

Rijksuniversiteit Groningen

# Social Care Robots: the Acceptance among Elderly

A qualitative research paper

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## 1. Introduction

In the modern day, robotics are becoming increasingly important in our way of living (De Graaf & Allouch, 2013); especially in the healthcare sector, in which there is an increasing shortage of professional nurses (Combes, Elliot & Skåtun, 2018). With robotics developing quickly, social care robots have the potential to play an important role in assisting elderly (Broekens, Heerink & Rosendal, 2009). According to Dahl and Boulos (2014), 'robots that fulfill tasks in the medical world are about to become one of the most influential technological innovations of the 21<sup>st</sup> century'.

However, the robots do not play a significant role in the healthcare sector yet; there have been some major barriers obstructing their potential use (Papadopoulos, Koulouglioti, Lazzarino & Ali, 2020). The main reason for this, is because the robots are not overly accepted (Broadbent, Stafford & MacDonald, 2009). To address the issue of the acceptance of social care robots more specifically, the following research question will be discussed in this report: what perceptions do stakeholders have on the acceptance of social care robots?

The purpose of the research is, to gain more knowledge concerning the acceptance of the social care robots among the target audience, so that this knowledge can be used to make sure the social care robot matches the needs of the target audience as accurately as possible.

## 2. Relevance of robotics in healthcare

As mentioned in the first section, robotics are becoming increasingly important. There are several arguments for this statement, like the demographic change, expected shortages of healthcare personnel, calls for improving quality of life and the need for higher quality care (Butter et al., 2008). Because of the demographic change, the proportion of the population above 65 years is increasing, more people will need healthcare, causing costs to rise (Butter et al., 2008). This, in combination with the expected shortage of healthcare personnel and the need for higher quality care, makes that robotics will become relevant in the healthcare industry (Katevas, 2001).

Another reason why social care robots could be of high value for the healthcare sector is because they can fight loneliness among elderly. Loneliness among elderly is a problem that is being seen a lot nowadays. From a study by the Dutch Ministry of Health, Welfare and Sport (2016), it has appeared that over thirty percent of the Dutch elderly feels lonely from time to time. This is a significant problem, because feeling lonely increases the chance of increased blood pressure, stress and depression (Luo, Hawkey, Waite & Cacioppo, 2012). Besides that, lonely elderly are fourteen percent more likely to die early than the average person (Luo et al., 2012).

According to several studies, social care robots could possibly be a solution to this problem (Broekens et al., 2009).

Another aspect in which the relevance of social care robots is shown, is with the current Covid-19 pandemic (Vervaeke, 2020). Because Covid-19 is highly contagious, robots are of high value: they cannot carry the virus (Vervaeke, 2020). Several experts in China praise the evolution of the robots in this turbulent period (Vervaeke, 2020).

## 3. Methodology

The conducted interviews for this report have been divided into different topics, of which the following are the most relevant for this study: 'the degree of acceptance of social care robots', 'the social capacity of the social care robot', 'the physical appearance of the social care robot' and 'the takeover of tasks of the employees of healthcare institutions'. These topics should all help to create

better understanding of what actions can be taken to increase social care robot acceptance (Rosenthal-von der Pütten & Krämer, 2014). Apart from these topics, in this report the theme 'voice/language' will also be evaluated.

To answer the research question as accurately as possible, four interviews have been conducted. The first interview that has been conducted, concerns a female single senior. Her perspective would be the most valuable one: it concerns the target audience.

The second interview concerns a female employee of the healthcare institution 'TalmaHof' in Emmeloord, The Netherlands. This interview is important, because it gives an insight in the perspective of healthcare professionals about the evolution of the robots and the impact on elderly. The third interview concerns a male relative of a single senior. Since he has a close bond with the single senior, he should be able to make an accurate estimation of their needs.

The fourth and last interview concerns a female specialist of the RUG. Since she has done several studies about this subject, her knowledge would be useful for the validity of this study.

The data collected from the interviews will be analyzed by using the 'coding' technique, using the application atlas.ti. This will be done by labeling sentences as open codes, axial codes and selective codes (Blumberg, Cooper & Schindler, 2014). Using these codes, tree charts will be created. These tree charts can be found in appendix 2 of this report.

These tree charts summarize the important aspects of the conducted interviews. The outcomes of the tree charts will be taken into the results section, which forms the basis for the conclusion of the research paper.

## 4. Results

### 4.1 Results interview single senior

For the value of the study, the first interview, with a single senior, has been one of the most value-adding ones, since this concerns the target audience of the product. The interviewee says to be positive about the upcoming innovation, but yet does not know much about it. She is positive about the idea itself, but has some serious doubts about the added value and she thinks the robot will be unaffordable for most of the elderly. Since the interviewee is part of the so called 'late majority', she will only accept the product if acquaintances of hers use it as well. In contradiction to this, the interviewee says she is sure she will not use the robot as long as she has a good mental and physical health. If her mental condition will get worse, she would be open to being helped by a social care robot.

As for subjects about the physical and social state of the robot, the interviewee says the robot should stay a robot and should not become too human-like. To support this meaning, she gives the argument that she is sure she will not connect with the robot; she would like to have a few conversations with the robot, but only when she feels lonely.

Concerning the voice of the social care robot, the interviewee prefers a female voice over a male voice, and would like to hear some emotions in the voice. However, the interviewee also said that she still wants it to be a robotic voice, because it should not be too human-like. To this conflict, she has given a solution herself: she would like the robot to be able to speak with different pitches, so it would be a robotic voice, but yet sound a little human-like.

According to the interviewee, the length of the robot should not be too small and not too tall. She does not give a more specific indication about her perception on the ideal length.

At the end of the interview, a situation was proposed in which social care robots would take over tasks of healthcare personnel. The response of the interviewee was, that she does still prefer human

contact above contact with a robot, although she thinks that it would be useful if social care robots could take over a number of tasks.

#### 4.2 Results interview employee of healthcare institution

In the second interview, with the employee of the healthcare institution 'TalmaHof', the way in which elderly socially connect with the robots has been covered. TalmaHof makes use of interactive cats, which will thus differ in some topics in comparison with the human-like robots. At this institution, one of the conclusions that the interviewee gave several times is that the robots serve as a point of contact for the elderly. What she sees on a daily basis is that the elderly have the urge to take care of the robots. Because of this, the elderly would be able to create a close bond with the robots, according to the interviewee.

Furthermore, the interviewee has noticed that women like the robots more than the men do. She can't explain what causes this situation: 'it could be that the male side of the elderly is mentally less healthy, or they are too bright and can still see that it is just a toy'.

According to the interviewee, the physical appearance of the robot is an important issue. She believes, that the degree of realness of the robot is what attracts the elderly the most. When talking about the realness, the interviewee alludes to the physical appearance and the actions of the robot. Since the healthcare institution is using interactive cats, this will differ from human-like robots, because it gives another perspective to problems like the uncanny valley theory (MacDorman & Entezari, 2015). The uncanny valley theory is based on the idea of the degree of realness of a robot: as a robot becomes more human-like, one will create an aversion towards it (Mori, 2012). The interviewee says the following about the physical appearance of human-like robots: 'I do think they should look real, but of course not for the full one hundred percent. I think this would scare people'.

Regarding the takeover of some tasks by a robot, the interviewee reacts neither positively nor negatively. Nowadays, the robots are not developed enough to take over significant tasks. However, they do reduce workload a little bit: when the elderly are interacting with the robots, the employees can focus on other – more important – tasks.

The interviewee is not concerned about the evolution of the robots; she does not think social care robots will entirely take over the healthcare industry: 'I do not think robots can bring the same kind of social warmth as human beings, not even in the long-term. I think they would only be useful as an addition to our current workforce.'

#### 4.3 Results interview relative of a single senior

The interview with the relative of the senior has shown that one does not fully understand what the robot exactly does and how it functions yet. According to the interviewee, this mainly has to do with the newness of the product; a new product will at first not be accepted by the majority, since few people actually understand how it should add value (Easingwood, Mahajan & Muller, 1983).

Concerning the voice and social appearance of the robot, the respondent indicates that there are several ways possible to look at these subjects and the elderly thus will have varying wishes and needs. Besides that, the interviewee names it important how the robot is being programmed: does it induce the feeling of genuineness, or does it only provide automated answers. Furthermore, the interviewee says the voice should sound as natural as possible: 'the more the robot has got a robotic voice, the stranger the experience for the elderly'. He believes that this will enlarge the social gap between human and robot.

The relative has a similar meaning concerning the physical appearance of the social care robot: he thinks it should look as natural as possible, in order to make it more likely that the elderly will bond with the robots. As a final point of interest concerning the physical appearance, the interviewee

names that the robot should be considerably smaller than humans, in order to increase the possible acceptance.

Regarding the takeover of tasks, the interviewee has a clear opinion: the robot should not be seen as a replacement for the current workforce in healthcare, but as an addition to them.

#### 4.4 Results interview specialist

The interview with the specialist from the RUG has shown that elderly, in a couple of years, will not have a choice concerning who of what will take care of them. Because of the increasing lack of employees in the health sector, this scenario will become inevitable (Combes et al., 2018).

However, nearly everyone has a natural preference for the human over the robot (Koay, Syrdal, Walters & Dautenhahn, 2007). According to the interviewee, this is explainable using the ‘uncanny valley’ theory (MacDorman & Entezari, 2015), which has been described in section 4.1. Concerning the matter of elderly feeling less valued when being taken care of by a robot, it is not possible to make any clear statements, says the interviewee. Yet, a study of Čaić, Odekerken-Schröder and Mahr (2018) has shown that robots are perceived less warm and less competent.

As to the voice of the robot, the interviewee says it is an essential aspect influencing the acceptance of social care robots, because the robots are developed to have social competences like talking, listening and responding to questions.

The earlier mentioned theory of the ‘uncanny valley’ also takes stand in the topics about voice and physical appearance. According to the interviewee, this shows a difficult situation. On the one hand, it is easier to simulate a human interaction when the robots has some human elements, but on the other hand, this could lead to an aversion. Furthermore, in the interview it has been named that literature has shown that one does like it, when a robot has some characteristic of the person itself (Rosenthal-von der Pütten & Krämer, 2014; De Graaf, Allouch & Van Dijk, 2015; Woods, Dautenhahn, Kaouri, Boekhorst & Kaoy, 2015). The specialist, however, asked herself if the robot should indeed look like the person itself, or if it should look more like a healthcare professional. Since the robots should perform tasks that are usually performed by healthcare professionals, it is likely that this will increase the degree of acceptance of the social care robots, according to the interviewee.

Regarding the last topic, the takeover of tasks by the social care robot, the specialist says that the robots are not expected to take over jobs in the industry: they would be an addition to the current workforce.

	<i>Acceptance</i>	<i>Physical appearance</i>	<i>Voice</i>	<i>Task takeover</i>
<i>Single senior</i>	Positive, but has some doubts about affordability and added value.	Should look like a robot, not too much like a human being.	Robotics voice, but with some human aspects like pitches.	Could be useful, but still prefers human contact.
<i>Healthcare employee</i>	Elderly have the urge to take care of the robots and create bonds.	Depends on the kind of robot: animals should look real, service robot should have a more robotic appearance.	X	Robot are not sufficiently developed to take over many tasks. Yet they do reduce workload.

<i>Relative</i>	One does not fully understand how it works yet.	Should look as natural as possible to make bonding more likely.	Elderly will have varying wishes, though, according to the relative, the robot should have a human-like voice	Robots should be seen as an addition, not as a replacement.
<i>Specialist</i>	Robots don't feel as warm and competent as humans, so people will have a natural preference for the human over the robot	Uncanny valley should be considered. There would be a possibility to make it look like a healthcare professional.	Uncanny valley should, again, be considered. The voice is essential in increasing acceptance.	Robots are not expected to take over jobs, they would be an addition.

Table 1: Overview results

## 5. Conclusion

To answer the research question, stated in section 1, a qualitative research with four different perspectives has been conducted. One can conclude, that the stakeholders partly agree and partly disagree on the different topics and the comprehensive subject of social care robots.

As to market factors of the robot, the low sales can be explained by two factors: the interviewees name the price and low added value as main negatives. Furthermore, one currently still prefers human social contact over robotic social contact, as can be seen in the interviews.

Regarding the opinion about the voice of the robot there are some disagreements between the interviewees. The relative of the single senior and the employee of the healthcare institution would both like to see a human-like voice, while the single senior would like to see a more robotic voice and the specialist advocates a mix of the two. The voice should also contain emotions, according to the single senior and the relative. As to the physical appearance of the robot, the interviewees have mostly non-corresponding opinions. The healthcare employee thinks it depends on the nature of the robot; whether it is an animal or a service robot. The relative of the single senior thinks it should look as human-like as possible to make bonding more likely and the specialist and single senior are more stuck in the middle and say it should have aspects of both a robot and a human. This corresponds to the uncanny valley theory (Mori, 1970).

Finally, all the interviewees expect that the social care robots will not take over complete jobs in the healthcare sector, but will only serve as addition to the current workforce.

Regarding the practical value of the study, the results could be useful for the developers of social care robots. By using the results stated above, the acceptance among elderly could be increased, leading to a higher usage and impact of social care robots in the healthcare industry.

## Appendix 1: Transcripts (Dutch)

*Transcripts of the interviews have been left out of this report because of privacy considerations.*

## Appendix 2: Tree Diagrams (Dutch)

### Boomstructuur interview specialist

#### Selectieve code: toekomst robot

Zorgrobot gaat in de toekomst veel gebruikt worden door ouderen

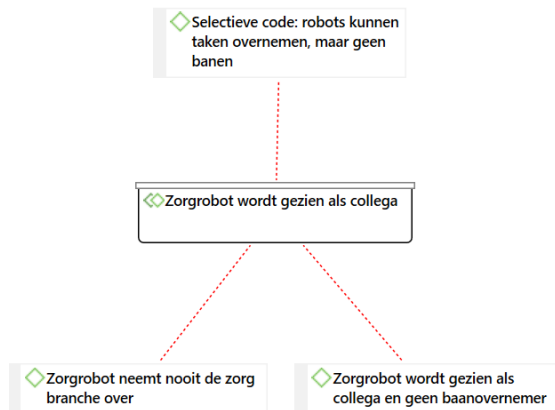
Veel veranderingen in de zorg

Onzekerheid bij gebruik robots



#### Selectieve code: robots kunnen taken overnemen, maar geen banen

Zorgrobot wordt gezien als collega





## Selectieve code: argumenten gebruik robot

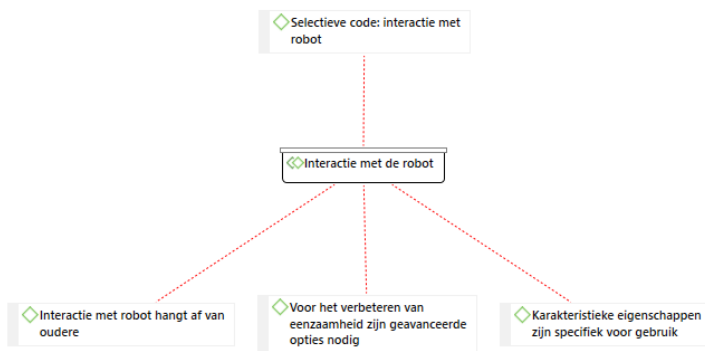
Argumenten voor aanschaffen robots

Argumenten tegen aanschaffen robots



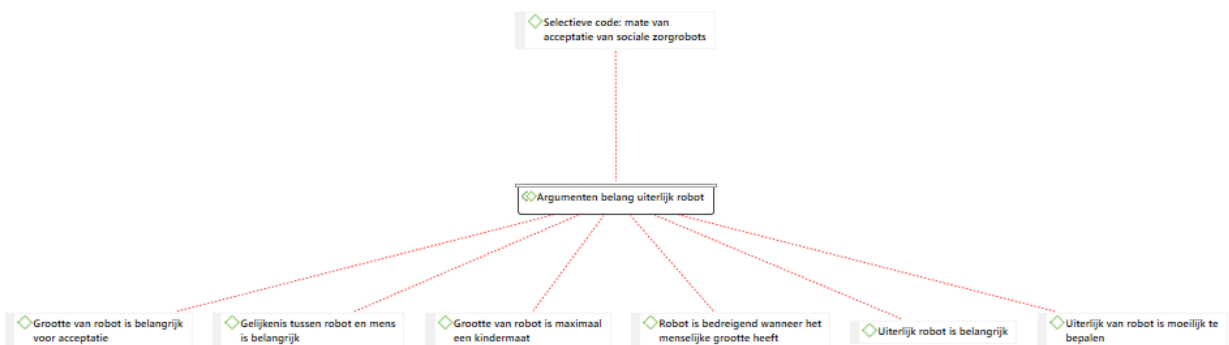
## Selectieve code: interactie met robot

Interactie met de robot



## Selectieve code: mate van acceptatie van de robot

Belang uiterlijk robot

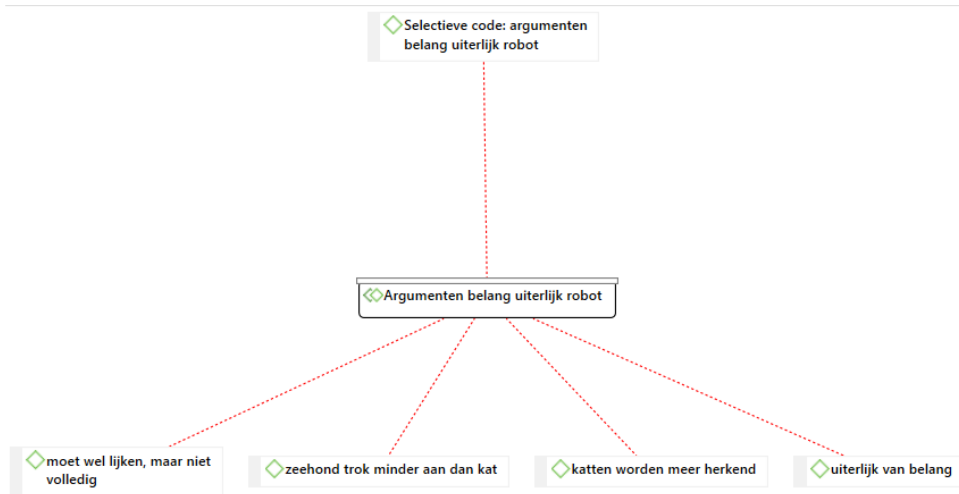




## Boomstructuur interview zorginstelling

### Selectieve code: argumenten belang uiterlijk robot

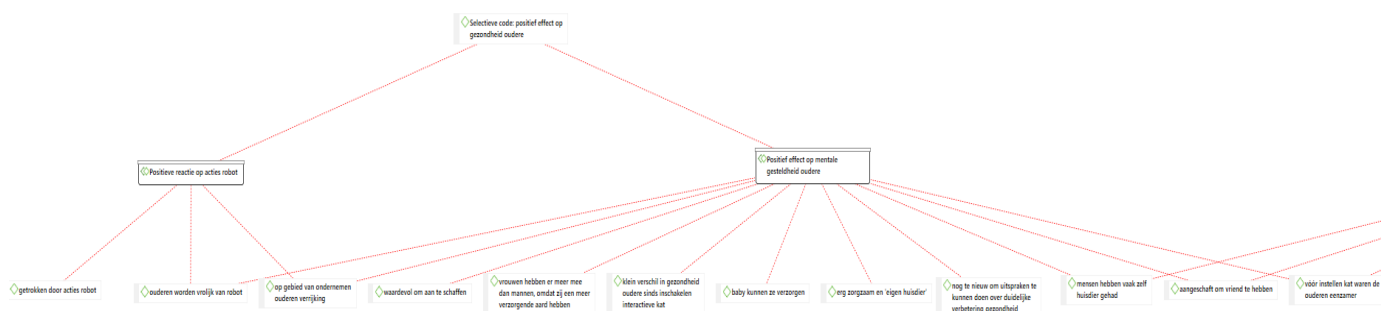
Argumenten belang uiterlijk robot



### Selectieve code: positief effect op gezondheid oudere

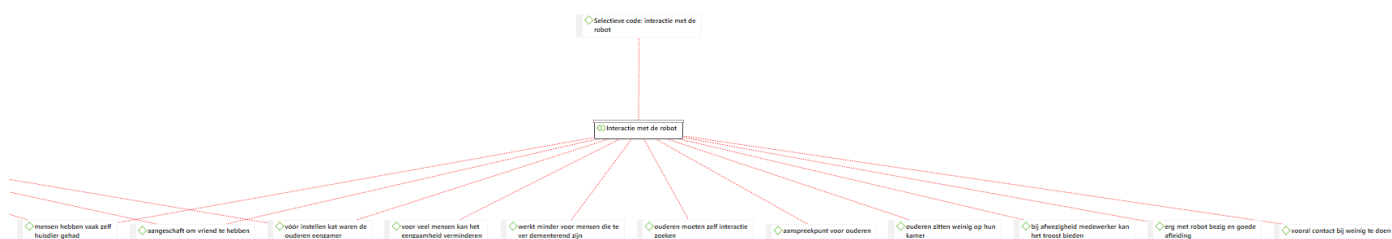
Positieve reactie op acties robot

Positief effect op mentale gesteldheid oudere



### Selectieve code: interactie met de robot

Interactie met de robot

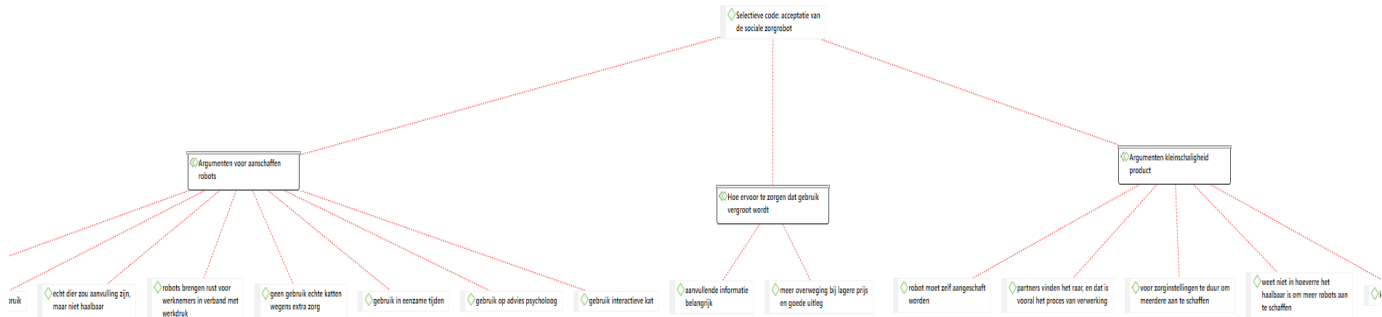


## Selectieve code: acceptatie van de sociale zorgrobot

Argumenten voor aanschaffen robot

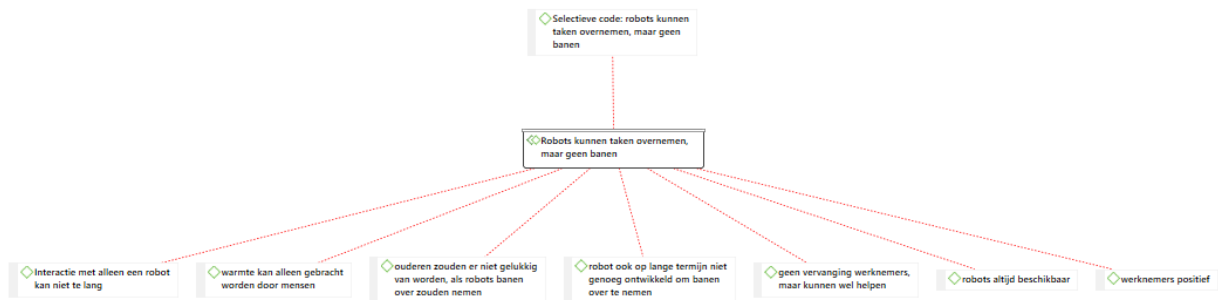
Hoe ervoor te zorgen dat het gebruik vergroot wordt

Argumenten kleinschaligheid product

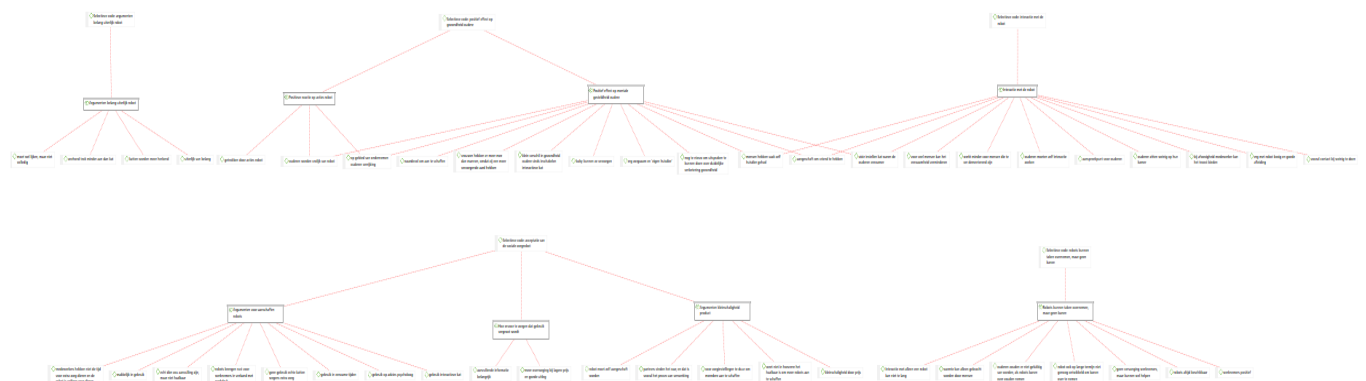


## Selectieve code: robots kunnen taken overnemen, maar geen banen

Robots kunnen taken overnemen, maar geen banen



## Alles samen:

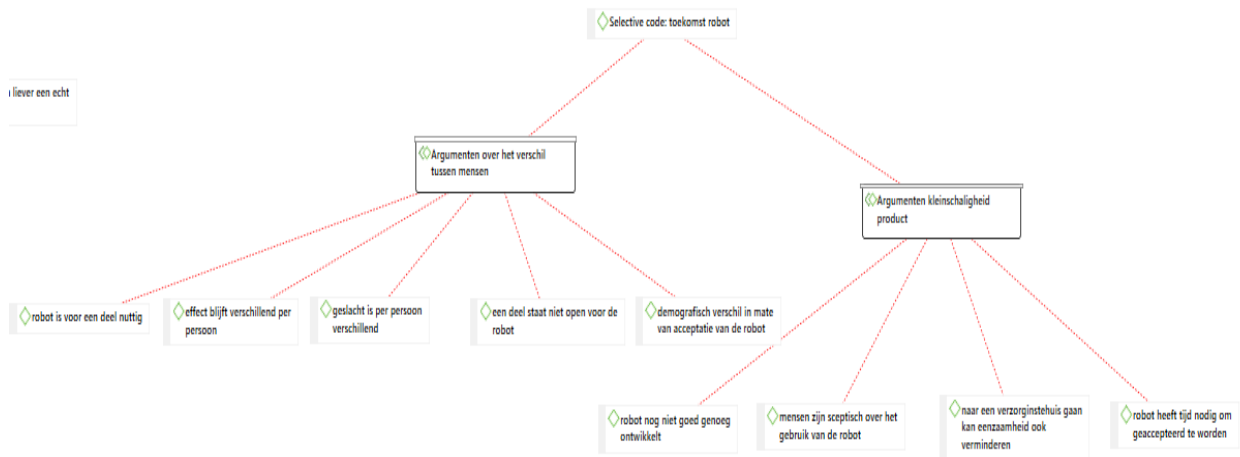


## Boomstructuur interview verwante

### Selective code: toekomst robot

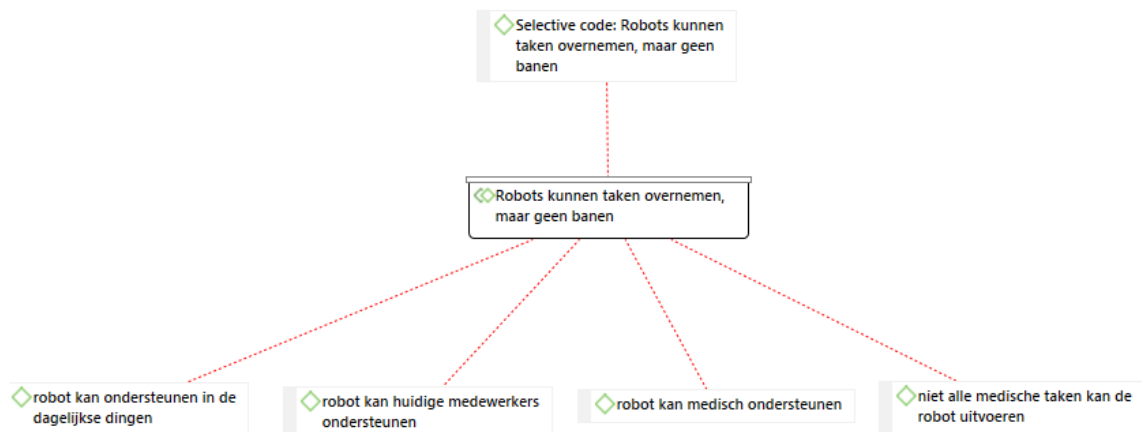
Argumenten over het verschil tussen mensen

Argumenten kleinschaligheid product



### Selective code: Robots kunnen taken overnemen, maar geen banen

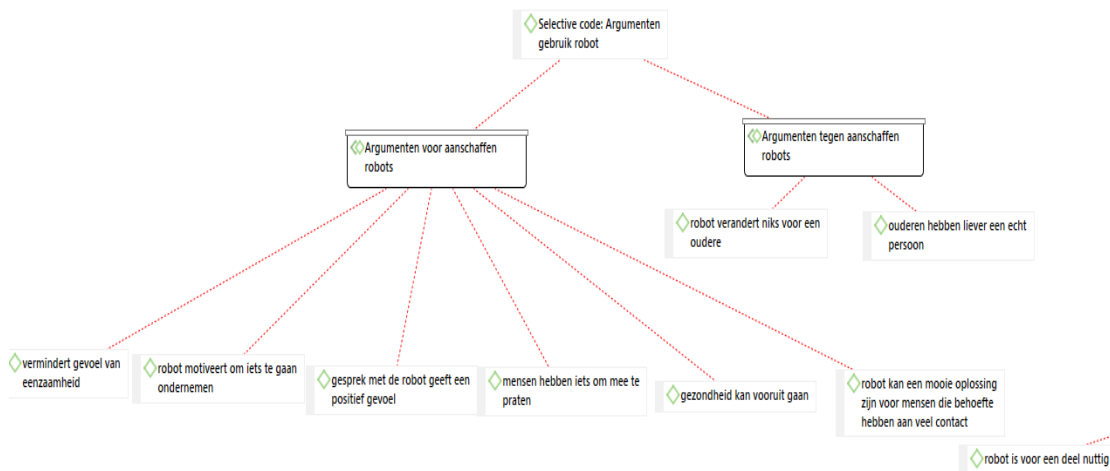
Robots kunnen taken overnemen, maar geen banen



## Selective code: Argumenten gebruik robot

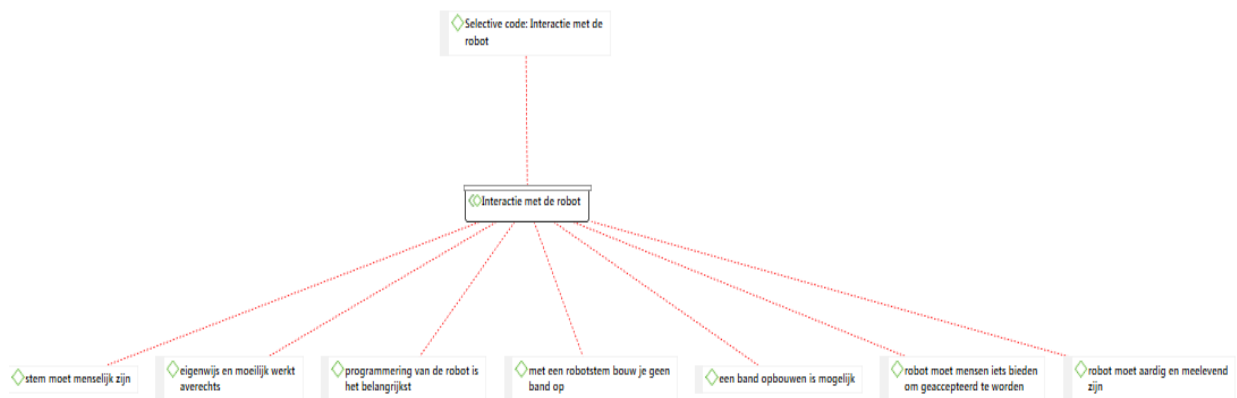
Argumenten voor aanschaffen robots

Argumenten tegen aanschaffen robots



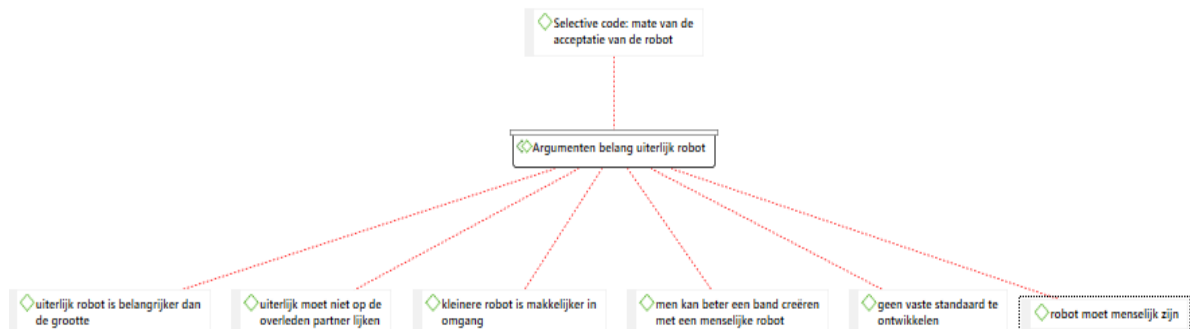
## Selective code: interactie met de robot

Interactie met de robot

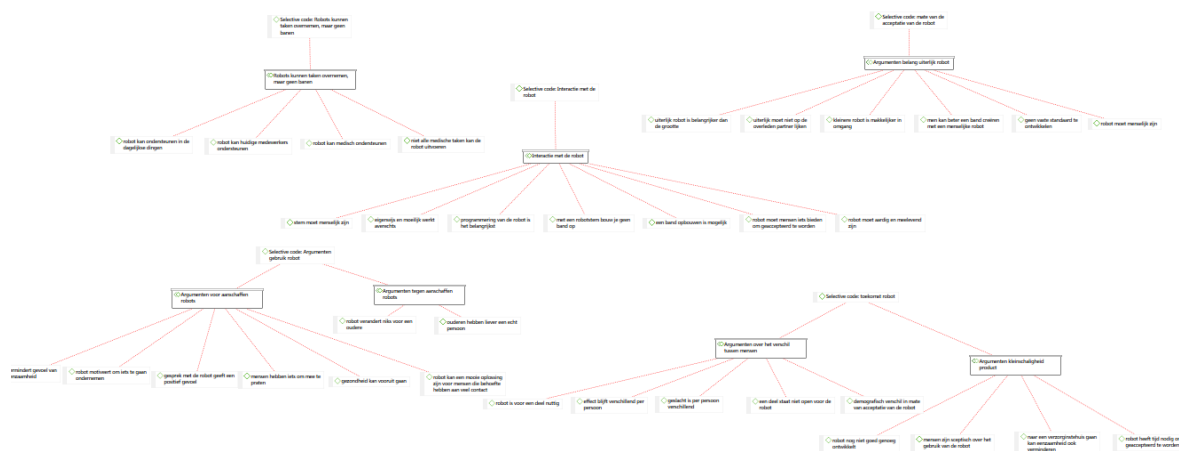


## Selective code: mate van de acceptatie van de robot

Argumenten belang uiterlijk robot



# Alles samen

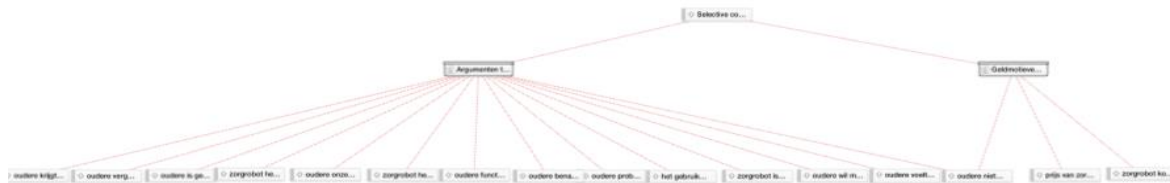


## Boomstructuur interview oudere

### Selectieve code: acceptatie met betrekking tot aanschaf robot

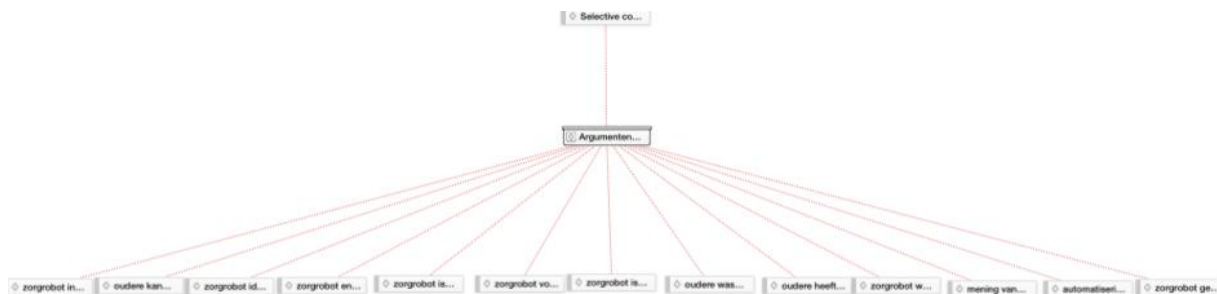
Argumenten tegen zorgrobot uit perspectief ouderen

Geldmotieven bij aankoop zorgrobot



### Selectieve code: argumenten voor aanschaf zorgrobot uit perspectief ouderen

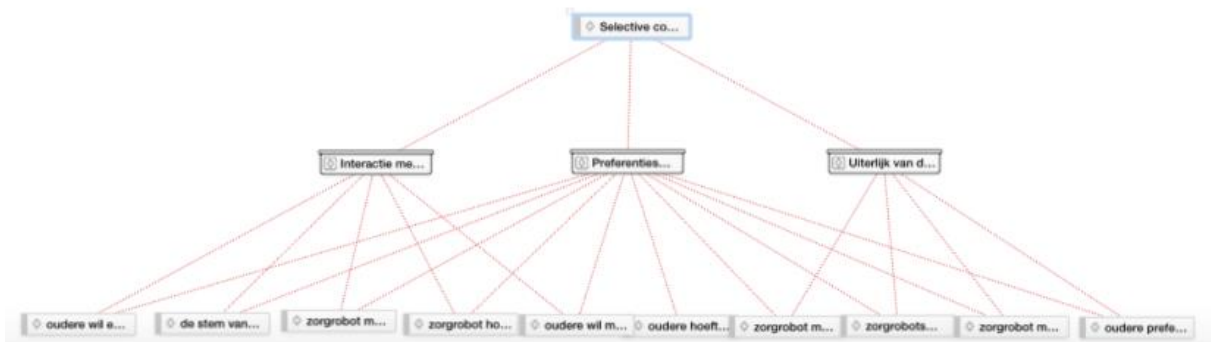
Argumenten voor aanschaf zorgrobot uit perspectief ouderen



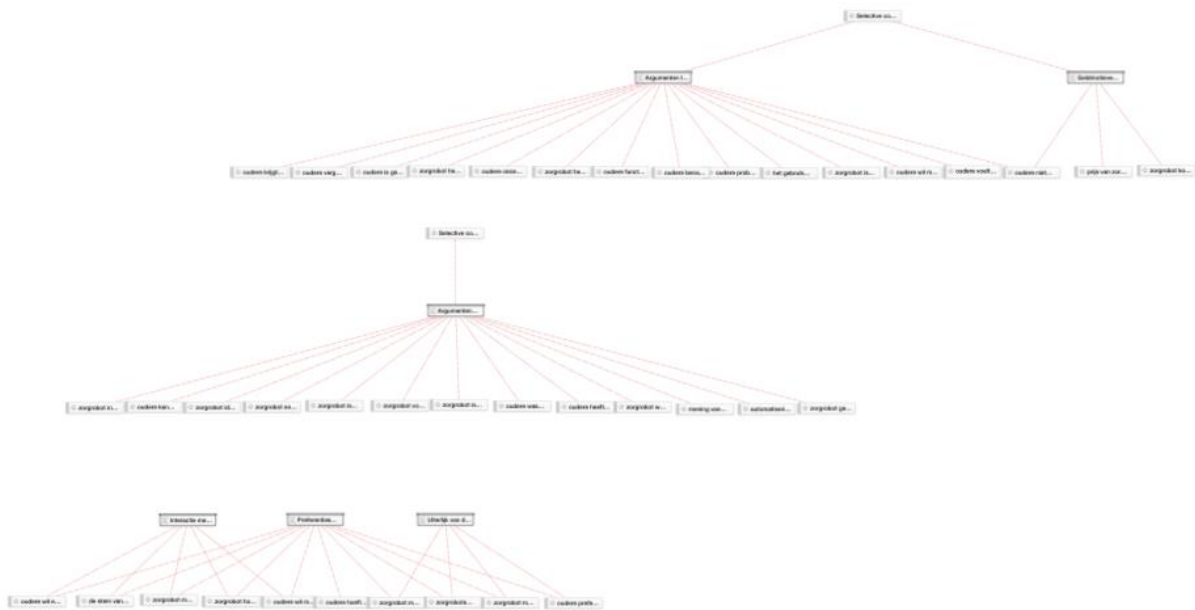


## Selective code: preferente eigenschappen bij zorgrobot

Interactie met de zorgrobot  
Preferenties bij de zorgrobot  
Uiterlijk van de zorgrobot



Alles samen:



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