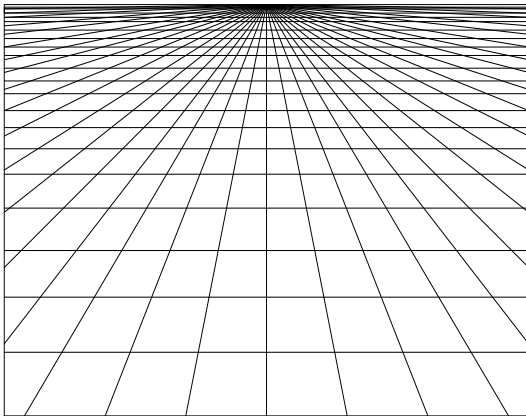




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# **Do Elders Dream of Electric Seals?**

A SCOT analysis of the mental commitment robot PARO in elderly care

Per Lyder Pedersen  
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Science and Politics in Controversies on Nature  
2011  
Word Count: 24800

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## Abstract

This study is a contribution to the public debate about demographic challenges caused by an increasing elderly population and lack of professional care to support them. The Norwegian Technology Board has given some advice towards a future health care for elders, among them supporting the implementation of robot technologies. One robot that is in use already at Norwegian elderly care centres is a social robot shaped as a seal puppy with thick white fur and big black eyes; the mental commitment robot PARO. Especially elderly demented people are said to calm down and become more socialised if the robot is present.

The thesis sets out to investigate how the mental commitment robot PARO has been interpreted and adapted by different groups at residential and treatment centres for people with dementia; which ethical aspects emerge when a robot like PARO is introduced or evaluated in elderly care; and finally how does the introduction of PARO in elderly care influence care practises and knowledge?

The descriptive framework, Social Construction of Technology (SCOT), by Wiebe Bijker and Trevor Pinch is the main theory in use to answer these questions. The thesis analyses how relevant social groups form and interpret the technology, demonstrating the interpretative flexibility of the robot. This flexibility comes from social negotiations among the members of different social groups, more than technical properties of the artefact. The empirical material was collected through semi structured interviews of sixteen respondents working at dementia care centres, distributors, and governmental advisory organisations. The study is approved by the National Data Protection Official for Research (NSD), given the project number 24540. NSD has demanded that sites and people described in this study are kept anonymous; protecting the vulnerable group of demented elders.

The SCOT analysis has revealed that the robot is interpreted in a wide range of different ways. Major solutions the robot fulfils are that it calm down elders, it increases social contact and is a new distraction that makes the caregivers more observant towards the elders, enabling the carer to see the elder in a new way. Major issues with the robot are that it is highly expensive equipment, stigmatising in some situations and creates a risk of deception due to its animal characteristics. The thesis concludes that a traditional caring paradigm competes with a new robot care paradigm. However, the caregiver and the social factors are crucial elements to why the robot works so well at some places, while not working in other situations.

Key words: Social robots, PARO, SCOT, Dementia, Elderly care



## Preface

The inspiration for this thesis comes from the documentary “Mechanical Love” and news articles presenting a seal puppy robot entertaining demented elders. Both the documentary and the articles show how easy adults feel affection and love for a machine, a new kind of role I find highly relevant to analyse (Ambo, 2007). For me, social robots recall science fiction stories, a topic this thesis departs from. My academic background is from mechatronic engineering. I am trained to design robotic systems and automatic machines where the system shall fulfil a set of predefined requirements. The lectures in Science and Technology Studies (STS) gave a deeper understanding of how the social and the technical co-evolve in a multitude of ways, sometimes for the better and sometimes for the worse; but impossible to predefine in a set of system demands. In October 2011 when most of this thesis was written, I found a new book that actually discusses the psychological aspects relational robots bring with them. The book “Alone together: Why we expect more from technology and less from each other”, written by Sherry Turkle (2011), has therefore influenced the conclusions in this thesis. However this is not a thesis giving advice for best practises in milieu therapy for elders with dementia, it is a thesis focusing on the professional caretakers and their choice to use this robot in their practice.

I have to pay my gratitude to every respondent that has participated in this study and accepted me at their workplace with open arms; unfortunately I cannot state their names since that would compromise the promised anonymity, but thank you all! I am also grateful for all support given by my advisor Göran Sundqvist; fellow students and friends for inspiring discussions; my whole family for backup and support; and CH; I could not have done this without your encouragement.

Per Lyder Pedersen

Oslo, November 11<sup>th</sup> 2011



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## 1 From Science Fiction to Electronic Pets in Elderly Care

You know how people are about not taking care of an animal; they consider it immoral and anti-emphatic (Dick, 1996, p. 13).

In the novel “*Do Androids Dream of Electric Sheep?*” Philip K. (Dick, 1996) portrays a dystopian world after the great world war Terminus where most people have been emigrated to the planet Mars on the initiatives of the authorities. To support the emigration each terrestrial traveller was given an android as a slave, a machine that has the presence of a human in all ways except the ability to feel real empathy for others. For the remaining people on earth, a forceful value residing within this community is the ability to show empathy for others, especially animals. In this dusty and destroyed world animals are on the verge of extinction, and unable to sustain themselves without humans taking care of them.

The main character, a bounty hunter employed to terminate roaming androids<sup>1</sup>, dreams of again owning a real animal after the first one died abruptly, but cannot afford one. A new market exists where electric animals are traded by false-animal shops and repair firms, camouflaged as pet stores and veterinarians. In danger of being seen as an immoral person among the neighbours and not wanting to hurt his wife’s feelings, he decides to have a mechanical replica made of their old diseased sheep.

-He ascended clad for venturing out...to the covered roof pasture whereon his electric sheep “grazed”. Whereon it, sophisticated piece of hardware that it was, chomped away in simulated contentment, bamboozling the other tenants of the building (Dick, 1996, pp. 8-9).

The other tenants do not know that the sheep is an electric one, not even his wife who adores the sheep so much. “He wished to god he ... in fact had any animal. Owning and maintaining a fraud had a way of gradually demoralizing one” (p. 9).

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<sup>1</sup> The science fiction novel was first published in 1968 and questions the difference between humanity, robots and empathy. The novel was commonly known through the movie Blade Runner. Terminating androids means to kill escaped robots that once has killed their owners and returned to earth.

## 1.1 Robot PARO in Norway

In February 2010, the National Nurses Organisation (NNO) member magazine *'Sykepleien'*, gave a story where a seal puppy, a robot pet, is entertaining elders with dementia (Block Helmers, 2010). On the south east coast of Norway, a caring centre for demented elders bought from Denmark a robot, PARO, and uses it as social stimuli and behavioural therapy for the elders living at the centre. In the article the manager claims that agitation decreases when using the robot, reducing the need for medication, while the communication also increases among the elders when the robot is in use. In the article it is described that the centre has one employee that is certified to use the robot and train others, an education that was given in Denmark where several robots are in use (Block Helmers, 2010). At the same period both tabloid newspapers and television news describe this new technology in elderly care with focus on its medical and calming effects (Gunnensen, 2009; Halleraker, 2010).

Project manager, Åse Kari Hauketo, at the Norwegian Board of Technology states in a newsflash on TV 2 that “as we see from this robot seal, it is a supplement to human care and some people have a joyful

experience with it” (Gulbrandsen, 2009).

At the same time as this news came out,

the Norwegian board of technology had given governmental advices regarding best use of new technology in care services, and what type of public policy is needed to meet future challenges in elderly care (Teknologiradet, 2009).



Figure 2 The seal PARO calms the patients.  
Photo: TV 2.

### 1.1.1 Pet Ownership and Animal Assisted Therapy

The idea that affective relationships exist between the animal and its owner was not only a controversial theme described in science fiction literature in the end of the 1960's. Pets' positive psychological and physiological effects on patients however, were not generally accepted until the end of 1970's according to (Shibata, Inoue, & Irie, 1996). As also Anthony L. Podberscek states, "existence of relationships with beings outside this 'strictly' human domain was either denied or dismissed as aberrant" (Podberscek, Paul, & Serpell, 2005, p. 2). Finally "in 1979, a program called " The People-Pet Partnership Program (PPP)" was officially recognised at the Washington State University to mark the beginning of research related to how animals can help human beings" (Shibata et al., 1996, p. 467).

Some empirical studies on Animal Assisted Therapy (AAT) conclude that reduced loneliness and increased socialisation can be measured. Marian and William Banks presented in *Journals of Gerontology Series A* that at least persons having a life-history of emotional intimacy with pets can have a desire for AAT when staying in long-term care facilities. AAT is for instance measured to reduce loneliness for this group of persons (Banks & Banks, 2002). In Norway this type of service is, among others, offered through the Norwegian Organisation for Animal Assisted Therapy, NODAT (Nodat, 2011).

Holding pets at long-term care facilities raises several questions. Who shall be the responsible caretaker of the animal, the nurses or the elders? Do people with dementia or other cognitive limitations hold the ability for proper care of animals? Or how to limit the possibilities for bacteria and animal carried diseases, combined with the challenge to prevent allergic reactions?

### 1.1.2 Robot Pet Design

Inspired by the theories of AAT, the Japanese scientist Dr. Takanori Shibata started in 1993 to work on an idea to create “commercial robots that could become people’s lives” (Shibata et al., 1996; Shibata, 2007, p. 21). He approached the task by investigating psychological reactions on people interacting with animated toys, in search for an animal shape that did not create any preoccupied expectations on animal behavioural patterns. Finally the decision was to use the shape of a new-born seal, constructing a personal assistive robot, PARO, able to interact and produce social and psychological connection from the person interacting with it<sup>2</sup>. Results from cognitive tests performed by the designers claim restored brain functionality in patients with Alzheimer disease, and multi country surveillance states that communication and sociability factors are increased within the groups using the robot (Wada, Shibata, Musha, & Kimura, 2008). Dr. Shiabata describes the robot as “a mental commitment robot, which aims to engender mental effects, such as pleasure and relaxation, in its role as a personal robot” (Shibata & Wada, 2010, p. 4).

## 1.2 Organisations are Critical Toward Use of PARO

NNO by Jan-Erik Nilsen, express their concerns “that the technology must not devalue people with dementia or treat them as children”. Nilsen also emphasises that “the ethical debate need to be held on a high level and be the driving force in selection of a technology like this”. He further claims that “nurses has to be in the driving-seat when making decisions for acquiring a technology like this, to prevent unit managers and institutions to be seduced by strong marketing forces” (Bloch Helmers, 2010 p. 45). On the opposite side of the table

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<sup>2</sup> Social robots are designed to interact with humans, either to give assistance with dedicated tasks like vacuum cleaning, entertainment and comfort like electronic pets, or communication robots shaped as androids.

the Norwegian association of local and regional authorities (KS), by Trude Andersen, claims that “caretaking technologies shall not replace human contact, but might be a good supplement” and claim that “the intention is not to remove people from their work positions, but more use the workforce the right way” (Block Helmers 2010). The journalist Block Helmers presents in her article the conflict of what is considered important in the selection of aims to provide good care, more technology as fronted by KS or a critical evaluation of possible solutions as stated by NNO.

### 1.2.1 Innovation and Technology, Can it Solve Future Health Issues?

The National Employer Organisations (NHO) and KS drive the debate on a more general level where welfare technologies<sup>3</sup> are seen as a solution to the future demographic challenges coming with an increased elderly population and a decreasing workforce. A debate that has been taken to the public market place by the report *Mapping of needs and possibilities for use of robot and sensor technology in the health and care sector* ordered by KS and NHO (Holbø et al., 2009) and the report *Future Aging and New Technology* ordered by the Norwegian Board of Technology (Teknologirådet, 2009). Both reports can be seen as part of the national reformation process “*The Coordination Reform*” within the health and care sector, initiated by the government (Report no. 47 (2008-2009)). A new committee *Innovation in Care* was set to investigate innovative and technological solutions towards the future challenges in care, and suggested in spring 2011 five more measures to be taken. Among the technology oriented suggestion, also asking to downsize the focus on technology alone, while promoting a second coordination reform called *near care* or *close care*. Suggesting a type of care co-produced in the society where care is made through co-citizenship with families and local communities,

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<sup>3</sup> With welfare technologies means first and foremost technological assistance that increases security, safety, social participation, mobility and physical and cultural activity, and enforce each owns ability to maintain its self in the daily life despite sickness, and social, psychic, or physical reduced mobility...(NOU 2011:11)

and social entrepreneurship<sup>4</sup> where focus is not only on technology or economy, but also the people involved through knowledge, politics and innovation (Report no.2011:11).

## 1.2.2 PARO in Denmark and the Ethical Debate

The Norwegian carers using PARO received training from Denmark according to DTI (Gaedt, 2009b; Institut, 2010a). In Denmark the usage of PARO was tested and later in 2008 introduced on a national level where approximately one hundred units<sup>5</sup> are in use at different institutions (Shibata & Wada, 2010; Institut, 2010b). Because of this, the Danish Ethical Board started a public debate focusing on new intelligent technologies moulding human biology and mechanical artefacts<sup>6</sup> more and more together. The debate was organised with public hearings and local debates across the country and ended in two official statements from the Board; one in relation to Social Robots and one about Cyborg Technology; Information and computer systems integrated with the human brain and the central nerve system (Birkholm, Agger, Jensen, Øhrstrøm, & Laursen, 2010).

The board highlighted three ethical questions to consider in usage of social robots as relational technologies. The first question addresses how relational bonds and intimacy limits change when humans and robots start to socialise and create emotional relationships with each other. The second question asks to what level it is ethically problematic when social robots are getting more humanised through their look, communication and behaviour. In this way they pretend being independent, feeling and acting as if they are human beings. The third question focus on what it will imply if social robots have the ability to learn from their own

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<sup>4</sup> Social entrepreneurship has a goal to increase social growth and stabile change in the society, not maximum profit. (NOU 2011:11)

<sup>5</sup> In autumn 2011 DTI reports that approximately 200 units are now deployed in Denmark.

<sup>6</sup> Artefact is in this context a description of any man-made object like a tool or art. The word origin from latin phrase *arte factum*, from *ars* skill + *facere* to make (artefact. (n.d.)). In many citations the word *artifact* is also used.

experience and act within a limited degree of freedom (DoF); this meaning the ability to select an action based on several alternatives where the choice is not entirely set by the internal system, algorithms, and other technologies given by the producer (Birkholm et al., 2010). In “*Do Androids dream of Electric Sheep?*” this issues was played out in full, but then as a science fiction scenario. Will these questions only remain valid in dystopian literature, or are they now valid to discuss for real?

### 1.3 Questions Emerging With Use of Mental Commitment Robots

Which conclusions can we draw from the questions above? The journalist Anne-Kristin Block Helmers asks some of these ethical questions. While some are more focused on increasing the usage of technology, such as KS and NHO, the organisation NNO is concerned with solving future demographic problems with technology only. Science fiction literature presents robots as a dystopian creation while designers see it as a good replacement for animals and pets. At the present time, year 2011, several robot-seals<sup>7</sup> are active in Norway and seem to be accepted at elderly caring centres despite ethical concerns and claimed resistance towards technology. It might be due time to ask how they are received and how the users interprets robotic technologies in caring practises.

The focus in this thesis is on the personal assistive robot PARO and the people using it in their daily work as a new technology in care practises. In the introduction several views of what robots are has been described. From the dystopian androids to electronic animals shaped as seal pets; social machines that might have moral implications, while also fulfilling a need carers consider important.

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<sup>7</sup> The seal-robots are able to learn a given name from their owners, like Snorre, Paro or Jytte. The robot is distributed in Norway by the supplier organisation, Competency centre for restructuring of municipalities (RO). RO is a non-profit foundation consisting of several advisors that assist municipalities in innovation and restructuring in relation to health and care services.



In the discussion of future demographic challenges towards healthcare, technologies gain a significant position in solving them. An interesting topic that emerges in relation to robots and healthcare is therefore how the adaption processes has proceeded after the robot PARO was bought and introduced to the local caring centre for demented elders. Do robots and in particular technologies with artificial intelligence (AI) raise moral questions as stated by the Danish Ethical Board, or do they challenge moral values causing resistance towards them? Does PARO have the ability to change the attitudes and behaviour of people, and how do the involved social groups, like trained health workers, the elders and others meet this type of technology?

#### **1.4 Research on Robots Interacting With Humans**

In general, research on robot technology interacting with humans is novel and “they still miss much of the complexity of social life” (Oost & Reed, 2011, p. 14), at least research on robots outside the laboratory. For instance in 2009, the scientific publisher Springer established a new periodic publication called *International Journal of Social Robotics* to cover this new emerging field (Ge, 2009).

Broekens, Heerink, and Rosendal (2009) have analysed a selection of articles documenting the effects of social robots in use with elders and state: “In medical journals only a few articles were found, whereas about 50 publications were found in literature on ICT and robotics” (p.94). Published research in relation to social robots like PARO, focus on the cognitive and social effects these have on elders at institutions. Broekens, et al. categorise the available studies in several topics as well as which effects the introduction of robotics had on the core group, categorised as: “Positive, undetermined or no effect” (Broekens et al., 2009, p. 99). However, four patterns limit the validity of these results according to Broekens. First

of all, the majority of the studies are with the dog AIBO and seal PARO companion robots only, limiting the possibilities to generalise since experiments with other types of assistive social robots have not been published. Secondly, the majority of studies have been done in Japan, limiting the validity for other cultures. Thirdly, the studies performed are practically only at nursery homes, not with elderly living in their own home. Finally, the methodologies applied on the studies are not robust enough with lack of good control conditions (Broekens et al., 2009, p. 101). In healthcare, verified results from evidence based research is a core requirement to approve new technologies or methods (Laupacis, Feeny, Detsky, & Tugwell, 1992). However, not only rational arguments steer the choice for which and how technologies are used. The social perspective is also important to consider.

Academics enrolled in Information and Computer Technology (ICT) studies raise concerns in the usage of technology with AI that responds to emotional behaviour and what consequences this has on humans (IRIE, 12/2006; Veruggio, 2007; Duffy, 2006). Due to this, a new field of ethics has emerged; Robotic ethics. Gianmarco Veruggio defined roboethics (Robot ethics) when he formed the “Scoula de Robotica” to “study the complex relationship between Robotics and Society” (Veruggio, 2011). Robot ethics as a field of philosophy elaborates on the power of the fake and how social robots are able to develop “an artificial system capable of socially engaging people according to standard social mechanisms” (Duffy, 2006, p. 33). The human ability to perceive objects as having a consciousness and “our propensity to anthropomorphise and project humanness into entities that may bear only the slightest resemblance to ourselves is well known” (Duffy, 2006, p. 33).

A researcher that has completed over a decade of work in understanding the social and psychoanalytical context of social robots is Dr. Sherry Turkle. Turkle has been experimenting with a range of robots, toys and electronic equipment designed for human interaction in domestic environments; for instance at nursing homes, kinder gardens, private

homes and other social settings. The robots have ranged from Tamagotchis, Furbies, AIBOs, My real babies, and the seal robot PARO. In the book *Alone Together: Why we expect more from technology and less from each other*, Turkle (2011) describe her research in detail and questions what authenticity, aliveness and humanness is. Based on her experiences with children and elders interacting with social robots, she looks behind the pleased and joyful faces and questions the consequences of people relating to robotic emotions. As seen in vulnerable children easily affected by robots, most need mutual companionship and enter a state of depression or affect if the robot does not recognise them, or reject them during interaction. Due to this, she questions why we propose machine companionship in the first place (Turkle, 2011, pp. 98-99). The possibility for deception is what Turkle raises general concerns about. She looks beyond the arguments that it associates “with pets and the comfort they provide” (Turkle, 2006, p. 2), stating that when elders attempting to comfort the robot, they actually try to comfort themselves (ibid). The robot has understood nothing, only “pushing certain ‘Darwinian’ buttons (making eye contact, for example) that cause people to respond as though they were in a relationship” (Turkle, 2006, p. 2). Turkle uses the word ‘*relational artifacts*’ to better describe these unidirectional bonds that are created. She explains it as «the people who meet relational artifacts feel a desire to take care of them” (p. 3). Turkle juxtaposes her knowledge in clinical psychiatry with science and technology studies (STS), presenting a more symmetric and critical analysis of the positivistic thinking within robotics and ICT communities.<sup>8</sup>

Ellen van Oost and Darren Reed label the view that a technical artefact has certain effects on its users as an “idealized relationship based upon communicative action between two essentially isolated individuals” (Oost & Reed, 2011, p. 11). This view is claimed to be a tradition that is formed by realist thinking and the disciplinary background of ICT. Oost and

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<sup>8</sup> Turkle is inspired by Pinch and Bijker perspectives, among others, and demonstrate the diversity in how robots are interpreted and met by different social groups by drawing on resources from their framework Social Construction of Technology (SCOT) (Turkle 2011).

Reed want to move beyond what they “called a ‘single point’ notion of interaction between human and machine” and suggest to follow Bruno Latour’s statement to “situate the technological artefacts within a broader ‘actor-network’ and prioritise the relational and transformational nature of the interactions between people and things in particular places” (Oost & Reed, 2011, p. 12). Oost and Reed elaborate and use the notion *robots as companions* to describe a “sociological understanding of robots” (ibid). They suggest a methodological framework of Actor-Network Theory (ANT) to investigate how these companions as agents configure their users in social contexts (p. 16). ANT is called a radical sociological methodology and theory claiming that everything influences each other, both objects and humans (Law, 1992); a statement that degrades the border between humans and their machines; now humans, tools and objects are equal and influence each other through powerful networks. This leads to the fact that AI now raises concerns for if there is something distinctively ‘social’ with human behaviour (Woolgar, 1985). This demand for a “Sociology of Machines” states Woolgar (1985): “AI is a technology which provides an interesting test case for attempts to extend approaches in sociology of scientific knowledge to the phenomenon of machines more generally (cf. Pinch and Bijker et al, forthcoming) “ (Woolgar, 1985, p. 567).

Jeneatte Pols and Ingunn Moser study healthcare technologies “as not only functional but also social and affective” (Pols & Moser, 2009, p. 159). They question the proverb “cold technologies versus warm care”, by analysing three different “aspects on how technologies create affection and attachment, through affective values, flexible language and establishment and facilitation of relations with others” (p. 174). Pols and Moser define cold technologies as technologies taken for granted where the “functional rationality of the technologies is put centre stage”. They argue that “technologies both have functions and exist in social and affective relations with their users – positive or negative”. They investigate “how [healthcare

technologies] are actually used in daily life, in order to learn what makes people appreciate them, or not” (Pols & Moser, 2009, p. 162). Relations are revealed and analysed by focusing on three technologies used in care situations, the relational robot dog AIBO, the assistive robot iCat and the medical communication device Health Buddy. The authors argue:

“That there are different relations between people and technologies within different use practices, allowing different affective and social relations, and this blurs taken-for-granted categories such as medical versus social problems, warm versus cold care, play and seriousness, and affective versus rational technologies” (p. 159).

In the case of the robot dog AIBO, the affective values are companionship, friendship, and conversation topics among the elders. Pols and Moser conclude with the robot dog AIBO through the games the robot proposes, “the user is not enacted as somebody who is in need of care: he or she is caring too. Apart from somebody who ‘likes to play’, Mrs. Brown [an elderly patient in the study] becomes somebody who cares“(p. 168).

Where the companion technology triggered love, the assistive technology iCat triggered appreciation as the users see the value of comfort and service. And with the Health Buddy “instead of less care, they felt they got more, if only in a different form” (p. 169). The different values that are enacted by the three different technologies establish different affective connections. Pols and Moser argue that “these relations might be warm or cold, positive or negative, intense or modest, motivating or not for different reasons” (p. 170). The warm care can be given through connections new technologies provide, as the Health Buddy, but also reside within the technology (p. 170). In conclusion they show “that there is no opposition between cold technology and warm human care” (Pols & Moser, 2009, p. 175).

Young, Hawkins, Sharlin, and Igarashi (2009) investigate the acceptance and adoption of robotic technology from the perspective of social psychology, by borrowing conceptions like psychological exception and willingness factors, seen as subjectivity in consumer perception. They argue that robots differ substantially from traditional domestic technologies

where “the most important and unique barriers to the widespread domestic adoption of robotics is an especially complex socialisation process” (Young et al., 2009, p. 96). By this they mean that domestication processes are not only influenced by a demand –supply driven phenomenon, entrepreneurs force on new markets, or human factors design problems. They claim that “domestic socialisation of robots is largely dependent upon subjective consumer perceptions of what robots are, how they work and what exactly they are and are not capable of doing in a domestic environment” (p. 96). To understand how acceptance and adoption evolve “requires that we understand them in the context of the social interactions, institutions and hierarchies into which domestic robots intervene” (p. 96).

In the presented research, ICT communities search to find answers on how well social robots work, while research within social science argues that these answers are more complex to reveal than running certain tests or experiments. The above mentioned studies from (Turkle, 2011; Oost & Reed, 2011; Pols & Moser, 2009) and (Woolgar, 1985) situate the technology in a sociological context analysing how people actually interpret technologies, assign values towards it and how technologies itself also reconfigure these contexts. In general, studies like these are part of the cross disciplinary field of science, technology and society studies (STS) (Moser, Brenna, & Asdal, 2007, p. 21). STS focus on controversies like where Turkle warns against unidirectional bonds, deception of elders and the psychological harm this might do to the person, Pols and Moser see affective values where the elder is enacted as someone who cares, not only playing with a toy or being cared for. This interpretative flexibility on how AI and robots are viewed is something Woolgar likes to use as test cases in the extension of sociology of scientific knowledge (SSK) to machines, a theory and method also called the Social Construction of Technology (SCOT) (Pinch & Bijker, 1984).

## 1.5 Investigating Interpretation, Adaption and Unidirectional Bonds

To investigate the seal-robot PARO's introduction in elderly care and entrance at Norwegian shorelines, several methodologies and tools are available to perform sociology studies of technologies. For instance the social studies of robotics investigate how different academic groups work together in designing robots by use of ANT (Sabanovic, Michalowski, & Caporaal, 2007), the affective relationships elders create with the technology is investigated by (Pols & Moser, 2009), and Young et al. (2009, p. 99) have revealed that social groups within research communities interpret robots in different ways. However the processes that lead to the decision to attain a robot (Young et al., 2009), and how this influences the employees in their care practises are not so much documented.

Social groups are by Trevor Pinch and Wiebe Bijker described as people sharing the same understanding and acceptance towards a defined technology. However, different social groups understand the technology in different ways; also called the interpretative flexibility of the technology (Pinch & Bijker, 1984, p. 414). These different interpretations reveal tensions and arguments forming the comprehension of technologies; as the proposed solutions for technology in health care create debates among involved people. Based on this knowledge - now when the robot PARO has been taken in use - three distinct research questions emerges:

How has the mental commitment robot PARO been interpreted and adapted by different groups at residential and treatment centres for people with dementia?

Which ethical aspects emerge when a robot like PARO is introduced or evaluated in elderly care?

How does introduction of PARO in elderly care influence care practises and knowledge?

## 1.6 A Qualitative Study

To answer these questions this thesis focuses on practices made visible through anecdotes from people facilitating usage of the robots, mostly health workers but also representatives from research institutions and promoters of the technology. This focus is anchored in the *empirical criterion* for social research; as stated by Keith F. Punch, “a well stated research question indicates what data will be necessary to answer it” (Punch, 2005, p. 44). The questions asked are connected with experiences about the technology more than testing predefined hypothesis related to social behaviour (p. 45). The empirical material available is from a rather small group of respondents interacting with an emerging technology. This leads the research towards a more open-ended qualitative study where data given by the respondents is presented as a descriptive case study, and further linked to theoretical concepts to explain how things have been as they are (p. 15).

In this thesis the theoretical framework of SCOT is explained in chapter two; the respondents’ narratives given in chapter three; the analysis by use of SCOT is found chapter four; and conclusions drawn in chapter five.

And finally, according to Punch “we are ready to move from content to method (Punch, 2005, p. 46).



## 2 Science and Technology Studies

One of the main figures in the field of STS, Bruno Latour, suggests that “there are no pre-determined boundaries for what constitutes technology or science, the social or the technical, science or politics” (Moser et al., 2007, p. 8). These fluent boundaries create tensions and discussions as we also have seen within the field of social robotics. The ICT community acknowledges that robotics as science has to consider these social effects. As warned by Veruggio, if the community does not tread carefully in their research towards a more humanised robot and systems with AI, they “could also be placed under scrutiny from an ethical standpoint by the public and Public Institutions” (Veruggio, 2007, p. 5).

Science and technology studies have its heritage from around 1968, when radical groups and social movements started to question the belief in science as a “neutral, progressive force that would produce the best results if left to its own logic” (Moser et al., 2007, p. 10). In this criticism it was implied that society had become technology deterministic, in the sense that technology and science were the driving forces behind social, economic and demographic development. In other words: “Science became to be seen as a tool used by those who wielded power” (p. 10). Ethnographers entered the scientific laboratories and observed the work processes, communication and consensus processes to gain a deeper understanding of how facts were made (Latour, 1982). Several academic disciplines enrolled in this movement, both political activists and natural scientists engaged in social sciences turned their view from doing science to studying the scientist itself in their laboratories (Moser et al., 2007, p. 11). The sociology of scientific knowledge (SSK) is one of the main areas in this movement that focuses on the “actual content of scientific ideas, theories, and experiments as the subject of analysis” (Pinch & Bijker, 1984, p. 401)

In the 1980's the social sciences turned towards technological communities with the idea that consensus about technologies and technological development were formed by the same social processes as observed within the scientific communities. This change is called the turn towards technology (Bijker, 1995; Pinch & Bijker, 1984). In this shift several research programs were formed "commonly labelled constructivist studies of technology" according to Bijker. The three most known programs "are the systems approach, the actor-network approach, and the social construction of technology approach (SCOT)" (Bijker, 1995, p. 6). The SCOT approach extends the thinking of SSK to technology studies where the concepts of interpretative flexibility are investigated among the relevant social groups involved in development of technology. This shows that that technology can be interpreted in more than one way. Hence that formation of technologies or understanding of technologies in society can be investigated in the same manner as SSK (Bijker, 1995, p. 13; Pinch & Bijker, 1984). All knowledge and all knowledge-claims are to be treated as being socially constructed. This means that the explanations for acceptance or rejection of knowledge claims are sought in the domain of the social world and not the natural world (Pinch & Bijker, 1984, p. 401). In their first discussion about SCOT, Pinch and Bijker conclude that "science and technology are both socially constructed cultures and bring to bear whatever cultural resources are appropriate for the purposes at hand" (p. 404), explaining that the boundary between science and technology is in general a matter for social negotiation.

## 2.1 The Social Construction of Technology (SCOT)

The Social Construction of Technology (SCOT) offers a descriptive model<sup>9</sup> to show intricate processes and negotiations that occur during the development of technologies, according to Bijker (1995). Bijker criticises the technology deterministic views that has emerged in society, claiming that technological development is an intertwined process of trial and error going on within social groups more than a linear development process from idea to product. The best technology is not determined by its functionality alone but more by social processes in the society and social groups using the technology (Bijker, 1995, p. 10). By other words, the SCOT approach reveals these groups of interest that are involved in the development processes of technologies, making technological development and change an intertwined process that goes on continually in the society, not separate from the society.

Social robots seem to be an emerging technology in care practises, based from the studies done by (Turkle, 2011; Pols & Moser, 2009). According to Bijker emerging technologies are best studied by doing empirical research and analysing which problems the involved parties report having with the technical object and which solutions are promoted to overcome these problems. In the theoretical framework of SCOT the focus is on how artefacts, like robots, have flexible meanings for different groups, and especially in what way the same meaning of an artefact constitute a relevant social group (Bijker, 1995, p. 45). By applying the descriptive framework of SCOT to the case study of PARO, a nuanced description can be given on how people interpret and adapt the technology in their daily work, and how this technology develops as well as social groups involved actually describe the technology.

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<sup>9</sup> A descriptive study in this context means that the users' interpretation of the technology is described and analysed, with focus on how the technology and the usage is formulated by the users. A prescriptive study would as opposite focus on how users describe technology compared to a predefined set of parameters and codes. (descriptive (n.d)).

### 2.1.1 Relevant Social Groups

A starting point when investigating the development process of an artefact is to identify all who share the same understanding of the artefact, and their relation to the artefact in detail. These constitute a relevant social group. By definition, “relevant social groups are only those groups who are concerned with the artefact and which meanings these assign to the artefact” (Pinch & Bijker, 1984, p. 414). Bijker emphasises the importance to follow the involved actors’ stories rather than “bringing our own evaluations to bear the story” to avoid a retrospective distortion. By following the actors a more accurate view on introduction of the technology can be revealed (Bijker, 1995, p. 45).

To define a social group two questions have to be asked. Does the artefact have any meaning at all for the members of the social group under investigation? And if so, decide “whether [this] provisionally defined social group is homogenous with respect to the meanings given to the artefact?” (Pinch & Bijker, 1984, p. 414). Pinch and Bijker list typical groups like institutions, organisations, and groups of individuals to be constituted as relevant social groups. The main goal is that they share the same set of meanings, attached to a specific artefact.

When these two first questions have been answered, related to the meaning the artefact has and all relevant social groups are identified, a third question has to be asked. Is it more effective to describe the developmental process by dividing a rather heterogeneous group into several different social groups? According to Pinch and Bijker “we need to have a detailed description of the relevant social groups in order to define better the function of the artefact with respect to each group” (p.415). So once the relevant social groups are identified, they are described in further detail.

“The description of relevant social groups is as important as the detailed description of artifacts in standard stories” (Bijker, 1995, p. 47), and when boundaries of the preliminary

defined social groups are traced more precisely, these might become unclear or dissolve since “new groups may split off and old groups may merge into new ones. Actors thus ‘simplify’ and reorder their world by forgetting about obsolete distinctions or by drawing new boundaries” (Bijker, 1995, p. 48). During the tracing of boundaries between relevant social groups, these boundaries change during the events of usage and interaction between users.

### 2.1.2 Focus on Users Problems and Solutions

SCOT focus on the success and failures artefacts have, where a failure or a problem exists only when there is a social group for which it constitutes a problem (Pinch & Bijker, 1984, p. 414). The principle of focusing on disturbances when studying a system can be usefully employed when describing the meanings attributed by relevant social groups to an artefact. To do this the focus is on the problems as seen by the relevant social groups. Each problem and each solution, as soon as they are perceived by a relevant social group, changes the artefact’s meaning, whether the solution is implemented or not (Bijker, 1995, p. 50).

These advices to identify and define the borders between different relevant social groups can as an example be applied to the story given by Block Helmers (2010). In the article several actors comment on different problems and solutions that are assigned to the robot. The NNO focus on the threat that robot technology removes health workers from tasks that demand closeness and care, while KS and NHO claims that robot technology does not have this effect, it is more about using the workforce in the right way. These actors opposing meanings also divert them in two different social groups. The first group see a danger with the artefact as a substitute to human care, while the second group see the artefact as a solution to more effective care. The mental commitment robot PARO can by this analytical move be extended by listing specific ways of using the technology, the risk involved for some by

describing techniques involved in typical use, or the personal feeling as comfortable versus disturbing (Bijker, 1995, p. 50). This leads to the term interpretative flexibility where different groups interpret technologies in completely different ways.

### 2.1.3 Interpretative Flexibility

By identifying the groups' problem with the artefact, and their solutions to the problem, the groups' different interpretations of the artefact are revealed. The diversity in problems and solutions explains the interpretive flexibility of the artefact, and can be used as an explanation for why some models fail and others live in the evolution of development. The true meaning of the artefact for each social group is analysed from this point of view.

“The consequences in revealing the different meanings attributed to an artifact by various relevant social groups...are that the artifacts working or nonworking can be explained” (Bijker, 1995, pp. 74-75). One way to reveal these different meanings is by “reversing the question; under what conditions constituted a well working machine, and other conditions was utterly non-working, can we hope to begin to understand technical development” (p.75). According to Bijker working and nonworking are now being treated as *explanandum*<sup>10</sup>, rather than used as *explanans* for the development of the artefact.

From the magazine article described in the introduction, the manager at the dementia centre focused on the effects PARO has on the elders using it. Like it creates good feelings, calmness, interests and so on. These effects have so far been the explanations for why the robot is used, and why it is working at this centre. This view will be from now on turned around when asking why it works and why does it not work. In general effects can be seen as

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<sup>10</sup> Explanandum is something that needs to be explained and its explanans is the answer of that phenomenon.

social constructed assessments, rather than intrinsic properties. For some it will be working as for others it will be nonworking. In this way the descriptive model will allow for a symmetrical analysis of technology according to (Bijker, 1995, p. 75).

What Bijker call “this sociological deconstruction” of the technology means in practise describing the robot PARO as several separate artefacts and by this “demonstrating the interpretative flexibility of the technology”. For the innovative social group, robots like PARO are an artefact that can solve resource issues in care, redirecting carers to tasks that matter. For the social group of concerned nurses robots are a threat that might remove human contact, finally for the manager at the dementia centre the robot PARO means increased social stimuli and reduced medication.

By doing this deconstruction “there is an immediate entrance point for a sociological explanation of the development of technical artifacts”. “If no interpretative flexibility could be demonstrated all properties of an artifact could be argued to be immanent after all” (p. 76). Once an artefact has been deconstructed into different artefacts, it is clear what has to be explained: how these different artefacts develop; whether for example, one of them peters out while the other become dominant. This leads to the next step of the SCOT analysis, where different degrees of stabilisation are revealed and closure processes identified.

#### **2.1.4 Closure and Stabilisation**

When the technology is deconstructed in separate categories it is time to ask the question, how did these artefacts develop further? (Bijker, 1995, p. 84). As the time goes by, previous defined problems changes between social groups, changing the view social groups have towards the artefact. If all problems for several groups are solved the technology development is said to have stabilised and the artefact reaches closure.

The analytical term closure has its legacy from theories of SSK where controversies within scientific groups diminished through consensus and scientific facts are made. Closure leads to a decrease in interpretative flexibility – to finally one artefact becoming dominant and others cease to exist. The dominant artefact will at the same time develop an increasing degree of stabilization within one, and possibly more relevant social groups according to (Bijker, 1995, pp. 84-86). According to Bijker: “Stabilisation can most easily be introduced by analysing the intragroup development of artifacts, while closure is primarily relevant to an intergroup analysis” (p.85). Further he claims: “If the closure concept has a primarily social interactionist origin, the stabilisation concept is coloured more by semiotics” (p. 85). The intergroup processes between the individuals can lead to closure by two processes, consensus or by rhetorical argumentation. When consensus occurs the stated problems disappear and everyone has the same understanding of the artefact, while rhetoric closure terminates the disagreements between the different social groups by argumentation.

Stabilisation focuses on the development of an artefact within one relevant social group. In principle the degree of stabilization will be different in different social groups. Internal in a social group the indication of stabilisation processes can be found by analysing how the technology is described by its users, by focusing on the changing “modalities” in how users describe the artefact. Bijker explains that stabilisation can be “traced by using an established type of rhetorical analysis first employed in science studies by Latour and Woolgar (1979)” (Bijker, 1995, p. 86). The study of stabilisation is best performed by focusing on a rather stable social group over time, and see how the rhetorical argumentation changes over time in relation to a thematic area.

The magazine article that has been used so far to enlighten the framework of SCOT, demonstrate the interpretative flexibility by defining three distinct artefacts hiding within the robot PARO. It can be a replacement for human care, it is a solution to a more effective care,



and it is a factor for increased socialisation and reduced medication. By following the argumentations that have come forward over time, closure and stabilisation mechanisms can be revealed within the relevant social groups. The manager at the caring centre argues that one of their carers has been certified to use the robot PARO, and they never let the elders be alone with the robot. This redefines the argument that the robot is a replacement for human care, since now the robot is always used with a caregiver that is trained and always there. For the concerned nurses this can be seen as a rhetorical argumentation that also destabilising their group, leaving them as a third part not really involved in the technology, more as concerned observers. In the article it was said that the robot was tested for a short time, uncertain of the effects. After a short period they found it pleasing and bought one for permanent use. This argumentation within one relevant social group shows the increasing stabilisation of the robot, from being an electronic pet they tested out to becoming the robot PARO that increases socialisation and reduces medication at the dementia care centre.

Bijker argues that when a controversy has reached closure, it is very difficult to reopen it again. By this the process of closure is almost irreversible- almost, but not completely. Bijker concludes that “the combination of stabilisation and closure processes makes it understandable that technical change is a continuous process, although not one that occurs at equal rates at every point of time; it is more like a punctuated evolution (Bijker, 1995, p. 88).

### **2.1.5 Wider Context**

The third move for the analyst is to relate the artefact to the wider society. Bijker states that: “Obviously, the socio-cultural and political situation of a social group shapes its norms and values, which in turn influence the meaning given to an artefact” (Pinch & Bijker, 1984, p.

428). The term sociotechnical ensemble describes the co-collaboration between the social and the technical. “Society is not determined by technology, nor is technology determined by the society. Both emerge as two sides of the sociotechnical coin during the construction process of artifacts, facts and relevant social groups” claims Bijker (1995, p. 276). By mapping the sociotechnical change within certain configurations, an explanatory model is created; “generalising beyond individual case studies by identifying processes that occur in specific configurations, irrespective of the particular case” (p. 276).

An important concept in identifying configurations is related to technological frames. “A technological frame structures the interactions among the actors of a relevant social group” (p. 123). This frame is not a constant entity or always present, but is built up over time if the premises are right. It is the interactions happening around a particular artefact that build up this frame. Bijker compares this frame with Kuhn’s paradigm since typical actions forming the frame are “goals, key problems, problem-solving strategies (heuristics), requirements to be met by problem solutions, current theories, tacit knowledge, testing procedures, and design methods and criteria” (Bijker, 1995, p. 123).

The configuration models explain different processes of technical change, dependent on how they related to the technological frame. If no frame exists there is no dominant groups driving the controversy, therefore enabling many different innovations. In the second configuration where one dominant group “owns” the definition of the technology’s problems and solution, a conventional evolution will occur. “In the third configuration, when there are two or more entrenched groups with divergent technological frames, arguments that carry weight in one of the frames will carry little weight in the other” (p.276). In this third configuration, closure is almost impossible to reach without powerful external interests intervening the controversy.

## 2.2 The limitations with SCOT

In chapter 1.4: Research on Robots Interacting With Humans, it was suggested to draw on theories from ANT to study how social robots configure the user (Oost & Reed, 2011, p. 12). This comment exemplifies critics that SCOT loose in evaluating possible power and politics technologies inhabits (Winner, 1980). The study of (Pols & Moser, 2009) shows these mechanisms where the artefact is considered to have a predefined script (Akrich, 1992). The danger is that SCOT turn away from the technology deterministic path but becomes sociological deterministic instead, by solely focusing on social groups interpretation (Moser, 1993, p. 164). Bijker argue against this view by pointing towards the sociotechnical configurations as a part of the SCOT analysis; considering both the technical, social, political and economic factors in the evolution (Bijker, 1995, p. 276).

The focus on –problem/solution space - gives the analyst a large challenge. The people interacting with a technology often describe all kinds of problems and solutions. Some of these are just concerns and worries, but no real problems, as seen from the involved people's side. Other descriptions are just solutions without any clear problem that has been solved. The challenges are to select problems that are valid to analyse, or focus on solutions that actually solved a previous existing problem that is possible to reveal through the analysis. This leads to the next challenge; to group the actors in the right relevant social group. Everyone interacting with a technology has certain knowledge about the technology, and a predefined impression on how it shall be used. As the designers of the robot PARO set out to design a dedicated artefact for elderly people (Shibata, 2007), the robot also has inscribed certain scripts, as mentioned above. These inscribed meanings are not considered valid in SCOT if no actor enrolls them. By this move this single item is in danger of being reduced to a social idea, not a physical object during the analysis. However, I also see the sociotechnical configurations as one way to materialise the physical object again in the end.

## 2.3 Methodology

Bijker promote the snowball approach and follows the actor approach to find people involved with technology (Bijker, 1995 p. 46). The snowball approach is put in use by interviewing involved persons and asking who else are involved, thus identifying social groups that are *relevant for the actors*. Follow the actor approach gives more knowledge about these groups and making them “theoretically *relevant for the analyst* when he or she sets out to explain the development of technical change” (p. 46). The idea behind these approaches is that after a while, no more new names will be revealed and you have the complete set of actors that are involved in the controversy (Bijker, 1995, p. 46).

The stated research questions asks “how” things adapt, leading towards a case-study approach according to Yin (2009, p. 8). “The case study is preferred in examining contemporary events, but when the relevant behaviours cannot be manipulated” claims Yin (p. 11). The definition of a case study is:

A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2009, p. 18).

In relation to the robot seal PARO and its context, the boundary is not clearly revealed yet, something this thesis sets out to analyse. Case study as a method offers a “set of data analysis strategies relying on multiple sources of evidence and benefits from prior development of theoretical propositions to guide data collection and analysis” (p. 18). The SCOT framework gives advices on data collection and analysis, where investigating interpretative flexibility acts as a proposition in this context. The robot PARO is in this study positioned as a single case deployed at multiple units. However, the study has a holistic design focusing on PARO as a unique case within elderly care (Yin, 2009, pp. 46-50). By treating the units as one, the needed protection for subjects under investigation is increased (Yin, 2009, p. 73).

The snowball approach was put in use through a fellow master student who knew about a medical institution interested in testing the robot PARO. A meeting was arranged with the people and through this I was also invited to attend a one day seminar about welfare technology, arranged by a municipality on the south east coast of Norway. At the seminar I made further contact with people actually using the robot and asked for permission to visit their working place to discuss access to relevant respondents.

### **2.3.1 Quality Assurance and Anonymity in the Study**

The reliability of the case study research has been increased by the thorough and rigorous work with the case study protocol, defined field procedures and case study questions (Yin, 2009, pp. 79-86). Attached to this thesis report is Appendix 1: Example of Presentation Letter to Participants, and Appendix 2: Interview guide, English and Norwegian Version. The use of a predefined interview guide might contradict the radical approach suggested by Pinch and Bijker to follow the actors, since these planned questions clearly presuppose a certain group of people and organisations. However, some actors were already identified through media as the context is limited to dementia caring centres in Norway. This helped establish where to search for respondents.

This thesis is a work on master's degree level as part of the completion of a Master of Arts in STS studies. According to ethical guidelines for social studies, rules related to student work on this level are regulated by the same norms as regular research and analyses (Den Nasjonale forskningsetiske komité for naturvitenskap og & Helland, 2007). The ethical norms for research are therefore applied as a fundament in this thesis work procedures, data collection and storage. The ethical committees recommend that groups or institutions that are vulnerable shall be protected from unnecessary load, or from being pictured in a biased view

that can harm them (p. 22). This study has therefore been reported to and approved by the National Databases for Social Sciences (NSD); given the project number 24540. The approval is granted provided that no individual or persons with dementia is identified. The collected data is therefore anonymised in accordance with instructions from NSD.

### 2.3.2 Empirical Sources Available

Previous studies on social robots focus on the users of the technology, being the elders. The notation user in socio-technical research is wide and unclear (Oudshoorn & Pinch, 2003) and in this study the caregivers are categorised as users as well as the elders, and the focus is on them. This study focuses on three institutions that have tested or use the robot today, and one that has a desire to test it out. Other institutions are in the process of acquiring a robot, and some have already been certified to use the technology. I have chosen to define these others as outside my study since this information came up late in the research and, at least from the outside, seems to be represented by the competency and views of the persons already interviewed. I have also interviewed the supplier chain consisting of the Norwegian organisation; Competency centre for restructuring of municipalities<sup>11</sup> (RO) and the Danish Technological Institute (DTI). External institutions interviewed are the Norwegian Technology Board and Ageing and Health, Norwegian centre for research, education and service development. In total 16 interviews have been conducted with people related to the robot PARO.

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<sup>11</sup> In Norwegian: Resurscenter for omstilling i kommunene. RO is a non-profit advisor organisation assisting municipalities and other customers in development and restructuring within health care. The organisation is fully founded by the projects they compete about and deliver (RO, (n.d)).

### 2.3.3 Field Procedures

According to advice given from NSD and (Yin, 2009), the research design is framed by the presentation letter to the participants with signed consensus from each recipient, as well as general advice for qualitative research given by The National Committee for Research Ethics in the Social Sciences and the Humanities (Den Nasjonale forskningsetiske komité for naturvitenskap og & Helland, 2007). To limit the probability of a biased answer coloured by the information letter and the aims of the study, focused open ended and semi structured interviews were chosen as the main data collection method (Punch, 2005, p. 169; Yin, 2009, p. 107). All interviews were held in Norwegian, also the interview done in Denmark. The conversation was recorded and later made as verbatim transcriptions. The notation in speech and pauses has been commented where I found it necessary. The transcripts are anonymised by giving the respondents a reference code. Citations from the transcripts, that are used in this thesis have been presented to the interviewees for approval, and translated to English by me before publishing. Any error in the translations is my responsibility solely.

### 2.3.4 Data Analysis Procedure

The sixteen interviews have been transcribed by use of the transcription software HyperTRANSCRIBE. The transcripts were then imported to the qualitative analysing software HyperRESEARCH. Several analytical cases have been defined following the SCOT methodology, like the description of PARO, the rejection of PARO, unrest, and daily life at care units. Then several codes have been defined, where each transcript is coded in accordance with these reference codes. In the empirical chapter each citation refers to these reference codes.

From the interviews two areas of problems emerged; care related problems, and PARO related problems. The empirical chapter reflects this by first presenting the interpretation of the robot itself, then care related problems, and finally respondents views on how PARO fits in their daily care practises are elaborated on.

A tradition within STS studies is the limited focus on theory and literature reviews, but a larger focus on the empirical data where theoretical concepts are drawn in the empirical descriptions to highlight how things evolve (Bijker, 1995, p. 16). However I have chosen not to do that since this is also a distortion of the narratives given by the involved people. According to the ethical guideline for social research, interpretation of technology is related to groups' normativity and personal motifs for using technology (Den Nasjonale forskningsetiske komité for naturvitenskap og & Helland, 2007, p. 20). To avoid the danger of assigning false motifs and attitudes to persons in this study, a thorough descriptive documentation and reasoning is given in chapter three. I therefore present a separate chapter four where I as an analyst twist and tweak the responses given and assign them to relevant social groups I have found during my analysis. The respondents might not accept or recognise how their view is used in this context. However, I believe I have given a thorough and good analysis of how a robot has become several artefacts seen from a SCOT approach.

### **2.3.5 Ethical Considerations**

Studies involving persons who are incapable of giving consent, or health related studies are limited by health ethic regulations. It was expected that access to nursing homes for observations or interaction with elders with dementia would not be approved by the ethical committees, or that the application would require an approval time so long that the research would be constrained by it. This conclusion is based on feedback given from managers from



one of the nursing homes I contacted and experiences from earlier studies related to technology and dementia (Thygesen, 2009). Observations by me or a third party person, not involved in regular caretaking actions have a danger of influencing the social setting in the public room, or wherever the robot is used. The danger for me as an observer being linked to the robot is therefore high. Observations are therefore not in this case considered as a good way of collecting data (Punch, 2005, p. 178; Yin, 2009, p. 109).

It is not the task in this thesis to describe single persons, but rather to identify the formation of social groups' understanding of the technology. People making the decision to use the robot or not, is therefore considered to be the right group to approach. In the thesis these are considered as the primary users.

From ethical concerns and design of the study, it is time to give my respondents a voice in this thesis.

### 3 The Use of Mental Commitment Robots in Elderly Care

PARO is a really advanced robot with white fur that is antibacterial. It has many motors and sensors. It can see contours, recognise voices, feel your touch and it moves. It learns its user and will adapt towards it.<sup>12</sup>

The idea of the antibacterial fur is that it shall limit the spread of bacterial diseases and make it available for allergic persons, one of the limitations with fur animals and pets. The robot's weight is said to be 2.7 kg, it is 57 cm long, 16 cm in height and 35 cm wide. The robot sensors in addition to the sensing skin consists of whiskers in the nose area, light sensors in the eyes, posture sensors to detect the way it is held, for instance upside down, and temperature sensors to monitor its internal temperature. Three microphones are in use to detect the location of a speaking person, and seal like sounds are uttered through speakers. The eye movement is made independent of each other by actuators on each eyelid, and actuators on each paw and the head creates a lifelike movement pattern (Intelligent Systems Co. & DTI, 2009).

#### 3.1 The First Impression of PARO

Many years ago I was on a conference in München about gerontology. It must have been around 1995 or 1997...long time ago. There were a couple of guys from Japan and they showed pictures of these pets that were electronic, or robots, robot-animals that looked like dogs and cats. That was the first time I heard about it and then I thought, oh my god, now...that was completely wild, really! But now things have moved forward then so...let me think. The first time I heard about PARO I can almost not remember.<sup>13</sup>

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<sup>12</sup> Ref.: Conversation with advisor 1. Ref.: 1390, 1626

<sup>13</sup> Interview 2, ref.: 25089, 25658

An occupational therapist talks about her first impression of electronic animals for use in elderly care. As she continues her story about PARO explaining how it was introduced a decade later, on a Norwegian symposium, Dementia Days<sup>14</sup>, the therapist says: “The Danish Technology Institute presented it and showed it to the audience.”<sup>15</sup>

And then I thought, okay, I hope they send it to the other row first, because that [thing] I do not want to touch. I had this, ouch, now I got cat allergy and maybe it is a little that I do not want this hairy animal in my face, but, then I thought, okay this is nothing. I don’t know. I was sceptical. I was sceptical and I did not want to touch this animal, which is true.<sup>16</sup>

From thinking about this crazy idea presented in the nineties to seeing it live ten years later, she still hesitates to interact with the robot. The most repelling feature with the animal she says is the sound:

It whines and whistles you know. I get those associations to the neighbour’s cat that kind of twirls around my legs when I come home, and it yowls then: miaow, miaow, miaow... And then I get this; oh I have to give it something, but I do not cope with this cat... So I enter this ambivalence towards this animal and I think: Can’t you just go away because I cannot touch you... And ... do not nag at me... I think it is a little difficult with this animal. I mean this robot. But I do know intellectually that it is a robot, but anyhow with this whining and such, it became too much for me.<sup>17</sup>

The robot’s sound is associated with a cat even though it is designed with the purpose of not resembling any familiar pet. She becomes ambivalent and stressed, because of this and decides that she does not want to have anything to do with this robot.

A couple of years later, the robot PARO was again exhibited at the symposium. This time the meeting with the fur seal robot was a little more pleasant and she managed to hold her hands on it. She says: “And at that time, I touched it and passed it on. So then we were one step further with that”. The respondent was at the time participating in a working group

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<sup>14</sup> Norwegian Dementia Days is an annual symposium where health workers and scientists meet to share the latest knowledge in dementia treatment, research and practice.

<sup>15</sup> Interview 2, ref.: 25714, 26049

<sup>16</sup> Interview 2, ref.: 26061, 26787

<sup>17</sup> Interview 2, ref.: 26934, 27698

visiting the Danish Technological Institute (DTI), where again PARO was presented for the third time:

It was the third time I saw it live somehow. And then everyone also had to touch it. And what I've immediately seen with these events is that there is someone who is completely... takes PARO, embracing: [say in a cuddly voice] "oh so nice" lifts it and cuddles, "oh so nice." They enjoyed it immediately, right? While others are a bit like, 'Oh, oh, oh gosh', and then pass it along. And some are like: [says in a business-like manner] "Yes, yes, it was interesting," and a bit like that. Starts to explore it, but not much [interested]. So, it is so different how people react to it when they get it in [their] arms.

She reflects on the change in attitude towards the robot and also interprets the different ways people in general react towards it; from embracing it immediately as a cuddly pet, to indifference or rejection. She explains that one day she got a phone call from a manager at a dementia centre who asked about PARO:

She called me and said "Hey, have you heard about this PARO?" Yes, I said, I know it. "I thought that we must get it here," she says. "Do you know how much it costs and stuff like that?", "No I do not know," I said, "or yes I think it was expensive". Well that, «... I have been at [DTI] now... So it's possible I can arrange an appointment so that you get to try it". So I called [DTI] and we got an appointment that they brought PARO on the plane to Norway, ... When I wrapped it up at home and turned it on, I got to be alone with it, and then I got a completely different relationship with PARO. And I have to say that I thought it was really cosy. And it was such a nice weight, just like when the kids are small. So it weighs three and a half kilos or something like that. Nice weight, it was really good shape. It did not matter that it screams and whines, it was not a problem. I thought it was cute<sup>18</sup>.

She changes the view of a disturbing cat to a creature that needs care, it recalls her memories about her children when they were small, the weight at least. When she got it alone with her she could familiarise herself with the technology. The day after when she delivered PARO to

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<sup>18</sup> Interview 2, ref.: 27878, 30268

the dementia centre she says that she did not want to leave it there alone, she said to the people working there:

“Now I hope you are kind to it, okay! I am ... can I let him be here now then, all alone without me?” No, that was completely strange. It was completely turned around. I think I just had to get some time to get familiar with it, kind of. After that time it is like this when I touch PARO now, I think it is really nice and...It is like saying hello to an old friend. So it...ehm...yes, it is strange. Really strange. But I used a lot of time to be familiar with PARO, I did.<sup>19</sup>

This ambivalence, rejection and later acceptance of the technology, is not unique for this respondent, but an interesting observation to have in mind, as later anecdotes show.

PARO was delivered to the dementia centre to be tested out, on the initiative of the local manager. They thought they had to deliver it back since it was so expensive, but the local medical association wanted to participate financially so the centre could get the robot on permanent basis.<sup>20</sup> The manager for training and education says that she was not really positive towards the robot at first. She had heard about it, but when she saw it presented in the meeting room her attitude changed. “In this room there were a lot of adult people when it was passed around. And when I, in a way saw what he did with people I have to say that I got a completely different impression than just having heard about it or seen pictures”.<sup>21</sup> This changed her critical attitude, maybe formed during her education and ethical reflection over years, as she explains further:

Well, I think it was when I went to nursing school. It is many years ago now. Then there were plenty of those ethical discussions related to stuffed toys, dolls and such. Using it in nursing homes, in a way, and what you thought about that. How you yourself would have thought if your parents were sitting there with it, in a way. And I was maybe coloured a little by that. ... In

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<sup>19</sup> Interview 2, ref.: 30301, 30969

<sup>20</sup> Interview 10, ref.: 3825, 4394

<sup>21</sup> Interview 10, ref.: 5229, 5557

general I would not have thought it was okay, I believe. But now when I have seen him, I have changed my opinion completely.<sup>22</sup>

There was the danger of breaking an ethical conduct of stigmatising the elderly by letting them cuddle a stuffed toy, but after she saw it in action among the patients “she thinks it does a really important job. However this is a supplement not a replacement for human contact in any way”.<sup>23</sup> It can be questioned who’s boundaries are broken if elders interact with a doll or a stuffed toy. This nurse positions herself as a relative and thought it disturbing if she would have watched her parents with such items. So the relatives might find the robot disturbing, like stuffed toys and dolls can be. However, she emphasises it is not a replacement for human contact in any way.

From the first impressions the occupational therapist had of the robot, several problem areas are identified. The shape created an ambivalent feeling and she first rejected it completely as it reminded her of the cat she could not touch. This is quite contradictory to the purpose the antibacterial fur and the strange shape the robot has. At the local caring centre some found the robot idea disturbing due to ethical considerations, but after seeing it in use among other employees, the attitude changed. These negative feelings are related to thoughtful reflections about what is good care, but the view changed when seeing that the robot is not a toy or a doll.

### **3.1.1 PARO as a New Strategy in Caring**

It took several annual symposiums to accept the idea of using PARO as social stimuli in caring, for the occupational therapist that is. According to the project description for the

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<sup>22</sup> Interview 10, ref.: 5010, 6416

<sup>23</sup> Interview 10, ref.: 6503, 7155

Danish project at DTI: “The Paro-project is a full-scale project, which systematically examines the practical utility of the seal-robot Paro within the range of elderly and persons with brain damages in Northern Europe” (Gaedt, 2009a).

The project manager explain that this is the second project in Denmark with the robot PARO and directly links it to the “Be-Safe” project, a project assigned to test out different technologies on a small scale to see if there could be assigned any effect towards technologies like these.<sup>24</sup> The idea emerged around 2005 as the robot was presented in Sweden, and she thought “I wonder if this can be something for us, if it can work”.<sup>25</sup> From this first idea, they tested it out; her statement for how it was interpreted was “Whooo! And it worked!” In September 2008, the Danish Technological Institute (DTI) in Odense started a national project to investigate the efficiency of using robotic therapeutic tools, while also professionalising the use of mental commitment robots as well as providing training and certify health workers in the use of this type of technology. These goals are met by letting municipalities and care centres in Denmark and also other European countries buy their own robot and get training through workshops and certification courses offered by DTI.

The first interpretations of PARO were ambivalent, as described by the occupational therapist and the personnel at the caring centre that tested the robot in Norway.

As DTI states, the project’s goal was not only to test the robot in Denmark but also in other northern European countries. The institution, Ageing and Health, Norwegian centre for research, education and service development was due to this first involved when the robot came to Norway, and later asked to participate in evaluating it further:

It is [DTI] as I understand who imports to Scandinavia then, in Denmark. And [they] has been really interested that someone in Norway shall test it out, and that...[they] asked also if the competency centre could participate in a trial,

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<sup>24</sup> Interview 4, ref.: 12241, 12647

<sup>25</sup> Interview 4, ref.: 12853, 13049

where we could evaluate the use of PARO. I thought it was interesting but, but when I raised the question here. The possibility for it, and the thing that we as a national competency centre should evaluate a product, and usability for people with dementia, so it became a little difficult for us... The important part, what weight most was that we should not interfere in such commercial interests.<sup>26</sup>

The competency centre cannot risk their independence and credibility as a research unit by promoting commercial products so they had to step aside in this case. DTI on the other hand does not label the robot as a commercial product when they explain why they contacted the institutions in Norway:

It is because we do not want a commercial anchor for PARO. We want a professional, a dementia competency professional community that can support the fact that PARO is not only a technology and an instrument, but something that shall be connected with pedagogic [knowledge] and proficiency. And many companies are eager, but we shall have the dementia profession angle, or understanding. So that is the reason they have PARO in tight leash.<sup>27</sup>

The project manager emphasises the importance of professionalism in dementia care, and not only focus on the commercial part of PARO. According to her, “PARO shall be a tool in dementia care, and then we shall define scientific usage of this tool. And that is what RO can help us with”.<sup>28</sup> RO or Competency centre for restructuring of municipalities (RO) is a non-profit foundation consisting of several advisors that assist municipalities in innovation and restructuring in relation to health and care services.<sup>29</sup>

One of the advisors at RO, explained that they saw PARO for the first time at a conference in 2009, where the Norwegian Technology board presented the robot and explained its use. Afterwards they found it interesting and therefore contacted the Japanese

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<sup>26</sup> Interview 2, ref.: 33870, 34624

<sup>27</sup> Interview 4, ref.: 13107, 13492

<sup>28</sup> Interview 4, ref.: 13521, 13736

<sup>29</sup> RO comment that they are organised as a non profit foundation but do not receive any financial support. The organisation is driven as a regular consultancy company where all income is from projects won through market competition. In relation to PARO they do not calculate any surplus since they only redistribute the technology on behalf of DTI. It is DTI that set the target price on the robot.



producer and asked if they could acquire one. The producer referred to DTI that was the European agent and they contacted them. From this proactive approach, they got the contract to distribute the robot and held training courses in Norway.

RO want to be established in the welfare technology market and show that we as an organisation are in the race. This was a wish from my side when we bought PARO. This is the first technology we as a distributor have responsibility for. This might be a new path for RO. I sees it as much as a door opener for technologies, as a tool in dementia care. There is generally large resistance in health care for use of new technology. Look to Denmark, in the years that have passed there are not sold so many robots yet. This does not actually make us rich by selling the robot.<sup>30</sup>

The advisor mention that the robot might be a door opener to the health care sector since it is a soft technology, with white fur and black dark eyes. According to the respondent, “it is really easy to like and many get interested in it when it is shown around. When you explain that it is a robot, this can be a part of changing the view of what a robot is, in relation to traditional views on robots, both to users and employees.”<sup>31</sup>

“I have got two more orders”, the project manager from RO is excited when I interview her for the second time. I ask how that was arranged and she explains that both places have thought about the robot for a long time, over a year. They might have heard about it at conferences and such. On the question if any of these had seen the robot before she states: “No, no one of these have seen PARO. And there was not even talk about lending it upfront to see if it worked or not. They were completely: this we shall have!”<sup>32</sup>

RO lend their demonstration robot, Snorre to municipalities that want to test it out for a short time. In the first meeting with her she explained that they had demonstrated Snorre at a nearby caring centre, where they also were able to observe the robot in use among the

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<sup>30</sup> Conversation with advisor 1, ref: 3181, 3730

<sup>31</sup> Conversation with advisor 1, ref: 1683, 2054)

<sup>32</sup> Interview 11, ref.: 768, 930

elders. She explains the experience from one of these demonstrations at another nearby municipality:

“They were really enthusiastic and had the right attitude, which is a really good entry point... I mean they were conscious of this with animals’ versus robots, and kind of this robot sounded a bit scary. But they fell completely in love when they saw it. They have borrowed it for fourteen days now so I have to contact them and hear how it is going.”<sup>33</sup>

She states that at least caregivers that have worked for some years and has experiences with therapeutic dolls are enthusiastic, not only at this place but also in general since it is a regular phenomenon to work with dolls or animals for elders that have dementia. The institutions economy is a topic that several respondents reflect on. This influence how much activities and equipment that is bought into the institution. The advisor comments on this:

What I experience from both [two new municipalities] is that they have been thinking about it for a year, also getting money and so on. But as at [this nearby municipality] they say, “we got over a million in gifts that are given”. So they have the money, they have it around, like. So they were really interested if they could get some successful trials now.<sup>34</sup>

Several municipalities are interested in testing out the robot. The project manager from RO explains that one caring centre borrowed the robot for short time to test it out. But they had some negative experiences that employees did not want to use it. “You shall not start up with this if you do not have the rest of the personnel with you” explains the advisor from RO.

Apart from this she says that there has not been that many that have contacted them lately, but after a conference, Arendalskonferansen, in 2010 she got some response where she held a stand to demonstrate the technology.

Yes, well I am not a professionalized stand, but I soon found out that the ladies would come and have a look at the seal, but it was much smarter to just

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<sup>33</sup> Interview 11, ref.: 1564, 1963

<sup>34</sup> Interview 11, ref.: 13691, 14095

take it under my arm and walk around. This was a conference mostly approaching councilors, mayors and leaders... Then he was up in the arms of these people and they were really charmed and I thought it worked, and there was a lot of positive feedback.<sup>35</sup>

She did not only get contact with the women who came to the stand by themselves, but also the councillors and mayors when she took the seal under her arm and walked around.

She explains further that even the employer organization KS invited her to the main office in Oslo to give a presentation after the conference.

### 3.1.2 A Symbol for Welfare Technology or Just a Stupid Toy?

At one caring centre the robot was introduced to the caregivers by an administrative person, a project manager. Due to a workshop focusing on future care services they got the committee leader for *Innovation in Care* to attend together with local politicians. As an idea to get a firm support for welfare technologies with the local politicians, they asked RO to lend them the robot for this workshop.

Our councillor gave a presentation about the Norwegian Technology Boards' report [*Future Aging and New Technology*] and they also used this PARO as one of these welfare technologies...so when we got the project manager for *Careplan 2015* to come here! To all politicians. Then we called RO to ask if we could borrow it when they were here, in a way, with the thought of establishing this foundation and such.<sup>36</sup>

Since the report from the Norwegian Technology Board already pictures welfare technology as a robot, they also want to let those who make public decisions see what welfare technology is. When they had the robot available they also wanted to test it out at the caring centre among the elders. The caregivers were informed about its usage and the seal was left at the centre for a couple of days to be tested out.

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<sup>35</sup> Interview 11, ref.: 14703, 15869

<sup>36</sup> Interview 9, ref.: 1428, 2113

Some of the users felt they got fooled when given a robot, according to the employees at one centre. The unit this happened at is a complex unit where both elders with dementia and elders without dementia are located together. “So some of the users thought this was just stupid.”<sup>37</sup> When asked about typical reactions from the negative users it was explained:

Well it is...it was the type of; I do not want to have anything to do with that, or what kind of animal is this...Some became a little, almost itchy. I was told...I wasn't there when those who became itchy expressed it then. But what they told the employees was that; it seemed like the users felt a little fooled. They kind of believed, they had believed it was something and you have just fooled them by giving them a robot.<sup>38</sup>

The respondent reflects on the way the technology is presented in the user manual as a cuddly toy, and the design of the charger for instance, shaped as a pacifier to insert in the seals mouth. “It is cute with the pacifier but really; but I think it is really wrong. Because it is not a cuddly toy”.<sup>39</sup> The manager states that when the technology costs so much money and is made for professional use, it must also have a professional touch to it.

They talk about a soft transition to welfare technology, that PARO is it. So then I will say it might be the opposite. You try to introduce something that looks like a cuddly toy, and you have to spend a lot of time to explain its usability; for instance...a robotic vacuum cleaner ...it's just to turn it on, then it cleans twice as good as a regular vacuum cleaner and you do not get any injuries on the user. Much easier to accept, it is.<sup>40</sup>

At this place they have seen that the technology is not accepted as easily like a robot vacuum cleaner, it needs explanations and focus on that the seal is not a toy, but a tool in elderly care. It is seen as an importance that the robot has more to it than a regular doll or toy. As a respondent explains; “some thought it was sad when I came with the seal, because they had a perception that this should be an initiative that should replace employees. That you in a way

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<sup>37</sup> Interview 9, ref.: 9449, 9502

<sup>38</sup> Interview 9, ref.: 9609, 10069

<sup>39</sup> Interview 9, ref.: 25419, 25532

<sup>40</sup> Interview 9, ref.: 26370, 26803

should just give the seal to a user and then leave”.<sup>41</sup> From these anecdotes, the value of the technology changes when certain employees are on duty. If someone comments the technology to be childish, the elders do not want to participate in interaction with it, but when left alone they still want to play with it.

One of the other institutions that tested PARO had some of the same interpretation in relation to toys. The respondent explains that some of the elders were sitting in a group of seven, and there was almost no communication between the elders, due to the dementia. When the robot was introduced they showed excitement and wanted to get it on their lap. “Those who haven’t talked in a long time started to talk with the others, they talked about PARO. They started to pet and cuddly talk [towards PARO]. But they understood it was a toy, but at the same time they did not. It was a cuddly pet for them. A real being”.<sup>42</sup> The respondent had to explain to the elders that “this was a toy, a robot, a stuffed animal that helps elders...and they understood it”.<sup>43</sup> At the same time the elders could come to ask “shall it have any food then?” In a way the elders with dementia act towards the object as it is a thing, but also a living being.

In the anecdotes so far some describe the robot as a symbol on welfare technology while others emphasises that it is difficult to explain its real purpose to sceptical employees. The distributors’ focuses on training and certification, stating that nobody shall use the robot before they have been certified. The reason for this is that those who use it must have the right attitude towards the technology. Some employees fear that it shall replace human care, or threaten their work position, while those who uses it regularly emphasises that this is not the case.

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<sup>41</sup> Interview 9, ref.: 16147, 16403

<sup>42</sup> Interview 14, ref.: 4356, 4647

<sup>43</sup> Interview 14, ref.: 4724, 5189

## 3.2 The Challenges With Unrest

One of my respondents works at a psychiatric ward for elders with dementia and was curious about the robot. She had informed me that they considered testing it out if they could get access to one. I arranged for an interview and asked her what she thought about PARO and how it could help in their daily care. The nurse describes that one of the challenges in caring for their patients is to handle unrest or agitation, in addition to finding good solutions to reduce the psychiatric problems the elders' experience.

They can have hallucination or delusions, angst, depression, and for some; behavioural symptoms that need specialist evaluation and treatment. For instance, it can be walking. I do not mean this calm walking but a more frenetic, agitated walking that can really exhausted them. As an example; they can be aggressive, they can stroke, kick, spit, hold; yes, threaten.<sup>44</sup>

### 3.2.1 What Unrest Is

This story of frenetic walking, agitation and aggressive behaviour is one of the strong descriptions given by caregivers working with demented people, and describes symptoms where unrest has evolved to physical agitation or aggression. Not only at this psychiatric ward but most of my respondents comment the challenges with *unrest*<sup>45</sup> as an emotional state demented people sometimes experiences. The other respondents describe unrest in similar ways: Frenetic walking, anger, anxiety, chaotic thought patterns, frustrations, repetition of words or questions, depressions, hallucinations or even delusions in some instances.

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<sup>44</sup> Interview 1, ref.: 1216, 1887

<sup>45</sup> All health workers I have interviewed talks about a phenomenon called "uro" in Norwegian, unrest or agitation in English. This behaviour among the elders is expressed without them explaining what it really is, accepted as common knowledge within dementia care. I therefore modified the Interview guide to include questions about what unrest is, in the cases when they talked about it.

The lack of critical barriers and reduced ability to perform daily activities are some of the symptoms of dementia.<sup>46</sup> Dementia is a collective label for a group of diseases causing reduced cognitive functionality due to brain damage. The disease is mostly related to the elderly population with an increasing number of persons above 65 being diagnosed with dementia. According to information given by Ageing and Health, over 50 to 60 per cent of the diagnoses are related to Alzheimer's syndrome, 10-20 per cent of the persons have vascular dementia while more rare brain diseases are related frontotemporal dementia or Picks syndrome, Lewy-legeme disease, and Parkinson's disease (Brækhus, Dahl, Engedal, & Laake, 2009). The development of the disease is slow and difficult to detect, where more and more symptoms become visible over the years. After a certain time, the number of symptoms increases fast also changing the persons' personality. The disease has often been present for several years when the elders' move from its own home to a supervised home, elderly care centre, or dementia competency and treatment centre. The reason to move from its own home is often due to hi social, psychological and physical burden on its relatives, as well as the elders own wellbeing and safekeeping (Brækhus et al., 2009).

### **3.2.2 Tactile Stimulation Reduce Unrest**

At the psychiatric ward the nurse emphasise that she believes that “the group of patients that will have especially use of a seal like this, might be those who have a need for contact with someone”.<sup>47</sup> She thinks that the seal can be a solution to persons actively seeking contact with others and might give some comfort and security for these, if they are given something to care about and pet. At the ward they have observed that tactile stimulation, massage and small activities have good effect on patients being in a state of unrest. She considers the seal

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<sup>46</sup> Interview 12, ref.: 2126, 2571.

<sup>47</sup> Interview 1, ref.: 1889, 2020

to be an object where you as a patient can control the activity yourself and be a substitute for intimate social contact, something that is difficult to receive as an elder at an institution or ward. Every person has its own personal border that only people who you are close to are allowed to cross. As a professional carer they have to read the person's body language to understand how close you can get in every situation. But by using the electric seal you as a patient can control this by yourself, according to the nurse.

However she emphasise that this is not a replacement for nurses or personal care given by people. A critic she has seen stated in the member magazine *Sykepleien* by some representative from NNO. She thinks that the robot might not solve any problems "but it can bring some happiness, it can give someone relaxation, it can give good experiences and a feeling of connection, like when you cuddle a dog, for those who like that, right? And it is socially acceptable."<sup>48</sup> The robot is socially acceptable in its caring practises she says. This is said in correlation with experiments done about fifteen years ago when different objects like teddy bears was used for some patients. The problem with toys that are applied to elders is the danger of them feeling stigmatised, and she says that "they do not use it anymore; if the patients themselves do not bring one with them."<sup>49</sup>

The psychiatric ward focuses on finding a good solution to each patient's problem while taking into account the patient's dignity, according to the nurse.<sup>50</sup> When the patients are ready to leave the ward, they are often transfers to municipality based caring centres or institutions. The solutions to handle patients' psychiatric problems are transferred with the patient where the local team is informed about the found solutions. The solutions must however have been tested at the ward before they can recommend it to the municipalities.

The ward would like to study the robot, and maybe define some guidelines for how it can be

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<sup>48</sup> Interview 1, ref.: 16094, 16771

<sup>49</sup> Interview 1, ref.: 2857, 3240

<sup>50</sup> Interview 1, ref.: 3486, 4256



used. However, they are not able to pay the price for it since it is expensive equipment she says, it cost up to 70000 (NOK), she have heard.<sup>51</sup> But if they are granted a local study they might be able to apply for a grant or similar.<sup>52</sup> A study like this they see is a strategy to help the patient:

Thus, I am thinking that; here are some who clearly believe that this we must try, this is in accordance to a strategy we do to help the patient. One's a bit helpless...what shall I do? Patients are demanding, agitated, in which case you have to do something. One must be with the patient, they must have supervision and help, what do I do? So, this could be one aid, I think that most people here are relatively open to new things within this area.<sup>53</sup>

In their goal to meet the patient they are open to try new strategies since they are feeling a little helpless with the objectives they have access to now. The head nurse describes an open attitude among her colleges towards new ideas in situations involving agitation and restlessness, as well as enhancing the quality of life for elders. This idea for testing out the robot and making a guideline seems like a similar idea that the Danish project is founded on. However it seems like the focus is not on the robots effects, but how it can be implemented in existing caring practises, treated as a tool like other tactile stimulation strategies available.

The importance of being ahead of the situation is emphasised by caregivers working with elders becoming restless. To see the situation and act before the person becomes agitated, or friction between the residents occurs. Typical situations causing unrest within a patient can be that the person is easily disturbed by the others in the room, or too much stimulation is given at the same time. As a nurse at a small unit for people within the late stages of dementia explains, agitation can be caused by elementary needs “that a person wants to go to the toilet

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<sup>51</sup> The distributor RO informs that the cost of the robot pr. March 2011 is NOK 35941, in addition comes VAT and a compulsory training course. The total costs are therefore approximately NOK 55000 (March 2011) (RO (n.d)).

<sup>52</sup> Interview 1, ref.: 8076, 8787

<sup>53</sup> Interview 1, ref.: 17114, 17579

but does not have words for it”.<sup>54</sup> Unrest influences the person’s wellbeing and might disturb the others living together, making others also enter a state of unrest.

### 3.2.3 How PARO Solve Unrest

At some of the interviews, the respondents brought the robot PARO with them to show how it worked. Often during the conversations, Paro got a male gender when we spoke about him, especially if he was turned on<sup>55</sup>. The interview takes place in a closed meeting room on a separate floor from the elders, and there is a table next to where we are seated. The respondent starts her story by explaining why she brings with her PARO to the meeting:

It is easier to understand when I explain how I think our residents experience it. By holding it, like, in my arm and starting caressing it, and talking to it; [she talks directly to the seal with a soft voice] “You, oh, you are so sweet, you know”, and when you then see those eyes then it feels like completely fantastic for many to get it in their lap. There can be large differences between the residents, but to get it on the lap and see how it acts and they talk with it and feel that they can give some care. They get other thoughts, right. [PARO makes a sound, responding to her voice as wanting contact with her] “Yes you are so beautiful, you know” [she says to PARO]. It experiences maybe. I see that it experiences really positively. For some of them. Other residents we do not use it on at all. But like it is now [PARO makes more sounds and moves the head towards her, you can hear the motors twirling] then there is, especially a lady at our place: she has some negative thoughts. I can just watch her facial expressions to know that this lady is not okay. And then really I know what moves inside her, but if I fetch Paro and say: “Can you please watch this for me?” “Oh yes, that I can truly do” [says in a calm and soft voice as being the elder]. And then she sits there with it and feels like she has a proper task that she can do with her whole self, right. And she can reside for half an hour, really, and becomes calmer. You see it in her facial expression, it changes, and she does what she can for him to feel well. And if she wants to go to the toilet or something she says: “”Can you come over to me and watch this, because I have to do a visit to the loo”. So, right. Caring! You know these elders living upstairs, before the dementia and things, most of them had

<sup>54</sup> Interview 5, ref.: 5383, 5594

<sup>55</sup> In the citations this gender focus is indicated with the name Paro in lowercase capitalisation, not as the product name PARO.

children and got to care for both children and animals and everything, right. And then they come here and, kind of, their daily life becomes something else. But having it on their lap and feeling that they get a mission, then I believe they just, they recollect in a way.<sup>56</sup>

Several methods and strategies are used to reduce unrest. As one of the caregivers explains how she uses the robot PARO to act:

It was like this: Paro has a nice big basket. And when residents have become a little agitated and need a way to calm down, then we retrieve the basket with Paro and turn it on. And then we say [with passion in her voice]: “Look what we have got and, so nice and...”, and then they were on it, immediately! And they: [with cuddly voice] “oh no, so sweet!” and then they got it on their lap and caressed it, and it reacted on all the cuddling it received.<sup>57</sup>

According to the caregiver, the use of PARO in this situation is at the beginning of a period with unrest, and the carer is ahead of the situation. At this place the robot seal has its own basket like a regular pet, and the carer presents the seal to the person with passion in her voice. According to the carer, the restless person accepts the animal and gets it on their lap and caresses it like a pet. The seal reacts to this by moving its limbs, changing its posture and looking at the resident talking to him. The seal also answers with different intonations in his voice and responds to the touches and words said to him. A similar experience is reported by another respondent where PARO calms a manic person. This manic person sees PARO on the lap of another resident, and calms down by the look of it. In this story there is a lady sitting next to this manic person, also gaining interest in PARO, when the robot is placed on the floor. She is a little disturbed by it residing on the floor and wants it removed so nobody steps on it.<sup>58</sup> The phenomenon that people next to each other use PARO as a source for conversation is stated by several caregivers, and seen as an unexpected effect.

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<sup>56</sup> Interview 13, ref.: 122, 2070

<sup>57</sup> Interview 5, ref.: 2261, 2877

<sup>58</sup> Interview 13, ref.: 4295, 4931

Earlier on in this interview we had been talking about how the elders understand PARO considering it is a robot or a toy. Some of the elders find it difficult in interpreting its nature as a live animal or not, they explain. To the question if the elders think it is alive the nurse Responds: “[One of the residents] really want to believe it is alive, but I think [this person] doubts it a little...But really, [said with a smile] does that matter so much? At least [this person] has a really good outcome by having it, right”.<sup>59</sup>

These reports of elders getting a different expression in their face while using PARO is also reported from other locations: “[The elders] managed to calm down when they got, got contact with PARO. And the employees also said so, like to see their facial expression; she looked so happy... And it is not so often she does that”.<sup>60</sup> Also at one of the other institutions they have the same impression that “you give people a small moment, at least, when they are able to relax and enjoy them self and get the smile out”.<sup>61</sup>

The value by using the robot for an agitated or demented person seems to be raised higher than not using it, leaving the question if PARO is interpreted as a real animal or a stuffed toy to a different sphere.

### 3.2.4 PARO Does Not Solve Unrest

Unfortunately the robot seal does not always get the smile out in people. If residents with late stage dementia are becoming agitated PARO is not always in use, as the nurse from a small protected unit explains:

Not at the moment. Because we have experienced that we do not have a suitable user-group. To say it in a different way, we have a quite varied group of residents at our place. It is an enforced protected unit. This means that those

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<sup>59</sup> Interview 13, ref.: 2201, 2414

<sup>60</sup> Interview 9, ref.: 17994, 18194

<sup>61</sup> Interview 14, ref.: 22613, 22721

with agitation or a lot of anxiety or psychosis or something, they are at our unit, and they need as little stimuli as possible.<sup>62</sup>

The robot might contradict the idea of as little stimuli as possible. Further she says that these patients, when they get agitated, have good response to other types of stimuli like contact with a local cat, outdoor promenades in the sensory garden, or one to one contact in their room. At this unit a Norwegian forest cat lives. This is not unique in Norwegian healthcare and several municipalities have cats living at their caring centres and institutions. To the question if someone does not like their cat she responds: “Everyone loves the cat. Because, as I said, it is quite smart, I think. So it feels quickly when I want to be alone, it then pulls away and nothing seriously happens. Or it will not come to any conflict between the cat and the residents”.<sup>63</sup> The cat is able to sense the mood and understand what is going on with the patients, and withdraw from the situation before anything happens. The cat does not create any agitation between the patients and is at this department seen as a better solution than PARO. The residents recognise the cat, she says, and the cat responds positively as well. So “in a way” she explains “we use the local cat instead of the robot seal PARO”. She also believes “this is one of the reasons we do not use PARO as much”. “Some of the employees are allergic to cats, so when they are at work the cat has to be left outside”, she further states. However this is not a problem for the elders according to the nurse because “they sense that the cat is present, but when it is gone they do not notice it”.<sup>64</sup>

The impression of the cat is differentiated between the workers, as one of the other employee states:

It has been outside now. It has been away for two or three days then. So when it came home, they were so happy because it came inside and lay on the sofa.

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<sup>62</sup> Interview 5, ref.: 495, 871

<sup>63</sup> Interview 5, ref.: 10785, 11067

<sup>64</sup> Interview 5, ref.: 11227, 11346

But he is not so much inside, he is mostly outside. Getting food and water outside, and then he comes in and steps inside for a while.<sup>65</sup>

The cat is roaming free between inside and outside of the residents' living quarter and is therefore not so much of an applied tool in reducing disturbances. The cat is located at this department, due to the pet allergies of patients and employees at other departments.<sup>66</sup>

There are different tactics towards approaching restless elders, not all carers use the robot in their care practises. If the agitation has increases some hesitate to use PARO as a tool to calm down the situation. Some of the patients have lot of temper:

So if you see that it is just before [the interviewee snaps its fingers], then I walk over and say: you have such a nice dress on today...[she imitates the elders response] "Oh, do you think so?" And then it is gone.<sup>67</sup>

The carer sees the situation that the elder is about to be agitated and walks over to the elders and gives some attention. If they had introduced PARO at that moment the patient would have shuffled it away and got more irritated, says the respondent.<sup>68</sup>

Next to this institution that has PARO, a unit of residential homes is located. Residential homes are differentiated from institutions since elders can rent an apartment or care flat, but still legally live in their own home (Laberg, Aspelund, & Thygesen, 2005). This residential home has shared common-areas and permanent care staff on duty during day and evening time, while at night an alarm system informs the carers at the care centre if someone is leaving the unit.

When asked if they have tested out the robot PARO they state that they have seen it on television programs and got it presented at staff meetings at the nearby caring centre, but they have not considered to use it. As the carer says "I have not seen it, no. Quite simply, it

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<sup>65</sup> Interview 6, ref: 7665, 7973

<sup>66</sup> Interview 7, ref.: 5186, 5293)

<sup>67</sup> Interview 6, ref.: 16026, 16325

<sup>68</sup> Interview 6, ref.: 16454, 16656

has not been a theme to use it at our place”.<sup>69</sup> Elders living at these shared flats usually spend the day in the common areas together, or with the staff on fieldtrips to cultural arrangements or just a walk in the neighbourhood visiting the local day care unit. If the staffs have to give more attention to one person they use several strategies, depending on the state the elder is in. As a carer explains:

If we see that a user has unrest, then it is important with one-to-one [contact]. If we are two on duty then maybe one of us handles this person, maybe leading the person away from the situation that has occurred, or go to the room. Maybe put over some coffee and in a way try to meet, yes enter this room [mental space] and then try to turn the person around, and that’s really effective. And it is very often effective to give a hug, or caress their arm or things like that. That works really well.<sup>70</sup>

As the carer states, the solutions to unrest at this unit are related to changing the focus within the person. This happens by taking the person out of the situation by physically changing place, or distracting the pattern by activities or just emotional contact. This works really well for the elders. However, there are only two persons on duty and this limits their ability to act on several persons at the same time, since the other carer becomes locked with the other residents.

### 3.3 The Daily Routines at The Caring Centre

The daily work at the caring centres is not only related to the challenge of handling unrest. The elders live at this centre and have their daily life there. One of the carers tells me that elders get assistance with the tasks that they are not able to do on their own, like taking a shower and other hygiene tasks, or getting dressed in the morning. They are also assisted with practical tasks that are difficult to manage or that they have lost the ability to do. “Each

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<sup>69</sup> Interview 12, ref.: 4118, 4468

<sup>70</sup> Interview 12, ref.: 6592, 7098

person has their own room but they are always out in the common area” states the carer, “both in the evening, daytime and afternoon”.<sup>71</sup> The elders seek contact with each other and the carers. To the question of what is the most important task professional carers do in their work, one of them explains:

The most important for us is, in a way, to create calmness and safekeeping and in a way improve their quality of life. So they feel; joking around with them [...] they do not understand irony, but they understand a good joke really well, and laugh well if I tell them something funny. It takes so little to make them happy. So little. Just baking some buns where they experience the good smell and look forward to tasting it. It really takes so little to make them happy, really.<sup>72</sup>

The daily life at the caring centres goes by while good humour and pastries are essential elements to improve the quality of life. At a regular home there are several activities that going on during the day, such as listening to music by Vivaldi or Norwegian folksongs, playing games, laying puzzles or just reading the newspaper. Some of the elders are not able to read anymore but the employees read the newspaper for them.

When I interviewed the first employees in July 2010 it was summertime and PARO was not so much in use. “You know, this summer I have not used it, because then we are all sitting outdoors”.<sup>73</sup> The carer emphasises that they like to be outside, if the weather is nice. They have a sensory garden with walking paths and benches, access to a nearby hen roost, and sometimes the cat comes by. A sensory garden is especially designed for elders with dementia to provide an outdoor space with a homelike environment, places for privacy and to provide sensory stimulation to increase mental alertness, among others:

The sensory garden is experienced in really different ways by our user-group. Some just enjoy the sun, by sitting in the sun. That’s enough for them. And others like to pick up different things. Then we have to make sure it is not completely destroyed, to put it that way. But we have, this sensory garden

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<sup>71</sup> Interview 13, ref.: 22271, 22699

<sup>72</sup> Interview 12, ref.: 29830, 30319

<sup>73</sup> Interview 6, ref.: 12214, 12587



contains flowers, strawberries, and currants and things like that. Yes everything is there, so there are senses for sight, or stimuli for eyes and for senses, and hearing and everything, really.<sup>74</sup>

The nurse compares the garden to PARO and says that PARO is similar, in a way:

And in that way PARO is quite similar. Because it is also, you can touch it so you feel. Okay the sense of smell is a little bit different, but you can hear and see it. And it is really cute when it blinks and looks at you and things like that. Most of them describe it as cute. With its big eyes and such: “O you are so cute!” So it is in a way different but similar as well. Because multiple senses are stimulated in the sensory garden, and equally with PARO.<sup>74</sup>

In the sensory garden the users are becoming calm and explore the value of sensory input, appreciated as beauty, calmness, relaxation. The nurse compares PARO to the sensory garden’s value and claims that it also gives some values to the users, like its cuteness and big eyes, triggering emotional responses from the user.

### 3.3.1 PARO as an Activity

When the weather does not make it possible to be outside, PARO is more in activity according to the informant. “If it is really quiet or someone is a little, to find something to do, then I can go and get Paro. So there is no system of when we shall use Paro or not. It is just an impulse I get”<sup>75</sup>.

The idea to fetch PARO is something one of the other carers struggles to remember during the daily care. “When I work at that unit I become really focused on nurturing and remembering who has gotten their medication and all practical tasks that must, shall be done, then I am not so good at thinking about activities. That I honestly have to admit, but I am

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<sup>74</sup> Interview 5, ref.: 7452, 8453

<sup>75</sup> Interview 6, ref.: 12214, 12587

working on it.”<sup>76</sup> When the employees are not so used to PARO it seems easier to forget to use it as a regular activity.

I believe it is more that of ignorance. The fact that they are not familiar with it, no. But it is also easier to use it in unit two where it is located in the office. When I come from the other units then I, in a way, have to say that I am going to borrow PARO but I do not have any key to the office, and then I need assistance to open up and things like that, true. But I do not believe it is, to say it in a different way then, I believe it is our elders who use it. Not so much the youngsters, no.<sup>77</sup>

When asked to elaborate what she means about the youngsters she says “that they are really skilled as well, but they do sit more and talk and read out from the newspapers and stuff like that”. The young employees seem to be more into doing different forms of activities together with the elders. PARO is located at one unit. This influences the usage of PARO and it has not been so normal to use it at the other departments.

The protected unit used it before when they had a suitable user-group, the shared flats have heard about it, but never considered to use it, yet. So who really uses it and is there a difference between the units on how it is used?

No, that’s really the same, but I’ve got two or three residents at unit two who are really excited about it. And I’ve got two or three residents on the other unit that are really excited about it. But it seems like when they get to know it better, like they are getting more, getting a closer relationship when they come, or if you are a stranger.<sup>78</sup>

The carer states that two to three elders at each unit are really excited about the robot, and appreciate it when the caregivers come with it, especially if the elder know the caregiver from before. But some of the residents do not really like cats or dogs and can get a little provoked by PARO, as a situation that happened one day. The caregiver also has the robot with her into the interview and explains:

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<sup>76</sup> Interview 15, ref.: 16728, 17340

<sup>77</sup> Interview 6, ref.: 19683, 20142

<sup>78</sup> Interview 6, ref.: 8278, 8601

But one day I placed it on the table, just like this [she positions the robot on the table in front of us] and then we were seated, drinking coffee with some that are a little, yes. They are really different, and then there was a comment; “Ugh, what is that, then? Yea, it is easy to get rid of it. Hehe. Just get it away.!” That was her opinion, right? That’s also a comment, right.<sup>79</sup>

In some situations the robot is not wanted on the table, for instance if they are drinking coffee. This is a quite normal reaction, for those who interpret the robot as an animal. Most people do not like animals on the table during their teatime. Comments from other caring homes testing the robot also describe similar responses like this.

### 3.3.2 PARO as a Therapeutic Tool

The use of PARO to calm down unrest, reduce manic behaviour, remove negative thoughts or just as a social interaction can be stated to be a kind of therapeutic usage. This strategic usage is also described by the distributor, RO, as one of the arguments for using the robot:

At the same time as you have these therapeutic, you cannot use the word therapeutic by the way, but we do it a little. He has some therapeutic effects, you can use the seal to maybe prevent too much unrest. You can also use him like this example I’ve got; where a person is extremely depressed in the morning, doesn’t want to do anything, can’t manage anything, life is just terrible. . But if they bring the seal when they wake her up, then the life is wonderful. She gives a big smile when she sees PARO, is out of bed on five minutes. It makes life easier then.<sup>80</sup>

RO focus on these effects in their argument for using the robot in care relations. In dementia care, one questioned method in relation to therapy is the use of medication for reduction of violent agitation or other strong symptoms. They explain that this is not the first choice and several strategies have to be tried out first. “But that’s also then. The patients are in such pains that it is for the best of the patient. Then the [patient] also has it better. But it is not

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<sup>79</sup> Interview 13, ref.:11572, 11997

<sup>80</sup> Interview 11, ref.: 42007, 42560

something we use immediately.”<sup>81</sup> The managers talks about how it is seen from their side, the use of medication:

There are several nurses that say “I took PARO out and, last weekend I had to give medication, because PARO was not charged”, for instance. But that you see it can have a certain effect that is much healthier than giving medication that often has side-effects, and after effects and, so I believe it limits the use of enterp (sic) medication or sedatives on its own. And this the milieu does since the milieu is small. And also taking small steps to acquire a cosy animal, regardless of whether it is PARO or [the cat].<sup>82</sup>

Another nurse also explains that “medication has a small effect and a large amount of side effects”<sup>83</sup> and emphasise the importance of “having several assistive tools and tactics to help the patient”. So medication to treat unrest is questioned and a source of controversy. PARO as a therapeutic tool, even if it shall not be labelled as therapeutic, is an argument for using it that is fronted by those who give daily care to elders with dementia. The positive smile on the elders’ face when using PARO (or the cat) is opposed to the silence that emerges when using tranquilisers.

### 3.3.3 PARO Makes Me a Better Caregiver

Ehm, maybe it makes us become better caregivers, I would say. Eh, better caregiver is maybe a little too heavy to state, but you may see nuances of what they need, more than medication and wash and care. They need to give care and be useful for someone, in a way. It can make us think.<sup>84</sup>

The stories given by the caregivers indicate that they have a focus on giving the elders living at the centre a good daily life. By having the opportunity to use this artefact in caring, the caregiver pays more attention to the individual needs of the elders. As the respondents state

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<sup>81</sup> Interview 12, ref.: 7141, 7518

<sup>82</sup> Interview 7, ref.: 28274, 28820

<sup>83</sup> Interview 1, ref.: 13705, 14013

<sup>84</sup> Interview 8, ref.: 42786, 43160

several times, we have to see when the robot shall be used or not to calm down a patient, or use it as a positive stimuli. This knowledge about when it shall be used or not, is something the distributor wants to inflict, as the stories with unrest show, the caregivers have a need for procedures and guidance in how the robot can be best put to use. The advisor from RO emphasises that everyone involved must be positive towards the initiative before a robot like this is taken in to use. The DTI has a prerequisite that everyone acquiring a robot shall on be given a certification course in advance, and that the robot shall not be used without training. This focus on certification and education is unique for Denmark and Scandinavia compared with Japan, according to the project manager at DTI. The focus on certification is said to be important to secure pedagogic usage of the robot and train the employees in knowing which situations it is suitable to use it or not.

### 3.4 Summary

The respondents' narratives describe how the robot pet has been introduced to elderly care, from the first small steps at gerontology seminars in the nineties to a fully established service for Norwegian elderly centres. The involved people, both caregivers in general and occupational therapists found the idea of using robot technologies strange and quite unfamiliar in the beginning, comparing it with science fiction stories. The process from getting the opportunity to test the robot to actually acquiring one was not straight forward for some, while others has decided not to acquire one. There are several reasons for this, both the costs that cannot be defended despite good experience, but also the difficulty to really know if it's a functioning technology or not. The resources available at the institutions to acquire services and milieu related equipment are limited, forcing the managers to choose carefully what has the largest impact of the equipment they are using.

In the respondents' stories, the robot has been situated in care practises where the main goal is the elders' needs. Unrest or agitation is a major problem in dementia care, something the robot is said to reduce. However, there is more than one solution to solve unrest, considering that the robot is only one of many practises put in use. The caregivers conclude that the robot might not solve anything, but it makes the caregiver more attentive towards the elders. The distributors, however, have a need to control how the robot is used and interpreted. They therefore emphasise the importance of training and certification. All these practices in solving unrest show that the robot has a role, but not always in the way that the distributors want it to be used. The story of PARO as seen by my respondents indicates that the process of implementing social robotics is not something that has just emerged over the past few years, but has been a social, political, economic and technological development going on for almost two decades.

By analysing the interpretative flexibility in relation to involved social groups, a more diverse and deeper understanding can be revealed of how the involved actors actually adapt the technology.

## 4 The Social Construction of Mental Commitment Robots

The aims of this master thesis are to investigate how relevant social groups interpret and adapt the robot seal PARO in the social contexts it is used, and to find out which ethical aspects emerge when it is introduced in professional care. The theoretical framework of SCOT offers concepts to investigate interpretations of technologies, as explained and illustrated in chapter 2.1: The Social Construction of Technology (SCOT). The exemplary analysis revealed that the concerned nurses questioned the robot as a substitute for human contact while the innovative employers saw it as a solution to effective care. A more diverse view has been drawn in chapter 3: The Use of Mental Commitment Robots in Elderly Care, where the respondents describe how they adapt the robot, seen in relation to what good care is.

Bijker describes the complexity in technological development as a profound social cooperation where both the technical, political, economic and social factors are essential elements that act together to form a socio-technical world (Bijker, 1993, p. 114). To reveal these factors it is in the framework of SCOT instructed to focus on disturbances in the form of problems and their solutions as described by the actors. The institutions' economy and the robot's costs are taken as an entry point when addressing the disturbances the actors describe. Further, the analysis investigates how the elders interpret the robot's ability to show aliveness, and finally how the attitudes among the caregivers form the robot.

### 4.1 How Anticipated Costs Forms the Interpretation of PARO

The first artefact that can be identified in the respondents' stories is the *test robot*, available to be borrowed from the distributors. In the beginning the robot was free to be tested by everyone, but over time this has been put under supervision where the distributor wants to

instruct those going to use the robot.<sup>85</sup> In the story these *curious people* describe positive experiences from the test, but decide “at that time we did not have any economy to buy him”.<sup>86</sup> Several institutions see the high costs as a major barrier in acquiring this robot. One respondent with the intention to test the robot clarifies: “I cannot imagine that we can pay 70000 NOK for this, so we have to get it sponsored in one way or another”.<sup>87</sup> These curious actors are eager to get the robot on a permanent basis, but see the price as a major problem for them to do so. Some respondents point to the role of voluntary organisations in funding such an item: “We would not have it now if it was not given to us”.<sup>88</sup> The voluntary organisations are thereby enrolled in the analysis as an actor, solving the retrieval cost issue as they come up with a solution to sponsor the institutions that have experimented with the test robot for a while. For those who get the robot sponsored the argumentation changes for how it shall be used, as now they have *an expensive robot* given by an external actor.

The *involved caregivers* who use the robot regularly do not describe the high costs as an obstacle. “I believe that we might turn this view around and look into what amount of money we spend on medication, and what we can spend on milieu treatment initiatives instead”<sup>89</sup> comments one respondent. The argument is that if milieu treatment can reduce the medication cost, this also has to be considered more than before when the budget is set within the institution. This argument puts down the need for voluntary organisations to sponsor a robot since now the money becomes available through adjustments in the institution’s budget. By this move the interpretation of the expensive robot also ceases to exist for some members of the social group of curious people, increasing the interpretation that the robot can be seen as *a new solution in care*, hence they get enrolled in the social group of involved caregivers.

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<sup>85</sup> See chapter 3.1.2 A Symbol for Welfare Technology or Just a Stupid Toy?” for comments on how the right attitude is considered as important to have before an institution shall test the robot.

<sup>86</sup> Interview 10, ref: 4150, 4394

<sup>87</sup> See reference in footnote 52

<sup>88</sup> Interview 10, ref: 47141, 47289

<sup>89</sup> Interview 10, ref: 47453, 47623



The distributor of the robot says that “one of the reasons that it is so expensive is just that it handles quite a lot, because you can go to any toy store downtown and buy cats and dogs that answer and shout and react in many ways... They have pretty primitive reaction patterns...they are not solid enough, they will not hold”.<sup>90</sup> The idea that PARO is something different than other robot toys is questioned by some:

So it is extremely expensive now, in relation to what all other consumer technology is. For instance, those robots for children that are much more advanced, like PLEO<sup>91</sup> this dinosaur that is a little smaller, it can walk and stabilise on pretty uneven surface and in addition it has this emotional, or it can both hear and react and look towards you just as PARO. This robot is more technologically advanced than PARO, and they got it on sale last summer for one thousand [NOK].<sup>92</sup>

A couple of respondents compare PARO with robot pets sold in toy stores and cannot see any difference. A respondent vindicates: “There is no point in acquiring such an item before a thorough evaluation has been done to show that this is the right choice. From an economic point of view you at least have to consider if it is right to acquire a robot seal before you, for instance, buy a robot vacuum cleaner. What will have the largest effect?”<sup>93</sup> From this argumentation where PARO is compared with other robots, the economy becomes a major problem since it is just another *robot toy*. This social group of *critical people* involved in evaluating the technology through testing therefore compare the price as a property for how well it shall perform compared with other social robot toys.

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<sup>90</sup> Interview 11, ref.: 24727, 25094

<sup>91</sup> PLEO is a dinosaur robot that was on the market from 2006 to 2009 through the company Ugobe. Over 100 000 units were shipped worldwide the first year, but Ugobe went bankrupt in 2009 due to lack of funding (Sosaka 2009). A new version has been released in 2010 (Pleoworld (n.d)).

<sup>92</sup> Interview 3, ref.: 23376, 25031

<sup>93</sup> Interview 9, ref.: 23418, 23754

## 4.2 How Animatism Forms the Interpretation of PARO

In the respondents' stories, the elders' interpretation of PARO is often mentioned. As one respondent informs; "usually two or three residents at each unit are really excited about it, while others can be a little provoked by PARO"<sup>94</sup>. Some of the elderly centres are divided in smaller units where four to seven elders live and share the common areas. Several respondents describe how those elders who are negative towards the robot act. One of the elders is said to "not like it at all. [The elder] sees it as a cat and cats shall be on the floor or best left outside."<sup>95</sup> At another institution they explain that an elder got scared: "And when it came on the lap and started to move, then she was scared and threw it on the floor. She screamed and did not understand what it was".<sup>96</sup> None of these elders want to interact with the robot, they believe either it is a real animal, or feel fooled when they find it is an inanimate object like a regular toy.<sup>97</sup>

Not everyone got scared of the robot, however. The caregivers describe how some elders accept the robot and find it fun to interact with. "They understood it was a toy, but at the same time they did not. It was a cuddly pet for them, a real being".<sup>98</sup> The elders are puzzled by the aliveness but logically accept that it is artificial. Emotionally they start interacting with it as though it was alive anyhow. The involved caregiver says that it is pleasant to bring the robot to the common room since the elders react so positively towards it. "You give people a small moment, at least, when they are able to relax and enjoy themselves and get the smile out"<sup>99</sup> The elders interpret the robot as a live animal in many ways. A more precise word for the phenomena is *animatism*, "the assignment to inanimate objects, forces,

<sup>94</sup> See the discussion in chapter 3.3.1 PARO as an Activity, and footnote 79

<sup>95</sup> Interview 10, ref.:28047, 28874

<sup>96</sup> Interview 14, ref.: 8673, 9266

<sup>97</sup> See the discussion in chapter 3.1.2 A Symbol for Welfare Technology or Just a Stupid Toy? and footnote 37, 38

<sup>98</sup> See page 46 and the discussion where elders see the robot as an animated object, footnote 42

<sup>99</sup> See page 52 and the comments caregivers give when discussing animated objects, footnote 61

and plants of personalities and wills, but not souls”.<sup>100</sup> The involved caregivers use several strategies to overcome the problem with anthropomorphising the robot, often by explaining its emotional cues as mechanical behaviour and the shape as a machine or robot, or they just choose not to mention it at all, since the elders seem to become more calm and happy when the robot is around anyhow.

From the elders’ point of view it turns out that the robot PARO can be seen either as a *robot toy*, as a *caring robot* that is almost alive, or as an *animated robot*. These artefacts also form relevant social groups of elders, as the *serious elders* and the *compassionate elders*. Those who got scared are more difficult to categorise, since it is not clear if this reaction is due to the dementia disease or the phenomena anthropomorphising. For analytical purposes this group is labelled as the group of *affected elders* seeing the robot as alive, becoming the animated robot.

From analysing how the elders interpret the robot’s aliveness I now move to investigating the involved caregivers’ interpretation of the robot. The relevant social group of involved caregivers has already been identified but how they describe PARO differs among the respondents, it seems. According to the SCOT methodology it can therefore be more effective to divide a rather heterogeneous group into several different social groups (Pinch & Bijker, 1984, p. 414).

### 4.3 How the Attitude Among Caregivers Form the Interpretation of PARO

With regards to the cost issue a social group of critical people was identified. This group evaluated the robot against other robot pets, finding the price too high. The scepticism towards the robot was expressed in general, not only because of its costs. As some

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<sup>100</sup> animatism. (n.d.) *WordNet 3.0, Farlex clipart collection*. (2003-2008).

respondents admit; in the beginning “I was not positive toward this robot.”<sup>101</sup> The actor compares the robot to a stuffed toy and justifies the attitude with a question: “How would you have thought if your parents were sitting there with it?” A question the respondent answers by referring to her own feelings: “In a way...In general I would not have thought it was okay, I believe.”<sup>102</sup> It feels uncomfortable for the children to see their parents play with a robot as if it was a live animal, or a toy. It was said that “one relative reacted to it and thought it was some childish nonsense.”<sup>103</sup> When the robot is demonstrated to the caregivers, this resistance towards it is described in the following way: “Sometimes when I show it, when there is only us caregivers around, then I see that some become a little aversive, they do not want it on their lap.”<sup>104</sup> They have considered carefully what it means to use dolls with adults and have found it stigmatising in some situations. In this situation, PARO is just a *robot toy* that is stigmatising for the elders to use, constituting the social group of *concerned caregivers*.

On the contrary, several caregivers have a positive attitude towards the robot, as one explains: “I thought it was really cosy...nice weight, it had a really good shape. It did not matter that it screams and whines, it was not a problem. I thought it was cute.”<sup>105</sup> One of the people who were sceptical in the beginning changed her attitude after a while, “when I, in a way saw what he did with people, I have to say I got a completely different impression.”<sup>106</sup> She saw that people interacting with it calmed down, and found it pleasing to be around. It solves a challenge in care turning the elder from being someone who is cared for, to someone who cares. The robot is seen as “an object where you as a patient can control the activity yourself, and be a substitute for intimate social contact.”<sup>107</sup> In this way, the robot is

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<sup>101</sup> See chapter 3.1 The First Impression of PARO as well as page 38 and the discussion of the ambivalence the robot create.

<sup>102</sup> Interview 10, ref.: 5010, 6411

<sup>103</sup> Interview 15, ref.: 8992, 9280

<sup>104</sup> Interview 8, ref.: 16168, 16325

<sup>105</sup> See footnote 18 on page 37

<sup>106</sup> Interview 10, ref.: 5229, 5557

<sup>107</sup> See page 48 and footnote 47

considered as socially acceptable and not a toy.<sup>108</sup> The robot is not just a robot pet or toy, it is a *caring robot*. It enables the elder to take care of the robot, feeling useful again instead of feeling as a burden at the elderly care centre. The caregivers cannot get as close as the robot can, since they have to keep a professional distance and not touch or enter the personal space for each person. This social group of *encouraged caregivers* assists the elders so they can use this caring robot, a socially accepted artefact in care.

#### 4.4 Interpretative Flexibility: A Spectre of Different Robots in Use

The three problem areas costs, animatism, and attitude reveal that the robot has different meanings to different social groups. While curious people see it is an expensive robot, it is a new solution in care for involved caregivers, and a robot toy for critical people. For the affected elders it can be an animated robot that is a bit scary, or it is a caring robot that activates the compassionate elders in a taciturn environment. These different interpretations are examples of an artefact's flexibility as it is formed by its social context, not only its intrinsic properties. This is the interpretative flexibility of the technology (Bijker, 1995, 1993; Pinch & Bijker, 1984).

In Figure 3 The deconstructed PARO as interpreted by the involved social groups are shown, the evolution start with the three identified problem areas, costs, animatism and attitude. The diversity of artefacts is exemplified visually in this figure, where each solution, constructed by its constituting social group, forms a new kind of robot. It has to be said that Bijker warns against achieving a complete evolutionary representation, as this is not possible due to the immense complexity in revealing all related problems, their solutions and constituting artefacts. He also warns that this representation is not completely adequate,

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<sup>108</sup> See page 48 and footnote 48

because it portrays a static moment that invite to presume an artefact as a fixed entity, where this is not the case (Bijker, 1995, p. 52).

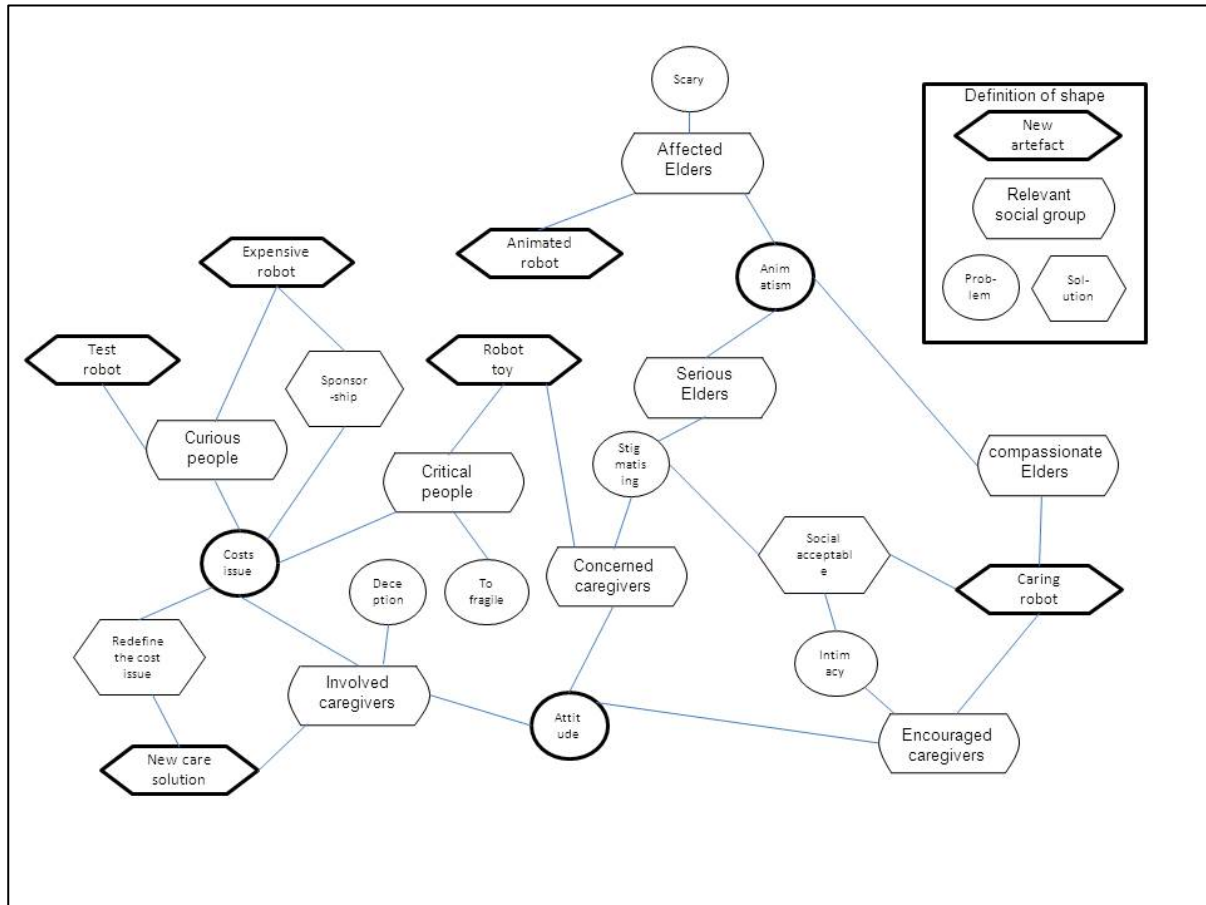


Figure 3 The deconstructed PARO as interpreted by the involved social groups

These different interpretations change continually, as members of one relevant social group might transpose to another, or belong to both at the same time. Within this snapshot of a dynamic world of PARO, there are some artefacts that gain a stronger hold within social groups, while others fade out, both the artefact and the constituted group, in other words, the process of closure and stabilisation of an artefact.

## 4.5 Closure and Stabilisation

Revealing the interpretative flexibility of the robot PARO is just a first step in the sociology of technology. The second analytical step focuses on how these fluid artefacts develop further to reveal if one or several of these interpreted artefacts disappear while others become more dominant (Bijker, 1995, p. 84). The process of closure and stabilisation is an intertwined concept going on at the same time. For analytical purposes, the degrees of stabilisation for each artefact are discussed first. Secondly, the closure processes among the different social groups are elaborated on.

The test robot was first a stable artefact for the social group of curious people, available to be borrowed from the distributors and experimented with. When the distributor put it under control, the test robot as an artefact is destabilised, since it is now a product available for just a free trial over a short time. This destabilisation also increases the focus on the robot as high cost equipment since it becomes clear that not only the robot has to be paid for but also the certification. For some the cost issues are an obstacle so high that they have to return the robot without buying it, by this leaving the social group of curious people.

With enrolment of a third party actor sponsoring the robot, the impression of the test robot is redefined to a new artefact, the expensive robot. The donation stabilises the artefact as high cost equipment since they have now received a costly contribution that has to be treated carefully. This is shown as they are careful in deploying the robot to only elders that do not fumble roughly with it, or throw it on the floor. By taking these precautions, the members of the social group of curious people reduce the importance of the fragility issue and high cost. In the theory of SCOT, the stabilisation process was described to be coloured by semiotics and analysed by tracing the change in rhetorical argumentation (Bijker, 1995, p.

86). This rhetorical argumentation shows that the expensive robot is a more valid artefact among the social group of curious people.

The modalities in the argumentation regarding cost changes over time, as shown where the expensive robot is compared with the robot as a new solution in care. This intergroup argumentation shows that in relation to the cost problem there are two relevant social groups using the robot in different ways. The curious group uses it carefully since it is expensive equipment, as the involved caregivers have a more confident usage among a range of elders, as a new solution in care.

As the cost issue dwindles away within the social group of involved caregivers, other issues become more acute. For the involved caregivers, the major problems are not the costs, robustness, or documented effects, but how the elders react when the robot is present and how the robot can be best put to use. As the elders see the robot as an animated robot, a caring robot, as well as a robot toy, these views challenge, but also support the impression the social group of involved caregivers has. When the caring robot is introduced, the compassionate elders show a range of positive emotions. These emotions become arguments for the involved caregivers to enforce the interpretation of a robot that works as a new solution in care. But there are two artefacts threatening the social group of involved caregivers, the robot toy and the animated robot. Both artefacts are argued against by the use of a set of rhetorical means. For the serious elders and affected elders, it is stated that they do not have to interact with the robot, while the animatism is more or less defied by explaining to the compassionate elders that it is just a mechanical robot.

Not all caregivers see the robot as a new solution in care, however. In some situations, the concerned caregivers express their impression of the robot as a stigmatising object. For this social group, the robot is just a robot toy that holds several problems, not only the cost as for the critical observers, but also ethical considerations such as the fact that it might be



stigmatising for the elders. They find proof for this by observing the social group of serious elders as well as the affected elders. These are strong arguments situated in moral philosophy regarding which ethical values shall be valid in care. Arguments that are not considered by the group of encouraged caregivers interpreting the robot as a caring robot. For this group, the robot is not a stuffed toy; it is an acceptable solution in care enacting the elders.

From three problem areas -cost, animatism and attitude- it has been shown that a diversity of factors influence why, how and where the robot shall be used as well as how different groups adapt to the robot. The controversy of cost has seemed to stabilise for the members of the social group of involved caregivers. However, the cost issue in general remains open and is questioned within other social groups such as critical people and curious people. The problem of animatism will remain open as it is a basic human ability to perceive objects as having consciousness (Duffy, 2006, p. 33), a problem also creating new ethical issues in relation to deception. These issues were revealed as a problem for the social groups of affected elders and serious elders. Finally the concerned caregivers see this danger of stigmatising the elders, since the robot is a toy, inhabiting ethical concerns that have to be considered. The encouraged caregivers on the other hand, see this as perfectly acceptable as a caring robot that does not have any ethical concerns inhabited in it. As a moderator between these groups, the involved caregivers are aware of the problem of deception and devaluation of adults, and therefore spend time explaining the robot to the elders, considering its use in each individual case.

## 4.6 The Analysis Seen in a Wider Social Context

The process of closure and stabilisation reveals that there are conflicting views among several relevant social groups. The strongest conflicts can be related to those already identified in the introduction of the thesis. Is the robot PARO a good solution in care, or is it stigmatising? The analysis has shown that what makes it a good solution or stigmatising differs widely among the different social groups.

The act of training and certification can be seen as an initiative to frame the artefacts as a new solution in care, where an important part is also to weaken the impression of the robot as a toy by defining a common social structure for how it shall be used. The focus on certification and training challenges the flexibility of how the robot shall be seen among different social groups, where those who have been trained become highly connected to the certification frame. Powerful identification processes are made through the act of certification, the test period, and the efforts made to acquire financial support for the robot.

This process can be said to configure the robot within a technological frame. This technological frame structures the interaction among the actors of the relevant social group and works as a recruitment process for new members as well. Bijker explains that “if existing interactions move members of an emerging relevant social group in the same direction, a technological frame will build up; if not, there will be no frame, no relevant social group, no future interaction” (Bijker, 1995, p. 123). By configuring the social group within a technological frame, strong powers are at work to stabilise the view that this is a new solution in care. A technological frame can also be called a cultural configuration where the freedom of the members of that configuration is constrained by previous history and actions. Bijker claims that this “frame functions in a similar way as Kuhn’s paradigm, when used to explain the stability of normal science” (p. 193).

The identified controversy exists because of different cultural configurations. This is especially visible in the social group of concerned caregivers where the robot is seen as a toy or robot pet. The caregivers as formed by a traditional caring frame emphasise that over many years, toys have not been accepted at care centres, since it is experienced as stigmatising for the elder. This is a learned knowledge that is established as a paradigm within traditional care. The traditional caring paradigm consists of established practises on how to interact with elders that have dementia, and how people shall be met if they feel uneasy. This means that the impression of toys and pets are valid, since they are constituted in a paradigm that is challenged by introduction of the robot PARO. Bijker explains this conflict as a process going on within socio-technological cultures where different configurations exist (Bijker, 1995, p. 276).

When there are two or more entrenched groups with divergent technological frames, arguments that carry weight in one of the frames will carry little weight in the other. Under such circumstances, criteria external to the frames in question may become important as appeals are made to third parties (pp.276-277).

These appeals become visible in the magazine article by Block Helmers (2010), and several statements from the respondents assuring that the robot is not a replacement for human care. The appeals are directed towards third party actors like financial supporters or policy makers such as governors and councillors; increasing support for the technology.<sup>109</sup> While the NNO questions if all ethical factors are considered and who exactly decide what technology to invest in; the involved nurses or the managers.

Other studies such as those within ICT communities work hard to prove that social robots have an effect on elders (Broekens et al., 2009). This is a deterministic view stating that technology in itself influences people. The SCOT analysis has revealed that the factors that make the robot work are also social negotiations within and among different social

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<sup>109</sup> See the discussion on how to enroll the politicians in interacting with PARO, chapter 3.1.

groups. The robot's functionality and properties sometimes support the sociological definition of working, while in other situations it actually causes the technology to not work. This has been seen in relation to its shape (robot toy, robot pet, caring robot, or animated robot), and its properties (costs, weight, movements, cuteness, and eyes). In relation to new ethical considerations, such as the robot being stigmatising or bringing deception, is acknowledged by the ICT communities (Veruggio, 2007; Duffy, 2006). Duffy (2006) confirms that the issues are relevant, but warns against "constraining the robot too much within the human frame of reference" (p.35). Duffy defines "the machines to become a different form of "species" accepting the chasm that separates man and machine.... This also constitutes a step in avoiding a number of the ethical issues that the domain is in the process of introducing. It being a machine is not a flaw, it's a role" state Duffy (2006, p. 35). This *role* is what the social group of concerned caregivers, critical people, the serious and the affected elders are provoked by. It does not fit in their care configuration, something Turkle (2011) also has revealed. Turkle is sceptical to considered the machine as a new entity, a kind of alive species, and rise the ethical debate of deception due to its highly efficient and smart emotional cues, constructed in computer programs and physical expressions, both visual and audible; just pushing certain 'Darwinian' buttons to make people believe that the robot has emotions (Turkle, 2011, p. 8; 2006, p. 2). Turkle state that revealing the mechanical workings is accurate, but irrelevant within an on going relationship (Turkle, 2011, p. 90). As seen in the process between the caregivers explaining the compassionate elders its mechanical workings; that becomes irrelevant. The elders just want to please the robot since it makes them feel well (p. 88). These caring robots renews Woolgar's reasoning for a 'sociology of machines'; and now when those 'species' are here, the questions he asked whether there is something eminently human, becomes more valid than ever before (Woolgar, 1985, p. 567).

## 5 Conclusions

This thesis has investigated how caregivers interpret and adapt the usage of the mental commitment robot PARO in Norwegian elderly care. By revealing a range of relevant social groups and their problems with the robot, different acceptance strategies were also revealed. These strategies are linked to the applied solutions each relevant social group proposes to make the robot work for them.

The general debate in media presents a polarised controversy where health care, and especially elderly care, is opposed to the use of cold technologies (Pols & Moser, 2009). This thesis supports Pols and Moser in the view that “there are different relations between people and technologies within different user practises, allowing different affective and social relations, and this blurs taken-for-granted categories such as medical versus social problems, warm versus cold care, play and seriousness, and affective versus rational technologies” (Pols & Moser, 2009, p. 159). This thesis specifies these different user practises and defines them in several categories as separate artefacts. These artefacts are: The test robot, the expensive robot, the robot toy, the animated robot, the new solution in care and the caring robot. All of these are constituted in separate relevant social groups as: the critical people, the curious people, the involved caregivers, the concerned caregivers, and the encouraging caregivers. The elders are also defined in the social groups of: compassionate elders, the affected elders and the serious elders. Some of the artefacts acts as boundaries between several social groups, meaning that they are interpreted as the same artefact, but constitutes different problems for each group.

Over time the involved caregivers have gained a stronger hold as a relevant social group being configured within a technological frame through the act of training and certification. This socio-technical configuration can be seen as a new paradigm, competing with an old paradigm of what elderly care is and shall be. These paradigms explain the

polarised views presented in the media in relation to technology and care, but they also have an influence on what meant by care and what is meant by good care. The members of the new frame where the robot is seen as a new solution in care claim that they become more observant towards the needs of the elders. By this, new caring practises are made and they see the elder in a new way, not only as patients. This can be linked to the enactment Pols and Moser have revealed. When the robot is used within the new paradigm, the elders are also enacted and lifted out of the caring frame.

The ethical considerations that are revealed come partly from the old caring paradigm where dolls are considered as stigmatising for the elders to play with. However, the threat of deception is a new ethical issue not considered so much as a problem among the different social groups of caregivers, but made visible by the affected and serious elders; feeling fooled or scared by the robot. The Danish ethical board emphasises this problem and suggests that it has to be solved from situation to situation. A concern Sherry Turkle share, since the robot has understood nothing, only projecting the elders own feelings and emotions (Turkle, 2011).

At the dementia centres, the robot is generally compared to cats and other animals that are common at these centres. It was said in the beginning that it is a danger that robots might replace humans, but I do not see this as a threat. Social robots like PARO might remove the animals from the centres, but only for a while. As this thesis has revealed, there are situations where the robot is the best solution, but there are other situations where the cat works best, and in the end those only have an influence if there are caregivers around. By this it is only possible to conclude that it is actually the caregiver that calms the restless elders, not the robot itself, but the robot helps and so does the cat.

There is one final question to answer. Veruggio claims that robot technologies are seen as a dystopian artefact in European culture. Veruggio (2007) assigns this scepticism to a common

topic in classic European literature, the rebellions of automata or misuse of technologies. This scepticism is not traced in Japanese culture where the robot is from. “Japanese culture does not include such a paradigm. On the contrary, machines (and, in general, human products) are always beneficial and friendly to humanity” (Veruggio, 2007, p. 23). This optimism towards new robot technologies are however profound in western ICT communities, also where “new ‘models’ are rarely challenged” (Turkle 2011, p. 104). And finally, when all analysis has been completed and the major social groups revealed, with their issues and resolving artefacts, it might be possible to answer the question first stated: Do elders dream of electric seals? As Dick’s (1996) story left this question open to the reader, I will also leave this question open. However, what we can say is that elders appreciate social contact and being able to communicate. This is evidently shown in the anecdotes. They also become happy when they are seen for what they are, and found valued by the people around them, regardless of the electric seal.

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## Appendix 1: Example of Presentation Letter to Participants

(A Norwegian version of this letter was also given to the participants)

xxxx bo og behandlingssenter

Date 10. June 2010

### **Presentation letter - Emergence and usage of mental commitment robots in elderly care.**

I am a student at institute for social sciences at University of Oslo writing a master thesis about the emergence and usage of mental commitment robots in elderly care. Mental commitment robots are a type of robotics designed as fur seal baby animals, in use for entertainment and stimuli of persons, often elders with dementia. Because of your experience with use of the robot Paro, I wish to ask for your participation in my project.

In my thesis I will analyse how Paro is interpreted and adapted by different social groups at residential and treatment centres. An important task is to analyse which ethical aspects that emerges when a robot is introduced in elderly care and how relevant healthcare units interpret and evaluate the use of Paro in their care plan. To find answers to these questions I would like to interview ten to fifteen persons, mainly health workers or relatives to elders that uses or have evaluated to use the robot in their care plan. The questions asked during the interview will focus on how Paro is interpreted during use, the role you as a user has and how the robot influences this role. The interview will be recorded on a voice recorder and afterwards transcribed by use of personal computer. You as a participator are invited to read through the transcript and comment it afterwards. Personal information about you will be removed and all information is treated confidentially. No single person shall be possible to identify in the final report. All voice recordings will be deleted after the project is completed and all analysed data will be made anonymous in accordance with advices given from Privacy Ombudsman for Research.

The interviews are planned to be conducted in June and July, with necessary follow up contact in August. The project shall be completed within October 1<sup>st</sup>, 2010 by delivery of a report in English language to University of Oslo. The interview itself will take approximately one hour and all participation is voluntary. You are granted to withdraw from the interview at any time, and no explanation is needed. If you withdraw from the interview all collected data will be deleted and made anonymous.

This request will be distributed by your manager and I do not know your identity up front. If you want to participate on an interview, please sign the participator declaration and send it to me or your manager. The declaration can be sent by email or by post. I will then contact you for making interview appointment.

If you have any questions about the project, or want in general to give some feedback I can be reached by cell phone number: (+47) 908 35 374 or email: [perlp@student.matnat.uio.no](mailto:perlp@student.matnat.uio.no). My academic adviser, Göran Sundqvist at centre for Technology, Innovation and Culture, can also be contacted by phone on number: (+47) 22841625. The master thesis project is reported to Privacy Ombudsman for Research, Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S.

Sincerely  
Per Lyder Pedersen  
Student MA ESST, at Universitet i Oslo

Adress:  
Skolegata 15  
N-3182 Horten

### **Participator declaration:**

I have received information about the study of mental commitment robots in use within elderly care and want to participate on interviews:

Signature:.....Phone number:.....

## Appendix 2: Interview guide, English and Norwegian Version

- En: Interview guide for use at dementia residential and treatment centres**  
**No: Intervjuguide for bruk ved bo og behandlingssenter for demente, Juni 2010**  
 En: Respondents:  
 No: Respondenter:  
 En: Explain before interview starts: Use of voice recorder, get signature for participation declaration, explains what happens afterwards the interview is conducted.  
 No: Forklar: Temaer, bruk av lydopptak, signatur på samtykke, hva skjer etterpå  
 Themes: **Technology, social groups, ethics, interpretations, problems, solutions**  
 Temaer: **Teknologien, Sosiale grupper, etikk, tolkning, problemer, løsninger**  
 \*\*\*\*\*
- En: Get an explanation on what the organisation and the respondent do**  
**No: Få en forklaring på hva organisasjonen respondenten er tilknyttet er for noe**  
 Hvilken bakgrunn har du  
 Hva er dine oppgaver ved senteret  
 Hva er det som gjør jobben utfordrende
- En: Get an understanding on how the centre/ respondent got knowledge about socialisation robots.**  
**No: Få en forståelse av hvordan senteret/ respondent fikk kjennskap til sosialiseringroboter.**  
 Første kunnskap om hva Paro var og kunne brukes til.  
 Hva viste de om andres erfaringer, hva skulle de bruke den til  
 Få en beskrivende fortelling om hva respondenten trodde Paro var for noe  
 Finnes det markedsføring av Roboten?
- En: How did the technology get to the centre/ respondent**  
**No: Hvordan kom teknologien til senteret/ respondenten**  
 Hvorfor har senteret/ respondent blitt valgt for utprøving av roboten?
- En: Get a description of how the reception of Paro was and what happened in the beginning when they started to use it.**  
**No: Få en beskrivelse av hvordan mottakelsen av Paro var og hva skjedde i den første tiden**  
 Hvordan var mottakelsen av Paro når den kom?  
 Hvilke forventinger oppfylte den  
 Hvilke forventinger oppfylte den ikke  
 Oppstod det noen problemer i starten?  
 Hvordan løste man disse problemene?  
 Hva var oppfattet som bra/ suksess med roboten?  
 Var det spesielle metoder ved bruk av Paro som dere kjente til fra før?
- En: What is the robot now after it has been used for a while?**  
**No: Hva er roboten Paro nå etter at den er brukt en stund**  
 Hva brukes Paro til nå?  
 Hva er Paro egentlig?  
 Er du fornøyd med å bruke en robot?  
 Hva kan roboten ikke gjøre?  
 Hvilke nye aktiviteter oppstår når Paro brukes?  
 Er Paro en fungerende teknologi?  
 Hva ville hvert alternativ til Paro?  
 Hvordan har Paro påvirket brukerne det året dere har hatt Paro?  
 Hvordan ser brukerne på Paro?  
 Har det utviklet seg egne metoder i bruk av roboten?

En: **Paro as an unwanted object**

No: **Paro som uønsket element**

Utenforstående kan assosieres Paro som ett leketøy. Hva er deres inntrykk?  
 På hvilken måte påvirker Paro arbeidsmengden til ansatte?  
 Hvordan har dette endret seg over tid?  
 Finnes det situasjoner hvor Paro kan være skadelig eller uheldig å bruke?

En: **The robots influence on users**

No: **Roboten virkning på brukere**

Paro promoteres som ett verktøy i erstatning for dyreterapi og dets beroligende og sosialiserende virkning på brukere er mye omtalt. Hva er dine erfaringer med dette?  
 Er det spesielle fenomener roboten virker bedre på enn andre?  
 Det at roboten ser ut som en sel, hvordan forholder brukere seg til det?  
 På hvordan måte kan roboten gi ny kunnskap om mentale lidelser?

En: **What happens with the professional roles and professions in regard to use and not use of Paro**

No: **Hva skjer med yrkesroller og profesjoner i forhold til bruk og ikke bruk av Paro**

Hvor mange av de ansatte bruker roboten?  
 Hva er alternativene til de som velger og ikke å bruke roboten?  
 Er det noen yrkesgrupper som bruker Paro mer enn andre?  
 Hva skjer med yrkesroller?  
 Hvordan påvirker Paro de daglige rutinene i omgang med eldre?  
 Hva er permanent endret etter at Paro kom hit?  
 Hvorfor påpekes det ofte at roboten ikke kan erstatte mennesker?

En: **Training in use of the robot**

No: **Opplæring i bruk av roboten**

Hvilken kunnskap trengs for bruk av teknologi som Paro?  
 Hvordan var det å bruke Paro i behandlingen uten at man hadde hatt ett kurs om den?  
 Ifølge importøren så må alle som nå bruker Paro først sertifiseres.  
 Er det forskjell på bruken av Paro mellom de som er sertifisert og de som ikke er det?  
 Hva skjer under sertifiseringen?  
 Trenger roboten noen form for vedlikehold?

En: **Communication with other institutions and organisations**

No: **Kommunikasjon med andre institusjoner og organisasjoner**

Finnes det noen spesifikke regler og rutiner som må følges ved bruk av robotterapi?  
 Har dere samarbeid med andre institusjoner/ organisasjoner om bruk av teknologi?  
 Hva er deres forhold til importøren?  
 Hvem forholder dere til i tekniske spørsmål om Paro?  
 Hvem andre kan jeg snakke med som har ett aktivt forhold mot Paro, pårørende, eksterne organisasjoner?  
 Hvilken rolle spiller Norske Kvinners Sanitetsforening inn i anskaffelse av Paro?  
 Hvordan har myndighet/ politikere reagert i forhold til bruk av roboten?  
 Finnes det institusjoner/ organisasjoner dere tror vil samarbeide om slik teknologi?  
 Er det organisasjoner dere savner å ha kontakt med?  
 Hvilke utfordringer er vanlig i samarbeid med andre organisasjoner?

En: **Alternative use of the robot that was not first thought about**

No: **Alternativ bruk av roboten, som ikke først var tenkt på**

Kan Paro brukes utenfor ett behandlingssenter, f.eks. hjemme hos enkeltpersoner?  
 Hva skal til for at en familie går til innkjøp av sin egen Paro til sin pleietrengende?

Hvordan ville dere brukt en slik “privat” robot på senteret? Vil andre brukt den og?  
 Hva skjer hvis Paro måtte fjernes fra senteret for godt?  
 Roboter kjennetegnes med at de har en form for kunstig intelligens, hvordan påvirker dette brukerne?  
 Hvilke nye funksjoner kunne hvert inkludert i Roboten, slik du ser det?  
 Kan teknologien brukes på andre områder enn omsorg for personer?  
 Hvordan stiller du deg til slik alternativ bruk?  
 Finnes det andre robot teknologier i bruk hos dere?

En: **Acquisition and economy**

No: **Anskaffelse og økonomi**

Hvordan går man frem for å anskaffe seg en slik robot?  
 Hvordan er det mest naturlig å få finansiert en Paro  
 På hvordan måte har økonomi noe å si i innkjøp av slik type teknologi  
 Finnes det offentlige ordninger som finansierer bruken?  
 Hvem andre kunne solgt roboten?

En: **My role in this study and influence during the interview**

No: **Min rolle i studiet og påvirkning på deg**

Hvordan har du det nå etter denne timen?  
 Hva mener du om studiet jeg gjør?  
 Har du fått noen nye ideer i løpet av samtalen?  
 Er det spørsmål jeg har glemt å stille?  
 Er det noen andre jeg bør snakke med, tror du?

En: **Questions to the institutional research and advisor sector**

No: **Spørsmål til Instituttsektoren**

Hva er en robot?  
 Hvordan ser dere på Paro som teknologi?  
 Kjenner dere til prosjektene med å bruke Paro i skandinavisk eldreomsorg?  
 Hvordan ser dere på disse prosjektene?  
 Finnes det noen teknologiske alternativer til Paro  
 Paro har ett begrenset spekter av ansiktuttrykk. Hvordan påvirker dette brukerne?  
 Hva vet dere om teknologi og demens?  
 Hva er viktig å ta hensyn til ved innføring av roboter?  
 Har dere noe materiale dere ser som relevant i forhold til mitt studie?  
 Det finnes flere typer terapiroboter, hvorfor satset dere på Paro?  
 Hvilke arenaer finnes det for spredning av informasjon om velferdsteknologi?