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FACULTY OF SOCIAL SCIENCES



Anthropomorphic Robots on the Move

A Transformative Trajectory from Japan to Danish Healthcare

PhD Dissertation 2017 | Christina Leeson

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unconditional love and patience. I thank Freja for turning our lives upside down in the most wonderful way. You always make me laugh and I love you beyond words.

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Explanatory Note

Japanese terms are Romanised in the Hepburn system with macrons used to show long vowels.

I follow the Japanese convention for personal names giving the family name first and the given name last. In most cases I have adopted the convention of referring to people by their family names with the suffix '-san' (the Japanese gender-neutral equivalent to 'Mr', 'Mrs', etc.), for example, Matsumoto-san.

In the parts of the thesis focusing on Denmark, I have adopted the convention of referring to people by their given names. The use of surnames is limited to such a use by the informants themselves.

I have created psudonyms for the names of most persons to protect their confidentiality and anonymity. Each company and institution, as well as some people have, however, preferred to be called by their real names.

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Chapter One: Introduction

When the Japanese professor of robotics Hiroshi Ishiguro took the floor at a conference meeting in Copenhagen in September 2010, he looked proud and triumphant. The conference had centred on human-robot interaction and had gathered several of the leaders in the field from Japan, USA and Europe. Professor Ishiguro captivated his audience. ‘This is our future,’ he stated convincingly as he displayed an animated picture on the large screen behind him: humans and robots walking the streets together. Known for his creation of robots that can ‘pass’ as humans, today, Professor Ishiguro was presenting his newest robotic invention: a child-sized teleoperated robot, ‘Telenoid’, taking the form of a small imperfect depiction of a human body. Designed to add an element of realism to long-distance communication by recreating the physical presence of a remote person, Telenoid was made to mediate communication between two people spatially separated. As the voice and movements of the robot’s operator would be transmitted through the robot’s embedded speakers and motors, Telenoid was to function like a telephone with a human face and body to speak to. ‘The most important question is,’ continued Professor Ishiguro, ‘how much human likeness does a robot need to have in order for it to be accepted *as a human?*’

Three years later, in June 2013, a pair of Telenoid robots arrives in Denmark. As part of a business collaboration between a Danish consultancy and Professor Ishiguro’s laboratory in Japan, the aim is to test and determine how well the robot manages to help older and disabled people address their physical and emotional needs. Telenoid had already carved out a role on this terrain in Japan, seemingly taking part in the so-called ‘robot army’ (Hornyak 2006: 9), marching from university laboratories, corporate research centres and toymakers into people’s private homes and daily lives around the world. This newly designed robot was just about to make its appearance, for a period of time at least, almost daily in parts of the Danish health care sector.

This was something Karen came to realize a couple of months after Telenoid’s arrival in Denmark. Karen lived down the hall from the room Telenoid had come to occupy at the nursing home where she lived. She had been at the nursing home for several years and had often told me that she felt bored: ‘Nothing really happens here. No fun or anything.’ When Karen first saw Telenoid, she was delighted. ‘Now I have something to do. You are indeed a peaceful little fellow and you are not going anywhere. You are not busy and we can talk about anything.’

* * *

These fragments from my field notes speak to the main concern addressed in the following pages, namely the diffusion of a human-looking, anthropomorphic, robot, named Telenoid in contemporary

Japan and Denmark. This thesis will follow the trajectory of Telenoid as it moves through space and time from its laboratory in Japan to enter the daily life of older¹ and disabled² people in Danish healthcare institutions. In contrast to widely discussed political issues such as legislation, economic advantages and public attitudes towards the introduction of technology in healthcare, this study deals with the experiences of people who are introduced to robots and encouraged to evaluate and use them in their daily lives. The research also focuses on the tenacious attempts of the Japanese roboticists to carefully structure and plan the processes related to making anthropomorphic robots capable of transcending the laboratory, and the fundamental questions regarding living and non-living things this process brings about. Above all, it is about the journey of a Japanese technical device that comes to be deployed in Danish institutions to care for elderly and disabled people. What meanings and practices could explain its movement from hand to hand and place to place? How do social relations shape its movement and how does it in turn shape those social relations? These questions are the starting point for the following text.

In various anthropological studies of science and technology much has been written about the difficulties in migrating technologies from one place to another (cf. Mol & de Laet 2000). For instance, Madeleine Akrich (1992) has shown how the transport of a photoelectric lighting kit from France, where it is made, to Africa, where it is supposed to be used, is hindered because its functioning depends on a non-standard type of plug that is not available in its place of arrival. Similarly, anthropologist Antina von Schnitzler (2013) demonstrates how prepaid meters, measuring electricity and water, do not travel smoothly from Britain to South Africa. As they are set to automatically disconnect users in cases of non-payment, they are rather bypassed by people in acts of resistance (von Schnitzler 2013: 687; see also Morita 2013; Nielsen & Jensen 2013; Akrich et al. 2002)³.

Stories like these bear a striking similarity to the trajectory of Telenoid. Indeed, the difficulties involved in Telenoid's travel would surely have been one of the topics most frequently discussed during everyday conversations in the laboratory. In fact, the unusual thing about Telenoid was that it was not *initially* developed for the healthcare sector. Rather, the robot was the product of a particular take on the emerging field of telepresence robotics within which an anthropomorphic artefact is

¹ Denmark has, like most other countries, accepted the chronological age of 65 years, as a definition of an older person. At this age one is therefore entitled to public welfare services targeted elderly people. See World Health Organization, <http://www.who.int/healthinfo/survey/ageingdefolder/en/>

² In Euro-American discourse, the term 'disability' implies a loss of a needed competence or qualification, suggesting a lack of power to perform a given thing (Ingstad & Whyte 1995: 7-8). In Scandinavian discourse, the notion of loss is underlined by the response to disability, rehabilitation, focusing on defining disabled people as equal citizens for whom the state has responsibility. Therefore the Danish welfare state is obliged to ensure help to disabled people in order for them to participate on equal terms in society (ibid).

³ An exception from studies documenting the difficulties involved when technology migrates from one context to another is Annemarie Mol and Marianne de Laet's (2000) study of the fluidity of the Zimbabwe Bush Pump. Specifically, Mol and de Laet discuss how the pump's travel is exempt from difficulties because its workings and boundaries (i.e. what the pump really is), change over time and space.

expected to serve as a substitute for a remote operator by offering him or her the opportunity of material embodiment at a distant location. Yet, after a series of unexpected moves, Telenoid ended up in the arms of a group of older people where, to much surprise, it aroused a fascinating infatuation. In order to take advantage of the situation, however, it became clear that a series of redefinitions of the robot had to be made. Consequently, whether having lunch in the canteen, preparing trials with the robot, or smoking a cigarette on the terrace outside the laboratory, roboticists were constantly considering and negotiating the means of modifying the robot's shape, its appropriate size and weight or the diverse reactions the robot elicited when encountering people in settings outside the laboratory.

Similar comments could be heard when the robot arrived in Denmark. In essence, Telenoid was not imported because consultants had a clear idea of how to put it into use in the Danish healthcare sector. On the contrary, Telenoid materialized in the Danish healthcare sector because the consultants saw the robot as an opportunity to establish important collaborative ties with the Japanese roboticists. 'This is a research project where we have an open and curious approach to what might work', stated, Jens, project manager in the consultancy before receiving Telenoid. 'We really wanted to work together, so now we must try to identify some scenarios where people can benefit from it. Telenoid is one of those kinds of technologies where we cannot automatically predict its potential so we must see what we can get out of it'.

Besides making me realize the amount of effort required to keep Telenoid moving, so to speak, by striving to modify the robot's physical shape and by searching for social issues for which the robot could potentially provide a solution, these comments have also led me to one of my central arguments, namely that the robot was less an object than a process; it was a becoming – not an entity. To put it differently, the robot was constantly and reciprocally in the making as it transcended its laboratory to enter the daily lives of people around the world. This was so for various reasons. Indeed, it was not only the case that roboticists modified the physical shape and functionality of the robot in response to a set of requests when Telenoid was put into use, as we shall see in Chapter Four. Since consultants were left unsure of the particular role and purpose of the robot, they attempted to make such roles and purposes emerge through concrete acts of testing it. In other words, as the robot moved between sites it is also handled in a variety of ways, re-modified and transformed into various forms and uses as roboticists and consultants try to make it fit a Danish context of care. Thus, even if technology often connotes straightforward, rational, mechanistic usage (Mol et al. 2010), this study confirms that in social life it is more likely to be absorbed and moulded into the practical environments by negotiations, modifications, tinkering and improvisation (Rubow 2014; Mol & de Laet 2000; Akrich 1992; Langstrup 2014). This implies that an analysis of Telenoid is tied to a discussion of the ways in which it continuously behaves differently to what its designers initially intended and thus clearly changes purpose and functioning in actual use 'to the point where its original function may be lost altogether'

(Ingold 1997: 119). To understand the trajectory of Telenoid, I suggest, one must look at how it emerges in a myriad of ways through particular interactions.

Prospects of advancement of technologies have historically been met with a mixture of amazement and concern about the direction that humanity and technology seem to be taking (Ihde 2002: 21). Utopian visions about the freedom, progress and betterment of individual and social life that technologies will bring have thus been opposed by a counter-discourse depicting dystopias, replete with warnings about the consequences for society of 'technology gone wild' (Lock 2002b: 246; cf. Ihde 2002: 111-113). Put differently, technology seems to become a double-edged sword, depicted as both creator and destroyer: an agent of optimism and hope, and at the same time of fear, anxiety and the destruction of culture (Lock & Nguyen 2010: 20). Robots designed to help people in need of care are no exception. While the promises heard most often in Denmark, concern improvements in efficiency in the public sector where fewer younger people would be available to care for a rising number of older people with chronic diseases and disabilities (cf. Ertner 2016; Hasse & Wallace 2014), dystopian images of 'care turned cold' (Pols 2012: 11; cf. Schwennesen 2016a), on the other hand, depict technology as rational and instrumental replacements of human care and love. Although usable and functional, such technologies, it is feared, will not provide tender human attention and care (Pols & Moser 2009: 160).

Yet, unfolding a story about the ways in which the creations of robotic researchers become real conditions in the daily lives among people in need of help, reveals that sometimes, in some situations and for some people, relations between users and technologies can indeed be caring, affective, and social (cf. Mol et al. 2010; Pols & Moser 2009). This does not mean that the introduction of robots into care practices is commonly accepted by everybody, but rather that robots may be perceived as sense-making if they are performing within specific familiar value spheres such as 'helping others' or 'providing care'. Although the decision to introduce robots into practices of care can indeed be accompanied by dystopian views, the *actual* use of Telenoid is often experienced as a mixture of amazement and excitement for the people involved. Among staff members in the institutions, it was evident that technology even came to be seen as offering important devices that could provide them with the ability of caring in new and better ways. For instance, as a young staff member from the nursing home where Telenoid was introduced told me: 'At first I thought that it was unworthy to use robots for our residents, but when I saw what it could do for them and for us, I changed my mind. I must admit that the robot is quite fantastic.' At the same time, however, even if the staff came to be in favour of technology, the area still raises ethical issues that are part of daily life, not just in the institutions but also among consultants and roboticists, where questions of ethical concern were constantly raised. Is it acceptable to introduce robots that people come to treat as living beings? Is it in order to encourage people to become emotional towards robots?

This has led me to one of my main arguments, namely that the introduction of robots into practices of care sets up a complex interplay of concern and anxiety on one hand and amazement and excitement on the other. Following this idea, the starting point of understanding the movement of robots is that they are always *more* than simply a matter of ‘cold’ technology surrounded by fear and anxiety. In some situations and for some people, they also simultaneously foster enchantment, which unfolds not only in those specific situations in which Telenoid is used, but also in those stories circulating among people and presented in public at conferences and in the media. Another important point is that, as enchanting and amazing as using Telenoid can be, most consultants and staff members in Denmark play an active role in shaping these capacities in the robot. In order to enchant and amaze, Telenoid depends not just on its design and performance, but also on dedicated people who structure its use in particular ways. ‘When the honeymoon is over and the ordinary day returns’, I was told by a consultant, ‘the technology often falls asleep or dies because people lose their interest in it’. In that sense, I argue, technology gains and loses impetus not just as a matter of how it is crafted and made, but also in relation to shifting degrees of support and dedication from the people and the conditions involved in its emergence. It is this complexity, fragility and interdependence of robots that drive my interest in the following.

Drawing empirical and analytical attention to the practical handling of robot technology and its importance to both developers in Japan and its users in Denmark, I show my interest in how people engage with the technology, what the technology realizes, what it makes people do, and the effects it has on its destination. Hence, some parts of this thesis focus on how such technology is conceived and created in the laboratory. Other parts show how it assumes other uses and meanings than planned and expected when encountering its users. The question about the relationship between robots and their place of departure and arrival is investigated through a number of processes at each station on Telenoid’s journey: the efforts to develop and modify the robot’s shape and (commercial) purpose in the laboratory in the Kansai area of Japan; consultants’ encounters with Telenoid as it arrives in Denmark; Telenoid’s entrance into the daily lives of staff members and residents in a nursing home as well as of developmentally disabled people and staff in an activity centre in Denmark; and finally consultants’ and roboticists’ evaluation of the robot. The thesis also examines the political and professional debate in Denmark and Japan. Even if the political and professional debate takes place outside the laboratory and institutions, its visions of improving efficiency, health and quality of life for people in need of help through technology affects the experiences of Japanese roboticists and Danish consultants, staff, residents and developmentally disabled people.

In the following sections I present an overview of the methodological and analytical themes that have dominated research on robots, thus locating this thesis and its contribution to the field.

Methodological Diversity

The very study design of this thesis resonates with the trend of 'multi-sited' fieldwork, which encourages anthropologists to move beyond the bounded field site in order to deal with the interconnected world system (Marcus 1995). Yet, moving across the different sites throughout Telenoid's journey, I soon came to feel haunted by a sense of incompleteness. I felt unable to fully uncover each site and I gradually realized that the strategy pursued entailed a loss of detail (cf. Candea 2007). In dealing with this methodological issue I found inspiration in Matei Candea's (2007) critical take on multi-sited fieldwork and his appeal to 'making the cut' (Candea 2007: 174) by 'recognizing the value of limitation' (ibid: 180). Ghassan Hage (2005) makes a similar point when he dismisses multi-sited research, proposing instead that multiple localities can be seen as 'a single geographically discontinuous site' (Hage 2005: 463). Hage argues that when studying migrants who share a unifying culture across a number of global locations, multi-sitedness is less helpful than a notion of a single geographically discontinuous site. The fieldwork conducted for this thesis was multi-sited in the sense that I followed Telenoid's journey from Japan to Denmark but similarly came to remain focused on *one* specific site: the ways in which conceptions and social relations shape – and are being shaped by – the movement of Telenoid. In that sense, I purposively excluded certain elements, moments, people, words and concepts from the analysis of each site the robot moved through (cf. Candea 2007).

The Meaning of Applied Anthropology

This thesis is a product of an applied anthropological programme. Whereas traditional Ph.D. programmes have their primary focus on contributing to the basic research within a scientifically defined disciplinary field, an applied Ph.D. has to combine academic interest with commitment to put knowledge into use in order to solve practical problems (Willigan 2002). Broadly stated, this means that there are stakeholders who stand to gain from the project. Being engaged within the field of applied anthropology has meant that I have spent a great deal of time and resources in exploring and situating my research agenda within the work of Hiroshi Ishiguro Laboratory – the Japanese robotic laboratory developing Telenoid – and the Danish Technological Institute - an independent, non-profit institution with the mission, among others, to assist private companies and the public sector to develop and implement technological solutions in the Danish public sector - hosting the consultants responsible for testing Telenoid in Denmark. Although I was employed as a Ph.D. student at the Department of Anthropology at the University of Copenhagen, prior to my employment my project was discussed and defined in collaboration both with the consultants and roboticists as part of a large application to the Danish Council for Strategic Research⁴ (*Strategisk Forskningsråd*) in the Ministry of

⁴ The Danish Council for Strategic Research closed down in April, 2014 and 'strategic research' is now part of Innovation Fund Denmark.

Higher Education and Science. The overall aim of this application was to design and implement a range of technologies for what the project referred to as 'patients', i.e. people who had already been in contact with the healthcare system. When the project, named Patient@home, received a six years' funding in 2012 from the Danish government, it was the largest of its type in Denmark which contained a number of different sub-projects⁵, including the one which focused on Telenoid.

The project focusing on Telenoid had as its overall goal to 1) provide new insights into the integration of Telenoid into the health care system in Denmark; and 2) develop a service model for the robot that described how the robot could possibly be used; for whom and with what effect. In order to do so, the roboticists were required to produce a set of Telenoid robots to be tested, while consultants, on the other hand, were to plan and carry out tests on Telenoid's effects on the health of patients, including introducing Telenoid to the staff involved, and providing assistance during the test period. Once the tests had been completed consultants were to collect specific data for the fulfilment of a 'Welfare Technological Assessment' (VTV) intended to provide an evaluation of the robot that documented its effects on its users and the institutions, as we shall see in Chapter Nine. An important aim of the project was thus not simply to evaluate Telenoid's effects on Danish healthcare but to contribute to *commercializing* the robot by identifying its application in the healthcare sector. In short, there seemed to be a common orientation among consultants and roboticists towards Telenoid as a case for further refinement and commercialization, and a shared understanding that this should be put forward by establishing a project in which roboticists - engaged in the scientific development of robotic technologies - would be provided with the opportunity of testing their robot in Denmark.

Consequently, the requirement was that my research would thematically fall within the overall objectives of the project in a 'useful' way. In other words, I was expected to produce anthropological knowledge about the introduction of Telenoid into healthcare that was useful in relation to the consultants' work on testing and evaluating the robot's role and on developing the service model that could eventually lead to the integration of Telenoid into the Danish healthcare. Given the significant belief in and emphasis on the value of anthropology, both roboticists and consultants considered my project relevant because they saw in it the possibility of practical documentation: my empirical accounts of users' responses to Telenoid and of the work related to using the robot could be used to modify the robot's design and functionality, and to develop more detailed descriptions of how to commercialize Telenoid in practice.

With this starting point, I see my fieldwork as a part of those ethnographies that are to be used not only by the anthropologist but also by the informants who learn and gain knowledge from it (Engelke 2009: 10). This is in sharp contrast to a tradition in anthropology in which anthropologists are supposed to influence as little as possible on the practices studied (cf. Baarts 2003). In this study,

⁵ For more information on Patient@home: <http://www.patientathome.dk>

roboticists and consultants were attentive to my presence as a researcher, involving me and my observations to form their project: both roboticists and consultants expected concrete suggestions from me and used me as an instrument to form, affect and evaluate the trials in Denmark. During the tests of Telenoid in Denmark, for instance, I became responsible for supporting the staff in their daily use of the robot on the one hand, and reporting and discussing results and complications with consultants on the other. This way of sharing observations and insights with my informants at the same time resulted in responses that were usable in my reflections and analysis, for instance when roboticists fed me ideas and concepts conceptualizing the nature of the robot, as we shall see in Chapter Three.

The Ethnographic Field: Access, Position, Ethics and Data

My ethnographic exploration of the trajectory of Telenoid meant that I conducted fieldwork in five different sites where the robot was in the hands of particular types of actors, moving between persons in certain kinds of social relations. Whether they had to do with crafting robots and building strategies in the name of technology, or whether they were more related to trying to make technology work on a practical level, these sites were products of conscious efforts to introduce technology into the healthcare sector. These sites each had their unique combination of social and structural elements and consisted of different roles, functions and positions, which created a social reality that I studied and which I participated in.

1. The Hiroshi Ishiguro Laboratory

My fieldwork started with a formal collaboration with Hiroshi Ishiguro Laboratory (HIL⁶), a robotic laboratory affiliated with the Advanced Telecommunications Research Institute International (ATR⁷) in the Kansai region of Japan. At ATR approximately 250 researchers are employed at the institute's eight laboratories each engaged in fields such as neuroscience, robotics and wireless communication. The particular approach of HIL was to develop so-called humanoid robots i.e. robots that meet two criteria: they have to have a body that resembles a human (head, arms, torso, legs) and to act like a human in environments designed for the capabilities of the human body, such as an office, hospital or house (Robertson 2010: 15). The aim of the roboticists was to make these humanoid robots capable of 'Living together with Humans in the Real World', as they themselves put it at their webpage⁸, through a number of robotic projects. From 2010 and onwards, Telenoid was developed and tested. I was part of HIL and conducted fieldwork there from January 2013 to April 2013.

⁶ See <http://www.geminoid.jp/en/index.html>

⁷ See http://www.atr.jp/index_e.html

⁸ See www.hil.atr.jp/en/index.html

HIL provided full access to the type of work I wanted to look at and despite their workload the twenty-five roboticists were all forthcoming and generous with their time and interest in my project. As a significant gesture I was given my own office space on the first day of my arrival; care was taken to see that I received my own password to the computer systems; I was invited when the roboticists visited local nursing homes to test Telenoid; I participated in work discussions during social gatherings; I was given access to reports; and I was often invited to comment on draft reports and research papers. I always felt included and the openness and the degree to which these scientists shared their passions and doubts about their work with me has given me access to a large quantity of data that leave them quite vulnerable to critique and mean that I am responsible for managing the task of presenting their work and concerns in a way that respects their openness and generosity. I found their work extraordinarily interesting, and I hope some of that originality is reflected in this thesis.

My role and functions at HIL all, in different respects, helped to prepare for shipping Telenoid to Denmark. In the laboratory it was quite easy for me to find a place in the work. The roboticists were used to having both national and international interns and students from the schools of engineering and from social sciences with whom they had collaborated before. They were therefore in many ways in the habit of articulating the grounds and visions for their work. My role was precisely that of an internal researcher taking an active and participatory role in discussing the design of Telenoid and setting up trials with the robot. I also participated in testing Telenoid in nearby nursing homes and I participated in demonstrations of Telenoid. Finally, I spent many days practising to set up Telenoid and understanding its technical system, in order to assist consultants in Denmark afterwards. In this way, I continued to gain insight into the development of Telenoid at HIL and my participatory role was in so many ways fruitful for my study. Indeed, had I only had access to the reports, and not the work practices of the roboticists, it would have left me with the impression that robotic work was mostly a technical task. But by participating in the laboratory work and socializing with the roboticists I realized that they also had detailed knowledge about how Telenoid was enmeshed in social life. Furthermore, access to the reports only would have left me unaware of the ways in which Telenoid was made tangible not just through different technical tools, models, trials and modifications, but also through ancient stories of spirits and animism, as we shall explore in Chapter Three.

I spent almost every day (and evening) in this period in the company of the roboticists as they worked either in the laboratory, carried out field trials with Telenoid in nearby local nursing homes, or took me to visit museums, seminars and conferences. The majority of my data from the laboratory were gathered through participant observation consisting of daily field notes from meetings, conversations and discussions between roboticists; notes from field trials in the nursing homes; field notes from assembling, programming and demonstrating Telenoid; field notes from attending social events (dinner, outings and exhibitions); and finally field notes on the conversations between

roboticists and myself. Audio-recorded data include fourteen interviews with roboticists who were involved in developing not just Telenoid but also other kinds of anthropomorphic robots in the laboratory; recordings of six interviews with managers, staff members, volunteers and residents in nursing homes involved in the roboticists' field trials; and two recorded interviews with roboticists from two different laboratories in Japan. I interviewed key informants in the laboratory several times during my stay. Furthermore, data from Japan and the laboratory includes roboticists' research papers, public presentations, newspaper articles, advertisements, television programs, policy reports and other promotional materials on the visions of and experiences with healthcare technologies in Japan. Those covered the period from 2012 to 2016.

Following up on my previous exposure to Japanese during my research in 2009 among another group of Japanese roboticists who were developing Paro, a robot in the shape and size of a baby harp seal developed for elder care (Leeson 2010), I took language lessons before my fieldwork in 2013, and continued these during my stay in Japan. However, although I acquired some language skills, I never learned enough to conduct a complex conversation in Japanese, which proved to be a considerable weakness to the empirical side of my research. I never got over the feeling of constantly missing crucial issues in everyday discussions in which people spoke only Japanese. In the laboratory, however, the language problem seemed less present than in the nursing homes we visited. Given the number of international researchers in the laboratory, the language spoken there was often English and most roboticists had no difficulties in speaking English in my presence even when not addressing me directly. On the contrary, when visiting the nursing homes I often relied on the help from roboticists' translation in order to grasp the entire content of a given conversation.

2. The Danish Technological Institute

When Telenoid was shipped to Denmark, I assumed a role of participant observer among the three consultants - Lisbeth, Pernille and Stine - allocated the job of testing the robot at the Danish Technological Institute (DTI⁹). The consultants' goal in DTI was to ensure that new knowledge and technology can be translated into value for consumers in the form of new and improved technological products. The strategy was first and foremost to bridge what they described as a *gap* between private companies that develop new technologies and their users. Many technologies, they claimed, are hampered by this gap, which ultimately results in the emergence of technologies that are not suitable for or adaptable to their end-users. DTI had therefore specialized in testing and evaluating a range of technologies – from robotic feeding devices and pet robots to rehabilitation robots and advanced wheelchairs – in collaboration with private companies and municipalities in order to make the technologies fit and contribute positively to the Danish healthcare system. During my fieldwork it was

⁹ See <http://www.teknologisk.dk>

this challenge of making Telenoid suitable for a Danish healthcare system that was the consultants' overall goal.

Thanks to my previous fieldwork in 2009 and because I had been working with healthcare technology in the health and care administration in the municipality of Copenhagen prior to this study, several of my informants in DTI had known me for a long period of time before the start of this project. I was expected mainly to participate as an active discussion partner and helper during my fieldwork among the consultants. This meant both doing fieldwork among the consultants as they met to plan and evaluate their work with Telenoid as well as at the nursing home and activity centre when they met managers and staff members to enrol them in the project of testing Telenoid. Accordingly, consultants would ask me how I thought the trials with Telenoid could be structured or how I thought the robot could potentially play a role in the healthcare sector. My contribution in these areas became part of my daily participation in meetings to plan project activities and coordinate the engagements of participating institutions. Indeed, I was expected to employ my knowledge in order to make a difference and to adopt the role of an active co-creator of the field I at the same time had set out to study. Before the start of field trials in Denmark, for example, I was asked to clarify the robot's purpose and functionality, and during the trials I was expected to assist when the robot was used in the institutions. Moreover, I was expected to share my observations at the institutions with the consultants when finalizing their evaluation of Telenoid's effect on practices of care. I thus became an informal part of the project team, partaking in developing and reflecting on the project as it emerged and concluded. I was part of the project team at DTI from September 2012 to December 2012 and again from May 2013 to April 2014.

In addition to field notes and tape recordings of the meetings between consultants planning field trials with Telenoid, my material includes a total of six interviews with four consultants; notes from consultants' meetings with three roboticists accompanying Telenoid as it arrived in Denmark; field notes from consultants' meetings with managers and staff in three nursing homes and one activity centre; notes from consultants' practical preparations before carrying out field trials with Telenoid; field notes from consultants' interviews with managers, staff, nursing home residents and disabled people when evaluating Telenoid's role in the institutions; and notes from consultants' presentation of their final evaluation of Telenoid at a major international conference. Finally, my material contains field notes from my ongoing conversations with the consultants during the entire period of my fieldwork.

3. *Benediktehjemmet: The Nursing Home*

My affiliation in Benediktehjemmet¹⁰ came about as a result of the consultants' work of enrolling municipal participants in the project of testing Telenoid, as I shall explore in Chapter Five. The nursing home, which formed part of the local municipality's mandate to organize care for the aged¹¹, was a residential living environment (*leve- og bomiljø*) accommodating approximately forty-eight residents. In an attempt to improve the physical surroundings both for residents and employees, such environments have gradually been replacing the traditional nursing homes since the early 1990s (Kofod 2008: 11). One overall intention has been to establish more room for the individual layout of flats for the elderly. Consequently, whereas the traditional nursing homes, typically built in the 1970s, provide residents with small one-room flats situated along a corridor hosting approximately thirty residents, it is the privacy of the residents that guides a residential living environment (ibid: 11). In the case of Benediktehjemmet, residents are thus accommodated in small groups of eight residents, each living in a two-roomed flat with a small kitchen, lavatory and bathroom, leading on to the communal kitchen and living room. Furthermore, Benediktehjemmet had just recently expanded its profile to focus on using new technological solutions for the benefit of the residents and the staff.

My access to the nursing home was provided when the consultants and I asked the manager if I could follow their tests of Telenoid. I was immediately given permission and encouraged also to participate in the daily life of the institution. Subsequently I was invited to every meeting that concerned the Telenoid tests and even though it was not the staff members themselves who had given me permission to participate in their work, they all welcomed me to conduct my fieldwork with them. Having plenty of time at my disposal turned out to be an important element in negotiating my position, not just among staff members but also among residents. Staff members would ask me kindly to do what they themselves could not, but wanted to, do: chat with residents over a cup of coffee, take someone for a walk, or simply sit talking with someone if they so preferred. Unlike the staff with their workloads, I could spend a whole day talking to one of the elderly residents and it turned out to be thanks to this facility that I came to be appreciated not just among staff but also among residents. They often told me how they valued the time I spent listening to them, something many missed in the company of those staff members whom they appreciated but also thought too busy, as we shall see in Chapter Six. While this information could have framed the foundation of many interesting dissertations, it taught me that the context into which Telenoid was introduced was full of dilemmas and controversies. Analytically this means that the ways in which people engage with Telenoid are heavily influenced by their experiences of being busy and under pressure of time. In fact, it taught me

¹⁰ See <https://www.fredensborg.dk/borger/senior-og-pension/pleje--og-aktivitetscentre/benediktehjemmet-i-fredensborg>

¹¹ Compared with the UK and the US, for instance, where the majority of the care facilities are privately administered, the municipalities run the vast majority of care facilities in Denmark (Kofod 2008).

that among staff, for example, Telenoid often came to be deployed as a much-needed tool, not just to provide room for otherwise missing conversations, but also to improve staff members' own communication and interaction with residents, as we shall see in Chapter Six and Chapter Seven. The hours of talking to residents also provided me with opportunities to observe the relationship between the older person and the staff members respectively. The latter entered the older person's home to undertake, for instance, cleaning, provide medicine, deliver laundry or to provide physical care. My participation in the daily life thus provided me with insights into the social relations, daily routines and social manners Telenoid eventually encountered and it helped me frame the nature of the questions I eventually posed during my interviews with people.

Additionally, I have been a consistent part of Telenoid testing. For example, I have been directly involved in using the robot, reflecting on insights and reactions, and have given public presentations of the results together with the staff¹². I have also helped staff with technical problems – to the extent that I could – and I have participated in staff members' meetings with their manager and colleagues on the presence of the robot in the nursing home. Furthermore I have spoken to each resident immediately after their interaction with the robot. These experiences have generated much data on human-robot interactions and, not least, the nursing home has provided a professional context to discuss the very idea of using robots in the healthcare sector at all.

Hence, the data I gathered from Benediktehjemmet was rich, involving not just field notes and audio recordings of people's actual use of Telenoid but also their working routines and daily life in the institutions, including care work; conversations between staff members, between staff members and residents, and between residents. The data also include an interview with the manager; seven interviews with seven staff members; two group interviews with four staff members; and six interviews with five residents. Finally, they contain numerous recordings of my conversations with staff members and residents. I was part of the daily life in the nursing home from October 2013 to April 2014.

The particular position I was offered – together with the fact that my fieldwork was undertaken among people in a vulnerable position, owing to their status as elderly people, many of whom had lost the ability to remember recent events – implied that not every one of the residents was aware of my role as an anthropologist. I handled this ethical problem of research content (Hammersley and Atkinson 1995: 264) by introducing myself as an anthropologist when entering into conversation with residents. Given that even fully-informed informants tend to forget about the anthropologists' reasons when rapport has been build (ibid: 264-265), I continually – often daily – reminded residents about

¹² The Danish television program, 'TV2 Lorry' ran a programme on the robot and the Danish tabloid magasin 'Her og Nu' published an article on the robot's encounter with the Danish Princess Benedikte on a visit to the nursing home during the trials with Telenoid.

my role. Furthermore, all residents in the unit where I did my fieldwork as well as the residents from other units who were introduced to the robot more than once, were informed orally and in writing¹³ of the purpose of my project. This document was sent out to the residents' relatives. In this description residents were asked for their informed consent when they had had time to discuss my description with their relatives or with the personnel. All residents and relatives gave their informed consent, allowing me in some cases also to use photographs and video recordings.

4. Aktivitetshuset Københavnsvej: The Activity Centre

Alongside my work in the nursing home, I followed the daily life in an activity centre¹⁴ for developmentally disabled people, which was the second institution that became enrolled in the project. Like the nursing home, the activity centre formed part of the local municipality's mandate to organize care and support for elderly and disabled citizens and was thus structured around a range of activities that the centre offered its users to engage with in order to develop and strengthen their motor, social and communicative competences. The goal of the centre was to enhance life for adults suffering from developmental disabilities and each of the twenty-four people who daily visited the unit of the centre where Telenoid came to be introduced, was therefore referred there from the municipality. While some had been given a specific diagnosis, such as autism or Down syndrome, the vast majority had no diagnosis apart from being categorized as a 'citizen' with reduced physical or mental ability. Furthermore, most were physically well-functioning¹⁵. Generally, all lived in housing facilities for people with developmental disabilities and they would go to the activity centre during the daytime for five days a week. For reasons of brevity, I will use the term 'citizen' throughout this thesis whenever I refer to some of the disabled people from the activity centre. The term, which formally refers to a person entitled to public welfare services, was commonly used among staff members when referring to the users of the centre. Similarly, I became aware that the disabled people used the term themselves when referring to each other¹⁶. When I apply the term in the following, it will thus figure alongside the term 'resident' referring to the older people in the nursing home. In each case, I will make explicit who the citizen or resident in question is when necessary.

My role in the activity centre was very similar to that in the nursing home. I was given permission to participate in the daily life and my presence was largely appreciated among the staff, who often told me how they could 'always use a pair of extra hands', as one of them put it. I therefore spent numerous hours participating in the daily activities whether drawing, doing pottery and

¹³ See appendix I for written information on the project and for informed consent (in Danish)

¹⁴ See <http://www.handicap.nu/generel-information/mellemgruppen>

¹⁵ Those citizens with significant physical disabilities were grouped in another unit in the activity centre.

¹⁶ One example is the following expression which was provided to me by Matthias, a man whom we shall meet several times in the forthcoming chapters, 'many of the other citizens feel like me, you know'.

woodwork, playing games and going for walks. On their call, I also visited several of the users of the centre many times in the housing facilities where they lived. This provided me with a broader impression of their daily lives and experiences. I also took an active role in using Telenoid. Hence, I participated in staff members' discussions of whom to introduce the robot to and reflections on the results. I also helped them to write down their experiences with the robot. They were obliged to hand the notes to the consultants afterwards, but they nevertheless struggled to do so because of lack of time. In the activity centre I once again assisted with technical problems and participated in meetings about the robot. This allowed me to have insight into how staff members as well as citizens experienced being asked to test Telenoid. The data I gathered from the activity centre involved not only field notes and audio recordings of their actual using of Telenoid but also staff members' working routines and daily life in the institutions, including numerous conversations between staff and the citizens. Importantly, it contains also numerous field notes and recordings of my own conversations with staff and all of the citizens in the unit where I did my fieldwork. The material also includes an interview with the manager of the activity centre; two interviews with the two staff members in the unit where I carried out my fieldwork; and seven interviews with six of the citizens. I was part of the daily life in the activity centre from July 2013 to April 2014.

In contrast to the nursing home, I never found that those in the activity centre forgot who I was. This did not mean, however, that everyone was fully aware of the purpose of my stay and I therefore spent numerous hours explaining in detail about my project and the purpose of my questions and participation in their everyday life in the centre. As in the nursing home, I also informed all concerned in writing¹⁷ of the purpose of my project. When possible the notice was sent to relatives and posted in housing facilities. All those relevant gave their informed consent, allowing me in some cases to use photographs and video recordings as well.

5. The Political Agenda

Throughout my project, a significant part of my fieldwork was participation in activities focused on exploring the various conceptualizations and applications of technology for the healthcare sector. These included participating in numerous conferences and seminars on technology, and visiting municipalities, government agencies and non-profit organisations to interview them about the introduction of technologies into practices of care in Denmark. Additionally, I constantly monitored comments and discussions on the topic in the media. I also visited a number of other nursing homes and activity centres engaged in testing or using technology in Denmark. I have interviewed the following persons once: a medical officer; a dementia coordinator; civil servants from twelve municipalities who were formulating policies on the use of technology for care; a civil servant from the

¹⁷ See appendix II for written information on the project and for informed consent (in Danish).

National Board of Social Services (Socialstyrelsen); a civil servant from the Local Government Denmark (KL); a civil servant from the Danish Disability Council; The Danish Council of Ethics; and EGV Foundation. Apart from this I have collected newspaper articles, a large number of Danish public reports and political strategies on healthcare technology.

Anthropology Takes up the Study of Robots

Over the past couple of decades a growing body of literature has emerged in the social sciences, focusing on robots developed for the healthcare sector. Below I present the most important themes for the purpose of my study and explain how this research relates to or distances itself from the existing work.

In much of the literature on robotic technologies, the ways in which certain theories, cultural ideas and representations of users are involved in the making of robots in laboratories around the world have served as a dominant analytical starting point (Neven 2011; Richardson 2010; Richardson 2015; Richardson 2016; Robertson 2007; Robertson 2010; Wagner 2010; Shea 2014; Vidal 2007; Glaskin 2012; Helmreich 1998; Suchman 2007). Many authors use the work from science, technology and society studies (STS) as a point of departure, with a particular interest in the co-shaping of knowledge, technology and society, and thus the ways in which ‘users’ and ‘user-scenarios’ are configured and scripted into the machine (Suchman 2007; Neven 2011). In his studies of a Dutch robot developed to keep older people mentally active and preserve their cognitive health, Luis Neven (2011), for example, demonstrates how engineers devise representations of the prospective older user of the technology and integrate, or ‘write’, those representations into the design of the robot. This inscription is, in turn, intended to become one of the determinants for the success of that technology. Other anthropologists demonstrate how science and technology researchers claim to produce neutral copies but instead embed cultural constructions of gender (Robertson 2010), sexuality (Helmreich 1998), emotion and empathy (Glaskin 2012), and models of disability (Richardson 2010) in their artefacts. Stefan Helmreich (1998) argues, for example, that computer science laboratories’ experiments in creating artificial life are influenced by models of gender, race, class and sexuality, and while scientists themselves might think they are creating a neutral double, they are in fact implicated in reproducing models of life that are consistent with their cultural hegemonies. This study builds on this large body of work to investigate the ways in which roboticists’ dreams and ambitions feed into the machines they create. As we shall see in Chapter Three, these dreams and ambitions are particularly related to acts of crafting robots that possess the capacity to transmit and convey the human presence of their operators, by what I choose to call an extension and abstraction of the human body.

Roboticists’ efforts to design a robot shape to which humans will respond have also been explored in numerous studies (Glaskin 2012; Vidal 2007; Richardson 2015; Robertson 2010). In his