Expert Considerations for the Regulation of Assistive Robotics.[1] A European Robotics Forum Echo

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Consideraciones expertas para la regulación de la robótica asistencial. Eco de un Foro Europeo de Robótica

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Abstract: Robots and AI technologies are increasingly deployed in contexts ranging from factories, hospitals or personal homes. These technological developments may raise different types of issues, varying from the invasion of privacy, to autonomy suppression or human-human interaction decrease. Engagement with these issues is crucial to adequately guide the design of these robots with incentives and regulation. Two European projects - the Inclusive Robotics for a Better Society (INBOTS) project (G.A. No. 780073) through its WP2 on ELSE aspects, and the COST Action 16116 (CA16116) on Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions, which has a dedicated working group (WG) on ELS issues - joined forces and organized two workshops in the INBOTS Conference 2019 during the European Robotics Forum 2019, where they gathered different experts in the field of human-robot interaction to discuss these topics. This article summarizes the main findings of such international effort, including the call for a European regulation to improve legal certainty and steer the development of assistive robots in the appropriate direction.

Resumen: Los robots y las tecnologías de inteligencia artificial se utilizan cada vez más en contacto con los humanos, ya sea en fábricas, hospitales u hogares. Estos desarrollos tecnológicos pueden plantear diferentes tipos de problemas, desde la invasión de la privacidad hasta la supresión de la autonomía o la disminución de la interacción entre humanos. Comprometerse en abordar estos problemas es crucial para orientar adecuadamente el diseño de estos robots con incentivos y regulación. Dos proyectos europeos: el proyecto de Robótica Inclusiva para una Mejor Sociedad (Inclusive Robotics for a Better Society, INBOTS), a través de su Paquete de Trabajo 2 sobre aspectos éticos, jurídicos y socio-económicos, y la Acción 16116 de COST (CA16116) sobre Robots vestibles para aumento, asistencia o sustitución de funciones motoras humanas (Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions), que cuenta con un grupo de trabajo dedicado a las cuestiones de ética, legales y sociales unieron fuerzas y organizaron dos talleres en la Conferencia INBOTS 2019 durante el Foro Europeo de Robótica (European Robotics Forum) 2019. Allí se reunieron diferentes expertos en el campo de la interacción humano-robot para discutir sobre estos temas. Este artículo resume los principales hallazgos de dicho esfuerzo internacional, incluida la necesidad de una legislación europea para mejorar la seguridad jurídica y procurar el desarrollo de robots de asistencia en la dirección adecuada.

Keywords: Ethics, Corporate Social Responsibility, Responsible Research and Innovation, Sustainability, Inclusive robotics, Wearable robots, Public policies, Work, Innovation, Regulation, Taxation, Incentives, Education

Palabras clave: Ética, Responsabilidad Social Empresarial, Investigación e Innovación Responsables, Sostenibilidad, Robótica inclusiva, Robots vestibles, Políticas públicas, Trabajo, Innovación, Regulación, Fiscalidad, Incentivos, Educación

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1. Introduction

In light of broader societal awareness of the potential impacts of robotics on different aspects of our social lives, researchers are increasingly exploring the ethical, legal, social and economic (ELSE) issues associated with robotics. Self-driving cars arise questions concerning who iss responsible in case of an accident and whether we should establish an insurance scheme for robot technology. Care robots challenge a great variety of aspects from the adequacy of the processing of personal data to personalize a care robot, to dignity questions, mainly whether robots are a tool that can deliver good care or, on the contrary, will enlarge the existing distance between caregivers and care-receivers.

Engagement with ELS issues is crucial guidance and regulation for the appropriate design of these robots. The EU has recognized the importance of this subject through their funding of different research projects that allocate resources to the study of these. Two recent projects are the Inclusive Robotics for a Better Society (INBOTS) project[4], that

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has an ELSE pillar and that includes partners with a background on socio-economic and legal science, which have been actively participating in current discussions about robotics and about responsible research and innovation actions; and the COST Action 16116 (CA16116) on Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions, which has a dedicated working group (WG) on ELS issues (European Cooperation in Science and Technology and the framework program Horizon 2020). The CA16116 ELS WG aims to develop a comprehensive understanding of ELS issues in Wearable Robotics, identifying relevant values and ethical, philosophical, legal and social concerns related to the design, deployment and practical use of wearable robots.

The ELS WG from both projects gathered together in Madrid in February 2019 to explore potential synergies between both projects.[5] After fruitful discussions, both projects agreed on the need to formalize collaboration. One of the outputs of such collaboration materialized in the organization of two workshops at the INBOTS Conference 2019[6], within the European Robotics Forum held in Romania the following month, in March 2019.[7] The first workshop was on Ethics and Corporate Social Responsibility for Inclusive Robotics and the second workshop was on Sustainable Policies for Innovation and the Future of Work.

This short paper summarizes the goal of each workshop, their structure and the main findings of the sessions. The results of the debates will also be included in a Preliminary Report and later on a White paper on the Regulation of Interactive Robotics in the European Union, to be delivered by the INBOTS project. These results inform the work of the COST Action, that will also provide a deliverable.

2. Workshop on Ethics and Corporate Social Responsibility for Inclusive Robotics[8]

2.1. Framing the workshop

Robots in society can be seen as a threat to human dignity, privacy, freedom, equal access or desirable social effects – perhaps furthering marginalization through a form of the digital divide (the robotic gap). It has thus been said that robots should be "inclusive", which would contribute to their acceptance in society. However, this raises several ethical, legal and societal questions. Some European projects have made a joint effort to address this urgent topic of common interest and decided to join forces in the task of defining and giving content to the word *inclusive*.

The achievement of "inclusiveness" depends on a multitude of societal actors. This workshop explored and defined inclusiveness and related concepts from the point of view of international organizations, governments, industry, academia and civil society. Representatives from each group identified the values associated with the design and use of *inclusive* robotics. The same groups also put forward their expectations in relation to other groups.

The workshop examined the question of inclusive robotics in relation to the society as a whole and in relation to documents such as the Convention on the Rights of Persons with Disabilities (CRPD). In this respect, some participants highlighted the distinctive models from which interactive robotics can be approached, with special emphasis on the dichotomy between

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the social approach vs medical rehabilitation model of disability in relation to vulnerability, functional diversity and care.

Robotics shapes human behaviors and can lead to discrimination and even marginalization. In order to overcome these barriers and to promote the implementation of truly inclusive interactive robotics, the workshop organizers asked some questions on which principles and good practices should constitute the ethical framework for responsible robotics committed to fairness, justice and the well-being of people.

The Workshop allowed an exploration of ethical and corporate social responsibility issues regarding the design and implementation of inclusive robotics, with particular focus on the role of robot designers, industry and societal stakeholders. Overall, the workshop was brought to the fore the diversity, potential dissonances and points of conflict regarding existing definitions and expectations of inclusiveness of interactive robotics.

For the interactive part of this Workshop, we used the Me-too tool[9].

2.2. Presentations

Dr. Vincent C. Müller from the University of Leeds opened the session with a presentation on the Ethics of AI and Robotics. He argued that AI and robotics are technologies that seem to be of major importance for the development of humanity in the near future. However, these technologies have already raised fundamental questions about what we should do with these systems, what the systems themselves should do, and what risks they have in the long term. They also challenge the human view of humanity as the intelligent and dominant species on Earth. In his presentation, Müller made the distinction between those issues that arise with AI systems as objects, i.e. tools used by humans, and those issues arising from the understanding that. AI systems could potentially be autonomous subjects, i.e. when ethics is for the AI systems themselves. In particular, he focused the attention under the conditions in which an agent can be held responsible for their actions, and under which conditions an agent should be taken to have rights and obligations. He alerted that his division should not be seen as proposing two neatly distinct classes, but rather as allowing degrees between the two, depending on the autonomy of the AI system[10].

During the session, addressed also ethical issues that arise from utility of consequences, including 'risk', as well as issues that arise from a conflict with rules, virtues or values. And he finally addressed the problem of a future 'singularity' or 'superintelligence' in relation to the ethical use of AI and the ethics for AI systems.

On this matter, Prof. Dr. Amparo Grau Ruiz highlighted that he role of private companies is key to implement inclusive robotics. Their Corporate Social Responsibility Departments should pay attention to the opportunities that this new approach brings to them in order to have a positive impact on society. Some CSR tools, that have been developed for other areas (e.g. environment) can be useful to show accountability. In her understanding, one approach could be to align the robotic business model with the United Nations framework of Sustainable Development Goals.

Dr. Aníbal Monasterio (CSIC, INBOTS) alerted, however, that to deploy the full potential of these technologies, companies developing inclusive robotics should take into account the functional

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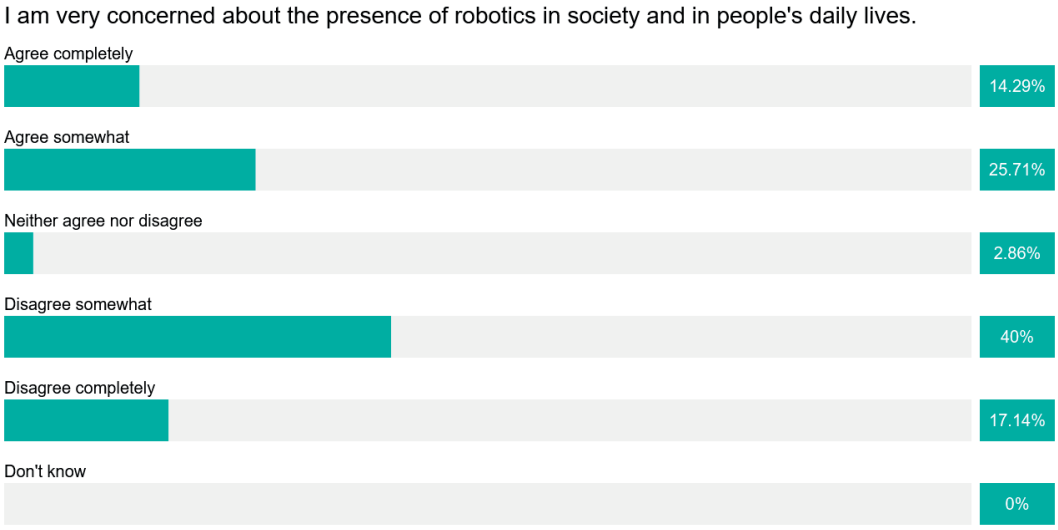
diversity of end-users and the needs of people with disabilities. For this reason, the design and construction of robots must satisfy values such as inclusiveness and difference if we really want a truly inclusive robotics for a better society. A responsible entrepreneurial view is necessary.

Moreover, Freygarður Thorsteinsson from ÖSSUR and partner at the INBOTS Project gave some remarks on the importance of following not only soft law or ethical requirements but also, and foremostly, legal requirements. According to Thorsteinsson, complying with the regulations becomes a necessity from the beginning, especially in the medical field. Although the interplay between the medical device regulation, innovation and the accommodation of ELS issues is challenging, there needs to be a responsible balance between all.

2.3. Interactive session

Dr. Eduard Fosch-Villaronga from Leiden University and the CA16116, and Dr. Heike Felzmann from NUI Galway and the CA16116 gave support to the workshop in creating an interactive session with experts in the field with the goal of identifying challenges, concerns and barriers regarding the realization of inclusive robotics, including wearable robots. The interactive session aimed at capturing the impressions of the experts in the audience and initiative a debate on how to help build a better society in the future, by asking questions previously agreed with the speakers.

The first question put to the audience was a quite general one on their concerns regarding robotics in real life and its impact on society as a whole. Most of them (40%) expressed partial disagreement with the statement proposed: "I am very concerned with the presence of robotics in society and in people's daily lives", and other disagreed completely (17,14%). Agreement was quite limited: partial (25,71%) and complete (14,29%). This shows that moderate opinions are more frequent and the degree of concern is not that much as one initially could expect. However, this result may be somehow biased, as the poll took place in a forum where robotics experts usually meet.



Question 1: Are you concerned about the presence of robotics in society?

As a follow-up question, we wanted to know whether, despite the challenges, the audience believed that society would be better with the increase of automation, robotics and AI. A vast majority (59,46%) agreed or completely or somewhat, whereas 21,62% were unsure on what to answer. The discussion on the audience revealed that, probably, these results reflected the opinion of people

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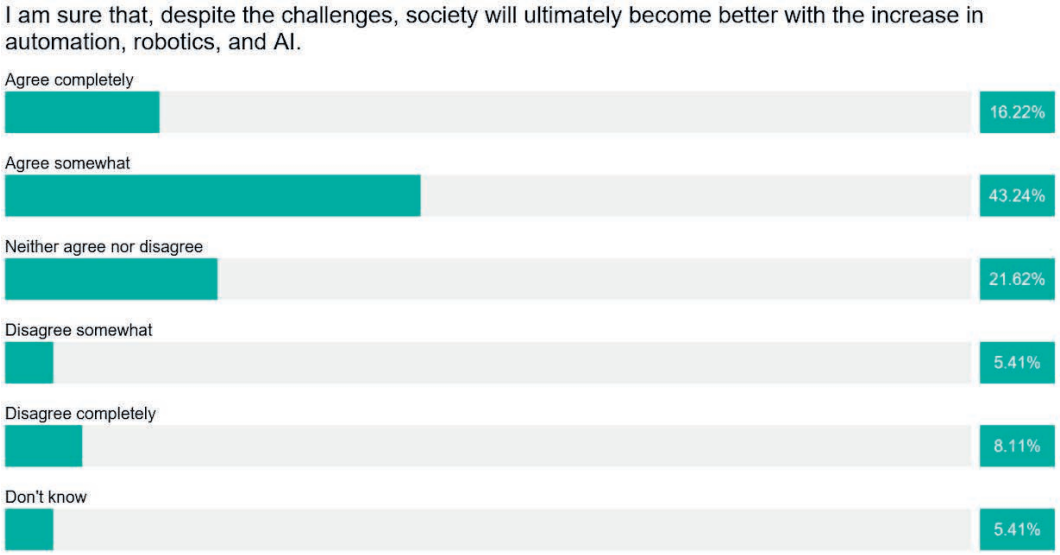
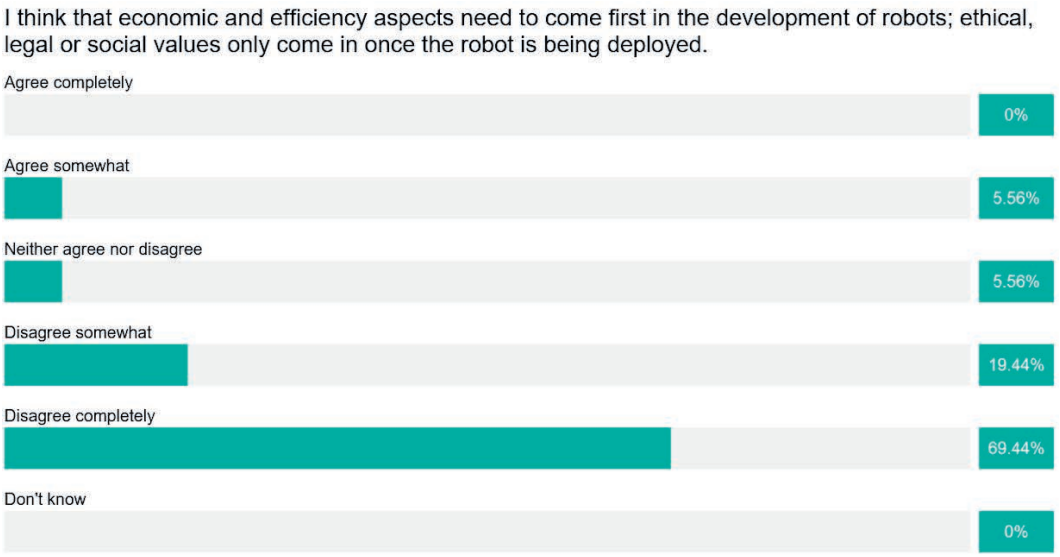
working on the field of robotics, that tend to be more positive about the potential positive impact of their field than those working in other fields. Only 8,11% of the audience did disagree completely with the statement, highlighting that robotics and AI would not make society better.



Question 2: Do you think that, despite the challenges, society will ultimately become better with the increase in automation, robotics and AI?

One of the critical questions, often raised, is the balance between different aspects while developing robots. Should economic aspects prevail over ELSE ones at a first stage? Or anticipation and combination of values along the process would be desirable? Here strong emphasis was given by the audience to the need to account for both simultaneously, either partially (19,44%) or completely (69,44 %). It makes no sense to care for ethical, legal or social values at a later stage. Nobody replied "don't know".



Question 3: Do you think that economic and efficiency aspects need to come first in the development of robots?

Robotics may challenge the privacy of the users. When it came to personal data, 40,54% of the audience completely feared that future developments in robotics and AI would challenge

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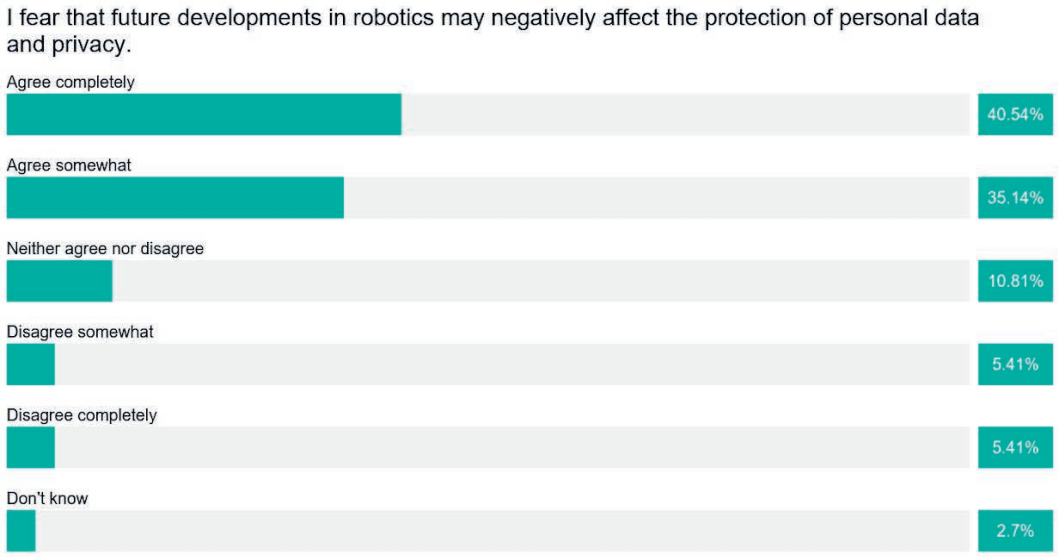
their privacy. A great number of participants also agreed somewhat, rising the total number of attendants that were afraid of robots infringing on privacy up to 75,68% (*see* below). The rest of the audience were not convinced that the robots would challenge the privacy of users.



Question 4: Do you think that future developments in robotics may negatively affect the protection of personal

Other sensitive topic is the attention to vulnerable groups. The opportunity to assess their needs when designing robots is clearly felt in the community. Most of the participants believed that too little attention was being paid to them: agree completely (29,73%) and somewhat (24,32%), whereas 18.98% disagreed somewhat with that statement.

Question 5: Do you vulnerable groups needs are taken into account in the design process of robots?

Regarding the integration of other stakeholders' views, when particularly focusing on workers, there are different opinions. The impression that their needs and perspectives are still not well considered in the design of robots is certainly worrying. 27,27% fully believe that

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too little attention is paid to them, and 21,21% agree somewhat with it. Disagreement, however reaches almost one third: partially (18,18%) and completely (12,12%).

Question 6: Do you think workers' needs are being taken into account in the design of robots?

As a solution to the problems debated, a reference to the toolkits offered by Corporate Social Responsibility initiative and more specifically to Responsible Research and Innovation was proposed to gauge the pulse of the audience. The most striking here is that "don't know" and "neither agree nor disagree" results were the higher ones, both with the same share (22,86%). This obviously shows a margin to improve CSR and RRI in the world of robotics. For the rest, agreement summed 45,71% whilst disagreement only reached 8,57%. So the opinion in general is favourable to the statement. Accordingly, robot companies should include robotics in their CSR strategies, implementing responsible standards in their research and innovation activities.

Question 7: Should robot companies pay more attention to the frameworks of Responsible Research and Innovation (RRI) and Corporate Social Responsibility?

Notwithstanding the positive attitude to demand a socially responsible behaviour to robot companies, problems arise with its realization in practice. 40,63% "don't know" and 18,75% do not

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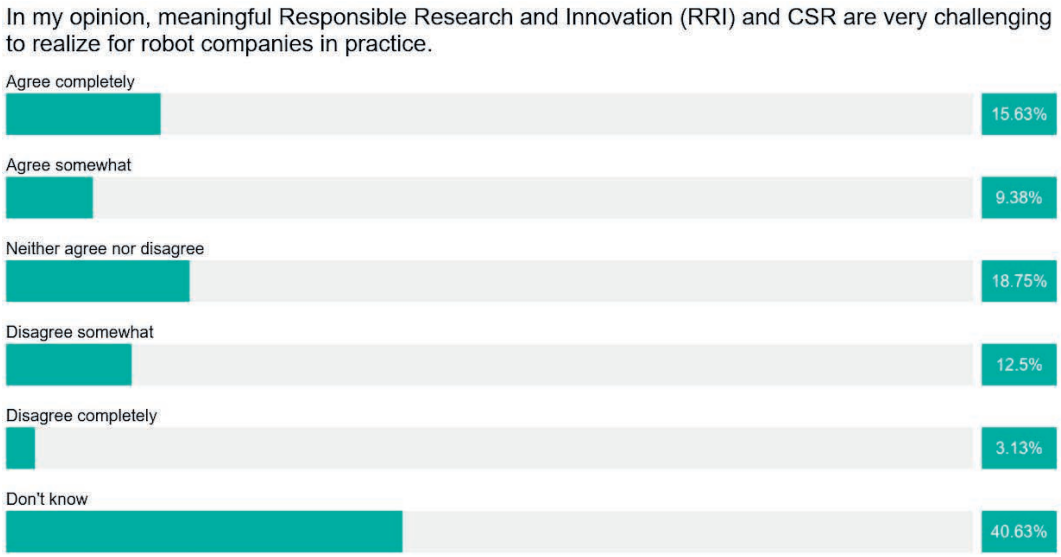
have an opinion whether RRI and CSR are challenging for these enterprises to implement. This is understandable, as the number of businessmen in the audience was scarce. Agreement reached 25,01% and disagreement 15,63% (both complete and partial). More information and support should be provided to robot companies on how to carry out meaningful RRI and CSR practices.



Question 8: Do you think Responsible Research and Innovation (RRI) and Corporate Social Responsibility is easy to realize in practice?

In the following word map, we can observe the importance given to the values that should be promoted through CSR and RRI. *Transparency, privacy* and *sustainability* were highlighted. Also *know, integrity and trust*. The role of *stakeholders* and *dignity* was significatively stressed as well as concepts not often heard, such as *calibrated* or *honesty*, but that they add to the discussion of human-centered design.

Question 9: Which values are promoted via Responsible Research and Innovation (RRI) and Corporate Social Responsibility?

In the same line of thinking, we asked the audience about the barriers that RRI and CSR should overcome in the field of robotics. A huge word appeared suddenly: *AWARENESS*. This reinforces the arguments explained before. The majority of the people in the audience was not aware of

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what RRI or CSR were, which suggests that greater effort from European institutions should be directed towards public understanding of these matters. In addition, other clarifying words are: *know/knowledge, resources, methods. Economic* and *profitability* were also highlighted. Another important aspect was identifying the lack of regulation as a barrier for RRI and CSR: it is not clear what are the requirements that need to be followed to ensure CSR or RRI.

Question 10: What are the barriers for the realization of Responsible Research and Innovation (RRI) and Corporate Social Responsibility?

In a similar direction pointed the answers to what are, then, the incentives to promote RRI and CSR. From the public side, the audience demanded *tax*-related incentives such as deductions, benefits and support. The audience also highlighted the need for clarity concerning *certification* processes, stressing the need for measurable and qualitative methods in assessing and mitigating robot-related issues. Another important aspect was *education*, the promotion of debates among different actors, and also the call for funding that could incentivize companies promote more responsible innovation strategies.

Question 11: What incentives do we need to promote Corporate Social Responsibility in robotics?

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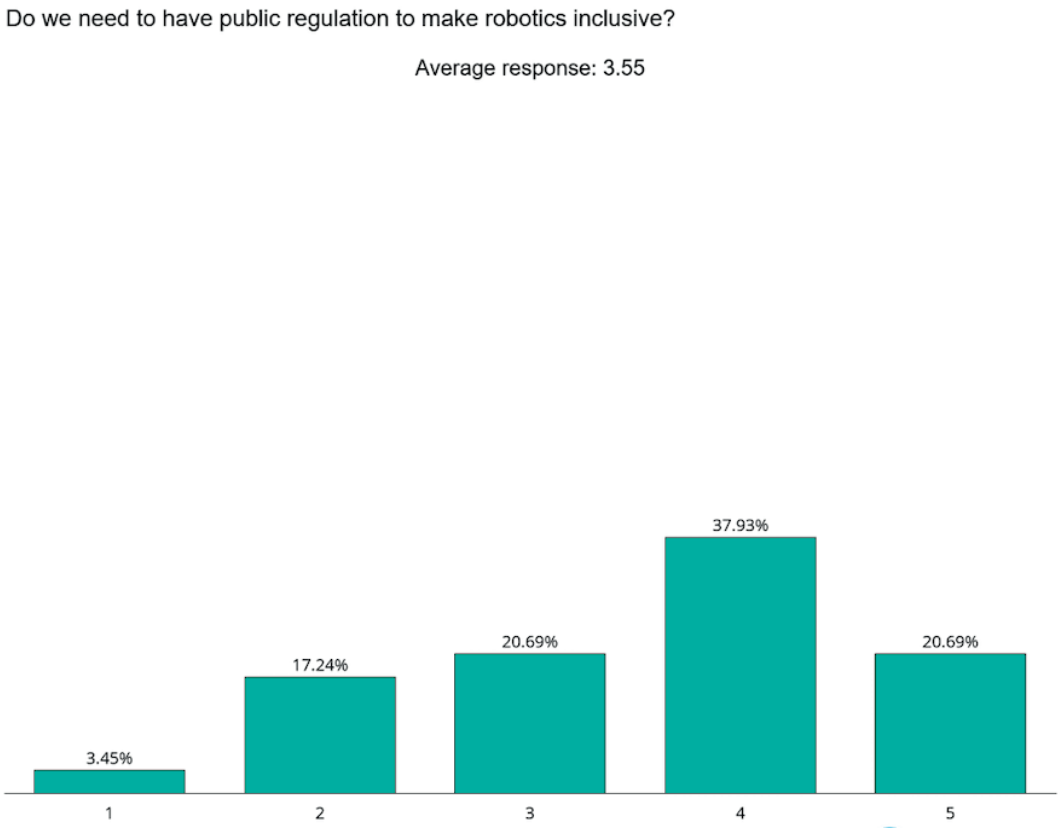
The last question of this workshop revolved around the specific question of whether we need public regulations to make robotics inclusive. Although the majority thought that it was a good idea (58,62%), the results show also some uncertainties (20,69%) as well as some skeptical results (20,69%). As per the conversations went, the audiences wondered whether other types of regulations, such as self-regulation, could be a more efficient approach towards achieving inclusiveness than public law.



Question 12: Do we need to have public regulation to make robotics inclusive?

3. Workshop on Sustainable Public Policies for Innovation and the Future of Work11

3.1. Framing the workshop

Introducing interactive robots in our society has economic and legal consequences. The High-Level Expert Group on the impact of the digital transformation on EU labor markets (2019) alerts the society to the potential positive or negative impacts of robotics in the labor market. A robotized administration, for instance, may trigger the redefinition of the legal and financial systems.

The international institutions have reluctantly admitted the use of tax benefits as a way to foster innovation through Public Finance, but stressing their proportionality. This approach could be useful, for instance, to solve the current needs recently observed for training in the digital economy transition phase not to leave anyone behind. However, there is still an ap-

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parent contradiction between the innovation policy and the uncertain future of workers that needs to be unveiled. This situation calls for sound legislation making compatible their fair protection and promoting EU companies' competitiveness, productivity and sustainability.

Under these circumstances, and at the risk of losing control over decision-making processes in the hands of autonomous processes, these decision processes will have to be clearly and explicitly defined. In this sense, mechanisms allowing stakeholder involvement, including workers, are deemed to be necessary. In this workshop, therefore, we explored how different considerations coming from robot designers, industry and societal stakeholders in relation to robots and the future of work translate into public policy, and how this process could be improved.

This workshop served as a platform to define decision-making processes for the insertion of robotics in society and in the workplace and to devise fair and transparent stakeholder involvement instruments. Experts from economics, business, law, labor market, and policy-makers shared their perspectives with the robotics community in depth in order to reach some consensus. These stakeholders lively debated about what is needed in transition times.

The workshop was divided between presentations from different experts and an interactive session moderated by the real-time audience-engagement tool Vevox.[12]

3.2. Presentations

Ronja Röttger from Utrecht University highlighted that the labor market is changing rapidly due to digitalization. Digitalization influences the nature, quality, and productivity of work. Röttger argued that European leaders face the challenge to make use of these developments to foster economic growth and employment – while at the same time ensuring decent working conditions, social protection and equal opportunities for all. In light of these ongoing changes, she explained that the European Commission convened a group of 10 High-Level Experts to discuss these challenges from their respective fields of expertise and provide out-of-the-box policy recommendations on how to address and overcome them (such as the digital skills personal learning account)[13].

Maria Luz Vega Ruiz, coordinator of the future of work initiative at the International Labor Organization (ILO), explained that, after the launch of its initiative in 2015, the ILO DG also launched a Global Commission that focused on the future of work. This Commission gathered a total of 27 experts that for more than 16 months has been discussing on the different issues related to the challenges that robot employment and digitalization bring about. In January 2019, this Commission presented a report stressing the idea of putting people and the work they do at the center of the economic and social policy and business practice.[14] According to the report, this is called the human-centered agenda for the future of work. Among the other nine recommendations, the Commission proposed to harness and manage technology in support of decent work and adopt a human in command approach to technology.

Another principle set in the ILO report on the future of work that there is the need for a universal entitlement to lifelong learning that enables people to skill, reskill and upskill. This connected with Prof. Dr. Amparo Grau Ruiz presentation. Grau Ruiz highlighted that the inclusion of robot technology in the workplace challenges the jobs of current workers. In par-

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ticular, robots challenge the re-skilling of those workers displaced by robots. In this respect, she reinforced the idea that there is the need to define a legal and economic framework to facilitate the transition period to a robot society, taking into account the changes in the training that workers should receive in order to adapt to new jobs. The best solution, she argued, would be to offer equal opportunities and to make efforts to reallocate the gains. The equality principle understood as non-discrimination calls for a search of legal actions in favor of vulnerable groups due to new forms of disability, such as the lack of technological skills. As predictions related to the risks of workers' displacement in a company may vary with the passage of time, due to the speed of the technological change and the improvements of robotics endowed with systems of artificial intelligence, a company should even consider the possibility of transferring the probable risk of displaced workers in the future to a third party.

One of the domains of application affected by the employment of robot technology is healthcare. Prof. Dr. Robin L. Pierce from Tilburg University suggested that much attention has been focused on developing sustainable policies for the regulation and governance of robotics, some with an eye toward use in the health domain. However, a techno-centric focus on governance and policies fails to adequately recognize the multiple pre-existing and longstanding normative frameworks that govern various aspects of healthcare. In her presentation, she explored the nature of intersecting normative frameworks of clinical care and robotics and made the case that sustainable policies need to acknowledge the force and motivation of existing norms and practices in healthcare and, at the same time, allocate appropriate responsibility to the multiple actors bringing robotics into the healthcare domain in order to be truly *sustainable*. To illustrate practical examples, she showed a video of a doctor using a telepresence robot to communicate that the patient was going to die. She reflected upon this fact in her talk and wondered whether certain doctors' tasks could be delegated by means of using robot technology, or, even worse, whether society is prepared to have certain decisions delegated to the machine in the medical field.

Francesco Ferro, the CEO, and co-founder, of PAL Robotics, made a presentation of how the company collaborates with public and private institutions in order to push forward robotics developments that have a positive impact in society, in multiple fields of application. According to Ferro, a relevant part of these collaborations are born through European Union frameworks such as Horizon 2020, which drive innovation in fields such as Industry 4.0, Assisted Living or AI, which do not aim to replace human workers but empower them through the use of robot technology.

3.3. Interactive session

Dr. Eduard Fosch-Villaronga from Leiden University and the CA16116, and Dr. Heike Felzmann from NUI Galway and the CA16116 gave support to the workshop in creating an interactive session with experts in the field with the goal of identifying core concerns regarding the realization of inclusive robotics, including wearable robots, to help build a better society in the future.

The questions for this session were elaborated in the meeting between INBOTS and CA16116 in February 2019. The first question that opened the interactive session was an exploratory

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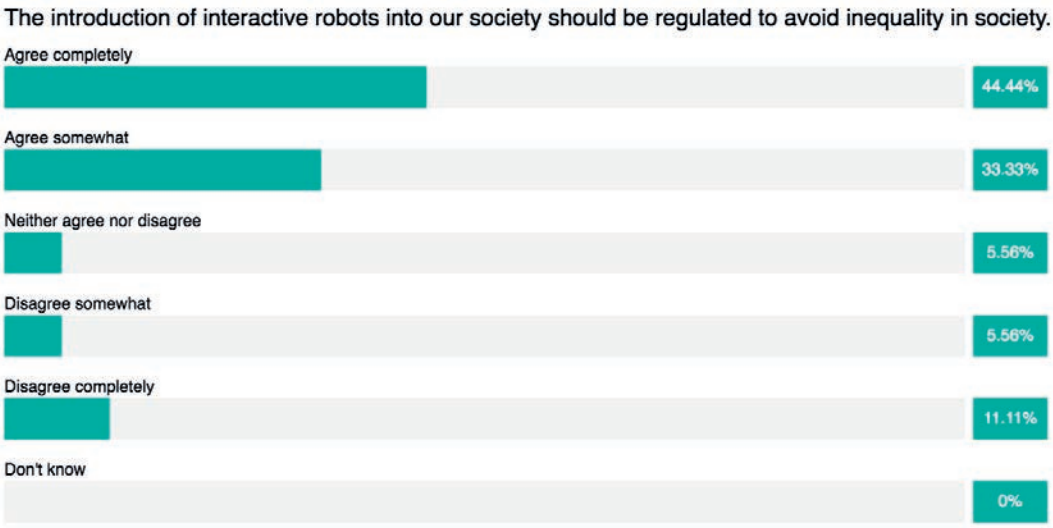
question to understand what were the impressions of the audience concerning the impact that robots had on society (*see* next figure).

Question 1: What terms come to mind when thinking about the impact of robots on society?

The answers to the question reveal a mixed feeling between excitement and fear, benefits and uncertainty, and about opportunity and challenge. Part of the audience believed that robot technology brought about unemployment but that automation could support cooperation and foster better innovation. Part of the group was concerned about whether robot technology could be considered a trojan horse and whether robots suggested a shift in control and responsibility.

The second question revolved around the understanding from the audience whether they agreed or not with the statement that interactive robots in society should be regulated to avoid inequality in society (*see* next figure).



Question 2: Do you agree with the following statement: The introduction of interactive robots into our society should be regulated to avoid inequality in society

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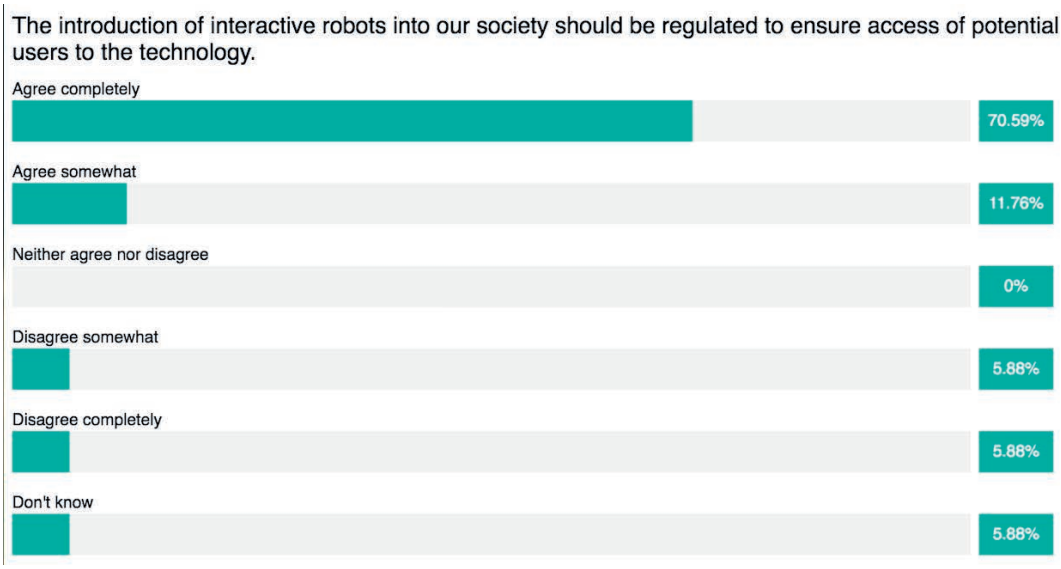
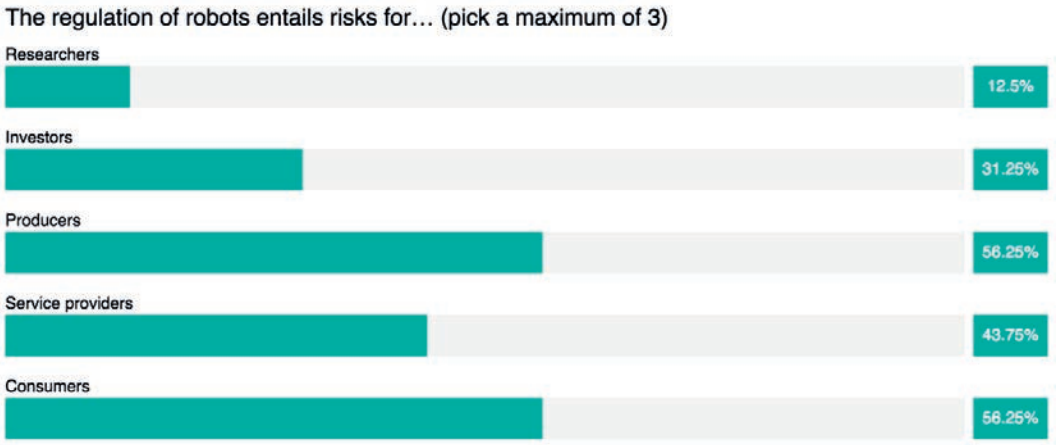
More than half of the audience (77,77%) agreed completely or somewhat to the statement. Whereas some participants did not engage in answering whether they agreed or disagreed with the statement, the rest did not agree somewhat or completely with the idea that robots need to be regulated to reduce inequalities. A similar part of the group agreed that regulation played a major role in ensuring users had access to technology (82,35%). The rest of the participants disagreed with such a statement (11,76%) (*see* next figure).



Question 3: Do you agree with the following statement: The introduction of interactive robots into our society should be regulated to ensure access of potential users to the technology

The fourth question aimed to know who, in the robot ecosystem/stakeholder equation, will be most affected negatively by the regulation of robot technology. The results show a clear divide between producers and consumers, although service providers received a lot of attention too. From all the options the audience could pick (they could pick maximum three), the regulation of robot entails fewer risks to *researchers*.



Question 4: To who entail risks the regulation of robots?

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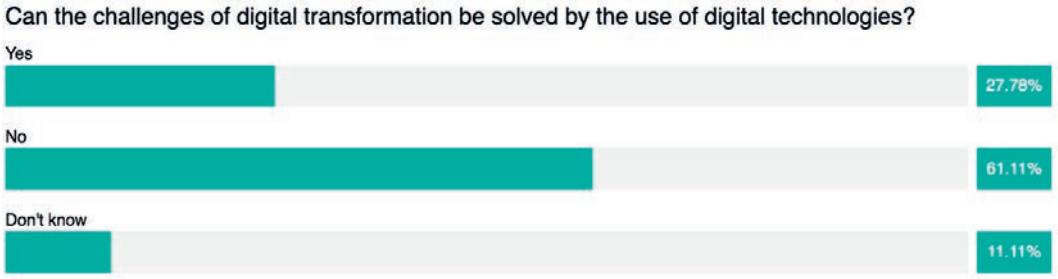
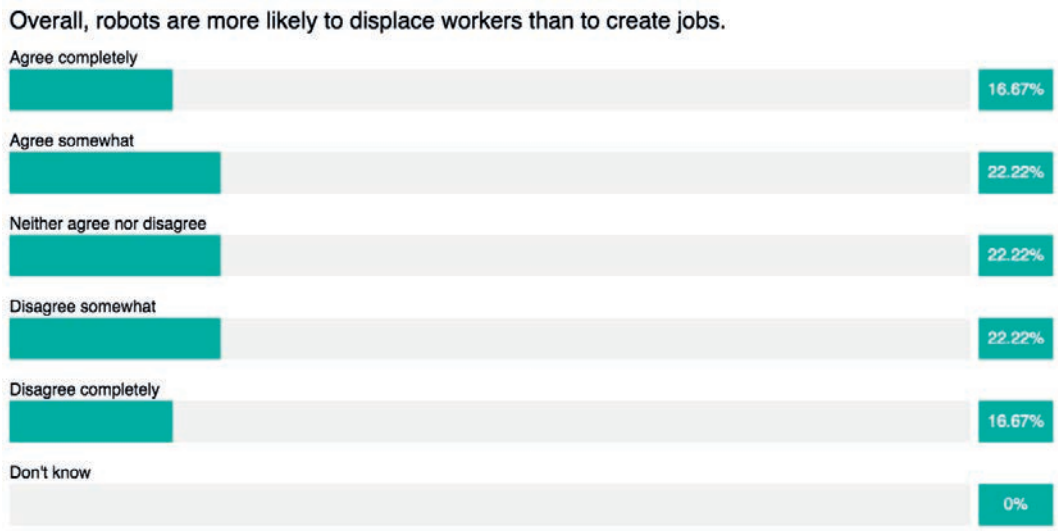
The fifth question wanted to explore whether the challenges of digital transformation could be solved by the use of digital technologies. In other words, whether the technology was the answer to technological problems. The majority of the audience (61,11%) did not consider that digital technologies could be the most suitable means to solve the problems of digital transformation.



Question 5: Can the challenges of digital transformation be solved by the use of digital technologies?

Connected to the overall theme of the workshop, the sixth question wanted to capture the impressions of the audience concerning the eternal discourse on whether robots create jobs or displace workers. The audience was divided in exact numbers between those who had a more pessimistic view of the consequences of the growing use of robot technologies in the labor market (38,89%) and those that were more positive about the future of work (38,89%). The rest (22,22%) did not take a position in the question.



Question 6: Do you think robots, overall, are more likely to displace workers than to create jobs?

In this sense, the majority of the participants agreed with the fact that if robots change the workplace, re-skilling of displaced workers should be incentivized through special tax treatment for companies (76,47%) (*see* next figure).

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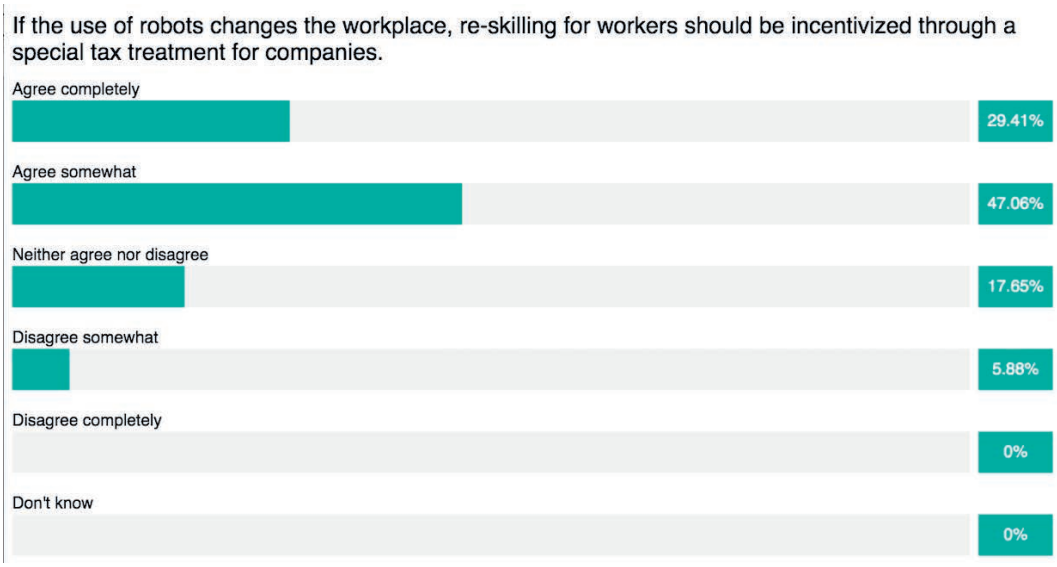
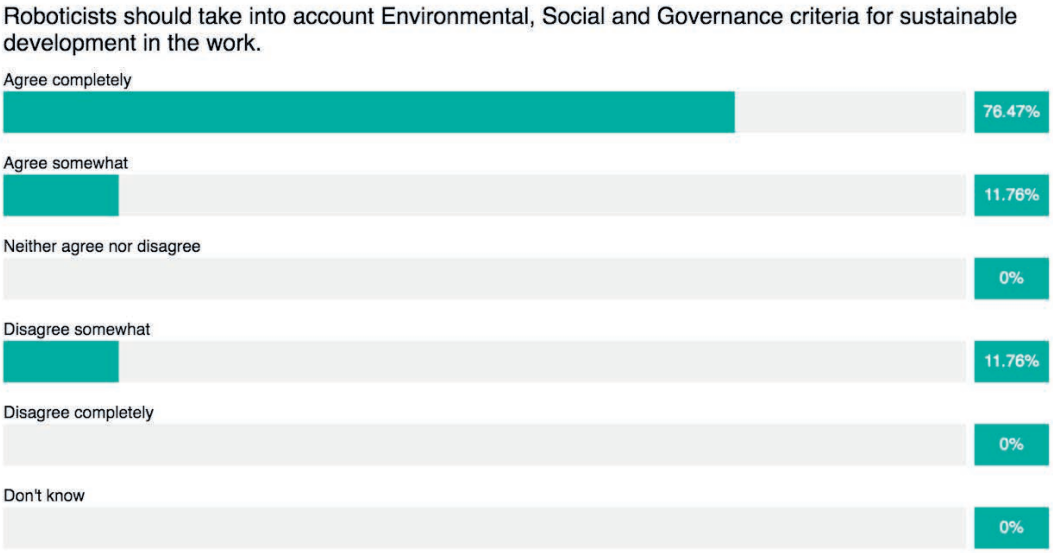


Question 7: Do you think that if robots change the workplace, re-skilling of displaced workers should be incentivized through special tax treatment for companies?

The audience also agreed in the vast majority that roboticists should take into account environmental, social and governance criteria for sustainable development of robot technologies in the workplace (88,23%). The rest (11,76%) disagree somewhat.



Question 8: Should roboticists take into account environmental, social and governance criteria for sustainable development of robot technologies in the workplace?

Then we asked the participants whether it could be useful to create an Observatory, Forum or Platform that could follow the regulatory and legislative process with regards to the deployment of robotics in society. Overall, the participants thought it was a good idea (78,95%) (*see* below).

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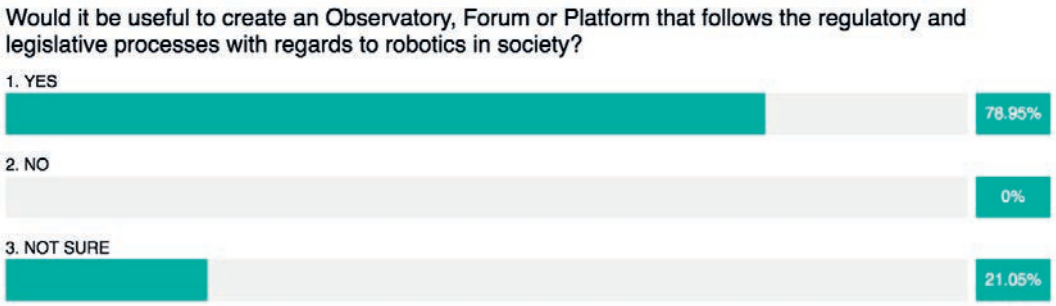
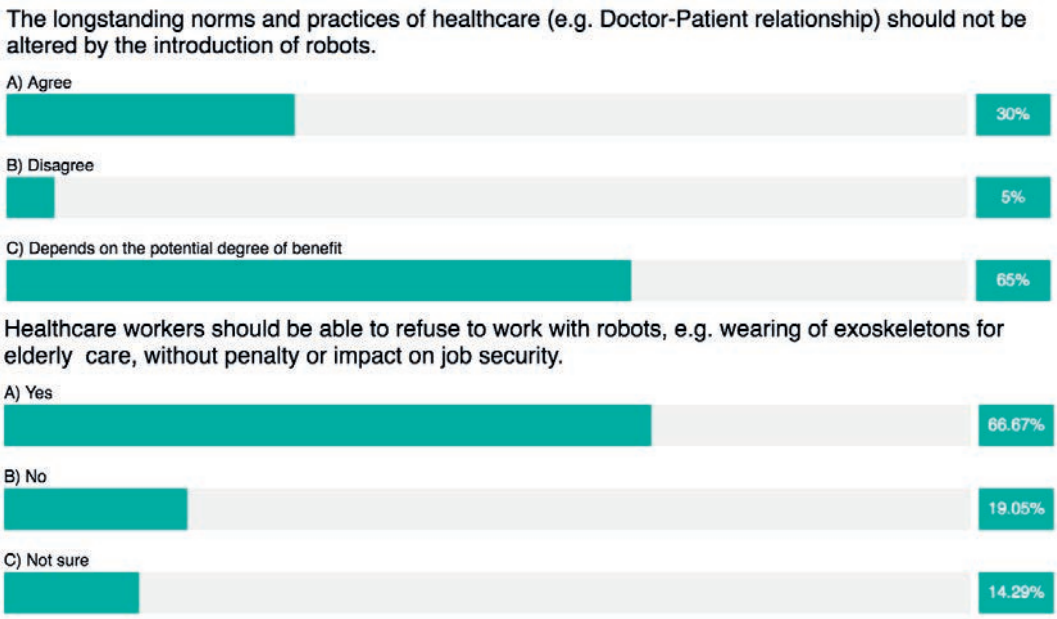


Question 9: Would it be useful to create an Observatory, Forum or Platform that could follow the regulatory and legislative process with regards to the deployment of robotics in society?

The last questions revolved around the topic of healthcare. The audience was unsure on whether the longstanding norms and practice of healthcare (e.g. doctor-patient relationship) should not be altered by the introduction of robots. 65% of the audience thought that it depended on the potential degree of benefit of robot technology, whereas 5% completely disagreed with such a statement. The majority of the audience, on the contrary, believed and agreed, that the integration of robots in the healthcare domain should depend primarily on the users/patients needs and preferences (82,35%) whereas the rest thought that it depended on the needs of the healthcare personnel. A wide majority (66,67%) also sustained that healthcare workers should be able to refuse to work with robots, e.g. wearing an exoskeleton for elderly care, without a penalty or impact on job security.



Question 10 and 11: Should the longstanding norms and practices of healthcare (e.g. doctor-patient relationship) be altered by the introduction of robots? Should healthcare workers should be able to refuse to work with robots, e.g. wearing an exoskeleton for elderly care, without a penalty or impact on job security.

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4. Conclusions

In this paper we have presented the main findings of two workshops organised at the INBOTS Conference 2019 within the European Robotics Forum 2019 held in Romania in March 2019. First, we have introduced the topic of the workshops, one relating to the Ethics and Corporate Social Responsibility for Inclusive Robotics, and another one on Sustainable Public Policies for Innovation and the Future of Work.

These workshops included a set of input presentations from experts in the field of human-robot interaction, including academics with different areas of expertise (ethics, law, cognitive science) and private companies. The workshops also consisted of an interactive session with the audience, debating several controversial issues after voting. One of the limitations of the findings is the limited sample of answers. Although some more participants attended the workshop on Ethics and CSR than the one on Sustainable Public Policies for Innovation and the Future of Work, both groups were relatively medium-sized (approximately between 30 and 40 people were in the room). The participants varied in numbers (some joined or abandoned the voting depending on their time-constraints and interests). They were from different age groups and gender mixed, although we did not take into account gender for the answers. Their background was diverse as we could check in the debate. As pointed out in the feedback round of the workshops, the audience found that the questions were formulated in a way that they were open or subject to different interpretation depending from which lenses one would approach them. This was a limitation of the collected answers.

In general, the audience agreed on the need of increasing legal certainty by means of the development of some sort of regulation, although it is uncertain what form (public or self-regulation) it should take. Probably a combination of both incentivised voluntary approaches and minimum mandatory requirements would be the best option. However, the general idea was that a regulation for robotics could establish a safeguard baseline for robotics and provide a common understanding of safety, efficiency and effectiveness needed in the uptake of inclusive robotics. In this respect, it was stressed, however, that economic and efficiency aspects should come on a second plane compared to the importance of ethical, legal or social values.

Another finding is that the majority of the participants in the workshop did not perceive the progress on robotics, automation and AI as a threat, but rather as an opportunity. In this respect, the audience was convinced that, moreover, and despite any related challenge, society would become a better society with the deployment of such devices if a responsible technological transition is implemented. In this respect, it is noteworthy that the majority of the participants were directly or indirectly related with the field of robotics, or deploying robotics or studying the field. The most evident *threat* identified in the workshop was that one of data protection and privacy: the audience that attended the workshop on ethics of CSR feared that robotics may affect negatively the protection of personal data.

To the surprise of the main organizers, the majority of the audience did not know what was RRI or CSR. This made the call for awareness evident to overcome such barrier. Other barriers have to do on the over- and under-regulation scenarios, which often come as a result of the uncertainties linked to the development of new technologies and transition period between the conception of the technology and its mass-scale deployment. Economic and tax incen-

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tives were preferred as means to face barriers to the realization of meaningful RRI and CSR but also in connection to the re-skilling of workers displaced by automation.

In the healthcare domain, there was the shared understanding that the users needs and preferences should be not only taken into account into the design of robots that they would later use, but also that this should be the case to integrate (or not) robots into such domain. In general, the audience stressed the idea that workers should be able to decide to use or not the robots provided by the employer without risk of losing their jobs as a result.

As future work, both projects INBOTS and CA16116 will continue to explore the ethical, legal and societal issues related to assistive robotics and will ask, in their networks, similar questions to understand whether the arisen points in these workshops stand or they just reflected the opinions of some experts in a precise point in time.

Acknowledgments

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Notas

1. Authors appear in alphabetical order.

2. Dr. Eduard Fosch-Villaronga is Marie Skłodowska-Curie Postdoctoral Researcher at the eLaw Center for Law and Digital Technologies at Leiden University in the Netherlands and co-leader of the Ethical, Legal and Societal aspects Working Group at the Cost Action 16116 on Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions. His contact is e.fosch.villaronga@law.leidenuniv.nl.

3. Prof. Dr. María Amparo Grau Ruiz is Full Professor at Complutense University of Madrid in Spain and leader of the Work Package 2 on the Ethical, Legal, Societal and Economic aspects of the Inclusive Robotics for a Better Society, INBOTS project. Her contact is grauruiz@ucm.es.

4. *See* http://inbots.eu.

5. *See* http://inbots.eu/inbots-cost-action-16116-on-wearable-robots/.

6. *See* http://inbotsconference2019.org.

7. *See* https://www.eu-robotics.net/robotics_forum/info/history/erf-2019-bucharest-romania.html.

8. The workshop on Ethics and Corporate Social Responsibility for Inclusive Robotics was held at the European Robotics Forum 2019 on March 20 from 14:00h to 15:30h in Room Galati. The organizers were Dr. Vincent Müller, from the University of Leeds and INBOTS, together with Dr. Heike Felzmann from NUI Galway and co-leader of the ELS WG of the CA 16116.

9. Now Vevox. *See* https://www.vevox.com/.

10. On the concept of autonomy, see Funk, M. and Coeckelbergh, M. (forthcoming 2019). "(Technical) Autonomy as Concept in Robot Ethics", J.L. Pons (Ed.), Inclusive Robotics for a Better Society. Selected papers from INBOTS Conference 2018, 16-18 October, 2018, Pisa, Italy, Springer.

11. The workshop on Sustainable Public Policies for Innovation and the Future of Work was held at the European Robotics Forum 2019 on March 21 from 10:45h to 12:15h in Room Galati. The organizers were Prof. Dr. Amparo Grau Ruiz from the Complutense University of Madrid, and leader of the ELS WP2 of the INBOTS project, together with Dr. Eduard Fosch-Villaronga from Leiden University and the co-leader from the ELS WG of the CA 16116.

12. Formerly meetoo, now vevox. *See* https://www.vevox.com/.

13. *See* the Report by the high-level expert group on the impact of the digital transformation on EU Labour Markets, Brussels, April 2019 https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=58412.

14. *See* https://www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_662410.pdf.

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