



# Halodi Robotics

*Citizen Survey Results*



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## Introduction

This report presents the results of a collaboration between Halodi Robotics (NO) and the EU-funded project Robotics4EU under grant agreement No 101017283. The collaboration is part of a European wide citizen consultation on validating different robotics business ideas from a societal perspective. In total 11 robotics applications participated in the activity and took part in exploring how citizens can be engaged and give input to the development of new robotic applications.

The assessment of each of the 11 robotic solutions was performed in an online, informed survey style consultation. Here respondents were guided through the survey via an online platform providing them with informative text, pictures or video material and questions about the specific robotic solution. The platform then collected the answers from each of the individual respondents which were further analysed by the Robotics4EU project.

### What is the Robotics4EU project?

The citizen consultation presented in this report is part of Robotics4EU, a 3-year project funded under the European Union's Horizon 2020 research and innovation program. The project aims to ensure a more widespread adoption of robots within the areas of healthcare, inspection and maintenance of infrastructure, agri-food, and agile production. To achieve this, the project is advocating for implementation of responsible robotics principles and raising awareness about non-technological aspects of robotics by organising community building and co-creation events bringing together the robotics community and citizens.

### Why involve citizens' perspectives in the development of robots?

The collaboration between robotics developers and citizens rests on the core democratic notion that technology with the potential to have a significant impact on how we shape our future society, should not only be discussed by stakeholders, policy makers, experts, or businesses, it should also include opinions of the broader public who most likely will be directly or indirectly impacted by the changes the technology may impose over time.

There are several ways in which robot manufacturers can benefit from engaging citizens in their development processes. While citizens may not possess the technical knowledge required to build a robot, they are experts of the social worlds that new technologies will inhabit, change, or at the very least affect in some way or another. This type of expertise is equally important as professional expertise because it is what ultimately decides whether or not society will accept a new technology. Inviting citizens 'behind the stage' can help make sure that the manufacturers' solutions are aligned with society's expectations and needs. The citizens bring an 'outsider' perspective that can be an effective tool to detect and identify concerns and potential problems that would perhaps otherwise emerge only when the robot is fully developed and on the market. Thus, by adopting inclusive approaches from early in the development process, robot manufacturers will be better equipped to make informed decisions about their products and avoid costly mistakes that may ultimately render their solutions(s) unfit for society.

## Halodi Robotics

Halodi Robotics has developed a service robot called EVE. EVE is a human sized robot platform that can be used for many different purposes. The solution can be utilised in areas such as security, retail, logistics and healthcare performing tasks that would usually be done by humans.

In healthcare, there is an urgent need for innovation and more hands. EVE can work alongside the healthcare professionals in hospitals. As EVE is not limited to a predefined space, but is able to move freely, it can assist healthcare professionals in everyday tasks such as patient hygiene or meal delivery — in both hospital facilities and eventually patient homes. For Halodi Robotics, the goal is simple: Improving patient care and outcomes with the help of a humanoid robotic assistant. The aim is to create a solution that reduces costs, improves service, and assists healthcare providers. Currently, EVE is controlled remotely by an operator, but in time it will be able to operate autonomously.



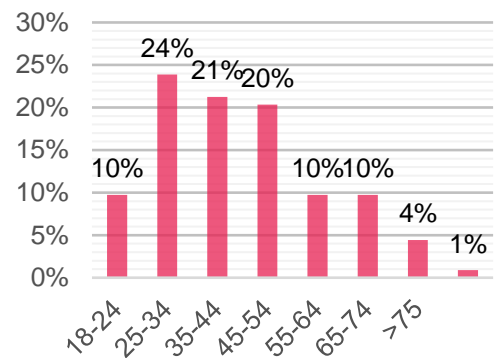
## Demographics

The survey received a total of 113 responses. Respondents were mostly citizens between the age of 25-34 and made up 24% of the total answers. The second largest age group was the age group from 35-44 with 21%. Closely followed by the citizens of the age between 45-54 with 20%. The age groups of 18-24, 55-64 and 65-74 all had 10% each of the total amount. A little less than 5% of the respondents were older than 75 years. The gender distribution was close to being evenly divided with 52% male respondents and 43% female respondents entering the survey. A little less than 2% did not wish to answer.

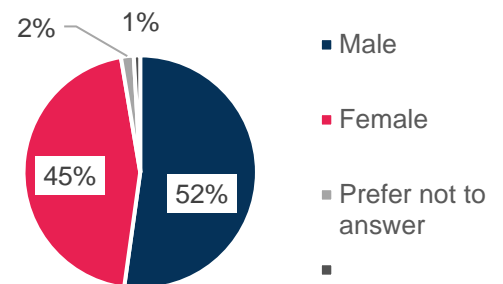
The distributions of the residence of the respondents were primarily from a large city with 43%, secondly with 25% of the respondents were resident in a small town. Closely followed by respondents living in suburban areas with 23% of the total amount. 7% of the respondents live in rural areas and form the lowest residential representation of the survey. See the figure below for an overview of residential distribution. The survey attracted mostly respondents with a high degree, the largest number being respondents with a master's degree representing 37% of the total amount, followed by 24% with a bachelor's degree. 6% had a general upper secondary education, while 5% had a primary or lower secondary education. Lastly 4% of the total had a vocational education or training.

These specific demographics may influence the answers and tendencies described in the report. However, when reading through the responses it is important to be aware that these results are not statistically representative, but indications of people's individual opinions which can be used as valuable input to the further work of the company's robot solution.

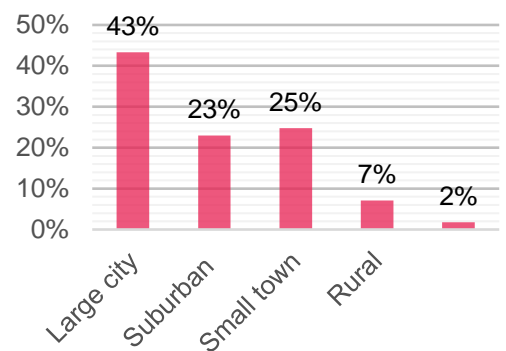
### Age Group



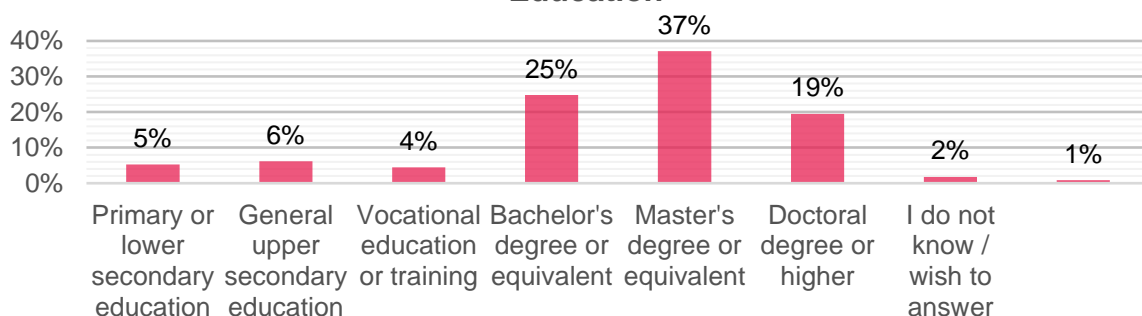
### Gender



### Area of Residence



### Education



## Survey Results

### Question1: I like the appearance and design of EVE

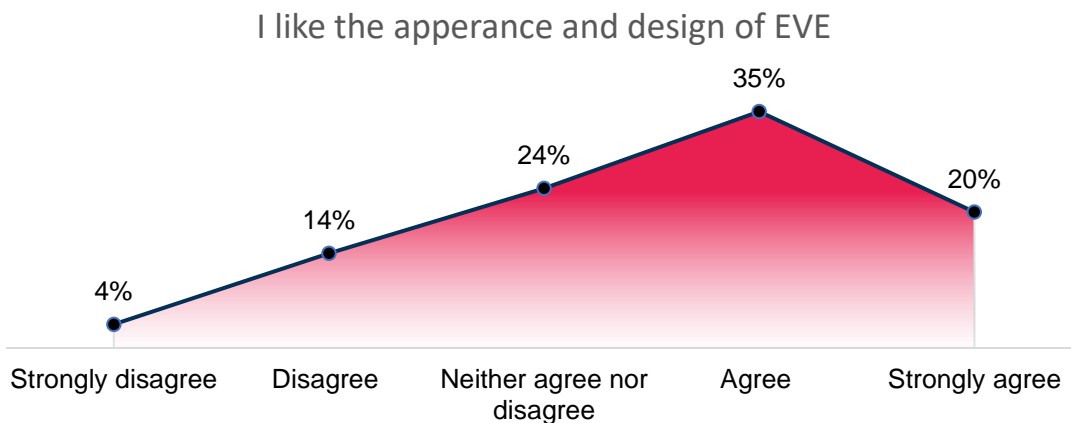
When asked about the robot's appearance many respondents were positive. More than half of the respondents answered that liked the appearance of the EVE (35% 'Agree' and 20% 'Strongly agree'), whereas only 4% 'Strongly disagree' and 14% 'Disagree'. A little less than a quarter of the respondents chose 'Neither agree nor disagree' as response to the question asked. Respondents were able to elaborate on their answer to the question and the reasoning behind it. Here, some of the respondents expressed how the look and appearance of EVE makes them feel comfortable, whereas others like the practical look, as one respondent states:

*"EVE's design is both human-like and practical. It doesn't take up much space, and the human-like appearance makes it feel more human."*

Another respondent thinks EVE looks both 'warm' and 'receptive'. The anthropomorphic look of the robot is mentioned by one of the respondents who argues that:

*"The anthropomorphic appearance is important, interaction is more comfortable. At the same time, it keeps the robotic appearance, it's very clear that it's just a machine."*

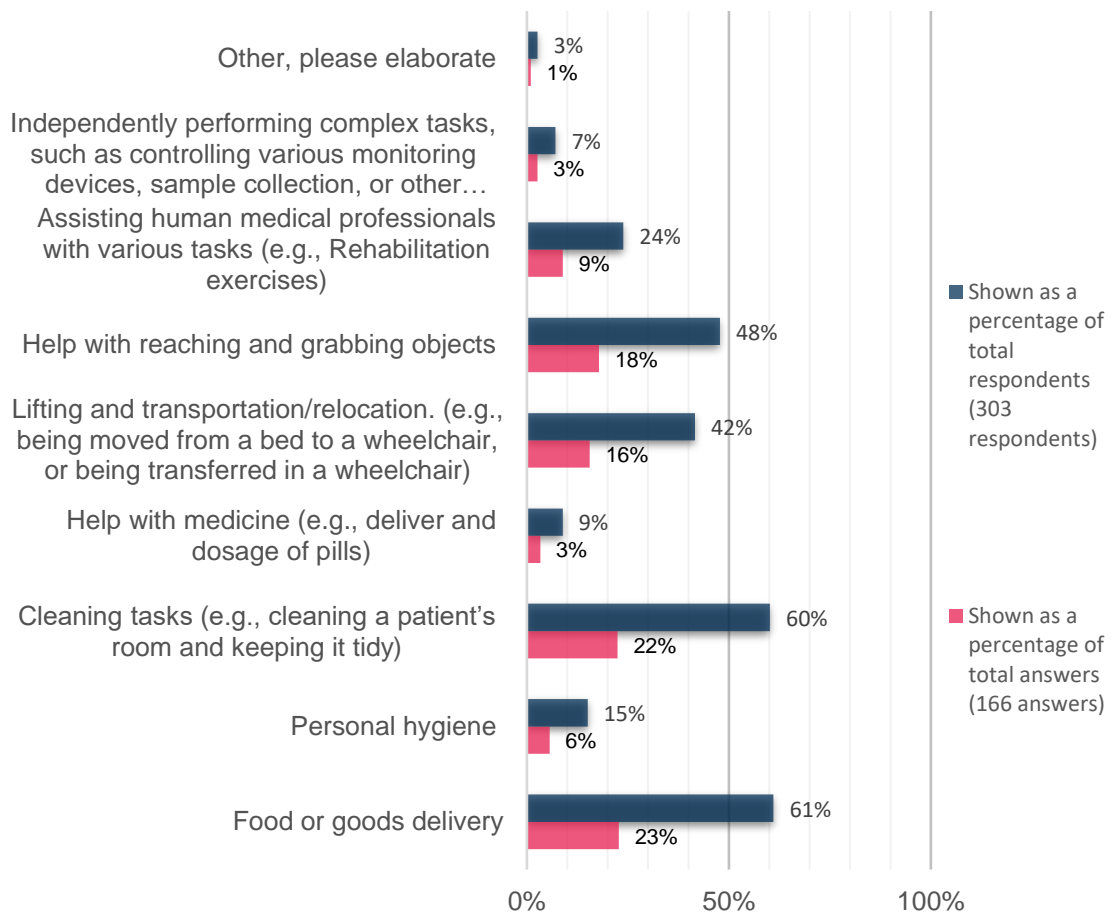
However, there were also some respondents that expressed a dislike towards the design and appearance of EVE. Some of these more negative comments were partly due to the humanoid aspects of the design. Here, words like 'alienating', 'scary' and 'daunting' were used by a few of the respondents to describe their feelings towards EVE. In line with these comments were also comments that were concerned with distrust towards the robot and its functionality. It is difficult to say whether these comments represent a fear towards the robot or a more general fear towards robots within healthcare. One respondent expresses concerns connected to the robot's stability: *"not confidence in its stability given the size and little fan of external cables at the level of the arms"*. Based on the elaborative answers there is a good indication that the look and appearance of the robot are important factors to consider for the broader societal acceptance of the robot.



**Question 2: In what medical situations, if any, would you be comfortable being assisted by a robotic solution such as EVE?**

Here, respondents were able to choose up to 3 answers. Among the most popular answers that respondents chose were using the robot to perform various deliveries (with 23% of the total answers) and using the robot for cleaning tasks (with 22% of the total answers). There were also many that thought the robot could be helpful as an extended limb able to assist in reaching for objects and grabbing them (18% of the total answers). Additionally, more than every tenth would be comfortable being lifted or transported by the robot (16% of the total answers). Some were also comfortable with letting the robot assist medical professionals with various tasks (9%) and a little less were comfortable with EVE assisting with personal hygiene (6%). Less than 5% are comfortable with letting EVE assist with medicine, such as delivery and dosages of drugs. The same goes for the robot to independently perform complex tasks e.g., controlling devices and sample collections.

**In what medical situations, if any, would you be comfortable being assisted by a robotic solution such as EVE? (Choose up to 3)**





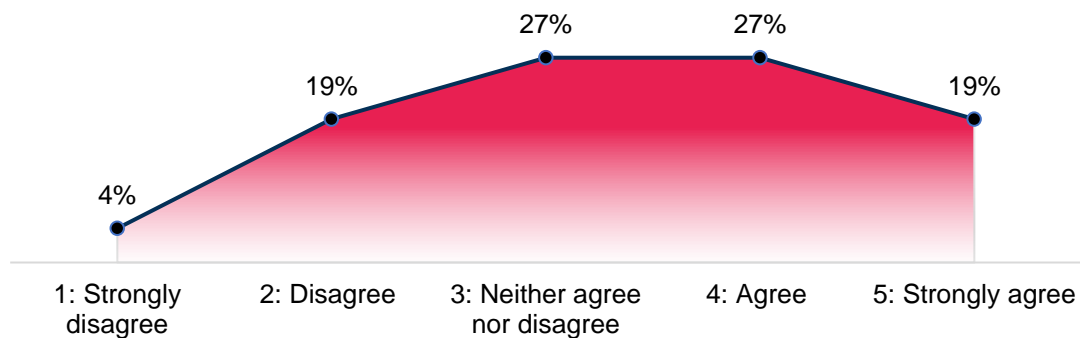
Some respondents mention other areas within healthcare where they consider EVE to be of assistance. One respondent suggests using EVE in relation to communication or even alertness in an alert situation and another respondent suggests using the robot to help disabled or people with weaknesses. A few respondents express how EVE can be useful with: “[...] *relieve nurses and care assistants of the demands of patient comfort [...]*” and “[...] *extension of staff’s efforts and presence [...]*”. There are however also several comments that places focus on how human contact is important for recovery. While robots such as EVE can assist with a broad range of tasks, the presence of human healthcare professionals is being accentuated by the respondents. This might be why most of the respondents can see the robot being of assistance to healthcare professionals and as a tool for an increasing requirement for help to the healthcare system.

### **Question 3: I would feel safe being around a robot such as EVE**

Almost a quarter of the respondents answered that either ‘Agree’ (27%) or ‘Strongly agree’ (19%) when asked whether they thought they would feel safe being around a robot such as EVE. Only 4% did chose ‘Strongly disagree’ and 19% chose ‘Disagree’. Many respondents also opted for ‘Neither agree nor disagree’ with 27%.

Considering the elaborative responses, it is possible to get a more in-depth look at the reasoning behind the distribution of the answers to the question. One respondent argues that: “*It would be at first very uncomfortable but would be easier over time*”. Such an argument might draw on the reasoning that adjustment towards new and emerging technologies can take a certain amount of time. Many of the respondents that placed their answers on the lower end of the scale also elaborated on their answers. Some of these comments focus on the size of the robot and have them question the stability of the robot, whereas others focus on the lack of human presence makes them feel less safe. When having to interact with a robot, respondents are wary about the maturity of the robot on whether it can communicate its intentions and understand what a patient wants. Another respondent mention that: “*I don’t think I feel safe. I rather think that if I need help it is available to help me*”, the comment shows how the respondent can see how the robot can be of assistance to the healthcare professionals but still is not ready to consider the robot as a primary caregiver. Other respondents have also voiced how they would feel safer if a human/healthcare professional were close by when using the robot. In addition, a respondent is asking for safeguards such as a “stop” signal or emergency button for them to feel safer around EVE and another respondent notes that if they were able to quickly get in touch with a human being, they would feel safer.

### I would feel safe being around a robot such as EVE



More than a quarter of the respondents neither agree nor disagree with feeling safe around EVE. Yet, one respondent remarks how: *“Feeling safe is proportional to friendliness. Smaller robots are better”*. The size of EVE might be one of the reasons why some respondents articulate worries towards the robot. However, there are also others who consider the size of the robot as an advantage for its functionality. Such doubts towards the robots could be considered when introducing a robot of this type into society with the aim of assisting healthcare professionals.

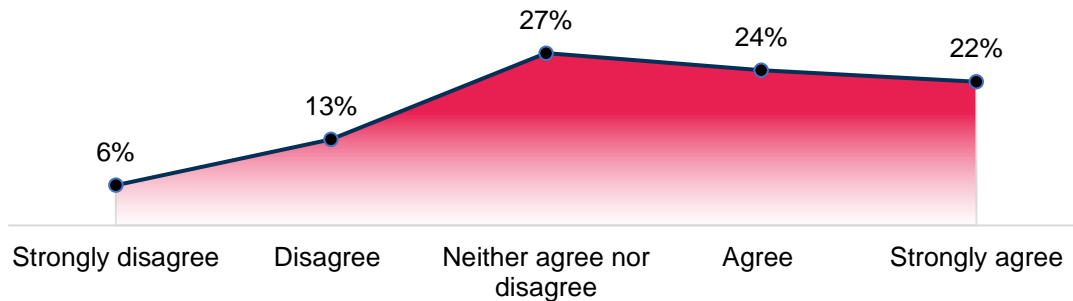
In the focus group interviews conducted during the Robotex Festival, the participants also pointed out that the robot looks scary and is associated with sci-fi movies that have been seen too much. *“I’m afraid his eyes will turn red and then it will be dangerous.”*

#### Question 4: Can you imagine a future where you would like to interact with this robot, on a daily basis, in different situations?

A little less than half of the respondents would like to interact with the robot. While almost every fifth answered they ‘Disagree’ (13%) or ‘Strongly disagree’ (6%) to a future where they would like to interact with EVE daily. Nearly every third respondent answered that they ‘Neither agrees nor disagree’ (27%). The distributions of answers indicate that there isn’t a complete answer to how likely it is that the respondents wish to interact with the robot. It is also important to keep in mind that the question and statement presented in here is hypothetical in nature, since respondents are asked to *imagine* a scenario in which they encounter the robot. Since they might not have an actual experience to base their answer on, it may be difficult to provide an answer with enough confidence, and so some respondents might prefer to remain neutral or at least undetermined in their response.



Can you imagine a future where you would like to interact with this robot, on a daily basis, in different situations?



Looking at the elaborative answers given, many of the responses were linked to activities that respondents did not wish to perform themselves. For example, respondents thought that the robot could be useful as an aid in cleaning tasks and some respondents answered that they would like to use the robot to help them with their mobility if this had been impaired.

There were also several comments where respondents expressed that they would prefer a human over a robot. Some mentioned that this is because they perceive this kind of interaction as important to mental health and fighting loneliness. One of the respondents stated that: *“Loneliness is a real mental health issue if we delegate care to robots. Just seems like neglecting vulnerable people to me.”*

However, there are also many that applaud the idea and are fine with interacting with a robot – some arguing that this would only be the case if a human is nearby or can assist if needed. Still, many see the growing potential of robots such as EVE and their ability to perform a wide range of tasks that can help humans in their day to day lives.

**Question 5: Currently, EVE is being used to support security guards, as a service robot for retail, for logistics and packaging and in healthcare. Apart from these, what other application areas do you think this type of robot can be used for?**

To answer this question, respondents were asked to write their ideas out as text. Here, the respondents came up with a wide variety of different suggestions. The most frequent suggestion was to implement EVE as a tool to help within different areas of cleaning. Respondents suggested using the robot for cleaning both inside and outside. Here, EVE could act as both an assisting role as well as being the one performing the cleaning itself – for example by cleaning workspaces and offices outside of working hours.

The second most suggested application area was the service area. There were a lot of sub-areas within the service area in which the many uses of EVE could be seen as beneficial. Respondents suggested the robot being used in hotels, delivery, restaurants, museums, or in general as a tool that could be used to convey information as well as other uses connected to communication. In short, it was pointed out by several of the respondents that robots such as EVE have the potential to reduce the workloads of a multitude of daily routines within a great many areas.

Other respondents also suggested that EVE could be a useful addition in areas such as safety and security work. Here, the comments were mainly focused on EVE as playing an assisting role to workers such as security guards or airport security. Another respondent suggested that robots such as EVE could potentially be very beneficial if used for traffic regulation and similar tasks. Among many of the suggestions, whether directly or indirectly, there is a clear wish for robots such as EVE to relieve the workload for humans. This was especially mentioned in relation to dangerous, strenuous, and unappealing tasks. Many suggested that using EVE for factory work and especially for heavy and repetitive lifting were voiced by the respondents and one mentioned that:

*“I can imagine EVE also working in storage buildings, doing the heavy lifting that would otherwise be too much for a human to handle.”*

These suggestions were also related to the fact that many consider robots such as EVE to be beneficial in helping to mitigate human degeneration, for example by using them in storage facilities and warehouses. Furthermore, some respondents suggested that it would be useful to implement EVE to conduct: *“Work performed in environments where hazards to human health pose challenges”*. Another respondent had a similar suggestion and argued that the robot could be used for environmental management. Lastly, some also suggested using EVE for companionship and one respondent – perhaps somewhat humorously – mentioned that EVE could be used to tell jokes and keep one company. A more serious suggestion was to use EVE as an avatar, for example in classrooms, where it could be operated remotely by the person teaching the class.

However, there were also some that were sceptic towards expanding the use of EVE and one important comment to highlight was made by a respondent that argued: *“Less is more. A universal robot will not work”*. This comment can be used to reflect upon which tasks and situations are most appropriate or suited for the use of EVE. There were also some respondents that generally thought that robotic technology is already imposing on too many aspects of society.

The results of the focus group conducted among the participants of the Robotex International festival show that a humanoid robot designed to look like a human being too strong can cause negative emotions. "Such a robot can actually have a rather frightening effect, that if you are used to robots being like boxes and completely ordinary machines, then this here already creates some emotions."

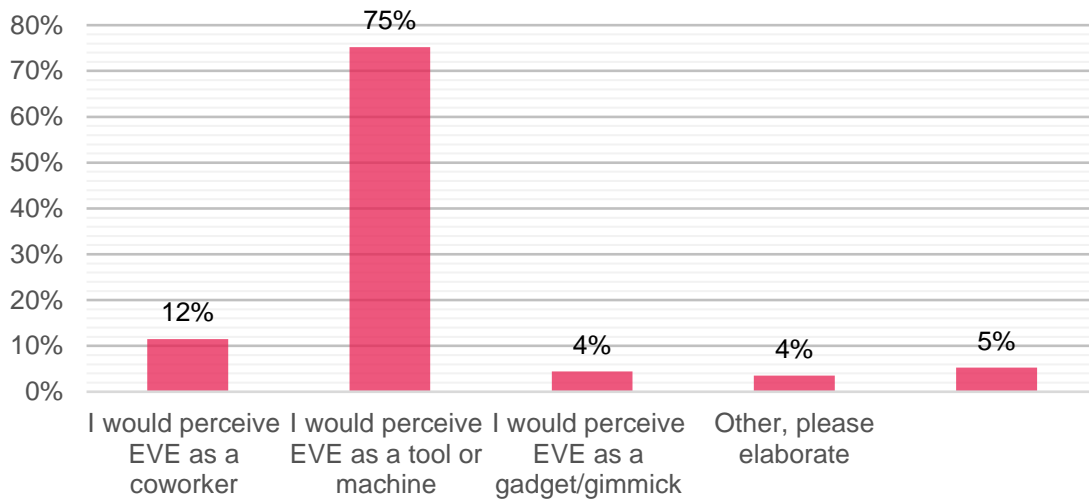
### **Question 6: In the future, if you were to work alongside a robot such as EVE, how do you think you would perceive the robot?**

Respondents were asked to reflect on how they would perceive the robot if they were working alongside it. More than 75% of the respondents agreed with the statement that they would perceive EVE as a tool or machine. Here, several respondents also elaborate and argue that they find it difficult to perceive a robot as a co-worker and even if they did, they would perceive it in a rather different manner than a human co-worker.

Thus, it seems that most respondents are somewhat unwilling to see the robot as an ordinary co-worker, in the elaborative answers a respondent wrote that they would view the robot: *“as an additional device”*, and another respondent elaborated that EVE would be: *“a different type of co-worker, not human”*. This indicates that even though the robot has some limits towards being an equal to human co-workers it could be viewed as an additional resource by the person that may collaborate with the robot. Only 12% of the respondents would perceive the robot as a co-worker and a little less than 5% would perceive EVE as a gimmick or gadget.

The distribution of answers to this question are perhaps not surprising. However, they are interesting insofar as so few respondents were willing to consider EVE as a something akin to a co-worker. Many of those who elaborated on this question did so by once again bringing up the need for human interaction and its importance. Some of the respondents argued along the following lines, saying that: *“He will have the appearance of a person but for me it is a working tool”* and *“Whatever the human aspect sought in its appearance, it remains a machine”*. Answers that indicate that for some, this type of robotic technology is still far away from being accepted as a co-worker in the workplace. There were however also positive elaborative comments by respondents that considered EVE to be more akin a colleague already, as one respondent stated: *“Both of us would be doing important tasks, so we would rightfully so be considered equals.”*

**In the future, if you were to work alongside a robot such as EVE, how do you think you would perceive the robot?**

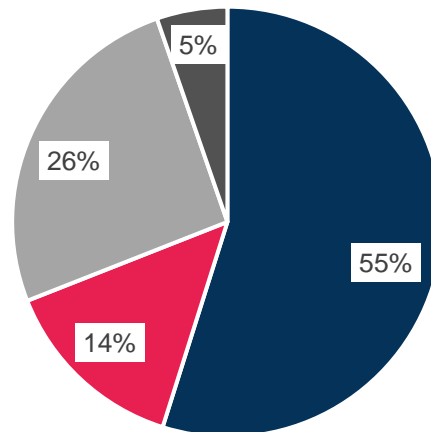


**Question 7: Many foresee a shortage of workers within the healthcare sector. Can you imagine that a robotic solution such as EVE will be able to relieve some of the pressure that the medical professionals are facing?**

The last question examined how respondents saw EVE as a solution to the increasing pressure medical professionals are facing.

Many foresee a shortage of workers within the healthcare sector. Can you imagine that a robotic solution such as EVE will be able to relieve some of the pressure that the medical professionals are facing?  
Please elaborate on your answer in your own words.

- Yes
- No
- I don't know
- 



More than half of the respondents (55%) answered that they could imagine EVE being a solution that could help relieve some of the pressure that is already on or may befall medical professionals. 14% of the respondents did not think that this was the case and 26% answered that they did not know.<sup>1</sup>

As with several of the previous questions, respondents were once again very focused on the potential that EVE has for relieving and assisting medical professionals without replacing them. Many respondents argue that these types of robotic solutions must be utilized in manners that help the medical professionals focus on their primary tasks. For example, one respondent points out that:

*“Currently, health care staff perform all sorts of tasks that are outside their domain. Robotic assistance would allow staff to focus on the patient in a purely medical manner”*

This sentiment is generally echoed throughout the elaborative answers as many consider EVE to be a very useful way to free up medical staff from time consuming tasks and allowing them to focus on the human being instead and robots such as EVE can perform a wide variety of tasks that will do exactly that.

Respondents mention uses such as: *“Heavy lifting tasks, cleaning duties and deliveries [...]”* as well as *“Moving the beds from one room to another. Carrying patient's luggage when leaving the hospital”* among many other possible uses.

<sup>1</sup> The remaining 5% did not answer.

A general sentiment among those respondents that are supporting an implementation of EVE, is that the tasks of the robot should be limited to specific tasks which will not deprive important time from medical professionals' interaction with their patients. Furthermore, the answers to this question echoed those of the previous question, namely that EVE is perceived by many as an additional resource to medical professionals.<sup>2</sup> The respondents see how EVE can help by performing tasks that have been assigned to medical professionals over time but remain outside their professional field.

If the respondents perceive the challenges within the healthcare sectors as structural issues as described in some of the elaborated answers. Some of the respondents might not see EVE as a sustainable solution towards handling the growing pressure the medical professionals are facing, but as a step towards a greater focus on professional competencies being utilised in a challenged environment. There were some that were not quite sure about what to answer and a little more than a quarter of the respondents answered "I don't know" to whether a robotic solution such as EVE would help medical professionals. The answers from this group of respondents are supported by various elaborated answers to the question. where the respondents do not understand the challenges for medical professionals as being the tasks they are performing, but instead are connected to the growing number of elderly citizens, employee shortage within the healthcare sector and fundamental issues of the management systems within the healthcare sector. These answers might also be connected to the 14% who answered "No" in the survey.

## Conclusion

In conclusion, the survey results show that many respondents had a positive opinion of the appearance and design of the robot EVE. However, some respondents expressed dislike for the design, finding it "alienating," "scary," and "daunting." The anthropomorphic look of the robot was seen as a reason for comfort in interaction by some, while others raised concerns about trust and stability. The responses indicate that the look and appearance of the robot are important factors in determining societal acceptance. In terms of functionality, the majority of respondents were comfortable with using EVE in medical situations such as performing deliveries, cleaning tasks, and assisting with reaching and grabbing objects. However, few respondents were comfortable with EVE independently performing complex tasks or administering medicine. Respondents also emphasized the importance of human contact in recovery and vulnerable situations and that the role of robots like EVE should more be seen as an assistive tool to aid healthcare professionals and the healthcare system. In terms of safety and interaction, the majority of respondents were neutral, with some expressing concerns about the robot's stability and lack of human presence. Lastly, the respondents came up with a wide variety of different suggestions for the application areas of the robot EVE, beyond its current use in security, retail, logistics and packaging, and healthcare.

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<sup>2</sup> Question 6: *In the future, if you were to work alongside a robot such as EVE, how do you think you would perceive the robot?*

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