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European regulatory framework for person carrier robots

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A B S T R A C T

The aim of this paper is to establish the grounds for a future regulatory framework for Person Carrier Robots, which includes legal and ethical aspects. Current industrial standards focus on physical human–robot interaction, i.e. on the prevention of harm. Current robot technology nonetheless challenges other aspects in the legal domain. The main issues comprise privacy, data protection, liability, autonomy, dignity, and ethics. The paper first discusses the need to take into account other interdisciplinary aspects of robot technology to offer complete legal coverage to citizens. As the European Union starts using impact assessment methodology for completing new technologies regulations, a new methodology based on it to approach the insertion of personal care robots will be discussed. Then, after framing the discussion with a use case, analysis of the involved legal challenges will be conducted. Some concrete scenarios will contribute to easing the explanatory analysis.

1. Introduction

The exponential growth of robot technology in non-industrial settings challenges not only current safety standards but also user's rights. Until now, industrial robot regulations have guaranteed human safety by fencing off robots from humans. Service robots, however, imply a close human–robot interaction (HRI), non-expert usage, and work in non-structured environments. The International Standard Organization (ISO) has released the industrial standard ISO 13482:2014 "Robots and Robotics Devices – Safety Requirements for Personal Care Robots" to precisely cover this shift from industrial to service robotics and ensure human safety in this specific domain. Nonetheless, standard compliance does not give answers to a person that feels hopeless because his/her person carrier is in protective stop mode due to a system failure and has left him/her in the middle of nowhere; or when a person is afraid of using an exoskeleton because its gait pattern is slightly different from that of the user. Although standards ensure safety, safety is only one of the principles the Law protects. If the legislature confined legal compliance to compliance with industrial standards, not only would other principles protected by the Law be disregarded, but it would convey the impression that the Law is being privatised. The regulation of new technologies, therefore, has to find a balance between the four constraints that, by default, regulate a thing: technical norms, the Law, the market and social norms (Guidelines on Regulating Robots, 2014; Lessig, 2006).

As Nelson explains (Nelson, 2015), standards help provide risk management assistance limiting liability and helping producers to meet market demands. They are considered soft Law (Shelton, 2003). Soft legislation provides good alternatives for dealing with many international issues that are new, specific

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and complex, especially when States cannot foresee the consequences of a legal document. Standards are flexible, and seen as a tool of compromise, and sometimes the basis of legal corpuses such as the Machinery Directive 2006/42/EC or the Medical Device Directive 93/42/EEC (BSI, 2014; GROWTH; Krut and Gleckman, 2013).

In an ideal world, robots are clear of impacts and therefore threats can be responded to in terms of prevention and opportunities in the form of facilitation. In practice, nonetheless, certainty about impacts of robots are often less clear, especially when they are inserted with the aim of caring about someone else. Therefore, regulators will have to address uncertain risks, ambiguity of impacts and ignorance about the effects of impacts. At the same time, moreover, standards are non-binding and are voluntarily adopted. They represent the capitalisation of Law (because they cost money) and they are self-interpretations of industry reality. These characteristics lead to questioning the legitimisation of standards. On the contrary, legislation (or "hard law") stands for legally binding obligations. They are precise or can be specified through regulations. Contrary to soft-law, hard law enhances the capacity for enforcement (i.e. allowing allegations and defences to be tested under accepted standards and procedures when a violation is found). Hard-law constrains self-serving auto-interpretation; it fixes consequences for violations (and also provides "proportional countermeasures" where other remedies are unavailable); it implies a specific form of discourse (that disqualifies arguments based solely on interests and preferences); and it entails higher reputational costs (that reflect "distaste for breaking the law") (Abbott and Snidal, 2000).

Novel service robot standards focus on physical human–robot interaction (HRI) hazards by stipulating safety requirements on several design factors such as robot shape, robot motion, energy supply and storage or incorrect autonomous decisions. Current robot technology capabilities nonetheless go beyond mere physical HRI. In fact, the robot can put at risk other spheres of the users' rights without causing them actual physical harm. In Kuner et al.'s words: "an interference with data protection rights does not depend on whether there has been any harm or inconvenience to an individual" (Kuner et al., 2015): for instance, when the robot collects users' behavioural data to create profiles and use it for other purposes; or if it prevents the user from committing suicide because the system recognises safety over free will. Autonomy and shared-autonomy also challenge the current system of allocation of responsibility after harm occurrence.

Questions concerning the impact of robot technology on the legal/ethical layer, such as with regard to respect for private life, data protection, autonomy, or dignity, are not part of current standards while they are at the core of any legal system (and are considered fundamental rights in the European Union). Fortunately, both the engineering and the legal community have tried to include some of these principles into their field of research. From the engineering perspective, in April 2016 the standard BS 8611 "Robots and robotic devices – Guide to the ethical design and application of robots and robotic systems" was published. From the legal side, there is the strong belief that, at the same time that safety standards are being developed, supra-/national and state laws are needed to provide citizens with full legal coverage. In 2014, the European project RoboLaw addressed the impact of self-driving cars, computer integrated surgical systems, robotic prostheses and care robots. In "mapping robolaw" they identified five legal themes on robotics regulation: 1) health, safety, consumer and environmental regulation; 2) liability; 3) intellectual property rights; 4) privacy and data protection; and 5) capacity to perform legal transactions. The final resolution of the European Parliament (2015/2103 (INL) Civil Law Rules on Robotics) introduced some general and ethical principles concerning the development of robotics and artificial intelligence for civil use (European Parliament, Committee on Legal Affairs, 2017). The European Commission has not yet responded to it, but it describes quite precisely the suggested content of such a future rule. It is worth noting that the principles are similar to the robolaw project: liability, safety, privacy, integrity, dignity, autonomy, data ownership, ethics and justice. We will implement them in detail afterwards. Certainly, robots are many and not all challenge these identified themes nor in the same degree (see *infra*).

This article aims at taking one-step forward in the regulation of robotics by:

1) Addressing the legal dimension of a concrete type of robot – person carriers; and
2) Incorporating into the legal discussion the grounded knowledge provided by the HRI community.

The main idea is to gain concrete understanding without losing legal respect; working towards meaningful frameworks that can be a) applied by roboticists (because nowadays legal rules are seen as a burden and not practical) and b) give full coverage to the protection of the user; be freely available (avoiding the business model behind standards) and enhance *bindingness* and the capacity of enforcement.

The article is divided in different sections. After the introduction, section 2 establishes the methodology that will be followed thorough the article: context (section 3), robot type (section 4) and risk analysis (section 5). Conclusions will be provided at the end together with a draft set of guidelines. In principle this piece of work is intended for person carrier robots and Europe, although it could be adapted and extended to other types of robots and other frames having a partially different cultural context (although a case-by-case approach is preferred similar to what the Consumer Product Safety Commission in the United States propose in regard to Regulatory Robots (United States Consumer Product Safety Commission)).

2. Methodology

With the aim to adjust to current times, and at the risk of the Law becoming a list of virtual general policies not suitable for regulation (Roig-Batalla, 2016) (and the end of the Law as Hildebrandt argues (Hildebrandt, 2015)) the Law has had to adapt the way in which it approaches new phenomena. Moving away from the top-down approach and recognising the need for grounded knowledge, the European Union has opted to incorporate the Impact Assessment methodology within its legislative framework. Within the European Commission's Smart