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Responsible Ethical
Learning with Robotics

Towards responsible robotics through cultural change and lived ethics

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FOREWORD

Responsible Ethical Learning with Robotics – REELER – is an interdisciplinary H2020 project funded by the European Commission with 1,998,265 EUR from the 1st of January, 2017 – 31st of December, 2019. Its main objective is to develop the REELER Roadmap for responsible and ethical learning in robotics. The project involves four European partners from the fields of anthropology, learning, robotics, philosophy, and economics, who work closely together in a research-driven collaboration between SSH-RRI and Robotic-ICT communities. Together, they aim to raise awareness of the human potential in robotics development, with special attention to distributed responsibility, ethical and societal issues, collaborative learning, as well as economic and societal impacts. The REELER Roadmap aims at aligning roboticists’ visions of a future with robots with empirically-based knowledge of human needs and societal concerns, through a new proximity-based human-machine ethics that takes into account how individuals and communities connect with robot technologies. REELER’s comprehensive research methodology includes a design-anthropological approach to onsite studies of roboticists’ laboratories and daily work, as well as onsite ethnographic studies and impact studies of present and potential affected stakeholders. The project also includes quantitative research in geographical distribution of patents and an AMB (agent-based model) research approach. Furthermore, the project makes use of novel methodologies to give both robot-designers and affected stakeholders a space for mutual exchange about a robotic future, built around a number of REELER’s ethnographic case studies of robots being developed in Europe. These novel methods include experiments with mini-publics, role play, social drama, and also explorations of the established sociodrama approach with professional sociodramatists. REELER aims to include all relevant aspects of this research in the roadmap, which will present ethical guidelines for Human Proximity Levels (HPL) in design work, as well as prescriptions for policy makers and robot-designers for how to include the voices of new types of users and affected stakeholders. The project aims to present an agent-based simulation of the REELER research to be used by roboticists and policymakers. The working papers presented in this series present ongoing research results, literature reviews, and position papers.

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TOWARDS RESPONSIBLE ROBOTICS THROUGH CULTURAL CHANGE AND LIVED ETHICS

By Karolina Zawieska

ABSTRACT: *This paper focuses on the field of roboethics and the need to develop new perspectives that would increase the practical value of ethical investigations to roboticists. The discussion is based on the findings of the REELER project and its ethnographic fieldwork as well as an overview of recent developments in roboethics. The main assumption is that in order to successfully integrate robots into our society we need to foster a cultural change towards responsible robotics with the participation of both robot developers and robot end-users/affected stakeholders. The key underlying framework of the ‘culture of responsible robotics’ is that of ‘lived ethics’.*

1.0 Introduction

Starting from the early 2000s, different attempts have been made to systematically address the subject of ethical design and use of robots, particularly within a newly established field of roboethics. In general, emerging technologies always pose new ethical challenges (Steinert, 2014) and require developing new ethical approaches. When applied to robotics and AI, ethics too has sometimes been described as ‘a territory that must be discovered’ (Nørskov, 2016: 90). This includes the need to develop entirely new ethical perspectives that would go beyond the classical moral theories (Veruggio & Operto 2018: 1505). Roboethics is an interdisciplinary field that combines robotics and ethics and it frequently taken to be a special new area of applied ethics. During the last decade, roboethics has been demarcated from other types of ethics, in particular machine ethics. The field has been dominated by philosophers and professional ethicists in the first place (e.g. Peter Asaro, Mark Coeckelbergh, Johanna Seibt, Robert Sparrow, John Sullins and Aimee van Wynsberghe), lawyers (e.g. Patrick Lin or Ryan Calo), and robotics engineers and computer scientists (e.g. Ronald Arkin, Noel and Amanda Sharkey, Gianmarco Veruggio or Alan Winfield among others). This work proposes to view roboethics not only as a field of philosophical and research investigations but also the area of policy-making and regulatory efforts that lead to development of ethical guidelines, standards, principles and recommendations for robot developers and robot users (for a detailed review see for example (Tzafestas, 2018; Winfield 2019)).

Developments in roboethics have been pursued mainly via the academic and expert efforts oriented towards developing and improving our understanding of ethical principles and values that could best guide the ethical design and use of robots. The area that combines such efforts with the societal engagement is that of responsible robotics. While the notion of roboethics has been relatively well-defined (Veruggio & Operto 2008) (despite disciplinary differences that impact individual understanding of ‘robot ethics’ (Van Wynsberghe & Sharkey 2016)), there is no well-established definition of responsible robotics. For example, when answering the question ‘What is responsible robotics?’, the very Foundation of Responsible Robotics (FFR) states that ‘This answer changes as

quickly as the technology in question'¹. Others have described responsible robotics simply in terms of 'responsibility of and for emerging technology' (Gunkel 2017) or generally as an umbrella term and a potential roadmap for the future of robotics (Van Wynsberghe & Sharkey 2016). In any case, the notion of responsible robotics and related ethical principles is closely related to that of Responsible Research and Innovation (RRI) (Murphy & Woods 2009; McBridge & Stahl 2014; Winfield & Jirotko 2018). RRI as such points to the direct engagement of science and research with society. For example, RRI has been described as a practice that aims to couple the scientists and innovations with multiple societal users at organisation and individual levels to improve human lives (Bridge & Stahl 2014). In other words, 'RRI encourages responsiveness to society's needs and engagement with society' (Bridge & Stahl 2014). The key for successful RRI is dialogue between a variety of different stakeholders involved as well as embedment of scientific and technological innovation in our society and culture (Von Schomberg 2013; Bridge & Stahl 2014).

It is important to note that while the core focus of roboethics is of course robots, for different reasons robotics community has been generally reluctant to systematically engage with ethical subjects and inquiries (Sullins 2015). Until recently, social and ethical implications of robotics systems and related technologies have been 'largely ignored' (Bekey 2012: 17) and considered as only optional or irrelevant for robotics (Zawieska 2018). Perhaps the absence or only limited contribution to roboethics from roboticists is one of the main reasons why different outcomes of roboethics have often been seen as largely inadequate for roboticists' work, particularly from the engineering perspective. To a large extent this is because, in line with the pragmatic and problem-solving thinking approach, engineers in general and roboticists in particular often tend to expect that ethics can be 'engineerised' (Newberry 2004) and translated into the engineering and computer science terms, the expectation that is often neither realistic nor plausible. Also, the proposed dominant perspectives such as normative rule-based deontological and consequential ethics have sometimes been viewed as ineffective as they do not lead engineers to modify their decision-making processes (Sorenson 2019). Calls have been made to upgrade the entire existing work in roboethics towards 'Robot Ethics 2.0' (Lin *et al.* 2017). Therefore, there is clearly the need to offer to roboticists not only novel ethical perspectives but also practical guidance toward understanding ethical challenges in robotics that would go beyond 'speculative robot ethics' (Van der Plas *et al.* 2010). Alternative approaches may include for example 'pragmatic and social engineering ethics' (Sorenson 2019) or 'virtue ethics', with its emphasis on practical judgements (Schmidt 2014). This paper also aims to bring a new perspective to roboethics by discussing it in terms of a cultural change and 'culture of responsible robotics'.

1.1 Background

This research is part of the REELER project. REELER is a H2020-funded interdisciplinary project that aims to align the roboticists' visions of a future with the empirically-based knowledge of human needs and societal concerns. The underlying assumption is that there is often a gap between the robot developers and their conceptions of the end-users' needs and the actual preferences and needs of individuals and societies that will receive robots. In order to ensure that robots are beneficial for people, such a gap needs to be bridged and the corresponding perspectives aligned. From this perspective, the REELER project explicitly aims to contribute to the pursuit of the ethical robot design

¹ Foundation for Responsible Robotics (<https://responsiblerobotics.org/about-us/mission/>)

and responsible robotics. As part of the REELER project, over 10 researchers conducted ethnographic research on robot design, development and implementation, as well as related ethical challenges identified across 8 different sectors in 13 European countries. The project followed a 'multi-variation' approach first aiming at variation in robot types, geographical distribution, and types of organisations, and then looking for patterns across such variations. The main data-collection method was in-depth interview and it involved both roboticists and end-users/affected stakeholders in the role of the interviewees. The ethnographic fieldwork resulted in nearly 160 interviews whose fragments are quoted here (for a detailed discussion of the project and its fieldwork see (Hasse 2019)).

2.0 Ethics and Culture in Robotics

In general, when addressing culture in roboethics and robotics / Human-Robot Interaction (HRI) research, culture has been typically seen as one of the factors that need to be considered to develop robotic systems that meet people's expectations and preferences regarding robots. Such an approach can also be observed in some of the related policy-making documents or guidelines that point to 'cultural diversity' as one of the factors that should inform ethical development and use of the AI and robotics technologies (as opposed to 'cultural bias') (Muller 2017; EAD 2018). For the purposes of this work it is important to note that references to culture often include consideration of societal and cultural values that should be reflected in the robot design, the approach that constitutes a direct link between culture and ethics. For example, ethical governance in robotics and AI has been defined as a set of cultures and values among others (Winfield & Jirotko 2018); some studies have explicitly combined together cultural and ethical considerations in robotics (Battistuzzi *et al.* 2018). Robots themselves have sometimes been described as 'a mirror of shared cultural values' (Capurro 2009). Most studies and ethical guidelines however, view culture as only one of many or an auxiliary factor in the development of robot design and ethical frameworks for robotics. From this perspective, the primary goal for addressing different cultural factors is to increase the social acceptance of robotic technologies among different user groups (just as considering ethics in the design process may help ensure 'customer confidence' in the robotics products (Sullins 2015)). In line with such thinking, some studies addressed the robot presumed capacity of being 'culturally robust' (Šabanović *et al.* 2014), or 'culturally aware' and 'culturally competent' (Bruno *et al.* 2019; Sgorbissa *et al.* 2019). Other have called for the development of applications in social robotics that are 'culturally sustainable', that is 'value-preserving and value-enhancing' (Seibt 2016). A number of cross-cultural studies have been conducted on people's attitudes and perceptions of robots (Bartneck *et al.* 2005; Funk *et al.* 2014), or the impact of cultural backgrounds on selected aspects of human-robot interactions, e.g. social norms for greetings (Trovato *et al.* 2013) or attribution of personality traits to robots (Weiss & Evers 2011). The term 'robot culture' has also been in use and it refers to a new form of coexistence and cultural exchanges between humans and robots (Samani *et al.* 2013). This is where robots and other computational objects are viewed as objects that not only do things *for* people but also *to* and ultimately *with* people (Turkle 2006). 'Robot culture' may also refer to the artificial culture that is created among and by robotic systems themselves (Samani *et al.* 2013; Winfield *et al.* 2011).

Rather than study culture in terms of design requirements for robots, one may also focus on roboticists themselves or the overall relationship between robotics and culture. This includes contributions from the social science and philosophical perspective (see for example Coeckelbergh 2014). In general, there has been a growing agreement on that roboticists carry into their work specific normative

cultural meanings and practices and robots are ‘culturally situated artifacts’ (Šabanović 2014). There have been a few examples of ethnographic research into the contemporary robotics communities and related socio-cultural aspects of robotics practice and research (Vertesi 2015; Šabanović 2014; Hasse 2019), including with the focus on ethics (Sorenson 2019). Also, a new method paradigm has been proposed, namely Integrative Social Robotics (ISR), to integrate socio-cultural research and robotics (Seibt 2016). Other examples include research projects such as ROCA that investigates cultural and aesthetic perspectives of robots framed within a practice-based research format² or the very REELER project this work is part of³. Unlike previous studies however that address culture as one of the many aspects of the design and implementation of robots, this work views culture as *key* towards pursuing roboethics and responsible robotics, and ultimately integrating robots into our society.

2.1 Engineering technical orientation

As discussed above, the interest in culture and ethics in robotics research has been only limited or instrumental. To a large extent this is due to the nature of the engineering culture. In general, engineers’ professional culture has been strongly technically oriented (Hanns *et al.* 2007), including in the field of robotics and HRI. For example, robotics has been described as ‘one of the great integrating disciplines. . . [that] touches on almost every technical discipline’ (Miller & Stein 2001: 23). Also, it has been argued that HRI designers follow a specific way of seeing the world through the lens of their own technical and computational needs (Wallace 2019) (in theory, HRI is a highly interdisciplinary field, in practice however just as robotics research HRI studies are predominantly technical in scope (Bartneck 2011) and the HRI field is centred around understanding, designing, and evaluating robotic systems for use by or with humans (Goodrich & Schultz 2007)). Engineering ethos has sometimes been described as technical orientation that involves a tendency to approach things practically rather than theoretically and through the lens of a formal and narrowly-defined problem-solving approach (Forsythe 2001). To be a roboticist is to design and develop robots in the first place. Thus, everything in roboticists’ work including their values and perspectives is inseparable from the robots they build (Cheon & Su 2016). While technical orientation does not necessarily disregard the ethical and social element, the two are often mutually exclusive. For example, it has been argued that until recently, engineering ethics has often relied on the assumption that technology is separated from its social context and it is also value-free (Kroes *et al.* 2008). Others described the professional culture of engineering as ‘the culture of disengagement’, with the technical/social dualism among its main pillars (Cech 2013). Even professional codes of conduct that do apply to such domains as for example industrial sciences often remain subject to individual contractual obligations rather than be an intrinsic part of the research culture (Ziman 1998). This is because ethics to a large extent continues to be seen as a narrow discipline or specialised field that lies outside of the professional field of robotics. Part of ‘thinking like an engineer’ includes following the assumption that ‘Ethics is not a matter for majority vote but for private conscience, or, if not for private conscience, then for experts; and the experts in ethics are philosophers or clergy, not engineers’ (Davis 1991: 153). It is only recently that academic and industrial science have been increasingly shifting towards applied research that requires considering wider economic and social impact of such research, and hence, its ethical implications (Ziman 1998). The reason for pointing to specific aspects of the engineering culture here is not to raise

² ROCA project: Robot Culture and Aesthetics (www.kunstogkulturvidenskab.ku.dk/roca/)

³ REELER project: Responsible Ethical Learning with Robotics (www.reeler.eu)

concerns about the insufficient importance of ethics in engineering but to emphasise that the way roboticists approach ethics is inherently embedded in the specific professional culture they are part of. This opens the door for pursuing responsible robotics in terms of culture and cultural change.

2.2 Robots in Society

As discussed above, the role of and approach towards ethics in robotics is deeply rooted in a specific engineering culture that applies to robotics communities. Thus, any change towards the culture of responsible robotics implies a change within the roboticists' cultures. At the same time, the REELER research has shown that the very introduction of robots into our society and the social acceptance of robots can also be perceived in terms of a cultural change. This is because robotics technologies, particularly social robots, intervene in the entire human 'world' that we constitute with our socio-cultural interactions (Seibt 2016) and bring as much technological as economic, societal and cultural changes. Also, the very robots are material embodiments of 'cultural imaginaries' where our future visions concern not only robots but also human societies where (social) robots will be introduced (Šabanović *et al.* 2014). It is interesting to note that on the one hand, there has been a growing debate on culture and cultural change in implementing and integrating robots into our societies; On the other hand, as discussed above, the similar topics have received only limited or instrumental interest in robot design and roboethics, particularly if pursued from the engineering perspective.

In general, the introduction of robots into different sectors and human everyday life environments raises serious social and ethical concerns. This is particularly true for the robots that are currently available in the market as they have a real and immediate impact on people's lives, especially on their professional life. Given the actual or perceived threat that different robots may constitute for people's jobs and their competences, as well as the novelty and hence uncertainty that comes with robotic technologies, the acceptance of robots in society is not given. While there may be a variety of reasons for hesitating to approve of the robotics innovation, based on the findings of the REELER fieldwork, this paper points to the cultural factors in the first place. First of all, some of the REELER interlocutors have explicitly associated people's attitudes or towards technology with their cultural background. One's attitude or 'approach' is an important factor that determines not only a level of satisfaction related to the use of new tools such as robots but also whether a given person will be willing to start using robots at all. As discussed by an ex-maintenance operator, one needs to be 'culturally ready' to embrace the introduction of robots (see Quotes Q1 and Q3). Such findings are consistent with the results of several other studies that point to 'cultural change' as the main hurdle to overcome when introducing AI and robotics to the social care sector (Consilium Research & Consultancy 2018) or for example as a key requirement for the successful use of robotics and autonomous systems in the water industry (Caffoor 2019). It is also important to note that to be a cultural challenge, it does not necessarily imply being an ethical challenge (see Q2).

Certainly, there will be someone who does not like the robot and prefers to have it in the garage.

Why?

Because maybe culturally he is not ready for this thing.

[Q1: Damiano, diagnostics expert and ex-operator, robot maker/affected stakeholder, OTTO]

I think, there's no ethical problems related to the robot, I think that's the approach the people have with robots, it's a very big change, there is a very big change during these years approaching robots and all the solution that involves robots. . . The approach is not "I work with a robot", but the approach is "the robot wants to steal my work, wants to work against me, the robot doesn't help me". So that's why I think the approach is the main theme, thinking about robot and the ethics about robot.

[Q2: Luciano, software engineer, robot developer, OTTO]

Here it depends on many factors that can be culture and on a cultural level. So, the ability with which people relate to variables that are external. If you start thinking that the robot takes your job away, it's an approach.

[Q3: Damiano, diagnostics expert and ex-operator, robot maker/affected stakeholder, OTTO]

Part of the resistance towards employing robotics technologies is due to an effort needed to learn how to use new tools and related procedural or other changes. This is because the change that comes with the introduction of robots goes far beyond simply learning to use new interfaces and execute new tasks. Robotisation implies bringing the entire 'solutions' rather than single robotic systems.

when you're selling a robotic application or system, you're selling a solution to a customer because the way they operate is going to be different, the way they plan will be different, the way they control their environment will be different and the way their people interact within the facility will be different. So, when you're selling to a customer for automation, you're selling a solution and you're selling something that will cut across the whole organisation rather than just putting a truck in for a specific task.

[Q4: Danny, sales manager, affected stakeholder, WAREHOUSE]

Given a large scope of the robotic innovations, in order to successfully introduce robots into society it may require not only training and educating direct end-users in how to use robotic systems but also changing their entire approach, i.e. 'mindset' towards new technologies and the related novelty such technologies bring into the private, professional and public domain. This applies as much to robot operators as persons who are not involved in direct interaction with robots (see Q7) and requires providing a bigger picture for why to actually introduce robotic systems into one's work or home environment. The relevance of one's mindset in embracing robotic innovations is also due to robots being not only systems or solutions but also 'technologies' that permeate human lives in their totality: As early as in the 1960s it has been observed that 'Technique has progressively mastered *all* the elements of civilization' (Ellul 1964: 127), and the contemporary imaginary about robots too implies that 'The machines promise to change virtually every aspect of human life, from health care to transportation to work'⁴.

In very traditional places [operators] say "Until yesterday it worked like that, I continue to use the method that I know well. Who will make me change procedure, use this robot?" etc.

[Q5: Bart, business unit manager, robot maker, OTTO]

⁴ Retrieved from <https://www.wired.com/story/wired-guide-to-robots/> (October the 25th, 2019)

It's been changing because not only our company, but also other companies are developing so many robots, many automatic robots that can help people, and also there are younger people in our company, in public companies, in the railway management – also the mind, the approach of these guys is a little bit [more] open. More open than the other people, than the oldest people.

[Q6: Luciano, software engineer, robot developer, OTTO]

It's a different mindset and skillset for managers with robotics in the sense that they're used to managing people. It's very different managing a robot because they require less management and more control around kind of task management. So, it's a very different style of management to probably what a lot of managers experience today. But it also eradicates a lot of issues associated with managing people.

[Q7: Danny, sales manager, affected stakeholder, WAREHOUSE]

As discussed in some studies, changing the mindset of robot end-users, and hence their perception of robots may require as much providing them with the relevant information as engaging them in a dialogue (Johansson-Pajala *et al.* 2019). Also, an improved understanding of the robotic systems and the potential benefits robots may bring beyond the single occupations or tasks often comes with hands-on-experience. The latter is the opportunity that needs to be actually given to end-users by the persons who are in charge of implementing robotic technologies to a given environment (see Q8).

Why do you think robots wouldn't be useful [at your work]?

Well, I can't say. I can't say because we haven't had one, so if we had one I could probably give you a better opinion on it.

But if you could, would you try one or not really?

It's down to the boss really, but yeah, I would try.

[Q8: Sean, warehouse worker, affected stakeholder, WAREHOUSE]

If we look at the implementation of robotics technologies from the perspective of cultural factors then it comes as no surprise that some interlocutors pointed to the differences in workers' attitudes towards robotics technologies that may vary between the countries and industries robots are being brought to.

Are workers generally happy to use robots or are they need time to get used to or to accept them?

I think, in my experience it's different in different countries. If you go to Germany, they're very happy to accept technology because they're very engineering-led as a nation. If you go to France, they can be quite resistant to it because they can – a lot of industries can be quite militant. . . So, it depends where you are in the country and it depends what industry you're working within.

[Q09: Danny, sales manager, affected stakeholder, WAREHOUSE]

In line with the approach that emphasises the role of an adequate mindset in accepting robotic technologies, some interlocutors also discussed the need of providing 'cultural education' regarding robots. Such an approach brings us directly to the pursuit of cultural change that may be actually actively fostered and acted upon.

when I said training users, educating people, I am talking about cultural education, ok? How they can be comfortable interacting with it?

[Q10: Ali, robotic start-up CEO & Founder, robot developer, WAREHOUSE]

there's normally some cultural change and some communications that are given to operators to allow them to understand how the technology works and – and what to do in the event of different scenarios. So, people need to have their awareness raised of how the technology is going to operate around them. And once they see it and they experience it then they start to understand it better.

What do you mean by cultural change?

I guess in some environments people get very used to people and when robotic technology is implemented, it's a different type of mindset and a different type of culture that's required to get the best efficiency out of the technology that you can get.

[Q11: Danny, sales manager, affected stakeholder, WAREHOUSE]

Last but not least, some of the REELER interlocutors explicitly associated the question of robotisation and related changes with ethics. It has been pointed out that the adequate training and understanding of the purpose of how robots work is of crucial importance not only for the successful implementation of robotics technologies and acceptance of robots but also for the assignment of (ethical) responsibility for the robot use and performance. In other words, responsibility can be extended to include the persons or entities who do not directly interact with robots but for example manage the process of robotisation or simply benefit from the use of robots. Such a holistic approach towards robotisation and related ethical responsibility well-corresponds to the notion of 'culture' understood as a shared construct and shared meaning system, i.e. an inherently collective phenomenon (Fischer 2009) that in the case of responsible robotics involves both robot developers and robot end-users /affected stakeholders.

And whose responsibility it is then if anything happens?

. . .the general answer that I would be that whoever works most closely with the robot, has control over the robot, is able to update or stop the robot, has an understanding of what the robot can and can't do, like the more boxes you tick in this kind of list of criteria, the more the responsibility kind of attaches to you. The problem being that sometimes these different kinds of questions, who is able to update or stop the robot? Who has an understanding how it works? Who can control it, you its function, etc.? That may be different people, so it may be that rather than having one person who's responsible, it might be the organisation that they're all part of.

[Q12: Nils, university lecturer, affected stakeholder, WAREHOUSE]

Responsible is the one who benefits from this type of systems [robots].

[Q13: Damiano, diagnostics expert and ex-operator, robot maker/affected stakeholder, OTTO]

3.0 Discussion

Whether we agree or not with the assessments regarding a degree of ethical considerations undertaken in science and engineering, it is important to emphasise that ethics and culture characterising a given community are closely related. Ethics can be defined as 'the enquiry into what

is valuable' or 'into what is really important' (Wittgenstein 1965). As already mentioned, the notion of culture also refers to values as one of its constitutive elements. For example, culture in science and engineering has been sometimes defined in terms of 'unwritten codes governing behaviour, language, styles of interactions, modes of dress, hierarchies of values, and practices' (Schiebinger 2008: 10). Some scholars described 'no ethics principle' as an integral part of *a complex cultural form* [emphasis added] (Ziman 1998) while discussing the insufficient engagement with ethics among academic scientists (ethics understood as consideration of 'human issues' which according to Ziman seems to be incompatible with the scientific pursuit of maximum objectivity). If we agree that culture is embedded in the 'communities' unspoken rules' (Schiebinger 2008: 10) and 'the system of ideals and values that dominate the culture and so tend to control the type of behaviour of its members [ethos]' (Bauman 1998: 131), then it comes as no surprise that there is no simple or straightforward way to plan, manage and carry out a cultural change – the entire realm of human socio-cultural interactions has sometimes been described as 'the most complex type of reality we are currently familiar with' (Seibt 2016: 34). In other words, '[c]ultural change cannot be legislated' (Schiebinger 2008: 13), just as ethical practice in RRI must be derived from learnt values and culture rather than legislated for or regulated (McBridge & Stahl 2014). At the same time, when addressing different ethical challenges related to new technologies, a few attempts have already been made to propose development of new cultures that would help embracing such challenges. For example, as stated in the ethical guidelines for the autonomous and intelligent systems, we should change the existing culture in the engineering and manufacturing processes, i.e. 'create value-based ethical culture and practices for the development and deployment of products based on autonomous and intelligent systems (A/IS)' (EAD 2018: 60). Ethical corporate culture should also be cultivated in the A/IS domain (EAD 2018). Other examples include calls for development of the 'culture of safety and moral responsibility' in robots and robotics (Crnkovic & Çürüklü 2012). Given the potential of AI and robotics technologies not only to reflect but also actively shape and challenge the existing societal and cultural norms and values (EAD 2018) as well as the possibility to use robots to actually construct cultures (Coeckelbergh 2014), the study and development of new cultural paradigms in this context is a valid approach. Responsible robotics as such has sometimes been described in terms of cultural change: As discussed by one of the founders of the Foundation for Responsible Robotics, the goal of the Foundation is to 'shape a culture of responsible development of AI and robotics to promote public good and a better life for us and generations to come'⁵. The question is what it means to create the culture of responsible robotics in practice and foster a necessary cultural change.

For the purposes of this work, it is important to emphasise that ethics is always about humans. In Sullins's words, 'Since robots are designed to interact with humans, robotics applications always have ethical implications' (Sullins 2015). Thus, ethical robot design is fundamentally human-centred design. It is important to note that when developing robotic technologies, there is a tendency to address human beings as a homogenous group, i.e. humans as a whole. For example, some works on the AI and robotics technologies have explicitly addressed global 'human culture' (EAD 2018: 83) (while at the same time also addressing 'cultural diversity') and different ethical guidelines for robotics and AI repeatedly refer to 'humanity'. This also includes defining humans in opposition to robots: 'in the West humans are defined by what they are not. They are not-gods, not-animals, not-"Zombies," and indeed

⁵ Retrieved from <https://robovalley.com/activities/news/frr-and-deloitte-announce-certified-quality-mark-ai-and-robotics/> (October the 14th, 2019)

not-robots. In this way, robots and (some) other technologies provide a “via negative” that helps us to define ourselves as humans’ (Coeckelbergh 2014: 64). And also, ‘[t]he similarities and the differences tell humans much about who and what they are. As AMAs [Artificial Moral Agents] become more sophisticated, they will come to play a corresponding role as they reflect humans’ values. For humanity’s understanding of ethics, there can be no more important development’ (Wallach & Allen 2009: 217). Thus, robotics technologies and the way we interact with machines and autonomous systems may significantly alter the existing societal and cultural norms and values (EAD 2018). This is because culture is ‘not a set of patterns to be copied, but is in continuous development, and involves questions of ethical and social choice between multiple alternative futures’ (Šabanović *et al.* 2014).

As mentioned above, in principle, ethical practice is derived from learnt values and culture rather than only legislation (McBridge & Stahl 2014). This also applies to RRI (and hence, responsible robotics) as RRI principles and concepts should be embedded in practice (McBridge & Stahl 2014). Depending on the approach, the notion of culture and ethics can also be understood in terms of practices. It has been argued that ‘Culture reflects the moral values and ethical norms governing how people should behave and interact with others’ (EAD 2018: 167) and ethics is about ‘doing what is right’ (Thimbleby 2008). This is why we propose here that the change towards culture of responsible robotics can be achieved through developing frameworks for ‘lived ethics’. To speak of lived ethics is to point to ‘the mutual shaping of ideas and real life’ which implies that moral systems should not merely be applied to specific situations but rather ‘applicable to and livable in them’ (Peterson 2001: 4-5). While the concept of ‘lived ethics’ shares similarities with ‘applied ethics’, it also goes beyond a mere application of given ethical frameworks as it implies ‘a particular (and perhaps distinctively human. . .) way of *being* in relationships, in the world’ (Peterson 2001: 25). In order to grasp the ‘lived’ and practical character of ethics, we propose here to combine the notion of ‘lived ethics’ with ‘culture’ where culture is understood ‘*as a whole* and as a way of life’ (Billington *et al.* 1991: 9). The latter implies that just as ethics, culture is ‘lived’ and embedded in society and the two are interconnected. On the one hand, culture can be studied in terms of its ‘ethos’, i.e. “the total quality’ of culture’ (Bauman 1998: 131); On the other hand, researching lived ethics involves addressing human lives as a whole: ‘[lived ethics] suggests an approach to ethics that attends to the moral assumptions, principles, and ideals that shape, implicitly or (perhaps less often) explicitly, the way individuals and groups make decisions, set and pursue goals – in short, live their lives’ (Peterson 2001: 4). This is how the notion of culture and ‘lived ethics’ may be highly instrumental in shaping our thinking and practices towards the development of the culture of responsible robotics.

4.0 Conclusions

Perhaps more than any other field of technological advancements, robotics research concerns ‘projections in the future’ (Dautenhahn 2013) and ‘future visions’ that concern as much robotic technologies as societies that will be part of them (Šabanović *et al.* 2014). The concept of culture also refers to our conceptions for who we are and who want to be, i.e. ‘beliefs and values people have about societies, social change and the ideal society they seek’ (Billington 1991: 1). In order to pursue the culture of responsible robotics we need to actively engage with ethics as roboticists and robot end-users/affected stakeholders at both an individual and collective level. Such an engagement should come through the totality of our thinking and practices, where robotic technologies are only a catalyst towards the creation of the entire ‘brave new world’.

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