

INBOTS Project report

Concerns and expectations raised by robots: some experts' opinions to guide policymakers

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ISSN 1989-7022

Informe Proyecto INBOTS

Preocupaciones y expectativas planteadas por los robots: la opinión de algunos expertos para orientar a los responsables políticos

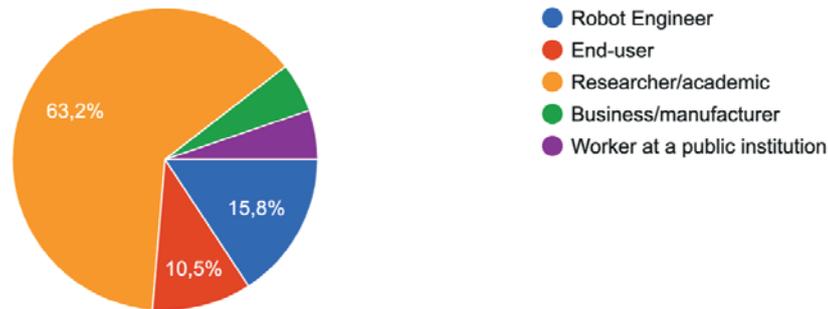
I. Introduction

The purpose of the following pages is to revisit the topic of general attitudes towards ethical, legal and socioeconomic (ELSE) issues in the public debate among robotics experts from different fields. This matter was previously addressed in *Dilemata* in 2019¹. After one year, the initial survey was further developed and opened for discussion again at the European Robotics Forum Workshop organized by the INBOTS project in Malaga in 2020². The number of responses was quite low (only around 20) due to the unexpected disruption caused by the COVID-19 pandemic, that seriously impacted on the level of attendance to the ERF Conference. Nonetheless, despite this limited sample (due to its specific focus on data of a qualitative nature) it is valuable to briefly share the results obtained with those interested in the evolution of perspectives since our first survey was launched in a couple of Workshops at ERF 2019 in Bucharest.

From a methodological point of view, it is important to note that some questions were added to the survey, particularly taking into consideration the ones generally asked by the barometers prepared by the European Parliament³ (which are directed at a broader audience), and other questions were somehow redrafted to be aligned with them.

* WP2 Leader, INBOTS project, "Inclusive robotics for a better society", This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 780073, <http://inbots.eu> The author wishes to thank Eduard Fosch, Ana Lambea and Amparo Pons for their help with the setting and launching this survey and the downloading the results and figures respectively.

The timeliness of this reflection is clear, bearing in mind that the European Commission made the original dataset of the Eurobarometer survey on public attitudes towards robots publicly available on the 9th of March, 2021. This includes a large number of responses, together with a detailed report⁴. Our main objective here is to offer some supplementary information, contributing our grain of sand and gathering opinions shared by experts in robotics. Their perspectives are shown in the following graphic.



II. Description of the results

The following paragraphs will follow the structure of the survey to better show the results obtained in each section. The first one delves into the general attitudes toward robotics. The second section is specifically dedicated to the concept of responsible research and innovation. Finally, the third one deals with social dialogue and public policies.

A. General attitudes toward robotics

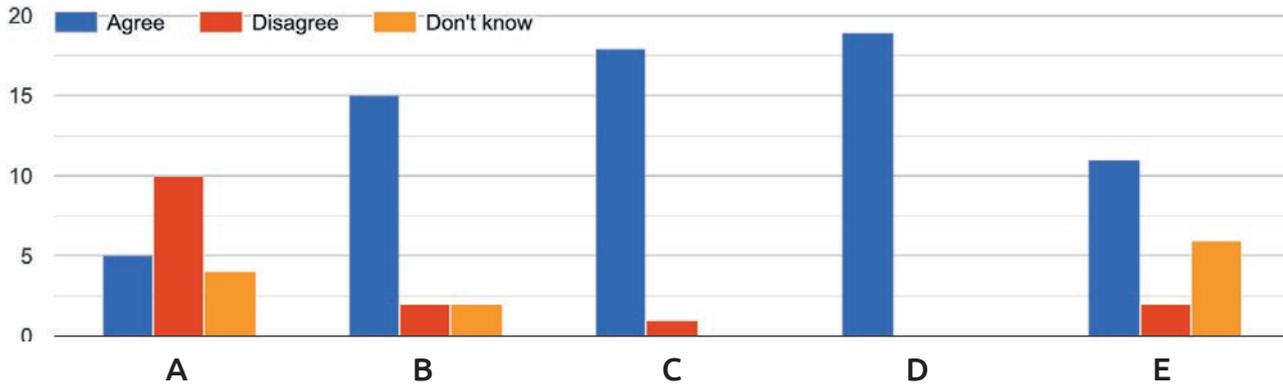
1. How could robotics improve your wellbeing?

The replies to this open question reflected that robotics must be put at the service of people. Of course, robots can improve wellbeing when used in emergency rescue situations or undertake tasks that are hazardous for humans to do. However, the most repeated answers suggest that the main improvements could be found in healthcare (e.g., diagnosing health conditions or cognitive therapy). Other responses point out to emotional companionship or to take away stress. In fact, interactive robotics can, in everyday life, support the simultaneous performance of certain tasks, increasing efficiency in our hectic lifestyles. When optimizing daily work functions in general or household tasks (e.g., grocery shopping for elderly people), they free time for humans to get involved in more creative tasks or even enjoy leisure activities (which could also involve the use of robotics). Robots improve our wellbeing by helping us perform tasks that would be too taxing on the body, by automating tasks that are repetitive or difficult to do with precision, and by making tedious tasks easier. Others believe that robots could improve our habitat and environmental sustainability. Someone added that wellbeing would improve as long as robots do not take over human jobs.

2. To what extent you agree or disagree with each of the following statements?

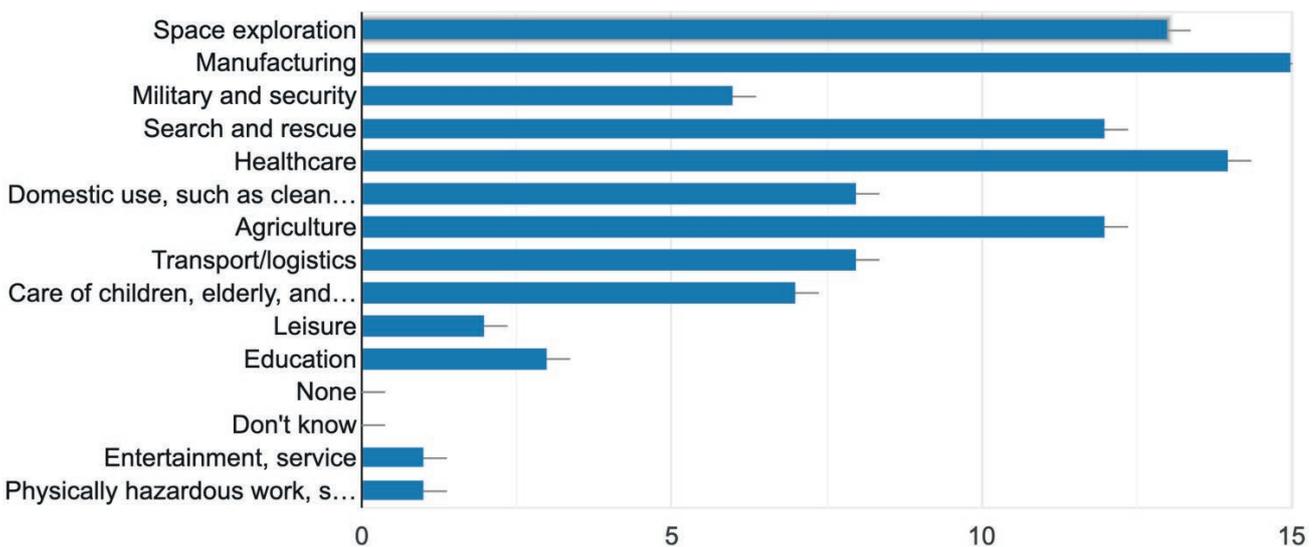
The idea of unveiling techno-optimism and/or pessimism, lead us to ask some critical questions. The first statement related to the controversy around “robots steal people’s jobs” (A).

Most answers (around 50%) show a clear disagreement. Only a minority agreed (around 25%). This positions are further reinforced by responses to the statement “widespread use of robots can boost job opportunities in the EU” (E), where there was agreement (more than 50%). The second statement was “robots are a good thing for society, because they help people” (B) and was supported by a majority (around 75%). Everyone agreed that “robots are a form technology that requires careful management” (D), and a vast majority, with minimum disagreement, agreed that “robots are necessary as they can do jobs that are too hard or too dangerous for people”(C).



3. In which areas do you think that robots should be used as a priority because it has an added value or it is more efficient?

The areas where the participants felt that there should be a priority use of robots follow the ensuing order: manufacturing, healthcare, space exploration, search and rescue, and agriculture. Domestic use, such as cleaning, and transport and logistics are followed by care of children, elderly, and the disabled. After military and security, there is room for education and leisure. Surprisingly, very few answers prioritized physically hazardous work or entertainment.



4. What is your first concern when it comes to the deployment of robotics in society?

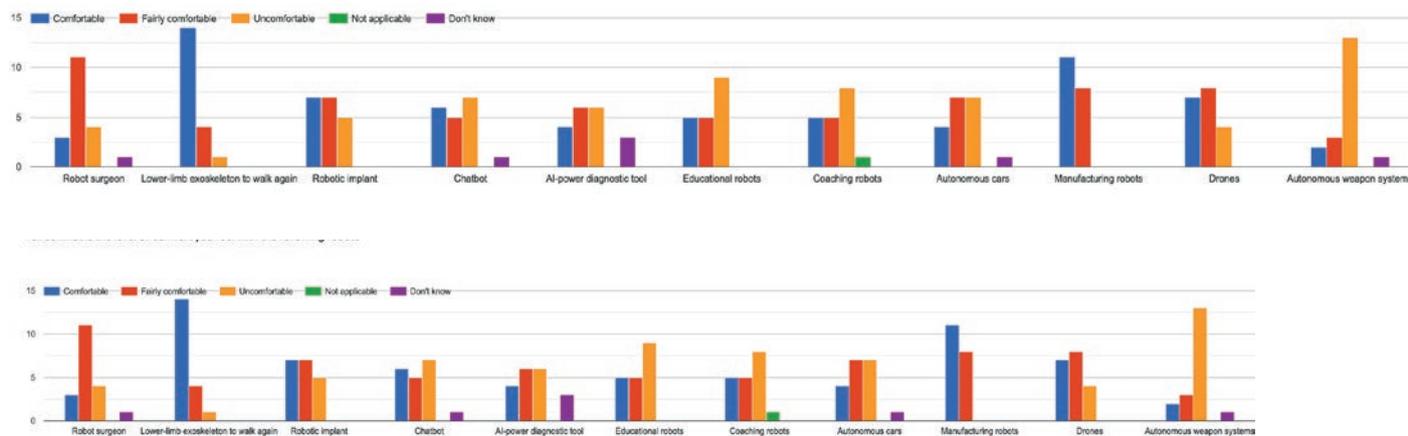
The answers to this question were quite varied. General concerns include whether the ethical aspect of robotics will be taken into account, what the individuals' expenses might amount to and whether the use of robots might become required to participate in our future society. Another issue to keep in mind is the loss of human interaction (because human is a social animal and massive use of robotics could generate a growing distance between people).

The boundaries and limitations to robots and their use is a further concern. The participants advocate for a human-centered approach (robots are here to help humans) with machine collaboration and the avoidance of bias risks. Robotics should not be deployed for the sake of deploying robotics, but rather to serve specific areas of unmet need or in specific contexts that are dangerous for humans (such as in social care, where they might be beneficial with judicious deployment of robotics in capacities that assist, rather than compete with humans).

Other line of responses highlights the problems derived from ignorance, like the irrational expectations of the public, and the required knowledge and intelligence needed for operations. In this sense, people can be harmed because they do not know enough about robots to properly work with them. Some participants in the survey care about potential manipulation and abuse. In the wrong hands, robots could cause physical and psychological damage. Together with safety, the data security is another concern. The loss of privacy and the potential for surveillance, manipulation and control also require consideration. Again, robots taking jobs away from humans, (in particular, the impact of robotization on service jobs) was a matter of contention.

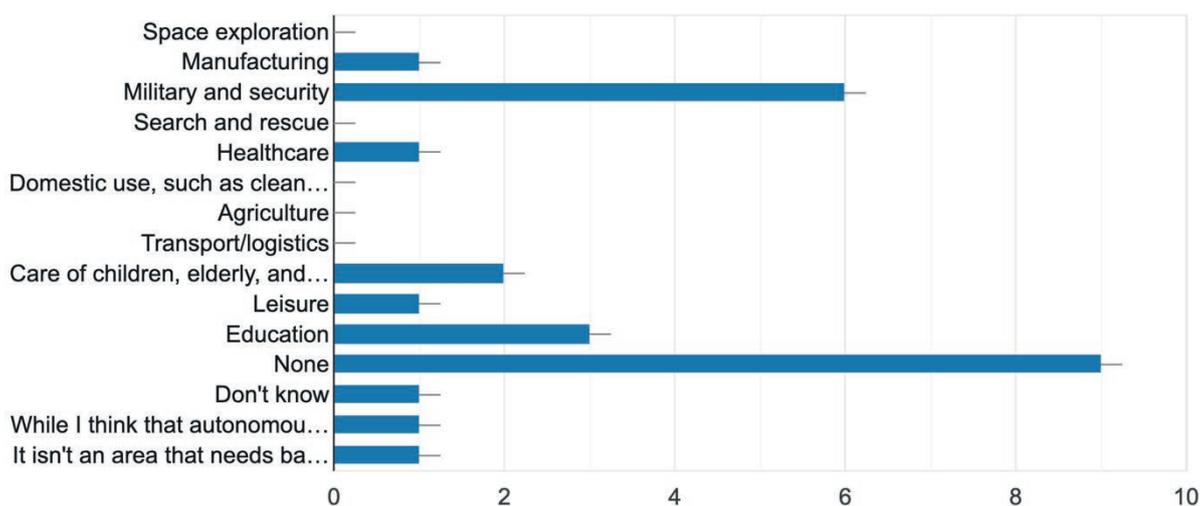
5. Tell us what is the level of comfort you feel with the following robots.

The preferences expressed regarding comfortability are the following: lower-limb exoskeleton to walk again, manufacturing, robot surgeon, and drones (fairly). Robots make participating experts uncomfortable mainly in their use as autonomous weapon systems, or within education and coaching; followed by involvement in autonomous cars and chatbots.



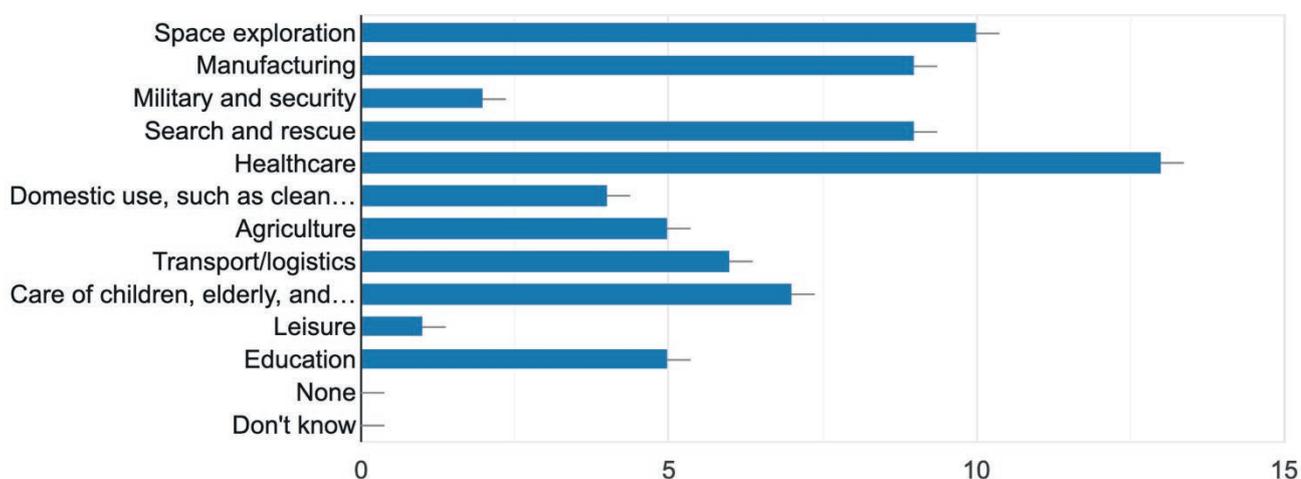
6. In which areas robots should be banned?

The results show a majority reluctant to the banning robots. The most sensitive area is military and security. Someone added that autonomous weapons (“killer robots”) should be banned, but there was some potential for more beneficial uses in military and security (e.g., mine-clearing). Therefore, they wouldn’t ban robots outright in any area. Robotics should not be banned throughout an entire area, but rather consider particular uses in all of them. Other domains where this reluctance to use robots is shown are education, and the care of children, elderly, and the disabled.



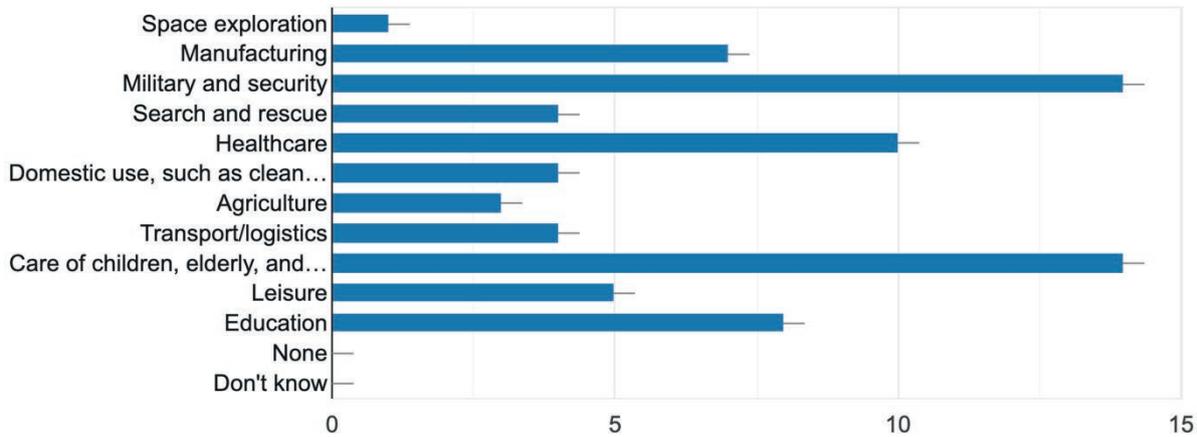
7. In which areas should robots be encouraged and stimulated (via taxation benefits or public funding)?

There is a clear support to the encouragement and stimulus of robots in the healthcare sector. Other desired fundable areas are space exploration, manufacturing, search and rescue, care of children, elderly, and the disabled. Agriculture and education are tied up in secondary, but still prevalent positions.



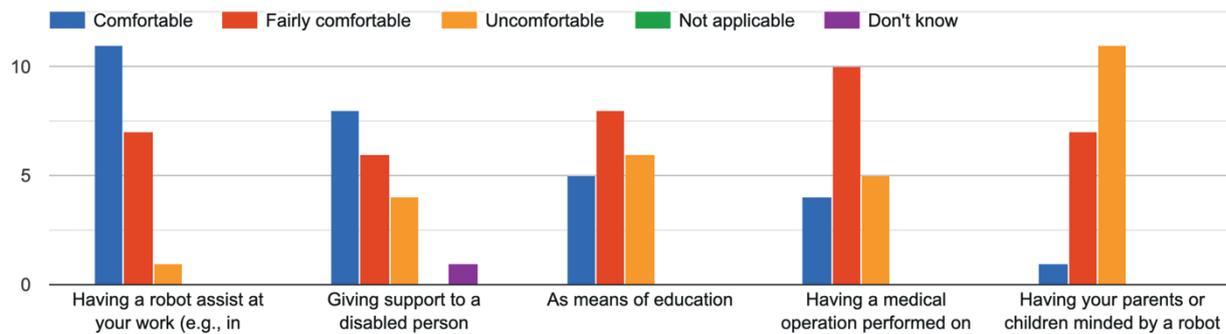
8. In which areas should robots receive more regulatory attention?

There is an explicit call to policymakers to regulate military and security first, as well as the care of children, elderly, and the disabled. In second place, healthcare, followed by education and manufacturing.



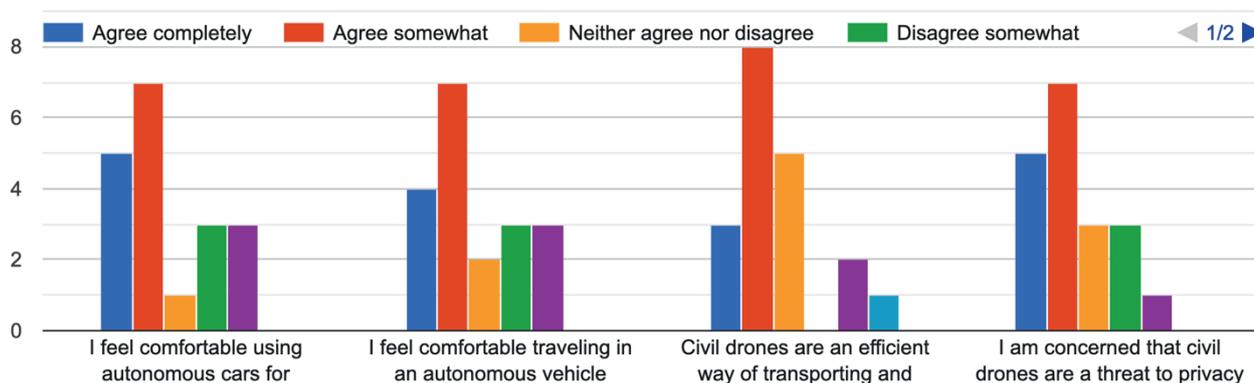
9. Here there is a list of things that can be done by robots. How comfortable do you feel with each of them?

The results show how opposite the views are depending on the context and the type of task. Having a robot assistance at work (e.g., in manufacturing) makes the participants feel comfortable, whereas having their parents or children minded by a robot makes them equally uncomfortable. Having a medical operation performed on oneself is accepted as being fairly comfortable.



10. Do you agree with the following statements?

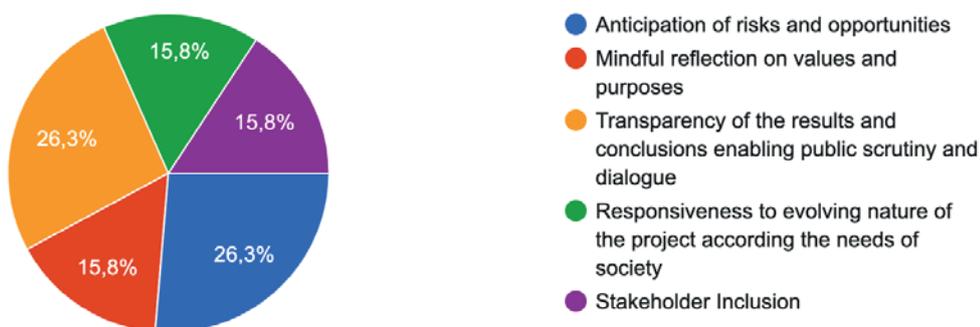
When discussing transport, there is some agreement about feeling relatively comfortable on the use of autonomous cars (either for goods or people). Civil drones are seen as efficient but raise concerns about respecting privacy.



B. Responsible Research and Innovation

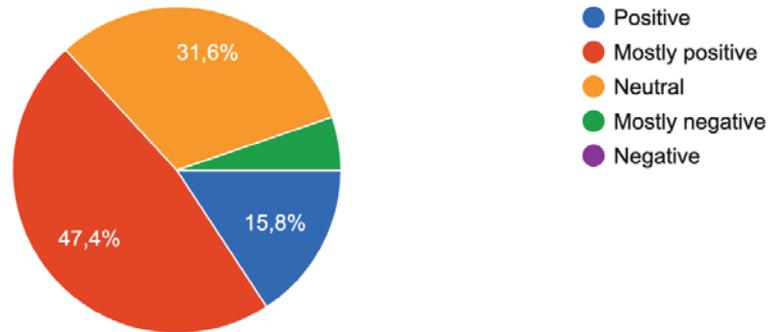
11. Responsible Research and Innovation include the following items:

It is important to stress the fact that the perceptions shared by the participants in this survey are particularly relevant as most of them are heavily involved in research professionally (as previously mentioned in the introduction). This is a core concept of the European Union approach to technological progress. Even when RRI comprises all these items, we forced contributors to choose only one (the most representative). The experts highlighted equally the anticipation of risks and opportunities, and the transparency of the results and conclusions enabling public scrutiny and dialogue. Thus, anticipation and transparency account for half of the total, while the other three share the same percentage (reflect on values and purposes, responsiveness to changes, and inclusion).



12. Robotics has an impact on the environment:

It is astonishing that none of the partakers thought that robotics has negative impact on the environment. Only a few signaled a mostly negative impact. On the contrary, almost half of the participants remarked that the impact is mostly positive, with an additional 15% finding it exclusively positive. Approximately one third found it neutral.



13. According to you, what main impacts does robotics have on the environment?

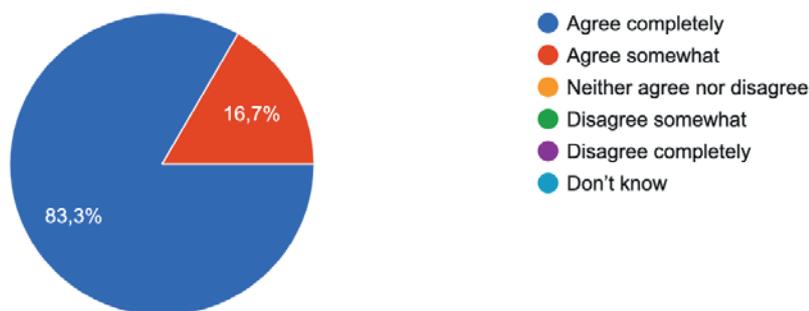
All the answers received have been grouped here to summarize both the negative and the positive impacts of robotics on the environment.

On the one hand, raw materials and energy used in manufacturing robots and servers and powering their use will have an underacknowledged, huge environmental impact. It will probably be a negative one, if we think in terms of emissions and climate change. Many robots are costly and energy-intensive to produce, and the technology that powers them can be energy-consuming as well. The impacts on the environment are mainly due to the use of energy (mostly electricity consumption) for operation and disposal. Despite their large added value, robots become trash sooner or later. The carbon footprint of making robots and the non-biodegradable waste that they produce are key environmental impacts. Also, scalability may cause problems, as it will be socially and physically destabilizing if there are suddenly a lot of automated objects appearing in the environment at roughly the same time.

On the other hand, robots may aid humans in the management and understanding of complex sustainability questions. Increased efficiency should benefit the environment (e.g., more efficient use of energy for transportation). Automation of automobiles could lead to an overall reduction in emissions and land use on roadways. At the same time, robots could help reduce unnecessary movement and reduce pollution. Agricultural robotics has the potential to increase yields with the reduction of harmful chemicals required to treat plants (by limiting the use of pesticides). Robots could be also in charge of cleaning.

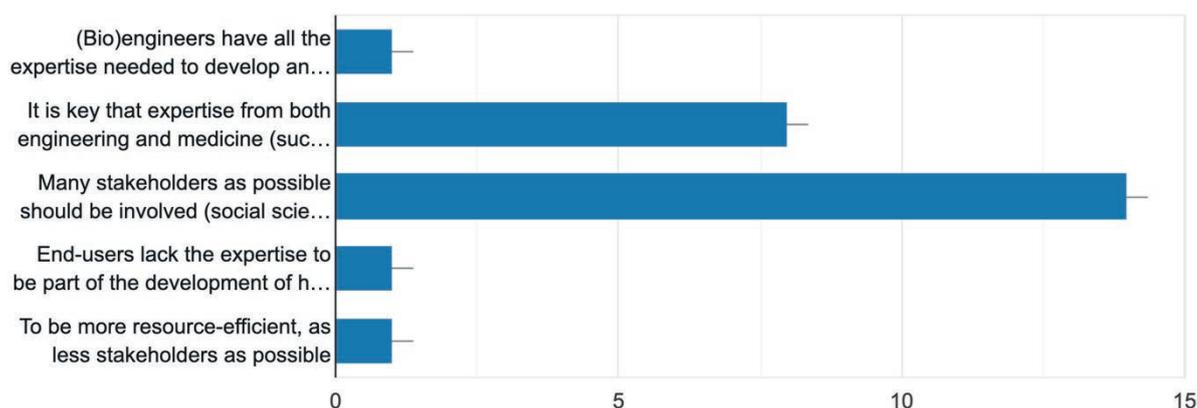
14. Should robot companies pay more attention to the frameworks of Responsible Research and Innovation (RRI) and Corporate Social Responsibility considering vulnerable groups and workers' needs?

There is a clear consensus on this particular point. Everybody agrees (83% completely, 17% somewhat) that robot companies should pay attention to vulnerable groups and workers' needs.



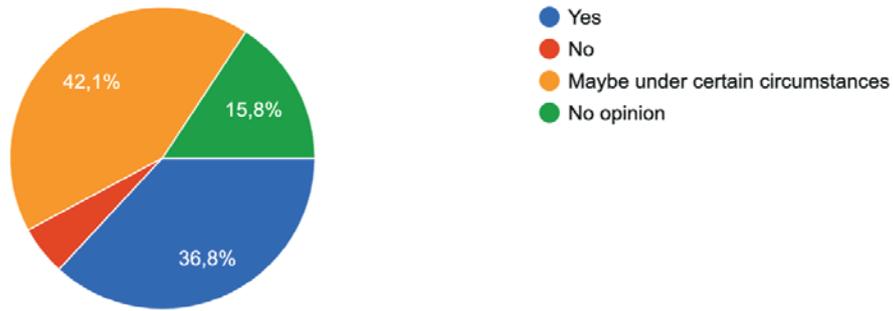
15. Whose expertise is needed for developing healthcare robots?

According to the majority and given that the development of robots for healthcare has already been established as a priority, the involvement of as many stakeholders as possible (social scientists, robot engineers, clinicians, and patient organizations as end-users) in this process is critical. Secondly, many answers found that it is key that expertise from both engineering and medicine (such as clinician-researchers) work together as these technologies will be used in/on the human body.



16. Do you think that collaborative robots can actually help including persons with autism spectrum disorders (ASD) in SME production processes?

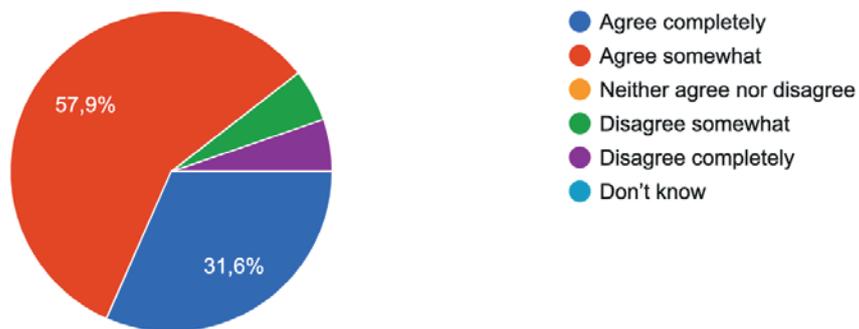
For the sake of inclusion of people with mental disorders, some researchers are currently trying to use collaborative robots to better integrate them in controlled environments. This help is assessed as probable under certain circumstances by 42% of the participants. 36% believe it can be positive. Consequently, it seems a line worth exploring further.



C. Social dialogue, and public policies

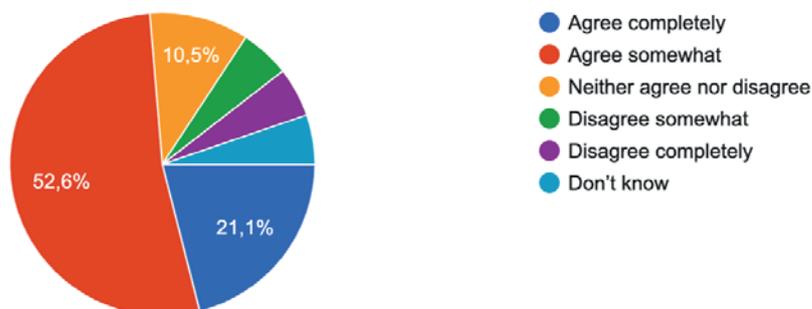
17. The introduction of interactive robots into society should be regulated to avoid inequality and ensure access to the potential benefits of robotics for users.

A great majority is in favor of the regulation of interactive robots as they are introduced more and more in our society, with the purpose of ensuring equal access to them (almost 60% agree and approximately one third agrees somewhat).



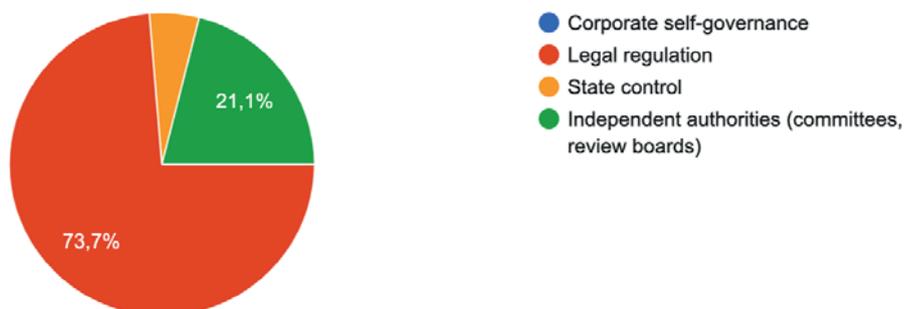
18. Do you think that future developments in robotics may negatively affect the protection of personal data and privacy?

There is a common wariness regarding the risks posed by future developments in robotics when it comes to privacy and data protection (21% completely in agreement and 52% somewhat). This calls for continued oversight in the future if this extremely sensitive field may be affected.



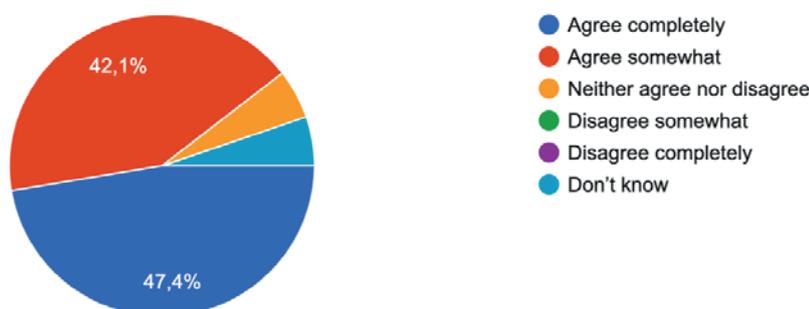
19. What is the best way to guarantee controllability and auditability for AI and robotics?

None of the participants thought that the controllability and auditability can be left to corporate self-governance. 73% find legal regulation is needed. Preferences are expressed for the review by independent authorities as opposed to State control.



20. 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?

Around 90% of the participants believe that a specific institution, either Observatory, Forum or Platform, would be useful (47% completely agree, and 42% agree somewhat).



21. Which tasks of your current job could be done by a robot in the future?

Some researchers would welcome a robotic summary of the literature in a specific research domain (through search and selection of information). In the legal profession, there is already an ample scope for robots to do the research and classification of precedent cases and identify pattern cases in the past for the application of legal rules. However, legal interpretation would still require human work, although robots could to some extent assist in the legal rule application as well.

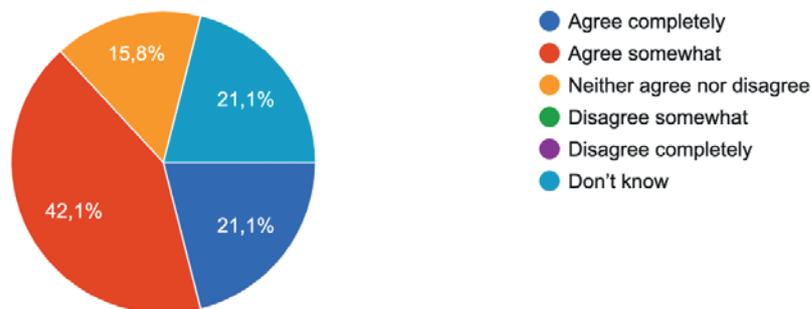
In terms of teaching, some participants are not sure whether robots will be in classrooms and lecture halls any time soon (beyond initial trials). They do not believe that a robot can replace a teacher. However, they can facilitate their work in many cases (especially in the case of online education).

Other future tasks that could be undertaken by robots are the automation of fetching devices or hardware for assembly, the assembly of test setups, and the automation of data collection with physical setups. Some uses are repeatedly mentioned: software testing and data analysis, testing applications, and repetitive communication and analysis.

In conclusion, in the far future, many of the tasks (doing literature reviews, analyzing data and reporting them in scientific publications) will be probably be automated. The question is whether we want them to be automated. Robots might be able to do several tasks autonomously, but they should work in cooperation with persons. The goal should be to limit their use to repetitive, administrative, non-thinking, physical, mechanical tasks (and clean offices or get coffee).

22. Should there be an opt-out mechanism for the use of robots in healthcare or in the workplace?

Around 63% of the contributors agree with the existence of an opt-out mechanism for the use of robots (42% somewhat and 21% completely). This is pretty important and should deserve attention when considering the enactment of future legislation.



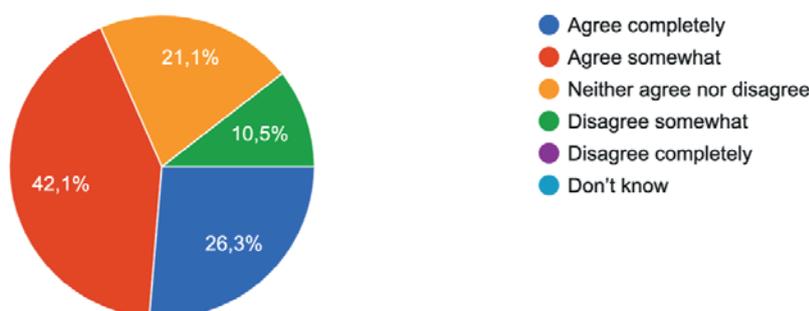
23. The inadequacy of qualifications is an important obstacle to the development and use of robots and AI in the current transition period. Labour market policies, Social Security schemes and taxation should be designed to...

In terms of revealed priorities, the first one is to help workers adapt to the new demands and to retain talented individuals to enhance competitiveness (31%). In the second place, 26% of the participants found that greater private investment should be encouraged in training and reskilling, as a means to facilitate employability (the maintenance, access and return to employment). Similarly, the fair share of the technological gains and risks, considering their origin, is also supported by 26% of contributors. The third preference is to both encourage companies to hire and people to offer their skills to the labour market. The last one is to encourage greater public investment in training and reskilling, as a means to facilitate employability and support for those made permanently redundant. Therefore, adaptation and talent retention are key. The need for private investment in employability and for the adequate sharing of gains and risks is clearly stressed as well.



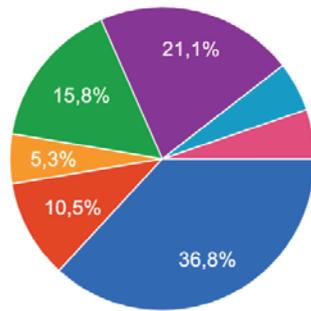
24. Do you think that if robots change the workplace, re-skilling of displaced workers should be incentivized through special tax treatment for companies?

Around 68% of the participants agree with the use of tax incentives for companies in order to facilitate re-skilling of displaced workers (42% somewhat and 26% completely). Only 10% disagrees somewhat.



25. Given the impact of robotics on the sustainability of the Social Security systems, policymakers should...

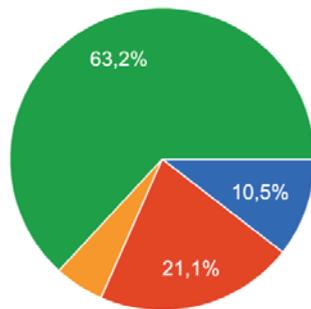
From all the available options, only a few participants chose the possibility to combine some or all of them. The opinions are reflected here in accordance with the percentage achieved in decreasing order. 36% of the participants believe that policymakers should try to keep active as many people as possible, by allowing reductions in Social Security contributions for training. Their amounts could depend on the workforce size or worker's gender (for example, increasing it for SMEs or women). 21% would ask for a solution at European Union level, either providing guidance on common admissible incentives or even target-oriented financial support. To a lesser extent, 15% thinks that policymakers should learn from the experience with the incentives for workers who ceased because of a disability and regain their full work capacity, or continue to be affected by a partial disability and return to work. 10% defends that politicians should think not only about the cost of the incentive from the public spending side, but also about the difference that is not spent in unemployment benefits or early retirements for each job that is saved. 5% would learn from the experience with incentives to change the job or function of certain workers, due to pregnancy, risk during breastfeeding or occupational diseases.



- try to keep active as many people as possible, by allowing reductions in So...
- think not only about the cost of the incentive from the public spending sid...
- learn from the experience with incentives to change the job or functio...
- learn from the experience with the inc...
- ask for an EU solution, either providin...
- All of the above (I think!)
- a combination of the above

26. Do you think that strong fiscal pressure on robotics prevents innovation and development?

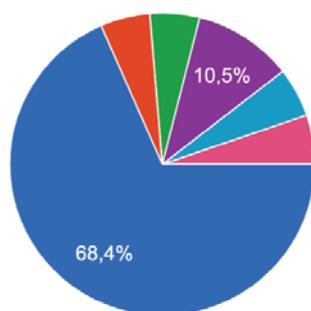
The correlation between more fiscal pressure and less innovation is seen as context-dependent by the majority of the participants (63%). Approximately one third believes that it has a negative influence (21% yes, 10% absolutely)



- Absolutely
- Yes
- No
- Depends on contexts

27. What tax incentives, if any, are more likely to encourage you to invest in new robotics' research?

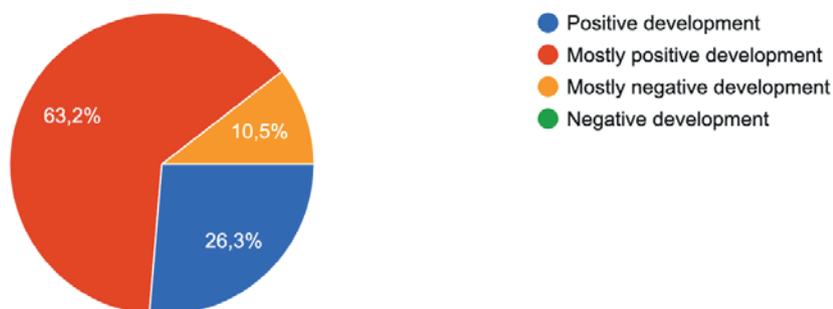
The research and development grants/breaks are the favorite tool (68%) followed by RRI process incentives (10%). This preference may be a reasonable consequence of the type of participants that completed this survey, as researchers and academics usually rely on them to carry out their work. Patent boxes (with lower effective tax rates on income derived from Intellectual Property - IP boxes) and other incentives could be better valued from an entrepreneurial perspective.



- Research and development grants/breaks
- Patent boxes (with lower effective tax rates on income derived from Intellect...
- Output incentives
- Input incentives
- RRI process incentives
- None
- I am unsure of the negative/positive impact of the various tax incentives list...

28. Do you think the use of robotics & AI by tax administrations is a:

An ample majority finds positive the use of robotics and artificial intelligence by tax administrations (63%), and more than a quarter mostly positive. None of the participants thinks this is negative, and only 10% perceives this development as mostly negative.



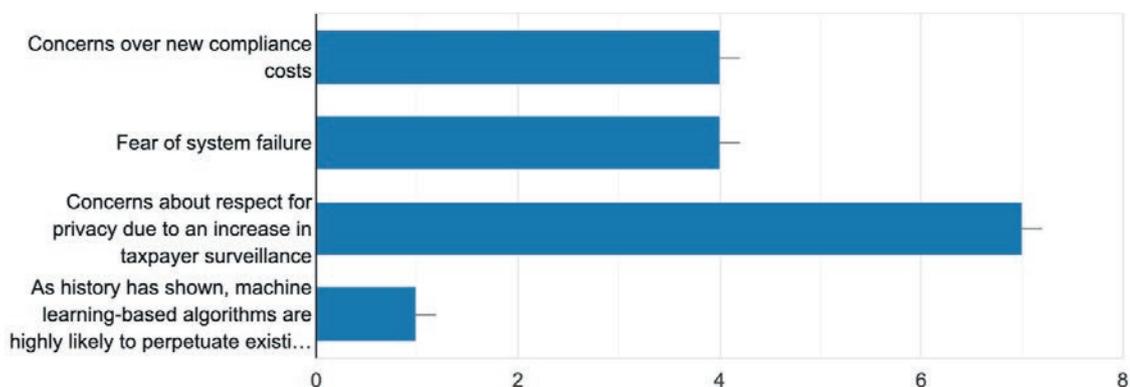
29. If you consider the development of robotics & AI in taxation positive, what is/are your main reasons (you can choose more than one):

The principal reasons for this strong support are the efficiency and easier compliance (47%), followed by the fight against fraud (23%) and fairer taxes (17%).



30. If you consider the development of robotics & AI in taxation negative, what is/are your main reasons (you can choose more than one):

The main reason to explain the negative perception is increased taxpayer surveillance and its effects on privacy. Fear of system failure or concerns over new compliance costs are relatively relevant as well.



III. Conclusion

After a closer look at the concerns and expectations raised by robotics in an intimate experts' forum, it seems that most people and experts would agree that the impact of robotics will be relevant and widespread across many areas. Some of them, particularly sensitive, will require a regulatory framework to prevent misuses, others will deserve instead financial support to allow improvements in human wellbeing. The development of robots will also have to consider sustainability. This study has provided some experts' insights on what to expect of robots and how to encourage their responsible development, addressing challenges and ways in which (tax or Social Security) policies and administrative transformation can contribute to make their impact as positive as possible.

Notes

1. Eduard Fosch Villaronga, María Amparo Grau Ruiz, "Expert Considerations for the Regulation of Assistive Robotics. A European Robotics Forum Echo", *Dilemata*, No. 30, 2019, pp. 149-169. <https://www.dilemata.net/revista/index.php/dilemata/article/view/412000296> [last accessed 20 May 2021].
2. Tools for Inclusive Robotics: Ethics, RRI, Taxation & Social Dialogue (Workshop at European Robotics Forum, Málaga, 2020) <https://eprints.ucm.es/59990/> [last accessed 20 May 2021].
3. According to a survey conducted almost a decade ago, "more than two-thirds of EU citizens (70%) have a positive view of robots; the majority agree that robots "are necessary as they can do jobs that are too hard or too dangerous for people" (88%) and that "they are a good thing for society because they help people" (76%). The survey found that people who have some personal experience with robots are more likely to have a positive view (88%) than the wide majority who lack this experience (68%). EU citizens have clear views about the areas where robots should operate: they should work in areas too difficult or too dangerous for humans, like space exploration (52% consider this a priority), manufacturing (50%), military and security uses (41%) and search and rescue tasks (41)". European Commission: Public Attitudes towards Robots. Digitalisation in our daily lives, September 2012. <https://europa.eu/eurobarometer/surveys/browse/all/theme/000009> [last accessed 20 May 2021].
4. The survey was conducted in all then-27 member states of the EU with 26.751 partakers taking part overall. The results are representative for each country that took part in the study. In addition to the dataset, the original questionnaire and an explanatory note are made available. A comprehensive report of the survey has been prepared as well and is available for download. <https://digital-strategy.ec.europa.eu/en/library/dataset-eurobarometer-survey-public-attitudes-towards-robots> https://data.europa.eu/data/datasets/s1044_77_1_ebs382?locale=en The Directorate-General for Communication published on 4 May 2021 the data related to Special Eurobarometer 382: Public Attitudes towards Robots https://data.europa.eu/data/datasets/s1044_77_1_ebs382?locale=en [last accessed 20 May 2021].