liability' (2016) SGAI Conference, 269-279

⁶¹ Hallevy G., 'The Criminal Liability of Artificial Intelligence entities- From Science Fiction to Legal Social Control' (2010) <<http://ssrn.com/abstract=1564096>> accessed 5 November 2018

⁶² Kingston J., 'Artificial Intelligence and Legal Liability' (2016) SGAI Conference, 269-279

systems. Many AI systems may be unpredictable in principle, and many may be unpredictable in practice. Predictability is crucial for the imputation of liability. From the traditional aspect of product liability, the manufacturer is liable for the product. His liability encompasses the product's function as designed and the foreseeability of problems that may occur or harm that may cause. As far as foreseeability, it is defined, by Asaro M. Peter "whether the manufacturer had knowledge of the potential problem, or whether a reasonable person should have foreseen it, or whether there is an industry standard of practice that would have revealed it"⁶⁴. The efficiency of an engineered product is subject to unpredictable factors. Such as failure or unexpected state of use. Although there are common aspirations regarding if it is efficient, if the limits of its efficiency have been tested, if it is likely to fail, and how it manages the risks that could predict⁶⁵.

In the case of AI to resolve the liability problem we must distinguish between:

I. AI systems that cannot produce knowledge, that have certain functions already determined and predicted by the innovator. In this case liability could be no different from the liability imputed to manufacturers for a traditional engineered product.

II. AI systems that can produce knowledge by modifying their functions and learning after their deploy, by becoming dependent on new data, that are unpredictable and uncontrollable by the designers and by the users. In this case liability will be different due to the factor of unpredictability. An AI program that is capable to learn open-ended, could apprentice functions unpredicted by its manufacturer, perhaps from the beginning and as a result in practice. Insofar, since autonomous AI system can use learning and open-ended learning, it will be unpredictable. Unpredictability can be ruled in a liability concept. The AI systems introducing that unpredictability could be themselves legally responsible for their actions. Even more, it could be efficient the management of the risks generated from unpredictability⁶⁶.

In most engineered products the predictability is defined and restricted by the actions of third parties, such as the consumers or the technicians and by the maintenance and

⁶³ Asaro P., 'The Liability Problem for Autonomous Artificial Agents' (2016) Association for the Advancement of Artificial Intelligence Spring Symposia (www.aaai.org), 190-194

⁶⁴ Ibid

⁶⁵ Ibid

⁶⁶ Ibid

the use of the product. In all the above-mentioned cases, it is clear who is liable for the improper function of the product

If Autonomous AI systems can act beyond their designers or operators, it is difficult to impute liability on them. This case can be compared to the way that somehow parents may be held liable for their small children actions. Even more can be compared to the way individuals may be held liable for their animals' actions.

The most legal systems to impute liability require ability of understanding the scope and the risks of an action. So, in AI systems the liability must be imputed to those who has the ability of understanding the scope, the risks and the responsibility that they are taking by developing an autonomous AI system. They must also develop some means to manage the risks through controls over the system⁶⁷.

A measure to bear the liability and compensate in case of unpredicted damages is that manufacturers or the programmers having the control not only on the creation of an AI system but also on the use of it by consumers. This scope can be obtained by limiting the consumers and user's ability of modifying, adapting or customizing their products using evolved AI system.

According to the model of strict liability, the manufacturer or the possessor is liable for any damage provoked by an AI system. Strict liability applies also to the status of having a wild animal. For example, it is expected that a snake will harm people if it gets free. In this case according to strict liability model, the holder of the snake is liable for any harmful result his/her snake may cause. While to domesticated animals we apply regular property liability, since we have the expectation that they would not harm anybody under normal circumstances. In consonance with Asaro Peter, we could apply the strict liability model to robotics. Specially by assimilating the evolved AI systems to wild animals, and simple AI systems to domesticated.⁶⁸

As a result, to charge liability to AI systems there could be three legal models based on the existing legal rules for similar categories of non-human beings in conformity with Kingston J.⁶⁹.

⁶⁷ Asaro P., 'The Liability Problem for Autonomous Artificial Agents' (2016) Association for the Advancement of Artificial Intelligence Spring Symposia (www.aaai.org), 190-194

⁶⁸ Ibid

⁶⁹ Kingston J., 'Artificial Intelligence and Legal Liability' (2016) SGAI Conference, 269-279

I. *“Perpetrator-via-another.* If an offence is committed by a mentally deficient person, a child or an animal, then the perpetrator is held to be an innocent agent because they lack the mental capacity to form a mentally intended action”. According to this model, AI programs could be held to be an innocent agent, and the liability is imputed to the software programmer or the user⁷⁰.”

II. *“Natural-probable-consequence.* If a part of the AI program which was intended for good purposes is activated inappropriately and commit a crime. According to Hallevy example, a Japanese employee of a motorcycle factory was killed by an artificially intelligent robot working near him. The robot by default identified the employee as a threat to its mission and calculated that the most efficient way to eliminate this threat was by pushing him into an adjacent operating machine. Using its very powerful hydraulic arm, the robot smashed the surprised worker into the machine, killing him instantly, and then resumed its duties⁷¹.”

“The normal legal use of natural or probable consequence liability is to prosecute accomplices to a crime. If no conspiracy can be demonstrated, it is still possible to find an accomplice legally liable if the criminal acts of the perpetrator were a natural or probable consequence⁷² of a scheme that the accomplice encouraged or aided⁷³, as long as the accomplice was aware that some criminal scheme was under way”.

Consequently, programmers or users could be liable if they had the knowledge that their program or the use of it respectively, could commit a crime in the ordinary course of events. Though to apply this rule a distinction should be made. On one hand the AI systems that have the knowledge that they could commit a crime, because they have been designed so. On the other hand, the AI systems that have not that knowledge since they are not designed to have such a function.

III. *“Direct liability.* Where both action and mental intent are imputed to an AI system.⁷⁴”

An action can easily be attributed to an AI system. Since an AI system act result can consist a crime. Even more, an AI system act result can consist a failure of action when it is due and lead as an action to an offence. What is not simple is to attribute mental

⁷⁰ Kingston J., ‘Artificial Intelligence and Legal Liability’ (2016) SGAJ Conference, 269-279

⁷¹ Weng Y-H., Chen C-H. and Sun C-T., ‘Towards the Human-Robot Co-Existence Society: On Safety Intelligence for Next Generation Robots’ (2009) Int.J.Soc.Robot 1, 267, 273

⁷² *United States v. Powell*, [1991] 929 F.2d 724

⁷³ Kingston J., ‘Artificial Intelligence and Legal Liability’ (2016) SGAJ Conference, 269-279

⁷⁴ *Ibid*

intention. While in strict liability offences, where there is no requirement of intention to commit a crime, there is an advanced possibility to assign criminal liability to AI systems. For instance, if an autonomous driving car, was violating the speed limit of a road, AI systems inserted to the autonomous driving car could be held criminally liable by law.

Of course, so for human beings as for AI systems, it is important to mention some cases where the advocacy of the accused party has present great arguments which led to the innocence of the accused party. For instance, in the case of a defendant accused of committing a cybercrime, the advocacy held that the computer of the defendant has been attacked by a malware program, which committed the cybercrime by using the defendant's computer. Moreover, the last one has no knowledge of the crimes committed by the malware program via the defendant's computer. More specific, a teenager computer hacker was accused of committing a denial of service attack. The advocacy of the teenager was that a Trojan program was responsible for the attack from the computer of the accused, which disappeared from the computer before it could be legally tracked⁷⁵. Why the approach for AIs must be different?

Another crucial matter for the AIs liability is the limitations that must be regulated. On the one hand, the limitations imposed to human being experts should be applied to AI systems, if they have the same knowledge. On the other hand, we have to apply AI technology's limitations compared with humans.

In legal terms, an argument could be that it is the merchant's obligation to inform the costumer of the AI system's limitations. Since the domain changes rapidly, it could be reasonable that the merchant provides a frequent update knowledge of the system as an extra service. Though it is difficult to define reasonable and frequent. Usually, in a legal form, reasonableness, is related to an AI system's life expectancy. So, if for example knowledge was awaited to change every year, then it would be reasonable the obligation of a merchant to inform the costumer of the expected knowledge changes of the AI System.

⁷⁵ Brenner S.W., Carrier B. and Henninger J. 'The Trojan Horse Defense in Cybercrime Cases', (21 Santa Clara High Tech. L.J. 1, 2004) <<http://digitalcommons.law.scu.edu/chtj/vol21/iss1/1>> accessed 21 October 2018

An interesting point in regulatory options that already started to flourish globally is the licensing of an AI system. As Kingston J.K.C sustains in his article⁷⁶ “The US Securities and Exchange Commission has introduced this option which required a registered stock market recommender system as a financial adviser⁷⁷ and also classified developers of investment advice programs as investment advisors⁷⁸”. In this way we can promote technology innovation and create new professions as a small fight against unemployment.

To summarize, it has been established that the legal liability of AI systems depends on at least three factors according to Kingston J.K.C ⁷⁹:

1. Whether AI is a product or a service.
2. In case of a crime, what mental intent is required.
3. Whether the AI system’s limitations are communicated to a customer.

So, liability definitely exists for AI systems that commit a crime or cause damages to a third person or non-human being. The question is who is liable for these actions? The answer depends on which of Hallevy’s three liability models apply (perpetrator-by-another, natural-probable- consequence, or direct liability)⁸⁰:

- In a perpetrator-by-another offence, the AI system’s Instructor– the programmer or the user will be liable.
- In a natural-or-probable-consequence offence, liability could be imputed on anyone who might have foreseen the product being used in the wrong way. Which means the programmer, the vendor or the service provider. Even the user if he had the instructions with the limitations on the use of the product, though the user did not proceed with the right use.
- AI programs may also be held liable for strict liability offences, in which case the programmer will be liable⁸¹.

Even though in most cases the programmer is held liable, arguments could be made for other actors’ liability through the process of the generation of an AI system. Such

⁷⁶ Kingston J., ‘Artificial Intelligence and Legal Liability’ (2016) SGAI Conference, 269-279

⁷⁷ Ibid

⁷⁸ Ibid

⁷⁹ Ibid

⁸⁰ Hallevy G., ‘The Criminal Liability of Artificial Intelligence entities- From Science Fiction to Legal Social Control’ (2010) <<http://ssrn.com/abstract=1564096>> accessed 5 November 2018

⁸¹ Ibid

as the program designer, the knowledge expert, the director responsible for the appointments of the inappropriate expert⁸².

This is the reason why this dissertation holds that a licensed procedure of AI systems should be established in order to charge liability to the owner of the license.

A way to treat AI machines

Society in the near future may have to accept that an AI software or even a robot will have legal rights and will be treated as a human. It is difficult to think of it now, as this meaning of rights is not understandable apart from humans. AI machines are programmed now to conform to rules, but they are not **(yet)** capable of following a rule, as it includes that they will understand the meaning of them. To be able to do that includes active engagement, participation and common sense⁸³.

Human beings are members of society and laws and rules are preconditions in order to coexist in this society in harmony. This is what separates humans from other beings, that they share these rules and laws and are able both to oblige to them and to respect the others obliging to them as well. In the case of giving legal rights and legal personhood to AI machines, we risk the dehumanization of our society. These machines may be smarter than humans, but in the end, humans have to separate them from all other beings in this world⁸⁴. Some may argue that since there is a corporate personhood, why there cannot exist a robot personhood? The key difference between these two entities is that a corporation always acts through humans, as humans are in charge and take the decisions⁸⁵.

Ultimately, AI poses intricate new regulatory issues with a huge potential societal impact if legal personality must be attributed to AI or not. So, the law will have to decide upon permissible forms of AI and upon a possible legal obligation to use AI devices in specific settings. Just think about 'medical experts' that are smarter than humans. The law will have to define rights and obligations of robots and/or their owners. The governance of firms will change fundamentally by being run more and more on AI.

⁸² Kingston J., 'Artificial Intelligence and Legal Liability' (2016) SGAI Conference, 269-279

⁸³ Eidenmüller H., 'The Rise of Robots and the Law of Humans' (2017) Oxford Legal Studies Research Paper No. 27, 1-15

⁸⁴ Ibid

⁸⁵ Ibid

One of the most important aspects is the access to AI. And first and foremost, we have to consider if some of these smart technologies should be considered as public goods. If they do, then we have to train everyone so as to be able to use this technology. Even if it comes with a cost, there should be a low-cost option for everyone that wants to use it. Elsewise, a gap will be created between those who can use this technology and those who cannot afford to use it, which would cause a great imbalance between the society.

The era of the robot law has arrived. The society has to decide whether there will be strict regulations so that the robots and AI will be controlled tightly by these human laws, or the idea of maximizing the utility of AI will leave some more freedom to how everyone should use it. This is one of the reasons why robot law will probably be characterized by much regulatory diversity and regulatory competition given significant differences in the 'deep normative structure' of different societies. It will be quite difficult for states to agree on common policies. Because of the need of some countries to adapt new technologies faster, and of course to attract more investments, there will be a competitive race among the countries for regulatory purposes. Some of these countries may adopt "robot-friendly" regulations, in order to attract more AI companies and this will also put pressure to others to follow such policies⁸⁶.

One more aspect, that AI will change as well, is the law-making and the legal profession. First and foremost, the question is raised whether, at some point in time, smart (AI- based) law-making will assist us in regulating AI products and services. It is beyond doubt that smart technologies will be a great aid in enhancing the efficiency of law-making on a technical level. The second question raised is whether AI would be able to tackle alone complicated regulatory problems that require intricate value judgments. This may seem too far right now as machines are not capable of thinking and give solutions to theoretical problems, but we have to be prepared for the advances in the technology and what it may happen in the future⁸⁷.

So, it is crystal clear that this dissertation stresses that AI systems should not be granted legal rights. We believe that these systems should not have legal personhood. For instance, they should not have the right to conclude contracts or own property. AI

⁸⁶ Eidenmüller H., 'The Rise of Robots and the Law of Humans' (2017) Oxford Legal Studies Research Paper No. 27, 1-15

⁸⁷ Ibid

systems should not be compared to corporations. Since corporation was given legal personhood in order to benefit commerce. The key difference between corporations and AI systems is that the first one is controlled by Humans. AI systems that can create knowledge and modify their functions are unpredictable and may be unstoppable, it is not clear that humans will continue to have control of the AI systems.

To answer this question the society follows the legalistic and the technological approach in combination. The legalistic approach starts from the existing legal system and continues with a catalogue of legal domains affected by AI systems. Such as liability, privacy, legal personhood, intellectual property etc. The technological approach is to encompass legal issues in technological application: driverless cars etc⁸⁸.

⁸⁸ Petit N., 'Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications' (2017), Working Paper, Université de Liège

5. REGULATORY PROPOSALS

The European Parliament resolution on Civil law rules on robotics in 2017 is a great step forward for AI systems regulation⁸⁹. Although promising regulatory proposals have been encompassed, there were not included principles to select subjects and to propose remedies. As a result, the resolution includes many contrarities. Specifically, not only sustains that the imputation of liability to humans for autonomous robots' actions is inadequate, but also requires the users to be provided with compulsory insurance⁹⁰. So how AI systems should be regulated?

AI regulation should be based on an institution responsible for the establishment of the general principles that have to be accepted universally. Furthermore, an organization in charge of the certification of AI programs should be established by law. One of the main tasks of this organization should be to certify an AI program only if the last one fulfils the requirements of safety and limitation set by the Organization's authority⁹¹. The AICO'S⁹² statutory act should start by defining its purposes. The purposes of AICO should be to warrant that an AI program seeking for certification is subject to human authority and in favor of human interests. These purposes should be reached not only by inhibiting the generation of AI programs in lack of the above-mentioned requirements but also by supporting the advancement of AI programs beneficial for the human kind, which contains those characteristics. One of the tasks of the AICO should be to constitute rules regarding the definition of AI and should also update these rules. The Organization would be required to create rules defining AI and to update those rules regularly as AI is a continuously changing disruptive technology. Legislature ratification should be required for the AI definition rules in order to determine the AICO jurisdiction's scope⁹³.

The Organization should be authorized by the AICO to install a certification system under which AI systems addressed for commercial sale should be subject to the

⁸⁹ European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

⁹⁰ Petit N., 'Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications' (2017), Working Paper, Université de Liège

⁹¹ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

⁹² From now on I will refer to Artificial Intelligence Certificate Organization as AICO

⁹³ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

organization's personnel review and safety certification. Those AI that would end up uncertified because they do not fulfil the requirements of safety, security, of human control and created for the human interest they should not be prohibited but in a way limited. This limitation would be reached by a strict liability tort system in order to not only give incentives to programmers, designers and manufacturers to present their AI systems for certification but also to ensure the safety and security requirements, if the above mentioned (programmers, designers and manufacturers) choose to overcome the certification process for their AI systems.

On the other hand, the AI Systems presented for certification and deemed worthy of the organization certification should be imputed limited tort liability. So, if an offense or a damage caused by a certified AI system occurs, complainants should prove that on the design, manufacturing, or operation process of an AI system actual negligence happened in order to win tort claim. Another issue that should be regulated by the organization is who will recompensate a complainant in case of the insolvency of all the actors involved in the generation or operation of a certified AI system. In such a case a successful complainant should be able to file an administrative claim to the Organization for the deficiency. So, it should be required that the Organization administer an adequate fund to comply with its expected obligations from such claims. Even more, it should be required that the organization publish a report (such as the reports that the National Transportation Safety Board prepares after aviation accidents and incidents⁹⁴) in case of a successful claim or suit grounded on the negligence during the design process of a certified AI system.

Enterprises and companies that generate, sell or use uncertified AI systems should be held strictly liable for damages caused by their uncertified AI systems. Additionally, the liability of the above-mentioned companies should be joint and several, in order to permitting a complainant to be recompensate entirely for the damages caused by any actor involved with the uncertified AI system. Moreover, since the actors involved in the creation of an AI system are many (generating process, distribution, sale, operation) an accused charged to be responsible should file an action of contribution or indemnity to be reimbursed from other possible accused.

⁹⁴ Aviation Accident Reports, NAT'L TRANSP. SAFETY BOARD, <<http://www.nts.gov/investigations/AccidentReports/Pages/aviation.aspx>> accessed 10 November 2018

Pre-certification research and testing of AI rules should be defined by the organization. These rules would help the AI developers to collect data and test their designs in secure environments, so that the Organization could be better informed and conclude to better certification decisions. This step of pre-certification and testing of the AI systems should be excluded from strict liability, contrary to uncertified AI systems. Moreover, AICO should give the Organization the authority to create a reviewing mechanism for the existing AI systems periodically in order to avoid risks.

This Organization should be composed of AI specialists – experts in an academic or industrial level.

So, the tasks of this new Organization would be to create policy, to certify AI systems that fulfill the requirements and to renew the certification periodically. The policymaking staff composed by AI specialists and experts would be authorized to define AI (though the definition would be ratified by legislation). Also would permit AI research in certain environments, where the researchers would be not strictly liable. Finally, would establish an AI certification process and a reviewing AI certification process periodically.

The Organization should also create rules regarding licensing and warning notice requirements for certified AI. For example, such a rule could determine that, a programmer or a company would lose its liability protection, if it sells a product without a licensing agreement that inhibits the modification of the AI system. This inhibition would safeguard that the product will remain the same as the one certified by the Organization through the possessors' chain, from the developer to the end user. Furthermore, Courts⁹⁵ will continue to play their role as in all other cases where there is a claim. The Courts should adjudge tort claims based on damages caused by AI systems. Furthermore, courts should apply the rules for negligence claims to cases involving certified AI systems. While rules of strict liability should be applied by courts for cases involving uncertified AI systems. The allocation of responsibility in multiple-defendants' cases and actions for indemnity or contribution, should be determined as in ordinary tort cases.⁹⁶

⁹⁵ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

⁹⁶ McGinnis J., 'Accelerating AI' (2010) Northwestern University School of Law 104, 366-381

There is a certainty that, courts would face cases arising from the certification process, the licensing requirements and the reviewing of the AI system. Even more would deal with cases where the parties will argue whether the version of the AI system at issue was the one certified by the Organization or will argue at what point the AI system was modified and thus it is out of the purpose of the certified version. In such cases, the key point that the court should examine, would be whether the product was in conformity with a certified version of the AI system at the time it caused damage, if it was not, the key point would be when the product differed from the certified AI system. That modification point would then be crucial for the liability of the accused.

The establishment of a liability system to regulate the AI through an organization gives a great incentive to AI developers to follow the certification process. Since the organization would have the authority to set the basic principles and requirements for the AI system certification, licensing and renovating process, the AI developers would more easily adopt the safety and security requirements. On the other hand, by imposing joint and several liability for uncertified AI systems the Organization would force distributors, sellers, and operators to examine carefully if an uncertified AI system is safe and secure. Companies would not be willing to modify a certified AI system if their liability protection is in danger.

Complementary to this Organization of AI Certification an entity controlled by the governments of each participating state in this universal AICO, would subsidize AI research for safety requirement. To assure the purpose of those entities tort rules that imposes the penalization of AI developers who ignore the results of that safety research. This is the way to promote the AI development in a safe and controllable way. Even more, from a commercial perspective, once an AI system is certified and licensed by the AICO, the manufacturers or operators of AI systems should be required to insure their AI systems, in order to directly determine the damage risk that AI systems could cause⁹⁷.

⁹⁷ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

6. CONCLUSIONS

The last decade, AI has been rapidly developed. In the beginning was introduced to existing technologies, but rapidly concur new fields by creating new devices and new possibilities and applications.

Th society however was not prepared to deal with the rise of AI. For that reason, our existing legal systems could not apply to AI systems. Since AI system is A technological emergency and is unpredictable and causal. The AI system revolution demands the modification of law and society so that both can adopt the changes that provoked this new technology. As a result, many questions are raised by this technological revolution that needs to be regulated and controlled in order to be used in favor of human. This dissertation is an attempt to answer some of the questions raised.

The dissertation begins by describing what the term AI means and its distinctive features. Then analyses the legal issues that are innately associated with AI. Then we proceed with the liability problem on AI systems, trying to answer the question, who will be liable in case of a crime committed or an error occurred from an AI system. How could we regulate AI in a safe, secure and for the human-interest way? We also include regulatory options and attempts made already in a unanimous way, including the European Parliament Resolution on Civil Law Rules on Robotics⁹⁸. In the last chapter, we propose a regulatory scheme that could be utilized in order to regulate AI. As a consequence, we conclude that AI could and should be regulated. The regulatory framework should combine the legal and technological approach. For that reason, a regulatory system based on tort liability could guarantee our security and safety. The regulatory system for AI should also be addressed towards human interest and benefit. For that reason, in this dissertation we hereby sustain that an independent universal authority maybe called AI Certification Organization should be immediately established. In order to guarantee that all the steps made by AI systems, the evolvment and the innovation will be in an obsolete way controlled by human and made for human. To ensure our safety and security, the AI systems should have an owner that would be liable for their actions or omission depending of the legal form of

⁹⁸ European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

these AI system. A manufacturer, programmer or designer would enjoy limited liability if follows the certification, licensing procedure established by the AICO⁹⁹. Contrary, if the above-mentioned relevant persons or companies forego the certification procedure for the AI system that they created, in case of an error, crime, fault they would be held with strict liability. So, it become obvious that in this thesis we impute liability to persons and we do not sustain that AI systems should be granted with legal personhood and legal rights. As to avoid major risks, humans should have the control of the AI systems through a legal procedure that ensures safety. As a matter of fact, technology is an invention of human beings in order to facilitate our lives, why this should change by recognizing legal personhood to AI machines that could turn over the human kind if the control is lost? Regulation of AI systems is a necessity. A control system must be built. Regulation would not stop the development of AI, on the contrary, could lead to many beneficial results. However, expertise is required in order to assure that the risks of AI technology and its regulation would be seriously taken into consideration. Academic and industrial specialists and experts on AI should compose the Organization that will certify the AI systems. As, due to the nature of AI a specialized staff and a centralized regulation on AI, with harmonization across Europe and worldwide will guarantee great results. Finally, since the subject of this dissertation is complexed, we believe that the basic principles and rules should be regulated by legislation, while at the same time, it should be established an organization authorized to cope with legal problems arising from AI technology.

In conclusion, we strongly believe that artificial intelligence should be regulated, in a centralized way by legislators and specialists on the field by affirming that AI systems should be treated as properties of legal person. AI systems should not have their own legal rights. By charging liability to all or one of the actors involved in the AI system process, from the creation to its final possessor we guarantee the AI development in favor of the human, in a safe and secure way. Since, in this way, we could minimize risks and give the right incentives to create more AI. This dissertation, stresses that a proper regulation is possible in AI systems. Since, a better future could be built by exploiting the benefits of AI in favor of human.

⁹⁹ Scherer M., 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) Harvard Journal of Law & Technology 29 (2), 393-398

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