On Ethical, Legal and Social Issues of Care Robots

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Abstract. According to recent figures, in the next years, Western developed societies will be supposed to face the "aging problem". The population aged 60 will surpass that of younger people and, to make things even worst, current trends in social relations indicate that family carers are no more willing to look after their older relatives. Such a situation has given more emphasis to the rise of robotics as a possible solution to deal with the demographic change and the new social norms in the care of elderly and disabled people. The ways in which robotics has been proposed to address the "aging problem" are manifold: ranging from humanoids, general purpose robots, to less invasive, distributed and task-specific systems. This chapter intends to provide the reader with an overview of the main ethical, legal and societal challenges concerning the use of care robots.

Keywords: Ethical issues, legal issues, social issues, care robots, robotics.

1 Introduction

"Assistive robots", "care robots" and "personal robots" are labels commonly used in the related literature to indicate different kinds of robots and different types of applications. In this chapter, I will use the expression "care robots" and will refer mainly to robots designed for the care of the elderly and disabled people (although I am aware that old age should not be considered as a form of disability). Care robots can be described as robots 'designed for use in home, hospital, or other settings to assist in, support, or provide care for the sick, disabled, young, elderly or otherwise vulnerable persons' [1]. Recently, the International Standard Organisation (ISO) released a definition of personal care robots as: 'robots that typically perform tasks to improve the quality of life of intended users, irrespective of age or capability, excluding medical applications' [2].

There are many arguments made by several stakeholders in support of designing and developing care robots. Among the most widespread motivations is the demographic shift, that is, the increase of the elderly population and the corresponding decrease of younger people. According to several statistics [3-4], the world population is growing older and therefore more people will need assistance during old age; however, the number of younger people will hold steady due to low fertility rates and therefore, in the next coming years, there will be a shortage of workforce, including care-givers [5]. The Global watch index points out that in Europe there are currently

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172.6m people over 60 and according to estimations there will be 233.1m in 2050, corresponding to 33.6% of the total regional population [3]. According to the World Health Organisation 'this population ageing can be seen as a success story for public health policies and for socioeconomic development, but it also challenges society to adapt, in order to maximize the health and functional capacity of older people as well as their social participation and security' [4]. Hence, many scholars claim that care robots can offer a valid solution to deal with the changes in demography and social norms.

Another of the main arguments used to support the development of care robots is the need to improve the quality of care. Such a need reflects a non ideal situation in the current practice of care. Improving the quality of care it means providing better working conditions for care-givers as well as better care for care-receivers. On the one hand, care robots could be a tool for empowering care-receivers. As a matter of fact, care robots could make elderly or disabled people more independent from the need to receive help from others by reducing physical or mental impairments and thus favouring aging at home.

On the other hand, robots could contribute to improve the quality of care. Indeed, the quality and quantity of assistance provided by care-givers is not always of the highest professional standards [6]. It is well know that in many countries live-in care-givers are migrant workers recruited from the black market [7]. The use of immigrants can be detrimental to the quality of care for the elderly, who are often unable to accept cultural differences and are attended by people lacking the professional skills needed. As rightly noted by scholars, this is a societal as well as humanitarian problem [8]. Moreover, it is well-know that the work of care-givers is hard, stressful (physically and psychologically demanding and with tight schedules), and economically unattractive (low rates and therefore a low social status). Robots could be designed to reduce the cognitive and physical stress of care-givers, which should result in better quality and quantity of human care.

Finally, last but not least, among the strongest motivations for introducing care robots is to reduce the cost of healthcare, even though, a great deal of the care provided comes from voluntary and non formal care-givers (i.e. family members or voluntaries). Moreover, the financial costs of care, in many countries, are mainly on the shoulders of families.

All these arguments could be considered as good motivations for introducing robots in care and assistance scenarios. In fact, they could potentially satisfy the needs and desires of many of the stakeholders involved in the field of care. However, the introduction of care robots cannot be considered as a neutral solution to fix the serious problem of care in the ageing society.

The goal of this chapter is to provide an overview of the main ethical and legal implications, positive as well as negative, emerging from the application of robots designed to care and assist elderly and disabled people. The overall goal is to increase the stakeholders' awareness on the ethical, legal and societal issues. The ambition is to turn such awareness into design requirements (e.g. "ELS specifications", equal to safety and usability standards), which, coupled with a careful design process, may contribute to develop better robots applications.

Indeed, the role of research in the fields of ethics, law and society should not be understood as a way to hinder scientific and technological developments, but rather as a way to steer advances in the "right direction" [9]. The right direction generally means responsible innovation and sustainable developments for human beings (including next generations) and for the natural environment [10].

2 Designing Care Robots

Drawing on Vallor's definition (quoted in section 1), it is possible to highlight three main aspects common to all robots, which should be taken into account in the design process: the kind of operative environment (e.g. private or public?), the typology of users (e.g. healthy or disabled? Youngster or adults?), and the nature of the task (e.g. lifting a person or handling a bottle?). In the specific case of care robots, there can be different kinds of potential users, namely the persons that may directly or indirectly benefit from the services carried out by the robot and those who directly or indirectly enter into contact with it. A first macro distinction applicable to care robots is that between care-receivers and care-givers (both formal and informal). To whom is the robot designed for? Such a question is determinant since there are clear differences in terms of needs and desires between care-receivers and care-givers. For instance, Jennifer A. Parks and colleagues point out that while a technology for lifting may be deemed desirable by care givers because it relieves them from hard-physical work, the same technology may appear unacceptable by elderly [11]. To make things even more complex, the vision of care-givers and that of care-receivers are often in contrast with that of the designers, that is, the engineers working on the robot. As reported in the study by Arjanna van der Plas and colleagues, the assumptions concerning the robot tasks of roboticists were in contrast with those of care-givers and care-receivers, who were against the idea that the robot could be a companion or a communication medium since they were afraid that such functionalities could create isolation and loss of human contact [12].

However, distinctions should be made also within each category of users. For instance, within the category of care-givers, there might be differences between formal and informal assistants. Likewise, within the category of care-receivers it is widely known that disabled people have different requirements with respect to the elderlies. Moreover, the physical and cognitive levels of the designated users are a matter of differences too. As pointed out by Jeson Borenstein and Yvette Pearson it is necessary to distinguish between different levels of age (e.g. infants, from adults) and capabilities of users (i.e. healthy or physical or cognitive impairments) [13]. Moreover, users may have different levels of expertise and different attitudes towards technology and to consider all these aspects during the design phase is important for improving the robot social acceptance and the degree of usability.

In particular, these issues can be determinant for the design of the interaction between the robot and the user. As pointed out by Tracy Mitzner and colleagues, one of the considerations to take into account in the design of a care robot is 'who would be interacting with it and in which roles' [14]. As a matter of fact, the difference between

the potential users of a care robot are many and they may have different levels of expertise or familiarity with technology (e.g. professional users such as nurses vs. non professional users, such elderly people for whom easier and simpler interfaces may be necessary) and roles (e.g. clinicians vs. relatives). Therefore, interaction modalities and interfaces should be designed by keeping in mind all possible users and all possible physical, cognitive and subjective differences among them.

As far as the operative environment is concerned, that is, the context – physical, structural and cultural – in which the technologies will be used, Mitzner and colleagues identify three main contexts for which a care robot can be developed: private homes, assisted living, skilled nursing [14]. As pointed out by the authors, 'the environmental differences between private homes and assisted living or skilled nursing facilities could have distinct implications for the design of robots. For example, long-term care residences tend to have wider open hallways than private homes, which allow for easier autonomous robotic navigation' [14]. To take into account the requirements of the environment is therefore crucial to solve not only technical difficulties, but to avoid ethical (e.g. tasks), social (e.g. robot appearance), economic (e.g. costs), and legal problems (e.g. privacy and liability).

Finally, with respect to the tasks, care robots are usually meant to carry out three main activities: daily tasks for assistance; monitor health and behaviour and companionship or entertainment [8]. However, it seems difficult to separate the activities carried out by robots in rigid categories. As a matter of fact, the ideal robot would be one that possesses multiple functions: for instance, to assist you in daily tasks and personal hygiene, but also to monitor your health and your safety, and, maybe, to entertain you and be of company. However, the choice of tasks should be the result of empirical evaluations of the users' requirements and needs.

As pointed out earlier, care can mean different things to different people, for instance, it depends on the users' perspective: the needs and desires of care-givers and care-receivers are different and may be different from those of the engineers designing and developing the robot. In the interviews made by [12], the differences between the needs and desires of care-givers and care-receivers are very well illustrated: dehydration, that is, the impossibility to raise and drink a cup of tea or water was pointed out by a care-giver, putting the shoes by a care-receiver, pushing beds in halls by a hospital nurse.

Therefore, an adequate design process should be the result of the interaction among designated users, context of use and tasks. In order to clearly identify the users, the operative environment and the tasks, it should be bore in mind that there exist differences among users, specific constraints for each type of environment as well as the fact that not all tasks can be automatized or performed by a robot. Furthermore, the operative environment, the user and the task, combined together, may be determinant for making other relevant design decisions, such as the definition of the shape or morphologies of the robot (e.g. humanoid or appliance-like?), its capabilities or functions (e.g. mobile or fixed?), and the level of autonomy (e.g. tele-operated or autonomous). Altogether, such considerations are fundamental in order maximize the robot performance, and, at the same time, minimize possible resistances deriving from ethical, legal and social implications.

3 Ethical and Societal Issues of Care Robots

The goal of this section is to provide the reader with an overview of the main arguments in favour and against care robots based on ethical, legal or societal issues. However, before entering into details, I believe necessary to address a few issues, which are preliminary to the phase of evaluations, namely the methods used in the identification and analysis of ethical and social issues.

3.1 Which Ethical Framework and Which Methods?

Which ethical framework should be used in the analysis of the ethical issues surrounding care robots? In other words, what are the values that should be taken into account when talking about care? And from which perspective: care-receivers, caregivers, parents, or the national health system? Moreover, which methods should be used to identify and analyse the ethical issues of care robots? Finally, is it possible to implement ethics into the design of a robot and which are the most appropriate legal instruments to regulate the design, development and use of robots?

These are among the main questions, still partly unanswered, concerning the so called areas of "roboethics" and "robolaw", that is, the theoretical and empirical research in the ethical, legal and social issues of robotics. These questions pertain to robotics in general, let alone care robots.

As far as the ethical framework is concerned, a few scholars propose to draw on the capability approach [13], [15]. The capability approach is based on the theories of philosophers Amartya Sen and Marta Nussbaum and its main principle is to promote and preserve human flourishing: 'Certain technological interventions expand people's opportunities by improving their ability to interface with their environment and helping them build or maintain relationships with others' [16]. According to the capability approach, therefore, care robots should be evaluated on the basis of their ability to promote human capabilities and its primary concern should be the care-receiver: 'if the use of robot caregivers is also efficient and convenient for professional and "informal" human caregivers, those are acceptable side effects, but having them as the sole or main impetus for using robot caregivers is likely to produce undesirable ethical and social outcomes' [16].

Another solution proposed by scholars to frame the ethical, legal and social debate is to draw on the principles contained in 'national and international charters and treaties concerning the promotion and protection of fundamental rights. These documents often include sections and articles specifically concerned with healthcare and medicine' [17]. For instance, article 35 of the European Union Charter of Fundamental Rights states that: 'Everyone has the right of access to preventive health care and the right to benefit from medical treatment under the conditions established by national laws and practices. A high level of human health protection shall be ensured in the definition and implementation of all Union policies and activities' [18].

In their analysis of the ethical issues related to socially assistive robots, David Feil-Seifer and Maja J Matarić propose an ethical framework based on medical ethics. In particular, they draw on Beauchamp and Childress's model based on four principles:

'beneficence – caregivers should act in the best interest of the patient; Non-maleficence – the doctrine, "first, do no harm," that caregivers should not harm a patient; autonomy – the capacity to make an informed, un-coerced decision about care; and justice - fair distribution of scarce health resources' [19].

However, as point out by Aimee van Wynsberghe, the attempts made by scholars to frame the ethical analysis fall short in their objectives. Indeed, it seems that the problem is not the ethical framework selected, but how it is applied to robots. In other words, it is necessary to combine and implement the ethical, legal, and societal frameworks with the common features characterizing each robot, that is, its designated users, its operative environment and the tasks, otherwise the risk is to remain at an abstract and theoretical level. Wynsberghe proposes a holistic and practical methodology for ethical identification, analysis and implementation. Indeed, according to her: 'A framework for the ethical evaluation of care robots requires recognition of the specific context of use, the unique needs of users, the tasks for which the robot will be used, as well as the technical capabilities of the robot. Above and beyond a retrospective evaluation of robots, however, what is needed is a framework to be used as a tool in the design process of future care robots to ensure the inclusion of ethics in this process. What's more, given the lack of standards provided by the International Organization for Standardization (ISO 2011), there exists an opportunity at this time to incorporate ethics into the actual design processes for these kinds of robots' [20].

As to the research method, there are neither standards nor validated procedures currently in use for identifying and analysing ethical, legal and social issues. For instance, scholars point out the need to distinguish between speculative ethics vs. pragmatic ethics, that is, factual from fictional problems. As point out by a few scholars, many studies about robotics and ethics are speculative since they deal with fictional issues, such as robot rights, robots taking over human beings, etc. [12], [21]. The risk is that theoretical discussion may overlook a number of ethical issues that emerge only in practical deployments. In contrast to speculative thinking, pragmatic or grounded ethics starts from what is technologically feasible and it is the result of users' involvement in discussions and interviews. According to Stina Nylander, grounded ethics should be complementary to theoretical speculations concerning ethics in care. As a matter of fact, it contributes to better focus on practical and scenarios oriented ethical issues: 'We believe that framing robots and robotic products in real-life use and real-life settings help developers, potential users, as well as researchers to create images of robots that balance the ones from fiction. This will shed important light on user needs, ethical issues, and design challenges within the field of robotics' [21].

In the method proposed by Arjanna van der Peas and colleagues, called "Visions Assessment" (VA), they propose to bring together the vision of the experts, i.e. roboticists, and the vision of the designated users, i.e. elderly. The authors point out that in their method 'the technological knowledge of the robot experts and the contextual knowledge of the designated users is married in a design, which is able to solve actual needs and seems technically feasible as well' [12]. The approach proposed by Van der Peas and colleagues is not exclusively aimed at the identification of ethical issues, but it is meant to co-construct moral vision and guidelines in the process of designing a

robot. In this method, the ethical analysis is not kept apart from the design of technology and vice versa.

However, among the main obstacles to ethical analysis one should mention also the methodological difficulties in assessing the safety of the robot with respect to the so called "soft" threats. With respect to "hard threats", which are related to the physical damages and can be easily quantified via empirical studies, "soft threats", which derive from prolonged interactions with care robots and affect the user's cognitive and emotional levels, are more difficult to be evaluated. For instance, it will be very difficult to study and assess the effects of "nursery robots" on babies.

Finally, and to sum up, there are many proposals, but not unanimous agreement among the experts concerning frameworks and methods for ELS analysis. It seems that the ethical discourse of robotics is still stuck in a "brainstorming phase", which has started more than a decade ago and is characterised by many attempts to identify and analyse ethical issues, but it is still far away from delivering sound scientific results. In addition, as to the "normative phase", which should naturally follow the ethical and societal analyses, there is still research to do on how to implement ethics into binding requirements for improving the design process and regulate the deployment of robots. Which are the legal instruments that can best translate ethical and societal "specifications" into binding requirements for robot designers and developers?

In the next subsections, a non exhaustive overview of the main ethical, legal and social issues voiced by scholars, researchers and experts in care, ethics and robotics is provided.

3.2 Positive Ethical and Social Aspects of Care Robots

In general, it is argued that care robots can contribute to improve dignity via empowerment of people in need, such as elderly and disabled. As a matter of fact, by providing physical or cognitive support, robots can improve people's autonomy and relieve them from dependence on the help of others, such as toileting or bathing, which may be caused of embarrassment or distress. According to Borenstein and Pearson, care-receivers are liberated from 'the frustration, awkwardness, and sense of dependence associated with requesting assistance from other persons' [13]. Moreover, according to the empirical study carried out by Nylander and colleagues on the effects of an eating-assistance device, robotic technologies can have positive effects not just on independence and autonomy but also on privacy and identity. The authors report on the story of Carl, a disabled person who, for a period of time accepted to use Bestic, an eat-aid device. The authors point out that thanks to Bestic 'Carl can have a meal with his wife without having an assistant present and not have his wife feed him. Bestic allows them both to have a social experience since they both feed themselves and no one has to help the other. They can talk to each other without having Carl's assistant listening and they do not have to include the assistant in the social conversation' [21]. According to the authors the device 'will not replace Carl's assistant, or create a situation where he never needs help from his wife, but it creates a more private and independent eating situation. Finally, by favouring autonomy and independence, robotic assistive devices may delay the move to skilled nursing home and, on

the contrary, favour aging in place, with great financial benefits for families or the healthcare system as well as psychological benefits for care-receivers. As pointed out by Mitzner and colleagues, move to higher level of care may be detrimental to the health and quality of life of elderly people. As a matter of fact, studies suggest that the development of depression and suicide in older adults is correlated to move from home to assisted living or other facilities [14].

From the standpoint of care-givers, the introduction of care robots can improve the quality of their job by alleviating the burden of care, that is, making less tight their schedules and reducing the physical effort needed in many activities, such as in toileting or bathing. Moreover, it is believed that in providing care-givers with more time and less physical stress, robot could favour human physical contact and communication with care-receivers.

Finally, for parents as well as physicians, care robots could be a way to have immediate access, via the robot cameras, to what a person is doing (care-receiver or care-giver). Monitoring their relatives, patients and the people looking after them as well as having a means to directly interact with the person in need (via audio and video implemented in a mobile base) can also contribute to parents' peace of mind and improve the effectiveness of therapies. Sharkey and Sharkey believe that robots could be used to monitor care givers to ensure they do not violate the rights of care receivers and thus be a way to improve the standard of care [8].

3.3 Negative Ethical and Social Aspects of Care Robots

One of the main perceived problems with respect to care robots is that they will lead to a deterioration of care. Such an opposing attitude is confirmed by the survey on robotics requested by the Directorate-General for Information Society and Media (INSFO) of the European Commission. The results show that only 4% of EU citizens believe that robots should be used in activities concerning the care of children, elderly or disabled. Moreover, 60% of interviewed consider care robots should be banned [22].

Among the main arguments against care robots pointed out in the literature by almost all stakeholders, including roboticists, is the problem of social isolation and loss of human contact. Indeed, social isolation is often already a problem for elderly and disabled people, independently from the environment or context in which they live. The most widespread feeling is that the use of robots may make the problem worse.

It is possible to identify two main fears supporting such a widespread feeling: 1) robots will replace human carers (completely or partially) and this will eliminate or reduce the time spent with human beings, and 2) robots will offer more possibilities for remote presence at the expense of in-presence situations, such as visits paid by relatives and friends [8], [23]. Concerning fear no. 1, it seems that nobody is interested in building robots that will replace human care givers anymore, not even roboticsts. In the Europ Strategic Research Agenda, it argued that: 'Particular care must be taken with the elderly and children. Robots should support, but not replace, human carers or teachers and should not imitate human form or behaviour. Further ethical issues can be derived from the European Charter of Fundamental Rights.' [24].

The fear to loose human contact and socialisation is usually targeted towards humanoid, general purpose robots, since they can, if ever realized, replace a human being in the accomplishment of many complex tasks. However, also robots designed for specific tasks (trivial or intimate activities) may raise the same concerns. As a matter of fact, care-givers and experts point out that the tasks that are most embarrassing, such as toileting or personal hygiene, or non social tasks, such as vacuum cleaning the floor, are often offering the occasion to be with another person and trigger social interactions [25], [16]. Moreover, scholars have argued that it is very unlikely that with the automation of some care tasks the number of human beings employed in care activities will remain the same. As pointed out by Jennifer Parks: 'The likely consequence of a technology boom in aged care is that the number of human caretakers will be seriously reduced; the net result will be a further reduction in the amount of human contact to which our elderly citizens will have access' [11]. Therefore, if on the one hand (general purpose or specific tasks) robots may contribute to improve dignity, autonomy, independence and privacy, on the other hand, it seems likely that they may reduce social interactions and human contact.

Deception is another widespread ethical issue identified by scholars. It concerns in particular the robots that show a high level of similarity with human beings or animal behaviour and/or morphologies. Some of these robots are currently used in therapeutic applications with patients affected by autism or senile dementia, such as the seal robot Paro [26]. According to Robert Sparrow, the therapeutic effect depends upon "deception". In other words, the working of these robots is based on the pretence that the robot can interact and behave like a human person or a real animal (i.e. having feelings and inners states): 'for an individual to benefit significantly from ownership of a robot pet they must systematically delude themselves regarding the real nature of their relation with the animal. It requires sentimentality of a morally deplorable sort. Indulging in such sentimentality violates a (weak) duty that we have to ourselves to apprehend the world accurately' [25]. Is this pretence problematic in itself, even if none wishes to deceive anybody? According to Jeason Borenstein and Yvette Pearson 'as long as there is no intention to deliberately deceive or neglect dementia patients through the use of a robot, the fact that some patients may form erroneous beliefs about a robot caregiver – a process over which other agents may have little control – does not necessarily amount to being disrespectful to a care recipients' [13].

For some people, the idea of having a robot with which they can interact at different levels, physical, cognitive as well as emotional, may be very appealing. Indeed, as pointed out by Byron Reeves and Clifford Nass, human beings, including healthy subjects, tend to behave socially with technological artefacts, such as computers and robots [27]. However, even if we were perfectly aware that the robot is not a 'real living entity', and therefore neither "authenticity" nor "deception" were a problem anymore, there could be another risk to take into account. Psychologist Sherry Turkle points out that interacting with "nurturing machines" – as she calls them – that is objects that simulate the mutual relations occurring among living beings can be a matter of concerns since 'a robot that demands attention by playing off of our natural responses may cause a subconscious engagement that is less voluntary' with respect to traditional liminal objects (e.g. a doll or teddy bear) [28]. Indeed, according to Turkle,

with "nurturing machines" – as she calls them – we are no more in control of our engagement and therefore are less free to step back from it.

Another critical issue pointed out by a few scholars is that care robots could imply a loss of freedom for care-receivers. A reduction of freedom could occur especially with robots designed to suggest or even impose a specific behaviour on people for their own benefit. For instance, if a robot is meant to monitor the activities of a person affected by dementia during the day there might be occasions in which the robot will have to necessarily limit (as much as possible) the will or freedom of the person for preserving that person's health. However, there might be occasions in which the restriction is not grounded on a real danger and, as pointed out by Sharkey and Sharkey 'restraining a person to avoid harm could be a slippery slope towards authoritarian robotics' [8]. Moreover, although up to now monitoring and assistance are related to the robot verbal, rather than physical, capabilities, it is likely that with further progress in physical interaction, robots with more effective coercive measures could be designed.

Finally, scholars point out that dependence and lack of competencies can be consequences of robots that provide too much help or assistance. As pointed out by Oppenaur-Meerskraut 'it could be that robots remove the need to do things that older people can still do and thus accelerate the process of forgiveness and therefore create a situation of dependence on the technology and a lack of skill…' [23]. Due to the lack of training a person may unlearn how to do things and therefore increase the dependence from other people and technology.

4 Legal Challenges for Care Robots

With respect to the ethical and social analysis, the study of the legal implications of robotics has a younger history. The growing attention to legal issues of the last decade is probably a result of the more realistic possibilities to turn robots from research prototypes into commercial products. The main motivation for developing a legal framework for robots is twofold: on the one hand to pave the way to the development of a market for robotic products and on the other to protect users from the consequences of new accidents.

Among the questions currently debated by scholars and experts in law is whether the current legal framework will be adequate to address the issues emerging from the deployment of robotic products and services. As a matter of fact, it is still a matter of concern whether robots, at least in its current state of development, will bring about new problems and therefore produce "legal gaps" in the current legal frameworks. Moreover, if new laws were to be designed, another relevant issue would be to determine the most appropriate legal tool (i.e. soft or hard laws?) for regulating the new robotic applications.

In what follows, I will present a non exhaustive list of general legal issues concerning robotics, which could be relevant for care robots too. As we shall see, most of the legal implications of robots are determined by what robots can do and by what they are [29].

Many of the care robots currently tested or used in private homes or public institutions are endowed with cameras and other recording devices to monitor the user and store different kinds of data, besides physiological parameters, such as user's preferences, habits, and wishes. With such capabilities a robot may offer very useful functionalities to care-givers, care-receivers and relatives. For instance, it could issue warning messages to prevent a fall, suggestions for cocking, reminders, or telepresence services. However, such capabilities may also cause a privacy problem, as illustrated by Sharkey and Sharkey: 'An elderly person might not like to find that an operator could remote control a robot to peer round their apartment before they are dressed, or when they are taking a bath. They might prefer the robot to have to do the equivalent of knocking on the door and waiting to be invited in. The issue becomes more complex if an elderly person's mental state deteriorates further and they become confused. A person with Alzheimer's would probably forget that the robot was monitoring them, and could perform acts or say things thinking that they are in the privacy of their own home' [8]. As a possible solution the Sharkeys propose that the robot should make its presence always detectable and before entering a room should ask permission and provide clear indications when recording or monitoring [8]. According to Feil-Seifer and Mataric, a further solution could be to distinguish between confidential and non confidential information. However, the authors wonder whether a robot could ever be capable of making such a distinction [19].

Monitoring and recording capabilities may also generate a breach in data protection. As a matter of fact, it is legitimate to wonder how safe will be and who will have the right to access and handle the files containing images and sounds recordings taken from the robot, which may be very appealing to the market [29].

Who is going to be responsible for the damages caused by an autonomous robot? This is one of the most recurring questions in discussions of robots and law by experts and non experts. However, the answer seems to be quite simple. As pointed out by Lehman-Wilzig, 'as long as robots continue to be merely sophisticated automata, many injuries stemming from their actions would fall into the broad category of product liability' [30]. A different scenario would emerge if robots could be considered as if human agents. As to current issues concerning liability, scholars point out that in case of damages caused by an autonomous robot it might be more difficult to identify a responsible due to the increased complexity of the causal chain [30]. As a matter of fact, to turn a robot into a market product involves many actors: manufacturer, importers, wholesalers, retailers, repairers, installers, inspectors, and the users. Moreover, as pointed out by Lehman-Wilzig, the manufacturer has now doubled into the hardware and the software manufacturers. Therefore, it could be more difficult to attribute or share the responsibility for a defect or a fault and in many cases there might be 'no one at fault!' [30]. The issue of the indeterminacy of liability is related to robot autonomy, but also to share control robot: who is responsible for a damage caused by an elderly person while using (i.e. controlling) a robot? According to Sharkey and Sharkey, in case of a care robot, the level of control should be related the user's state of mind [8].

If one day autonomous robots will enter into basic, economic transactions, by performing legal acts, and even being accountable for the damages caused to their users and to third parties, they should be granted the status of legal subjects. As point out by Elettra Stradella and colleagues, endowing robots with legal capacity it is not a matter of ontology, that is, granting robots the status of "sentient beings", but it could be a way to solve practical problems. As a matter of fact, to enter into a contract could allow a robot, for instance, to purchase goods, such as food, drugs, newspapers, etc. Therefore, turning a robot into a legal subject could be a way to solve the problem of having a centre of imputation for the effects deriving from the agreement and avoiding the contract to be considered void [31].

Some law scholars have proposed to create a new legal category for this kind of robots, i.e. "e-person" (electronic persons), by analogy with that category of "legal subjects", in use for corporations, foundations, and companies, which have legal rights and duties even though they are not physical persons [32]. However, it seems that legal scholars agree that without assets to compensate for the damages caused by a robot, to hold them liable will not make sense. Indeed, the supplier would not get paid and the victims could not recover damages. Therefore, a few scholars propose to entrust robots, previously entered in a public register, with a certain financial basis, according to the area of application, hazard, and degree of autonomy [32].

Finally, the legal status or classification of autonomous robots deserves some consideration. As illustrated by the numerous experiments with autonomous robots operating on public roads (e.g. Google car), in the sea or in the air, there is currently no category for classifying self-driving cars, AUV (Autonomous Underwater Vehicles) or drones according to existing laws. Special permissions [33] and, in some cases, modifications of the law [34] have been necessary to allow autonomous robots to be deployed on public roads [33], [34], in the air [34] or water [35]. Given their flexible nature, there might be cases of robots operating in mixed environments, that is, private and public areas [37] or ground, air and water and this may complicate things from the legal perspective.

5 Conclusions

According to Joan Tronto care should be distinguished into care *for* and care *about* [38]. To *care for* somebody means to provide help or try to alleviate the physical and cognitive impairment of people, while to *care about* somebody means to provide a person with love, attention and social exchanges. This distinction is important because it points out that hidden in the generic term "care" there are very important meanings, which are determinant both for robots and human beings. Care does not mean only physically assisting someone, but also establishing a human relation with another human being. Such a distinction is useful since it helps to better understand what care really means and also to evaluate the potential role of robots in practices of care.

As a matter of fact, as one of the most advanced technologies, robotics can contribute to care and assist people in need. The question is: how? Among the solutions proposed it is possible to distinguish two main trends: on the one hand general

purpose, mobile robots, such as a humanoids, theoretically capable of replacing human beings at almost all levels, from physical to emotional interaction; on the other, there are distributed robotic devices, which perform specific tasks, such as automated wheel-chairs. At least in the next decades, robotics does not seem capable of *caring about* human beings and, perhaps, it should be better not to use it in such a way. The widespread fear that care robot may determine a loss of human contact and socialisation is a significant warning in this respect.

On the contrary, robotics could be a solution for many tasks belonging to the practice of *caring for*. Among the benefits that could derive from the introduction of robots in the care of elderly and disabled, there is the improvement of the quality of care both for care-receivers (e.g. independence, autonomy, dignity, privacy, etc.) and care-givers (reduction of physical and cognitive burden).

However, *care for* and *care about* should never be separated in care practices. Therefore, care robots should be understood as a tool in the hands of care-receivers and care-givers and not as a replacement of the latter or a companion for the former.

Nevertheless, the de-humanisation of care and the objectification of care-receivers are not just problems brought about by robots, but they can emerge also when care is provided by other human beings. The need to improve the quality of care, both of care-givers and care-receivers, also in view of the incumbent demographic shift, is of paramount importance, but the solution cannot be only one and that one cannot be only robots. The hype always surrounding new technologies such as care robots may conceal the drawbacks and make people think that technology can solve all the problems; in so doing we tend to forget that there might be alternative solutions based on human beings. In the specific case of care, an alternative solution could be to make the job more appealing by proposing better working conditions, such as better economic remuneration, improved professional quality of care-givers and by granting equal rights and duties to immigrant workers. Robotics alone cannot be the solution for all the problems affecting care: from the demographic shift, the low quality of care, to the demanding working conditions of care givers and the high-costs of care. A combined solution is needed, brining together robotics technologies and human beings.

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