The Interplay of Law, Robots and Society, in an Artificial Intelligence Era

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Abstract

The rapid advances in Artificial Intelligence (AI) and Robotics will have a profound impact on the society and its laws. Robots, humanoid / anthropomorphic or not, e.g., self-driving cars, will have physical presence, take autonomous decisions and interact with all stakeholders in the society. While already some AI robots are available, e.g., self-driving cars, their intelligence is expected to skyrocket in the next decades, and many prominent scientists predict that they will reach (and potentially surpass) human intelligence. The symbiosis with robots, may lead to a civilizational change with far reaching effects. In a future society, where robots and humans are in a symbiotic relationship, philosophical, legal and societal questions on consciousness, citizenship, rights and legal entity of robots are raised such as: Should robots be recognized as a legal entity? How should criminal and civil law deal with their decisions? What are the societal implications? etc. This work, starts from the theoretical viewpoints pertaining law and society, is inspired by intersectional approaches, and utilizes existing literature in order to analyze the interplay of law, robots and society via different angles such as law, social, economic, gender and ethical perspectives. In addition, a discussion, especially pertaining core elements of law and society provides new insights and challenges that may emerge. The analysis and discussions presented here make it evident that although robots are inexorably integrated, the law systems as well as society are not prepared for their prevalence. What is clear is that robots and AI will create a new era for humanity. What that era might be, is still under discussion and not well understood. As Stephen Hawking put it “The rise of powerful AI will be either the best or the worst thing ever to happen to humanity. We do not yet know which”. Overall one has to consider that law is meant to be proactive in nature and ideally be in place to prevent problems before they happen, and therefore it is now the time to start a detailed discussion, involving all stakeholders, and derive the necessary policies and frameworks, for the key issues that pertain law, robots and society. This work makes a contribution towards the multi-faceted aspects that such a discussion pertains.

Keywords
Robots, Artificial Intelligence, Law, Society, Ethics, Gender
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## Acronyms

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<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AGI</td>
<td>Artificial General Intelligence (Strong AI, or Human-Level AI)</td>
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<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>ANI</td>
<td>Artificial Narrow Intelligence (Weak AI)</td>
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<td>ASI</td>
<td>Artificial Super Intelligence</td>
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<tr>
<td>AV</td>
<td>Autonomous Vehicles</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<td>EP</td>
<td>European Parliament</td>
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<td>EU</td>
<td>European Union (28 European member states)</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technologies</td>
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<tr>
<td>STEM</td>
<td>Science, Technology, Engineering, and Mathematics</td>
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1 Introduction

This work pertains the areas artificially intelligent robots, law and society and their interplay. A future symbiotic relationship with robots, that may lead to a civilizational transformation (Makridakis, 2017; Stiglitz, 2017) with far reaching effects is the driving force behind this research. In order to fully grasp the context, a short introduction into artificial intelligence and robots is first discussed, followed by the aim, theory, method, literature and delimitations.

1.1 Motivation

Robots are considered as artificial agents that realize tasks in an automatic way. Although they may be composed only of software (called bots), robots are associated with physical presence, whether that is humanoid/anthropomorphic (Nomura et al., 2012) such as Honda’s ASIMO or not, e.g., industrial robotic arms, nano-robots, self-driving cars (Rödel et al., 2014). Generally, robots depict characteristics such as autonomy, self-learning, physical presence and adaptation of its behaviors and actions to its environment (Nevejans, 2016).

The rapid advances in key Information and Communication Technologies (ICT), including Artificial Intelligence (AI), computer vision and hardware sensors/actuators, have resulted in an amazing evolution of robot and their capabilities in the last years. However, with the steep advancements in AI, robots can learn and master a wide variety of practical tasks, which is expected to result to their mass-utilization in modern society by the general population (and not only in factories as it is mostly the case today). The wide interest in robots and their applications are coupled with the economic aspects that pertain the development, commercialization and utilization of the technology.

Artificial Intelligence is a field of research with the aim to understand and build intelligent entities that pertain the categories of thinking and acting humanly and rationally according to Russell and Norvig (2010), i.e.:

• Thinking Humanly: “The exciting new effort to make computers think … machines with minds, in the full and literal sense” (Haugeland, 1985). “[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning …” (Bellman, 1978).
• **Thinking Rationally:** “The study of mental faculties through the use of computational models” (Charniak and McDermott, 1985). “The study of the computations that make it possible to perceive, reason, and act” (Winston, 1992).

• **Acting Humanly:** “The art of creating machines that perform functions that require intelligence when performed by people” (Kurzweil, 1990). “The study of how to make computers do things at which, at the moment, people are better” (Rich and Knight, 1990).

• **Acting Rationally:** “Computational Intelligence is the study of the design of intelligent agents” (Poole et al., 1997). “AI ...is concerned with intelligent behavior in artifacts” (Nilsson, 1998).

AI is not new, as it originated back in the 1950s. Since then it had periods of great successes as well as set-back periods. However, a renaissance has been realized the last couple of years, as breakthroughs coupled with big data and high-performance Information and Communication Technologies (ICT) have given rise to practical applications of it such as sophisticated algorithms that can surpass humans in specific tasks, intelligent robots, self-driving cars etc.

There are several evolutionary levels of AI, i.e.:

• **Artificial Narrow Intelligence** (ANI) or Weak AI. This task-specific AI excel at specific activities, e.g., winning a chess game, driving a car etc.

• **Artificial General Intelligence** (AGI) or as also known Strong AI or Human-Level AI, is sentient and has the capabilities humans have; as such it can learn and perform in a way indistinguishable from humans.

• **Artificial Super Intelligence** (ASI) surpasses by far human capabilities, or as Bostrom (2014) puts it, ASI can be defined as “any intellect that greatly exceeds the cognitive performance of humans in virtually all domains of interest”.

ANI is already making itself evident, e.g., in self-driving cars, in voice interactions (e.g., Siri/Cortana), in recommendations (e.g., at Amazon or Facebook), in automatic translations (Google translate), IBM's Watson etc. Although we are still in the age of ANI, and AGI as well as ASI belong to the future, this might not be very far. Kurzweil (2006) predicts that AGI could be achieved by 2029, followed by an AI-triggered radical transformation of mind, society and economy by 2045; although some are skeptical of this (Goertzel, 2007; Makridakis, 2017). However, even for large scale penetration of ANI, modern societies including the legal systems are not adequately prepared (Dietterich and Horvitz, 2015; Rossi, 2016), not to mention the next step, i.e., AGI.

The prevalence of Artificial Intelligence (Dietterich and Horvitz, 2015; Rossi, 2016) and its applications especially in Robots, has the potential to significantly empower them with sophisticated human-like (and beyond) capabilities, and make them sentient. Such robots
may be humanoid / anthropomorphic (Nomura et al., 2012) or not, e.g., self-driving cars (Rödel et al., 2014), and will have physical presence, take autonomous decisions and interact with all stakeholders in the society.

Co-existence with robots is expected to benefit humanity. However, as robots are expected to advance and become sentient, while many of them will have humanoid (potentially indistinguishable from human) features, and blend in our society, a symbiosis of robots and humans is expected.

The symbiosis with robots, may lead to a civilizational change with far reaching effects (Delvaux, 2017; Lin et al., 2012; Pagallo, 2013). For instance robots are already blamed for leading to unemployment, while their utilization by the military raises ethical concerns. If AGI is to take more roles as part of the future society including that of law enforcement personnel, war soldiers (Calo et al., 2016), co-workers (Haddadin, 2014b) etc., one has to consider if the robots should have rights (in line with “human” rights). To exemplify this, one could consider AGI robots, including those with biological brains (Warwick, 2010), that are indistinguishable from humans also in their physical forms, and are in a symbiotic relationship with humanity in all areas of future society.

In such a symbiotic relationship philosophical, legal and societal questions on consciousness, citizenship, rights and legal entity of robots are raised. Hence, this work approaches the area via the prism of an intersection of law, robots and society, and investigates the interplay of them.

1.2 Aim

The question that arises is how the symbiosis with robots in an artificial intelligence era can be contextualized. More specifically, how the intersection between the areas of law, society and robots interact and form the context where humanity and robots are in a symbiotic relationship. The research question (RQ) that pertains this work can be posed as:

**What is the interplay between Law, Robots and Society in an artificial intelligence era?**

Although the RQ may seem broad at first sight, one has to consider that it is investigated within the context defined by the delimitations in section 1.6 while its focus is clearly in the scope of law and society area. The posed question is approached theoretically by a literature review and critical discussions, that pertain developments in robotics, societal issues and European law. The research focus can be seen as the trichotomy between law, robots and society as illustrated also in Figure 1.1. The intersection of law, robots and society is discussed across the law, social, economic, gender and ethical dimensions.
1.3 Theory

The proposed work involves the interplay of law, robots and society (as shown in Figure 1.1) and as such it pertains concepts such as (human) rights for machines, gender, machine ethics, European law etc.

Law reflects the basic rules under which the behavior of individuals and organizations is regulated. Law is generally divided to criminal law, which deals with harm induced and aims to punish the guilty party, and civil law which resolves the disputes among parties such as individuals or organizations. The world today features different legal systems representing different ways of understanding and applying law. Examples of legal systems are Common law (Anglo-American system) and Civil law (Continental system). Different systems have different approaches, e.g., legal positivism (civil law / Sweden) vs. legal relativism (common law / US).

Law is considered as a “discrete object of study, clearly defined and labelled with distinct boundaries and categories comprising a recognizable body of knowledge” (Mansell et al., 2015). Such a view reflects the doctrinal view of law. However, as “a legal system has no function in itself but only as it plays a role in the society in which it exists” (Mansell et al., 2015), it makes sense to investigate a “law and society” viewpoint where law is attempted to be understood in its wider world context.

In doctrinal studies, law is understood as a phenomenon detached from the world, i.e., a world of its own with clear boundaries to society, politics and economics. On the contrary, in law and society, the starting point is on the opposite side of that of the doctrinal law, i.e., it is part of the world constantly interacting (e.g., law interacting with politics and societal norms). Law and society interplay is a broad interdisciplinary academic field pertaining law and sociology.
Different approaches can be considered, e.g., with roots in sociology that approaches law as a social phenomenon, or with roots in law that has a social orientation. Banakar (2014) considers two major approaches here, i.e., (i) law in context that “uses social theory and a broadly conceived notion of what empirical research amounts to in order to study issues which are internal to the processes and operations of law” and (ii) the “socio” in socio-legal studies representing “an interface with a context within which law exists” that is largely concerned with regulation, social policy, enforcement and implementation issues. In both approaches, social sciences here are treated as a tool for gathering empirical data on the role of law in society according to Banakar (2014). Generally in social-legal studies there are diverse approaches attempting to understand “the nature and role of different types of law and legal phenomena, as well as the part they play in different types of society” (Creutzfeldt et al., 2016).

Considering the “socio” aspect of the socio-legal relationship is important in order to bring law in touch with reality and consider its social context (Minkkinen, 2013). Law and society can be viewed both as an alternative and a challenge (critique) to the doctrinal view of law. This work uses as a base for discussions law and society field viewpoints, as this is generally encompassing how law and society interacts.

Intersectionality is proposed to address the issue of how categories are inter-/intra- connected, interact at multiple levels and have an effect on identity. There are three approaches "defined principally in terms of their stance toward categories, that is, how they understand and use analytical categories to explore the complexity of intersectionality in social life" which are (i) anticategorical complexity, (ii) intracategorical complexity, and (iii) intercategorical complexity, although these may not be clearly discrete (McCall, 2005). In practice, “the concept of intersectionality is often used to grasp the interconnections between the traditional background categories of gender, ethnicity, race, age, sexuality and class” (Staunæs, 2003). As such, using intersectional analysis one can attempt to understand the multidimensional aspects that impact social phenomena, e.g., injustice and social inequality. Applying intersectionality however is challenging, for instance Phoenix (2006) points out, that although “many accept that social categories are mutually constitutive and that gender is not clearly separable from other social categories. In addition, although Intersectionality is promising to capture and manage complexity via “multilevel models” (Carbin and Edenheim, 2013) there is not adequate justification as a simpler model might be adequate. This work is inspired by intersectional analysis, and utilizes some of its aspects when it approaches the interplay of law, robots and society.
1.4 Method

The selected method is that of critical discussion with starting points inspired from law as well as law & society discourses. The analysis performed builds upon the material briefly presented in section 1.5 and investigates in depth their applicability in future societies where symbiosis with robots is part of everyday life. Key challenges, potential directions and critical discussions pertaining areas of law and society forge the core of this work.

As this work is on socio-legal aspects pertaining the area of robots in society, it is beyond the doctrinal view of law, and it attempts to understand the interplay of law and society in light of the robot symbiosis era. To do so, inspiration is derived from the intersectional theory as indicated in section 1.3. A way to conduct intersectional multi-level analysis results in eight steps according to Winker and Degele (2011), i.e., (1) describing the identity constructions, (2) identifying symbolic representations, (3) finding references to social structures (class, gender, race, body), (4) denoming interrelations of central categories on three levels, (5) comparing & clustering of subject constructions, (6) supplementing structural data and analyzing power relations, (7) deepen the analysis of denominated representations and (8) synopsizing the interrelations in the overall demonstration. Generally though, intersectionality will continue to be characterized by multiple methods (Phoenix, 2006).

This work, does not utilize the full steps as these are challenging (Phoenix, 2006), but inspired by the intersectional theories attempts to approach the intersection of law, robots and society, via a closer look to key aspects that pertain them such as liability, ethics, decision, rights etc. These are investigated by building upon the existing literature which was presented shortly in section 1.5 and analyzed in detail in chapter 2. There are hardly any empirical data, as this work deals with futuristic aspects. Therefore, the discussions here are mostly theoretical nature, which however builds upon a variety of existing literature and views.

Summa summarum, this work starts from the theoretical viewpoints pertaining law and society, is inspired by intersectional approaches, and utilizes existing literature in order to analyze the interplay of law, robots and society via different angles such as law, social, economic, gender and ethical perspectives. As such, this work should be considered more as an independent approach to the area, in the context of theoretical and methodological foundations discussed.
1.5 Literature Review

Law and sophisticated/sentient robots has hardly been investigated (Pagallo, 2013). The effect of robots and their applications in society and law has recently been recognized by the European Parliament in a recent report (Delvaux, 2017), and proposed a potential framework for regulation including a “status of electronic persons with specific rights and obligations” for robots which could even consider “taxation and social security contributions”. Additional considerations have also been proposed by other organizations (Grinbaum et al., 2017; Nevejans, 2016; Palmerinid et al., 2014).

Today the robot is not a “legal subject” in civil or criminal law although suggestions exist. However, as Nevejans (2016) points out, in civil law, assigning a legal personality to a robot may not be appropriate. Liability for damages caused (Dyrkolbotn, 2017; Schellekens, 2015) is a key issue that is highly debated with respect to robot decisions and their impact. For instance, any autonomous decision a self-driving car takes, will have to comply with criminal law (Coca-Vila, 2017; de Sio, 2017), and a legal entity will need to be held responsible for its actions, but how this will be formalized is unclear. The alternative of course would be to avoid such challenging aspects, but not building sentient robots (Hassler, 2017).

The prevalence of humanoid robots may lead to a strong symbiosis with unforeseen and complicated social effects (Delvaux, 2017). For instance, humanoid robots may take various intimate roles in the future (Sullins, 2012), such as that of domestic partner (Huang, 2017) or a sex robot (Petrakovitz, 2017; Yeoman and Mars, 2012). Such aspects are hardly researched and also have a gendered angle (Scheutz and Arnold, 2016).

Apart from social aspects, ethics pertaining robots are also intertwined (Lin et al., 2012; Operto, 2011). Artificial Intelligence and by extension also Robots are expected to follow ethical principles, moral values, codes conduct and social norms that humans would follow in similar situations (Rossi, 2016). For instance, self-driving cars in unavoidable accidents will have to take life and death decisions (Bonnefon et al., 2016; de Sio, 2017), but the ethical frameworks that guide such processes are complex and pertain society and law aspects (Coca-Vila, 2017; Gogoll and Müller, 2016; Hevelke and Nida-Rümelin, 2014). However, ethics come in different variations with their own differences, e.g., Utilitarianism, Deontology, Relativism, Absolutism (monism), Pluralism, Feminist ethics (Ess, 2014). In addition, People have different expectations and also judge differently humans and robots; for instance Malle et al. (2015) found that compared to humans, robots were expected to take utilitarian actions that sacrifice one person for the good of many, and were more blamed when they did not. In addition, there are gendered aspects in ethics, as men and women differ in how they handle ethical decision making (Adam and Ofori-Amanfo, 2000). Ethical
principles are also needed to protect humans from robots and regulate their interactions with humans (Nevejans, 2016). This might need to be further fine-tuned depending on the group, e.g., children (Kyriakidou et al., 2017).

Sentient robots may be an integral part of the future society, especially in light of ageing population (Ferreira and Sequeira, 2017). Robots could take several roles in a future society, including that of law enforcement personnel and war soldiers (Calo et al., 2016). Emerging visions in industry consider that robots are to be co-workers (Haddadin, 2014b) and collaborate with humans in future workforce. Even typical sport activities such as football might be led by a team of humanoid robots (Haddadin, 2014a). If robots and humans are to be in a symbiotic relationship, and humanity is to benefit, several additional associated aspects need also to be considered and investigated in detail. The latter applies also for new knowledge produced by such sentient robots, i.e., Intellectual Property Rights pertaining the knowledge created by robots (Delvaux, 2017).

Pushing further boundary conditions, things are even more fluid. For instance, sophisticated robots with biological brains might be at some point in reality (Warwick, 2010). Such robots would be humanoid creatures brought to life with a brain consisting of human neurons, with a robot body. Their existence would raise philosophical, legal and societal questions on consciousness, citizenship, rights and legal entity.

1.6 Delimitations

The study will limit itself to Artificial Intelligence empowered Robots, that have a physical presence. These may or may not be humanoid/anthropomorphic robots, e.g., self-driving cars. Other forms of artificial intelligence and robotics are excluded, e.g., intelligent algorithms in non-physical entities, static intelligent machines. In addition, the focus is mostly on mobile autonomous robots (not controlled by humans) that can operate within society and interact with its citizens. As such, for instance surgical robots, where today still the human takes most decisions, are excluded.

Lately, with the increased capabilities via human-prosthetics, also questions are raised on what is a robot and where the limits between humans and robots lie. This includes also fringe cases such as robots with biological brains (Warwick, 2010). However, such investigations are not in the context of this work.

This work is inspired by intersectional analysis, but it does not claim to follow in detail a concrete approach with all of its proposed steps, as generally applying fully intersectional analysis is challenging as for instance “social categories are mutually constitutive” and may not be clearly separated (Phoenix, 2006). The interplay of law, robots and society is viewed
under the prism of law, social, economic, gender and ethical perspectives, while others or more detailed views are not considered.

In this work, a high-level view on a potential EU legislation is considered, by studying relevant proposals, but no country-specific laws or legislative approaches are in focus. In addition, EU legislation is utilized in a limited exemplary function, but no exhaustive analysis has been performed.

Finally, the area pertaining law, robots and society and their potential interplay is huge, and the aim of this work is to pinpoint some key issues, but due to limitations in time, only some key issues are highlighted; hence this work is not to be seen as an exhaustive view on the area.
2 Key Issues and Analysis

This work looks at the intersection of law, robots and society from different perspectives, i.e., Law Perspectives, Social Perspectives, Gender Perspectives, Economic Perspectives, and Ethical Perspectives. Therefore, an analysis is performed via the prism of the selected perspectives, questions are raised, and critical views are depicted.

2.1 Law Perspectives

2.1.1 The Robot as Legal Subject

Today the robot is not a “legal subject” in any civil or criminal law of any country. Being a “legal subject” the robot would have obligations as well as rights in the society. Some initial discussions pertaining several aspects of robots including the possibility of granting them “electronic personhood” status, are underway. For instance, in the European Parliament report (Delvaux, 2017), a potential framework for regulation including a “status of electronic persons with specific rights and obligations” for robots which could even consider “taxation and social security contributions” is proposed. In the words of MEP Mady Delvaux “What we need now is to create a legal framework for the robots that are currently on the market or will become available over the next 10 to 15 years” (Hern, 2017). Similar considerations have also been raised by others (Čerka et al., 2017; Grinbaum et al., 2017; Nevejans, 2016; Palmerinid et al., 2014; Villaronga and Roig, 2017).

From a doctrinal perspective, an autonomous and rational person with good knowledge of the law and with a mind to obey or disobey that same law is part of the modern contract. The legal subject is detached from relations, circumstances and contexts beyond the legal framework in order to maintain the legal system independence and coherence. As such, the legal subject is included in and liable to responsibilities the law has defined. The legal subject can be described in a coherent and comprehensive way in relation to the law categories of actors. This includes the ability to accept and conform to the needs of the system. The separation of law as a system in combination with a perception of the law as a centrality is especially necessary in order to maintain the doctrinal view of law. Based on the demand
for deep knowledge of the law and its upholding, enforcing and change the subjects own
responsibility to mainstream individuals to the system instead of the system to individuals.
The question that arises, is if the robot can be seen as a legal subject, within the doctrinal
view of the law.

From a law and society perspective the legal subject cannot and should not be separated
from its context, experiences or relations within the realm of law. The perspective underlines
the meaning and importance of bringing the cultural, economic and political system into the
legal. As such, an argument is that when considering granting legal status to robots, one has
to look at the whole context and the impact different perspectives have. This intersectional
perspective seeks to open other ways to look upon society and its intrinsic mechanisms. The
legal subject in law and society is not preset or restrained to certain behaviors explained in
a book of law. Consequently, the judicial system cannot aspire to grasp all the situations at
hand.

Legal aspects are of special interest as they are hardly investigated when it comes down
to robots, while also prejudice exists. Today most robots are considered to “belong” to an
owner, e.g., a person or a corporation. As such, and due to their limited intelligence, they
are mostly considered as Aristotle’s natural slaves (Aristotle, 350 B.C.E.), without any further
future considerations. However, such views may need to be rethought when AGI is achieved.
Especially humanoid robots featuring AGI, may be very much human-like. This would nat-
urally raise the question for many if “robot rights” ought to be in place to regulate law and
societal aspects. Recognition of a robot as a “legal subject” also implies rights and obliga-
tions. However, simply exhibiting human-like characteristics, such as affective speech, or
other human-like behavior, is automatically not implying rights and privileges (Massaro and
Norton, 2016).

Considering the robot as a legal subject is also entangled with discussions about con-
sciousness. An issue that arises is even if civil or criminal law makes sense for robots. This
question is especially pertinent and connected to rights, as, e.g., our notion of human rights
is safeguarded by the law. Nevejans (2016) points out that in civil law, assigning a legal per-
sonality to a robot may not be appropriate (or at least until AGI is reached). The existing law
system applies to humans, and protects their rights, as it is built around the ability of humans
to suffer, and aims to protect them. This implies the ability of the legal subject to not only
feel pain, but also be aware of it, and include it in its decision-making processes. As such
questions are raised, e.g., if a robot that does not feel pain or pleasure, is it meaningful to be
“punished” in the context of criminal law? Even rights such as freedom are connected with
the notions of fairness and consciousness. A robot that does not have a fear of death, would
not perceive its dismantlement under criminal law as a punishment. Similarly, a robot that
doesn’t move, most probably would not be affected by a freedom of movement deprivation etc. However, the assumption is that maybe with AGI and ASI, such aspects may be included in the robots who are now sentient and hence could be treated exactly as humans are.

A robot recognized as a legal subject would have also rights. However, what that exactly means and its implications are far from understood. For instance, would a robot refuse to dismantle a bomb due to the high probability of getting damaged (even if that damage is temporary as mechanical parts could be easily replaced)? Could a robot go on strike for better working conditions or demand work leave?

It has to be pointed out that prominent scientists have raised concerns that an ASI may see humanity as obsolete and (intentionally or not) lead to its demise. However, in the meantime, the major danger is not from robots to humanity, but the other way around, from humanity to robots. History has shown that humans consider themselves on the top of the living organisms, and that other lifeforms are seen as inferior, e.g., animals. Looking through history, one can see countless acts of barbaric actions (by today’s measures), not only against animals, but also to humans, justified by the fact that these were considered inferior, and therefore were substituted to slavery, discrimination, violence etc. Even in modern societies, among humans, there are ongoing battles, e.g., for gender and race equality. Hence the question arises, what would happen if robots emerge as a new kind of species; would history including slavery, revolutions, fights for (robot) rights would have to repeat itself?

One has to consider here, that we as humans, have an economic incentive in denying robot rights and as a result legal status. Many robots are created to do repetitive and dangerous tasks 24/7 that humans would not or cannot do. This is OK for ANI, however forcing a sentient robot doing these tasks would imply torturing it for economic benefit. The humanity track record is not good on this aspect, as this has happened extensively in the past, i.e., slavery, and there was never a shortage of ideological justification for inhumane actions. For instance, slavery was justified, e.g., by the will of gods, or by providing the slaves with the basics (food, shelter) to survive. Even in other areas justifications were not an issue, e.g., women were deprived of their voting rights for several decades, with the justification that men are better suited in taking the difficult decisions. Hence, one has to expect that if the issue is unresolved when AGI is achieved, and robots become sentient, there will be justification for deprivation of robot rights, especially if economic interests come into play.

### 2.1.2 Liabilities and Robots

If robots can take autonomous decisions, their actions may cause harm to humans and society at large. As such, there is a need for compliance of robots to existing civil and criminal
law, and ideally safeguarding against any harm that could be caused to humans. An attempt to tackle the safeguarding aspect is illustrated by science fiction author Asimov (1950) who drafted three main laws that each robot should obey and cannot be bypassed:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

Such laws were foreseen in science fiction as a safety feature for AGI robots in order to protect humanity. However, Murphy and Woods (2009) note that if we try to apply Asimov’s Laws to today’s robots “problems arise from the complexities of situations where we would use robots, the limits of physical systems acting with limited resources in uncertain changing situations, and the interplay between the different social roles as different agents pursue multiple goals”. Robots exist today that do not obey Asimov’s laws, and there may even be no interest from specific organizations or industries (e.g., the military) in doing so. History has shown that multiple industries, e.g., tobacco industry, did not propose any safeguarding mechanisms and even resisted their imposition.

The liability issue is no longer only in the hypothetical sphere. For instance, the Swiss police in 2015 “arrested” an online shopping bot named “Random Darknet Shopper” that was making illegal purchases (including drugs) on the dark web (Eveleth, 2015). As other forms of robots are becoming mainstream, e.g., self-driving cars, they will have to comply with criminal law (Coca-Vila, 2017; de Sio, 2017), and a legal entity will need to be held responsible for its actions. As such, the question is raised, of who exactly that legal entity is, e.g., the designer, the producer, the owner, the robot itself?

The aspect of liability for damages caused by the robot is an unresolved issue in civil or criminal law, and hardly directly addressed (Dyrkolbotn, 2017; Schellekens, 2015; Villaronga and Roig, 2017). Within the European Union, treating this issue in a conventional manner, would imply that liabilities incurred by a robot, could be classified as a result of malfunction, and as such they should be treated according to the EU Directive 85/374/EEC (EC, 1985) which is implemented in the EU member states. According to article 1 of EC (1985), “The producer shall be liable for damage caused by a defect in his product”, and according to article 4 in the same directive “The injured person shall be required to prove the damage, the defect and the causal relationship between defect and damage”. Such law-relevant considerations exist in most countries, and stem from the simple fact that the producer ought not to create and make available defective products (product liability). While this looks logical, the
proof of “causal relationship between defect and damage” in the case of robots may become challenging. The problem that arises is that robots, even at ANI, are expected to learn, and therefore proving a damage as a result to a malfunction (and not deliberate robot action) might not be straightforward.

There are many cases where the liability aspects pertaining robots are complex. Apart from malfunction, damage may simply rely with the user specific usage, and as such, the user of the robot may be liable (depending on the concrete situation). It could also be that damage occurs while the robot is learning, and then probably also the user is the liable entity. However, if the damage is due to a programming error in the algorithm of the robot, then the producer or designer of it ought to be held liable. Complex cases arise, e.g., if a user updates the software of a robot with code he downloaded by potentially unknown authors from the Internet (open source), or if the robot proactively searches for extensions of its functionality over the Internet, or even utilizes “transfer learning” where it learns from experiences of other robots.

As most of the robots will be mobile, and there is already several efforts for self-driving vehicles, e.g., taxis (Singapore, Pittsburgh), shuttles (EasyMile, Olli), trains, trucks (Daimler, Audi), ships (Rolls-Royce), liability aspects ought to be considered also under additional directives such as the ones regulating vehicles. Any autonomous decision a self-driving car takes, will have to comply with criminal law (Coca-Vila, 2017; de Sio, 2017). Resolving the liability issue is strongly coupled with the ongoing discussion about having a robot as a legal subject, as then any liability issues would be straightforward and systems would be far more effective at compensating victim (Nevejans, 2016). Today, such discussions are resolved by assigning as liable a legal entity such as human or corporation, to which the robot can be considered as property or at least under their operational responsibility. This is mainly because up to now ANI is in place, and machines are mostly considered as a proxy of humans (Millar, 2014) that would reflect upon them. However, as robots become more intelligent and autonomous, the link to a human proxy is becoming thinner, and the robots now become the actors that may need to be directly liable for their actions.

### 2.1.3 The Robot as a Lawyer, Judge, and Legislator

Access to justice is of paramount importance in society and can be even considered as a basic human right. However, the judicial system and its stakeholders are usually understaffed, and in many countries far from well-organized with cutting edge technology and processes. It is not uncommon to see that cases taken to court, proceed with extreme delays and are judged even years after they happen. Even then, adjournments induce further delays, which
result in more prolongations and in cases expiration of the original crime. Acquiring legal representation to take and defend a case in court differs in various countries and can be a tedious, lengthy and costly process. In addition, there are several controversial decisions, or cases where bias is evident from the lawyers, judges, jury etc. Sometimes, societal, political or other conditions seem to play a role in the process, and hence affect judges, which does not also further help in raising public trust, even if such cases are the minority. Such aspects, significantly lower the trust of citizens to the judicial system itself, as well as the trust in objective justice served (mistrials or unjust decisions).

Robots pose the possibility to have a positive impact in several aspects pertaining the processes of the judicial system, as automation outperforms humans, increases productivity, and even makes tacit judgments (Manyika et al., 2017). Remus and Levy (2016) consider that utilization of new legal technology in place today, could result in 13% decline in lawyers’ hours. That would enable more rapid processing of cases in court of law and at least tackle the long delays. However, concerns are raised whether algorithmic performance of a task conforms to the values, ideals and challenges of the legal profession (Remus and Levy, 2016).

Robots taking over lawyer activities, may also enhance access to justice and enable mass scale representation. In 2015 a chatbot called DoNotPay enabled people to utilize it in order to appeal unfair parking tickets, which utilizing human lawyers would be much more costly than paying the ticket. In April 2016 it was revealed that the DoNotPay robot had helped people overturn 160,000 of 250,000 parking tickets since its launch at a success rate of 64% (Gibbs, 2016). Since then, the same robot has acquired more skills and for instance now it can help refugees in UK, US and Canada to fill in applications or apply for asylum support.

Access to legal expertise may overall assist both the judicial system as well as the public perception of justice. Especially if robots become sentient, they may be capable of analyzing and understanding more complex situations, that go beyond the doctrinal view of law, towards considering the intersectional interplay of, e.g., society, politics, economics. Hence, and with vast instant access to world’s knowledge, the judicial system functions may be carried out more effectively and just, as human bias could be minimized. Hence the robot could act also as a judge (Rutkin, 2014), and potentially serve more objective decisions.

Such considerations pertaining the robot as an active stakeholder in the judicial system, has far reaching implications, as one could consider one step further. If robots could take decisions according to the law, free of bias and have the collective knowledge of all cases, why not have the robots as legislators? That could lead to potentially more just laws, potentially free of inequalities (e.g., gendered views) as robots may be able to detect and filter-out such patterns. However, also voices of concern have been raised as “bringing machines into the law could imbue us with a false sense of accuracy” (Rutkin, 2014). In addition, although
doctrinal viewpoints may be potentially easier to be considered, the complexities pertaining the law and society aspects are far from understood by scholars, not to mention robots.

2.2 Social Perspectives

The social implications pertaining robots are hardly investigated, although some aspects pertaining emotions have been researched. Sociability, companionship, enjoyment, usefulness, adaptability, and perceived behavioral control are key factors towards social robot acceptance (de Graaf and Allouch, 2013).

The already known benefits provided with animal companions for many people, could potentially be achieved with robots (e.g., in animal form or humanoids). The area of cognitive and emotional robotics is investigating how robots can “perceive the environment, act, and learn from experience so as to adapt their generated behaviors to interaction in an appropriate manner” (Aly et al., 2017). Emotional robots are a subcategory of socially assistive robots and are “aimed primarily at fulfilling psychological needs, such as interaction, communication, companionship, care for others, and attachment” have already been created (Kolling et al., 2016). It has been found that in the interaction of people with robots, their attitudes and emotions toward the robots, affect their behavior (Nomura et al., 2008). This has practical applications, e.g., emotional robots are already used in the therapy of children with autism spectrum disorders (Peca, 2016). Recently, Honda, a car manufacturer announced that is experimenting with emotional cars in order to offer a more interactive and immersive experience.

In a society where robots and humans coexist, direct or indirect discrimination might also be an issue. As people consider robots as flawless machines, they are blamed more than humans, e.g., when deciding to sacrifice a person for the good of many (Malle et al., 2015). Recent findings suggest that 6- to 14-month-olds are unable to discriminate between the humans and robots, although they can clearly distinguish them (Matsuda et al., 2015). However, generally humans may further discriminate against robots in concrete cases, e.g., in healthcare domain.

One key motivation behind robot developments, is to take care of the world’s ageing population (Ferreira and Sequeira, 2017). However, situations may arise, e.g., where elder people may refuse to be fed or taken care by a robot, as this may violate their human dignity. Dignity is one the six fundamental rights protected (and legally binding) in the EU together with Freedoms, Equality, Solidarity, Citizens’ Rights, and Justice (EC, 2000). The clash between human liberties and robots is another challenging area. For instance, a robot may attempt to prevent people from engaging in careless behavior, e.g., an alcoholic from drinking al-
cohol. This may clash with the EU fundamental right of human liberty (Palmerinid et al., 2014). As such, efforts towards acceptance of robots in such specific scenarios needs to be considered and investigated.

Privacy is another key issue that needs to be considered. Robots are equipped with audio-visual sensors and can therefore record their surroundings and act upon certain situations. This is a double-edged sword. On the one side, this means that due to these capabilities, criminal behaviors and violence may be reduced. On the other side, robots can be misused as monitoring devices, if not properly protected. As it has been the case with computers, mobile phones, and other ICTs, in case of privacy breaches, the private life of the people the robot is in contact with, is at high risk. In malicious scenarios, robots could be used also for exploiting private aspects, or even enforcing compliance in totalitarian regimes.

Several societal roles and activities are coupled with emotions. For instance, in a football game emotions of the players, activities etc. are all part of the larger context. It is predicted though, that even typical sport activities such as football might be led by a team of humanoid robots in the near future (Haddadin, 2014a). The question that are raised, is how this will impact typical social activities, e.g., sports watching. In addition, as robots could take also other roles in a future society, including that of co-worker (Haddadin, 2014b), law enforcement personnel and war soldiers (Calo et al., 2016), the impact of these on society and the diverging behavior humans might exhibit is hardly investigated, and it is already known that some differences exist (Nomura et al., 2008).

The impact of robots in social aspects, is already underway although probably not perceived as such. As an example, “automated journalism” is underway, where news media is utilizing AI to collect news sources, select articles, analyze them, and automatically generate news (Jung et al., 2017). Such efforts, coupled with highly personalized data available in a digital era, may be highly personalized towards humans, and as such the potential for maliciously using them to guide behaviors is high. Thinking one step further, e.g., when AGI or ASI is achieved, and robots are able to exhibit emotional behavior, the question that arises is how this can be utilized in specific contexts. Could for instance a sentient robot emotionally manipulate humans and pursue its own agenda?

2.3 Economic Perspectives

Articles pertaining job fears lost to technology automation and robots are increasingly appearing over public media the last months, especially in connection with the advances in AI and robotics. There is a fear that robots and AI at large, could substitute humans in workforce, which is translated as job losses and a point of social friction (Nevejans, 2016). A recent
study found that 47% of total US employment is at risk (Frey and Osborne, 2013), while AI and robots at large are already changing the workplace, impacting the types of jobs available as well as the skills needed by the (human) workforce (NSTC, 2016). Such loss of job fears, are not new (Albus, 1983) and seem to be common to any disruptive technological change. However, there are indications that initial job losses may be followed by other kinds of jobs, which rely on the new status quo of the market (Doyle, 2016; Nevejans, 2016).

Some, including Bill Gates, have proposed that if robots are to take over human jobs, then they should be taxed similarly (Paul-Choudhury, 2017). Tax sources are capital, labor, and expenditure. Taxing robots would be a tax on capital which is significantly reduced the last decades, and may also help combat tax avoidance by large corporations, as these would be calculated upon robot notional salaries. Tax may be also an effective measure to balance job loss and benefit the impacted ones. As indicated by Stiglitz (2017) “The reality is that whenever social and private costs and benefits differ, corrective taxes may lead to more efficient outcomes”. However, due to lack of legislation, but most importantly lack of political will, such efforts can hardly be realized today. In early 2017 the European Parliament rejected a proposal to impose a proposed robot tax (Prodhan, 2017). With the tax money, jobs more suited for humans could be financed, e.g., in caring for children or health sector, while in addition, robots “are also unlikely to complain about tax levels, they don't use services financed by tax revenue such as education or the health services and they are most unlikely to salt away income and assets in a tax haven” (James, 2017).

The societal transformation due to technological advances, and especially the utilization of robots, including the resulting unemployment, has led some to discuss issues of “universal income” under which all citizens would receive a min grant. However, individual work is valued and a system based only on redistribution, without work, may not be acceptable (Stiglitz, 2017). Considering the proper policies, roboticization could actually be welfare-enhancing as the benefits of economic growth (even robot-stemming) would be made available to everyone, while without proper policies in place, societal well-being may be lowered, leading to a larger divide in the society (Stiglitz, 2017). Therefore, from an economic perspective, robots could act as enablers, e.g., assisting towards humans potentially finding more fulfilling jobs. Such actions and policies targeting economic and societal challenges may be more effective as they are easily linked to the human natural sense of justice.

Another key issue related to the economic perspective is related to knowledge created from robots and pertains the Intellectual Property Rights (IPR) (Delvaux, 2017). IPR covers a wide range of activities as per definition “Intellectual property refers to products of the mind, inventions, literary and artistic works, any symbols, names, images and designs used in commerce” (Davies, 2011). With increasing intelligence, robots may create new ideas, product,
inventions, art etc. The question that arises then is who “owns” and who can exploit the ideas and solutions that robots come up with. Would that be the robot itself, or in lack of a robot legal subject, the owner of it? Or could that be a collective AI that goes beyond specific companies and national boundaries? Existing law and policies in place are inadequate to deal with such questions (Davies, 2011). Especially in modern knowledge-based economies, commercial capitalization driven by IPR is relevant and one of the economic motivators for utilization of robots.

2.4 Gender Perspectives

The history of artificial intelligence, similarly to other technology fields, is gendered (Adam, 1996). Robotics, as most Science, Technology, Engineering, and Mathematics (STEM) fields depict a striking imbalance between men and women, which may be reflected upon the design, programming and operation of the robots.

Gender aspects may play an important role when interacting with robots, as the gender of social robots may help building common ground (Tay et al., 2014). Although the choice of the gender reflected by a robot in combination with a specific function may be based on stereotypes, this enhances in many cases the persuasive power and task suitability of social robots. For instance, Tay et al. (2014) report that “participants showed more positive affective evaluations, greater perceived behavioral control, and marginally greater acceptance toward the female-gendered healthcare robot”.

Acceptability seems to be influenced by gender also in other scenarios. For instance, in the context of children with autism spectrum disorders, it was found that men manifest a higher level of acceptability of human-like interaction compared to women (Peca, 2016). The same study also reveals that men had also a higher level of acceptability of non-human robot appearance.

Gendered aspects in ethics also exist, as men and women differ in how they handle ethical decision making (Adam and Ofori-Amanfo, 2000). Gilligan (1982) highlighted distinctive ways in which men and women approach ethical dilemmas. For instance, women pay more attention that the everyone in a group is included and treated fairly and they focus more on the emotional dimensions of the ethical dilemma (Gilligan, 1982). Such ethics of care (feminist ethics), give greater respect to the positive role of emotions (specifically care) and could influence not only the ethical guidelines robots ought to abide (as analyzed in section 2.5), but also potential scenarios where knowingly gendered robots and behaviors should be utilized.

As humanoid robots are rapidly evolving, and become more similar to the human physi-
ology, they are bound to take-up gendered roles in the society (Scheutz and Arnold, 2016). For instance, humanoid robots may take various intimate roles in the future (Owsianik and Dawson, 2016; Sullins, 2012), such as that of domestic partner (Huang, 2017) or a sex robot (Petrakovitz, 2017; Yeoman and Mars, 2012). A futuristic scenario of robots utilized in sex tourism industry and their impact is investigated by Yeoman and Mars (2012), i.e.: “In 2050, Amsterdam’s red light district will all be about android prostitutes who are clean of sexual transmitted infections (STIs), not smuggled in from Eastern Europe and forced into slavery, the city council will have direct control over android sex workers controlling prices, hours of operations and sexual services.” One can see via this example, how such practices may affect other areas such as the sex-stemming violence against women, human trafficking, health, financial, crime etc.

Contract theory historically placed the man under direct protection from the state and his household, i.e., wife, children, servants under his protection. His household becomes the private sphere. Problems though arise when people in the private sphere are in danger from the man in their sphere because in these instances the law or state did not offer protection. Although law and society has developed since this age, some notions of the private and public sphere still exist today, particularly in cases of domestic abuse and sexual violence. The unequal power relations among men and women is the cause of discrimination against women, one form of which manifests as gender-based violence (Burman, 2010). If robots are to be omnipresent in public and private spaces, apart from the raised privacy concerns, there might be impact also on the gendered violence, especially that against women, which is still at high rates worldwide, even in welfare states (such as the Nordic countries) where democracy and gender equality are widespread (FRA, 2014). As indicated by Wendt (2012) and reaffirmed by FRA (2014) violence takes place not only in private sphere (home) but also in public places. Robots due to their audio-visual capabilities could potentially have a positive effect towards reducing violence, as they could act as real-time witnesses recording violations and notifying the authorities. However, they could also take more active roles, e.g., in protecting those in need, and battling perpetrators, both in public as well as in private spheres.

Robots are expected to continuously evolve and learn by observing and interacting. Here, violent behaviors may actually lead to the robot considering them as the norm, which may subsequently lead to the robot itself becoming the abuser. As an example, Microsoft had in 2016 deployed Tay, an AI chatterbot modelled to speak “like a teen girl”, e.g., utilizing millennial slang, with the aim to improve customer service. Tay was supposed to adjust by interacting with other (human) users, which led it to the catastrophic result that Tay started posting inflammatory and offensive tweets, and was shut down hours after its launch (Hunt,
As such, the context robots operate in, needs to be considered, in order not to replicate gendered behaviors, criminal acts or other inequalities for which humans are biased. Actions are needed in conjunction with the ethical aspects (as shown in section 2.5).

Smart (1995) argues that the law is not objective but gendered, i.e., although the doctrinal law itself is objective, its applicability may relate differently to men and women in practice. Therefore, it is not necessarily harmful to women but because it is applied differently, it is gendered. We have already tackled the aspect where robots could enhance law and potentially make it free of bias (as analyzed in section 2.1). However, another issue is raised now, i.e., if the robot acquires legal status and becomes a legal subject, will similar behaviors be observed, this time not against women but against robots? Would then a “roboted” applicability of the law be observed where robots will be discriminated?

### 2.5 Ethical Perspectives

Ethical aspects pertaining robots (Lin et al., 2012; Operto, 2011), especially when they are in position to take life and death decisions are another challenging area. The question is if machines should abide to an ethical code, and of their decisions are to follow ethical principles, moral values, codes conduct and social norms that humans would follow in similar situations (Rossi, 2016). For instance, self-driving cars in unavoidable accidents will have to take life and death decisions (Bonnefon et al., 2016; de Sio, 2017), but the ethical frameworks that guide such processes are complex and pertain society and law aspects (Coca-Vila, 2017; Gogoll and Müller, 2016; Hevelke and Nida-Rümelin, 2014). To what extend ethics can be “programmed” or “learned” by an algorithm embedded in a robot does not have a straightforward answer. Bonnefon et al. (2016) consider that “Figuring out how to build ethical autonomous machines is one of the thorniest challenges in artificial intelligence today. As we are about to endow millions of vehicles with autonomy, a serious consideration of algorithmic morality has never been more urgent.”

To exemplify the ethical dilemma and its impacts, one can consider a hypothetical situation where a robot, e.g., a self-driving car is about to be involved in a fatal accident with human casualties involving the car’s passengers and pedestrians. The self-driving car can decide, depending on the ethics of its logic, to follow option A and prioritize the least loss of life overall. Such a utilitarian way of thinking would result in killing an innocent pedestrian and save the car’s passenger. An alternative option would be option B, where deontological pacifist ethics of its owner are in place, according to which all life is sacred and no harm to others should be caused. Option B would result in killing the driver and saving the pedestrians. Here multiple ethical issues are raised, e.g., what is ethical might be rela-
tive, how priorities when calculating life loss ought to be considered etc. As ethics come in
different variations with their own differences, e.g., Utilitarianism, Deontology, Relativism,
Absolutism (monism), Pluralism, Feminist ethics (Ess, 2014), there is no consensus on what
guidelines a robot should follow.

Additionally, research indicates that there is discrimination against machines, i.e., people
judge differently humans and robots. For instance, Malle et al. (2015) found that compared
to humans, robots were expected to take utilitarian actions that sacrifice one person for the
good of many, and were more blamed when they did not. Apart of ethics that robots should
abide to, what is also needed are ethical standards that are directed at the designers, produc-
ers and users of robots (Palmerinid et al., 2014).
3 Discussion

The aim of this work is to tackle the research question posed, i.e., What is the interplay between Law, Robots and Society in an artificial intelligence era? In chapter 2 key aspects pertaining the intersection of law, robots and society have been presented and analyzed. Some initial views and comments already made there are not repeated here in favor of brevity. In addition, from the analysis made, it became obvious that the intersection among law, robots and society, is much more complex than originally thought, and this became evident once it was systematically investigated under the prism of different perspectives, i.e., Law Perspectives, Social Perspectives, Gender Perspectives, Economic Perspectives, and Ethical Perspectives. In the analysis presented in chapter 2 one could follow for instance how an issue raised under the category of ethics, had a significant interplay with law, gender, and social aspects. As such, it is evident that this work, even with the boundary conditions posed in section 1.6, only scratches the surface of the overall underlying complexity posed in the research question.

Artificial Intelligence is increasingly embedded in our everyday interactions, starting from repetitive mechanized actions, but rapidly moving the last 2–3 years to new areas. Especially when combined with robots that feature mobility and in cases humanoid characteristics, new areas, including those heavily interacting with humans can be utilized. Today AI is currently at early ANI level, but nevertheless depicting various degrees of sophistication, and in several tasks, e.g., voice or image recognition, already better than humans. However, more general-purpose intelligence at AGI or even later ASI levels are still science fiction and potentially several decades away.

Some prominent scientists of our era have argued that AI including robots could be the demise of our civilization, and if not properly built and operated, even at ANI level, it could lead to disastrous global-level extinction events. As Stephen Hawking put it “The rise of powerful AI will be either the best or the worst thing ever to happen to humanity. We do not yet know which” (Makridakis, 2017). Others though have argued that AI and robots ought to be seen as one more tool added to our long-lasting efforts of maintaining and expanding our species survivability. A significant argument in favor of AI is that it can at some point tackle very complex problems (e.g., climate change, universe understanding etc.) that the
humans with their capabilities may never be able to fully do. In addition, in the embodiment of robots, physical that humans may choose to delegate, e.g., because it is too dangerous or too boring, can be carried out by robots, which would enable humanity to focus to other more fulfilling goals. Hence, an utopia could be realized where robots and AI, operate on the background and regulate all aspects of the everyday life to fully accommodate the needs of humanity and empower it to flourish. However, such discussions on the future of robots and AI are ongoing, as the distance between prediction extremes is large and not well understood.

Several aspects analyzed in chapter 2 deal with the major issue of how human-like robots might be, and if their human characteristics (both in physical appearance as well as behavior) would entitle them recognition of an identity and treatment as a legal subject. Such an aspect is the predominant issue that needs to be dealt with, as it is a game-changer for all other considerations. The potential recognition of the robot as a legal subject though is challenging from a law viewpoint. To shed some light in the complexities pertaining such issue, one can approach this via a doctrinal viewpoint of the law, as well as from the law and society viewpoint.

Exhibiting human-like characteristics such as affective speech is not implying rights and privileges (Massaro and Norton, 2016). Simulating human behavior may not be considered adequately “human” and therefore many see no need for a legal entity with rights. The supporters of this approach consider that the owner of the robot ought to be responsible. One may argue still on that basis for ANI, however, especially with the future move towards sentient AGI, such statements may need to be reassessed.

From a doctrinal perspective, an autonomous and rational person with good knowledge of the law and with a mind to obey or disobey that same law is part of the modern contract. In doctrinal view, the legal subject is detached from relations, circumstances and contexts beyond the legal framework in order to maintain the legal system independence and coherence. In the doctrinal view, the legal subject is included in and liable to responsibilities the law has defined, and can be described in a coherent and comprehensive way in relation to the law categories of actors. This includes the ability to accept and conform to the needs of the system. Therefore, from a doctrinal perspective an autonomous and rational robot (at AGI level and beyond) is expected to possess excellent and detailed knowledge of the law, and abide to it. In doctrinal view, the robot as a legal subject would be liable to responsibilities the law has defined. As such, there might be one common law framework for all (humans and robots), and many aspects could be analogously treated under the law.

Apart from the doctrinal view, there is also the law and society perspective, where the legal subject cannot and should not be separated from its context, experiences or relations within
the realm of law. The perspective underlines the meaning and importance of bringing the cultural, economic and political system into the legal. This is based on the idea of the already full-gendered society, and soon robot prevailed one. The law and society perspective seeks to open other ways to look upon society and its intrinsic mechanisms. The legal subject in law and society is not preset or restrained to certain behaviors explained in a book of law. Consequently, the judicial system cannot aspire to grasp all the situations at hand. If such views hold for humans, then they would be applicable for sentient robots as well. Therefore, robot decisions ought also to be seen under the prism of context conditions such as cultural, economic and political aspects.

The construction of the sentient robot as legal subject, needs to consider in the right balance such context aspects, which make more evident the clash between the neutral and objective law and the need to consider the personal situation, e.g., the level of responsibility and liability of the robot. The dangers of essentialism, uncritical adjustment and pitfalls of recontextualising are real and need to be properly considered starting with careful theoretical work. However, one has to establish a link between such conditions and their actual effect in the robotic decision making and action processes, something that may be challenging, and is not well understood even for humans.

The existence of robots as legal subject may further create friction between the doctrinal view of law and the societal view of it. A doctrinal view of law would say that the tension is uninteresting since the system itself is a guarantee for justice, neutrality and objectivity. The doctrinal view may have to rest on a common platform of values and ideals for both humans and sentient robots. The legal system from a law and society perspective would identify people's and robot's circumstances and tend to address cases based on circumstances and drives. Robot situations would then also need to be identified, and assessed. Such actions though, might be more familiar when they pertain human to robot interactions, as they may be extrapolated from human to human interactions and behaviors. The question raised is, at what degree would societal conditions impact the behavior of robots? A causal relationship is expected to be difficult to prove.

In a society where robots have achieved AGI level, it may not be uncommon to have disputes between robots. In such robot to robot interactions, considering law and society viewpoint, should social conditions still be considered, or a doctrinal view of the law ought only to be applied? Assuming that robots are sentient, and probably indistinguishable from humans, such societal conditions may need to be considered by the law, even for robot to robot interactions. Such considerations though might be very challenging, as robots are expected to feature “transfer learning”, i.e., being able to collectively learn from each-other's experiences (via knowledge transfer, e.g., over the Internet) at global scale. Such technological
capabilities, would not be available to humans (at least not without prosthetics), and may make the consideration of societal and situational aspects within the law decision making challenging.

The existence of different legal systems such as Common law (Anglo-American system) and Civil law (Continental system), represent different ways of understanding and applying law. Different systems have different approaches, e.g., legal positivism (civil law / Sweden) vs. legal relativism (common law / US). As such, the way law is applied differs around the world, and this may need to be considered when robots are designed and also during their operation. Furthermore, legal cultures (a way to group legal systems, by considering cultural criteria) might also need to be considered. The question that arises, is what (if at all) would be the effect on the robot behavior, if the robot roams between countries with different systems. In addition, that would also imply that software would have to reflect these aspects, and adjust accordingly, but how this can be done is not clear. So, would the same robot have a different ethical framework, and different law abidance depending on its location in earth or the people it interacts with? Such aspects would affect its behavior and interaction both with humans and other robots.

Knowledge is power, and availability of knowledge can have a significant impact on the decision-making processes. However, in a fully electronic era, where information can be instantly acquired, and huge amounts of data can be easily analyzed, knowledge and insights can be derived with low effort. As robots would be capable of featuring such capabilities, and also tap instantaneously to the global robot knowledge pool, the question that arises is how their behavior and actions could be affected. To provide a provocative thought, one has to consider if a robot that is about to “break the law” with an action that is borderline behavior (or clearly unlawful), could prior to acting, analyze all court cases in a county, assess that a statistical possibility of being punished (if caught) is low, and then act accordingly. Such behaviors would imply that differences in what law conveys, and how it is understood and applied, could be potentially exploited, and would be challenging to prove intent. In addition, if societal but also other aspects such as international relations, cultural aspects, psychology, political aspects etc. come into play, how can the law integrate them objectively and minimize their misuse?

Feminist research has already extensively discussed that the law is not objective but gendered, and although the doctrinal law itself is objective, its practices relates differently to the genders. It is expected that similarly to the feminist literature discussions, in the future doctrinal laws may be influenced by robot stereotypes which subsequently may have an effect upon the notions of fairness and justice, especially if they involve robots and humans. As such discrimination may be evident, especially considering that already people have differ-
ent expectations from machines (ANI) than from other humans, where they are more forgiving on errors made by humans. As such, even if the law is exactly the same for both humans and robots, its applicability may be biased, and discrimination may be witnessed. To what extent the law for humans and robots will be the same is not clear, as robots are expected to have treats that may not be at the same degree available to humans, e.g., quick reaction, quick situational analysis, perfect knowledge of law, etc. As such, the doctrinal view of the law may exhibit stricter conditions or be applied differently which would lead to discrimination between humans and robots.

How we will treat the robots and position them to society is heavily debated. It is a common belief today, that robots should be treated as machines only (as slaves), and therefore they should serve humanity in that role. This position can be considered similar to Aristotle’s natural slaves (Aristotle, 350 B.C.E.). For Aristotle and the majority of its contemporaries, slavery was justified and accepted; something that might be claimed for robot utilization in modern world. Aristotle referred to the slaves as “living tools” whose labor is the proper use, something that can be claimed also for robots. After all, by delegating work to slaves (which was also considered as degrading in ancient Greece), it was possible for Athenians to have adequate free time to devote themselves to intellectual pursuits of science, philosophy, architecture etc. The question that arises, is if robots should be treated as Aristotle’s natural slaves, in order to take over (mechanized or unwanted) activities, and enable the world’s humans to stop worrying about everyday basic aspects, and have enough time and tools to pursue intellectual activities and personal dreams. In this case, robots should not be given any rights and would act as enabler for humanity. One could very well argue for ANI that this could be the case, but things may be more complicated once AGI or ASI is achieved.

Even if it is decided to treat robots with rights and recognize them as a legal subject, there might be a long way until these are applied, as history has shown in similar matters. In post 17th century Europe, the idea of freedom and equality between men prevailed. As described in contract theory, the relation between the ruling and citizens is regulated. The free individuals rule their private sphere, while they consent to obey laws, pay taxes and serve in army (public sphere). However, women, servants, black people in western context etc. were explicitly excluded, and they were related to the "Bonus pater familia". Hence, protection in the private sphere, e.g., protection from the spouse becomes controversial. The state can protect vertical relationships, e.g., from state abuse, but excludes protection from horizontal relationships, e.g., gendered, class-based, racist etc. If robots are to be seen as simply under the ruling of individuals (who they might be ultimately responsible for them), then we might relive history and its aspects that pertain, e.g., slavery, oppression, mishandling, racism etc. all of which are redirected this time against robots. However, as mentioned, with the rapid
advances of technology, in the near future robots may look and act indistinguishably from humans, which may result in the emergence of such problematic behaviors that may not be constrained. Such aspects, however have no place in a welfare society. This excluding nature of robots may be problematic, and at least in history it has raised debates on the legal subject and what is demanded/expected from it.

As it can be seen, handling the tension between the need to be objective and at the time considering the embodied persons, especially if the latter are robots recognized as legal subjects, increases complexity. In addition, as discussed, the law has to consider the embodied in particular living persons and their circumstances, which in the future is going to be both humans and robots. The alternative of course to all these considerations, would be to avoid altogether such challenging aspects, by simply not building sentient robots (Hassler, 2017), and consider them in the context of Aristotle's natural slaves (Aristotle, 350 B.C.E.). However, such neo-Luddism (Jones, 2006) may not serve humanity in the long run, as history has shown with similar revolutionary technological advances (Makridakis, 2017). Some even consider that such choice might not even be possible, once AGI/ASI levels have been achieved. Hence, embracing a symbiotic relationship in an informed and well-thought manner with AI robots may be the best way forward.
4 Conclusions

Robots featuring AI, especially at AGI or ASI level are still considered science fiction, and only predictions exist about their achievement in the next decades. However, at ANI level we already witness several robots that in the next years are going to pertain key dedicated activities, e.g., self-driving cars. This work considers the full spectrum of such robots, and although in the short term focuses in ANI, it clearly targets also aspects that lie in the intersection of law and society when AGI or ASI levels are achieved.

This work discusses several aspects that pertain intersectional interplay among law, robots and society, and demonstrates the complexities that pertain them. The systematic investigation under the prism of different perspectives, i.e., Law Perspectives, Social Perspectives, Gender Perspectives, Economic Perspectives, and Ethical Perspectives, reinforces the view that such investigations ought to be done in the domain of law and society. From the analysis and critical discussions, it can be seen that issues raised under the one perspective had a significant interplay other perspectives and as such, it is evident that this work, even with the boundary conditions set in delimitations, only scratches the surface of the overall underlying complexity posed in the research question.

Today it is clear that we do not understand AI, robots featuring AI, and may not be able to control it, nor it might be wished in cases. Single aspects such as legal subject have far reaching implications and set the base for the future symbiosis of robots and humans. However, our society is not ready for this paradigm shift yet, and too many aspects pertaining law and society, are insufficiently discussed and assessed. Overall one has to consider that law is meant to be proactive in nature and ideally be in place to prevent problems before they happen. As such it is not advisable to wait until problems arise within large scale utilization of robots and then attempt to derive the respective laws, policies and societal actions.

Robots and AI will create a new era for humanity. What that era might be, is highly debated. As Stephen Hawking put it “The rise of powerful AI will be either the best or the worst thing ever to happen to humanity. We do not yet know which” (Makridakis, 2017). If AI achieves AGI or ASI levels, and empowers humanoid robots, both law and society discussions will need to be revisited. At AGI or ASI levels, robots would be smarter than humans, and potentially humanity will have created the next evolutionary step that may benefit it, or as some
consider, be its demise. In any case, as parents hope that their children would be smarter than they are and do better in life, similarly humanity giving birth to AGI/ASI can hope that it will make the world better and provide solutions to complex problems that we cannot. Any change is seen with skepticism and potentially fear, however, a symbiosis with robots and AI could potentially be the key differentiating factor for long-term survivability of humans and act as an enabler for global human benefits and a new era of prosperity.
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