Article:

Criteria of implementing feeding assistance robots in disability care – a sociomaterial perspective

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Abstract:

This article discusses the entanglement of implementing welfare technology in disability care, and draws on ethnographic observations from a pilot project involving 30 disabled citizens from three different boroughs in Denmark. The disabled citizens suffered from diseases such as multiple sclerosis and cerebral paralysis. The article follows four care assistants and four citizens through a period of 10 months, focusing particularly on the experiences and struggle of two citizens. Against this background, the article takes up a number of conflicting values and criteria practiced by diverse interested groups: 1. employee retrenchment, 2. citizen independence and 3. workforce flexibility. The main argument is that the housing institution studied has turned into a battlefield, where professional values of authentic care meet a strong governmental discourse of modernization of the public sector. The study demonstrates that the implementation of welfare technology in disability care is highly fragile, which is predominantly due to the delicate body-technology assembly, and takes place in agony. Theoretically, the article articulates a sociomaterial approach to the balancing of incoherent agendas and goals in institutions based on Orlikowsky (2010, 2007), Akrich (2000) and Law and Moser (1999, 2003).

Keywords: welfare technology, feeding assistance robots, disability care, sociomaterial, science and technology studies, criteria, values

Introduction: The promises of welfare technology

Public health care constitutes one of the heaviest expenses in the Danish public budget. In 2008, the collected public spending within health care was close to 125 billion Danish kroner (DKK), which accounts for more than one-fourth of the entire public budget (Ministry of Social Affairs and Integration website, 2012). These expenses are expected to rise during the coming years since treatments are becoming more sophisticated and the population in general is getting older. Unsurprisingly, in times of crisis the questions arise: Who is going to pay? How should we prioritize between treatment and care? Public care seems to be progressive, and has already widely applied digitalization and technologies. Together, these conditions point to the possibility that there is a significant potential for welfare technological solutions in hospitals and care institutions. In care for the

elderly and in disability care, welfare technologies are indeed topological issues at the political-managerial levels and, not least, in the media.

Welfare technology is a technology that helps and assists users in their daily lives, e.g. with intelligent aids such as screen devices, cleaning robots, sensors in clothes, smart phones and feeding assistance robots. Welfare technology is closely linked to ambient assisted living, but whereas this focuses on addressing the needs of the ageing population, welfare technology addresses not only the elderly, but also other users of public services such as the disabled, public schools, day care centres and substance abusers. The Ministry of Social Affairs and Integration in Denmark focuses on the use of welfare technology in the social sector, where demographic developments are resulting in an increased demand for public services. At the same time, it will become harder to recruit employees to the public sector; therefore, a focus on welfare technology is essential to solve these challenges. Welfare technologies may be an opportunity for citizens to take care of themselves and participate in society, thereby improving the work environment and freeing up time for employees. At the official Web site for The Ministry of Social Affairs and Integration, it is stated: “We wish to find ways in which new technology and new work routines may contribute to more free time, an increased quality of service experienced by the citizen and an improved work environment for employees doing social work.” The financing institution of many welfare projects, the Welfare Fund based in the Ministry of Financial Affairs, emphasizes documented employee retrenchment as a condition for funding. As such, it is the official politics of the Danish government that welfare technology is associated with three goals: entrenchment (money), improved quality (citizen dignity and independence) and an improved work environment for employees (flexibility). Welfare technology is therefore closely associated with promises for an improved public sector, with a number of interesting questions arising in relation to the balancing of these ambitious and diverse promises. It is pivotal to untangle to what degree and how these promises may be realized by implementing welfare technology. Hence, the two main questions of this article are: How is the balancing among entrenchment, quality and flexibility actually carried out in the implementation of welfare technological projects? What is the effect of the specific welfare technology in relation to balancing these criteria?

Implementation of feeding assistance robots in disability care

Citizens with comprehensive reductions of normal functioning in arms and hands due, for instance, to multiple sclerosis or cerebral paralysis are often not able to eat independently through their own effort. Support from a care assistant may take up to 30 minutes for one meal, which adds up to 90 minutes per person, per day. Consequently, at institutions where several seriously disabled live, the need for care assistance is extensive.

Although they have existed for a while, feeding assistance robots have been applied quite rarely, which most likely has to do with the fact that these robots are controversial, and that many institutions do not know of them. Currently, feeding assistance robots have been tested and implemented in three boroughs in Denmark. The intention is to offer feeding robot aid to relevant citizens in disability care institutions throughout the country, and possibly also in private homes. The vision is that the implementation of feeding robot aids for institutionalized citizens who are not able to eat independently and by their own force will profoundly reduce the time and effort used by employees. Ideally, feeding assistance robots provide the possibility for numerous disabled citizens to eat independently, i.e. without any help; thus the potential is enormous for the elderly, the mentally disabled and others.

As previously mentioned, it is expected that feeding assistance robots will not only create a more flexible work day for the care assistants, but also contribute to increasing the quality of life for those who may become competent and independent—or semi-independent. The project is managed by the Ministry of Social Affairs and Integration (in Danish, Socialstyrelsen), and is carried out in collaboration with The Danish Centre for Assistive Technology (in Danish, Hjælpemiddel Instituttet), the Danish Technological Institute - Centre for Robot Technology and the municipalities of Horsens, Lolland and Furesø. The test period comprises 30 physically disabled citizens at eight different institutions, and only citizens who wish to adopt the feeding assistance robot are participating. The project is funded by the Welfare Fund (in Danish, Velfærdsfonden) in Denmark, which belongs to the Ministry of Financial Affairs (in Danish, Finansministeriet). I have been asked by the Ministry of Social Affairs and Integration to evaluate the project in one of the boroughs by way of qualitative methodology, which has to do with the fact that the overall project is

evaluated by use of a quantitative methodology. In order to do so, I have followed four disabled citizens, four feeding assistance robots and four care assistants during a 10-month-period at a single institution.

Exploring technology in organization studies

For the most part, the field of organization studies has ignored or downplayed the fact that organizing, as well as agency, are bound up with the material forms and space through which human interaction is shaped. To the extent that such ignorance continues, the discussion of balancing remains peripheral. This is because organizational life increasingly and everywhere has been mediated by all different sorts of technologies (Latour, 2005, 2000; Suchmann, 2007; Barad, 2003). Thus, this article articulates and discusses the possibilities of a sociomaterial approach to the balancing of different values in everyday organizational life, and it has been argued that the sociomaterial perspective provides an important analytical approach, which opens new perspectives. The article first provides a vocabulary for exploring the co- constitution of technology premised on science and technology studies (STS).The challenge of a sociomaterial approach is to articulate people as well as materiality as being constitutive for institutional life. Next, the article will draw on the case of feeding assistance robots to ground and illustrate this idea. Understanding the co-constitutive participation of technology is crucial if we are to understand the subtleties of contemporary disability care and its tools. Agency is not necessarily built into human bodies; hence it is not predominantly politicians, managers or professionals who have the privilege of prioritizing values, but rather prioritizing and balancing are constituted across spaces by multiple emergent, shifting and interdependent sociomaterial assemblies. The case used as an illustrative example is the controversial, politically loaded implementation of so-called welfare technology in public disability care, more precisely the implementation of feeding assistance robots in a housing institution for the physically disabled.

A sociomaterial perspective on institutions and care for the disabled

Wanda Orlikowsky (2010, 2007) and Wanda Orlikowsky and Susan Scott (2008) query that materiality is, in large part, ignored in organization studies; however, a body of studies treating this issue does exist. There are three problematic ways in which technology and materiality are dealt with in current organization research.

First, materiality is treated as being absent present; it is simply disregarded or taken for granted. The examples are numerous (see for instance March, 2005, 1994; Weick, 1996, 1995, 1979; Argyris and Schön, 1996). The second way organization studies have treated materiality is to explore particular cases for the diffusion of certain technology. This cluster of studies has powerfully illustrated the implications of the adoption of specific technologies, but at the same time they have created difficulties for dealing more generally with the issue of materiality. The problem is that materiality is seen as a special case, a particular occurrence, which loses general sight of the fact that every organizational practice is mediated by materiality. The point is that materiality is not an incidental element of organizational practice; instead, it is a constitutive, integral and an inseparable part of it, as there is an intra- action between people and materiality (Barad, 2003).

Thirdly, organizational studies of technology tend to focus either on the implications and consequences of the technology on organizational life, or merely on people's interactions with technology. The *techno-centric* perspective sees technology as an exogenous force coming to the organization, and proponents of this perspective are interested in understanding how technology leverages human agency, taking predominantly an instrumental and functional approach. This perspective seems to assume that technology is predictable, limited to certain aspects of organizational life and performs as intended across space and time, while ignoring that technology is ephemerally bound with social, historical and cultural meanings and influences. This approach is typical for the economist, the statistician, the engineer, the designer or the architect (see for instance Perrow, 1986 or Blau et al., 1976). On the other hand, the *human-centred* perspective predominantly focuses on how humans make sense of and interact with technology. This perspective focuses on emergent processes, and the technology is understood based on the multiple perceptions and meanings it creates and how people commit themselves to the technology. This tends to minimize the focus on the technology itself by primarily focusing on identification and human meaning making (Orlikowsky, 2007, pp. 1435-1437; 2010, p. 131).

The human-centred perspective has been influenced by a number of diverse schools and ideas. An early influence was the research conducted by the socio-technical school (Trist and Bamforth, 1951; Rice and Miller, 1967), which argued that social, psychological, environmental, and technological systems were to be addressed as a

whole. They queried the techno-centric focus of traditional work design, promoting the thought that social and technical elements in a system derive mutually and must therefore be designed together. Another influence came from science and technology scholars interested in social shaping (MacKenzie and Wajcman, 1985) and the social construction of technology (Bijker, Hughes, and Pinch, 1987; Hughes, 1983).

In order to move beyond the pitfalls of techno-centrism and human-centredness, it is pivotal to challenge the agency-structure division (i.e. the idea that people and things live in separate worlds). In order to initiate a useful discussion of the sociomateriality of balancing among multiple criteria, this is a necessary starting point, which leads to a fourth perspective in organizational studies of technology. According to the agendas of actor-network theory (Callon and Latour, 1981; Callon, 1986a; Callon 1986b; Latour, 2005; Latour, 2000; Latour, 1987), the mangle of practice (Pickering, 1993), material relationism (Law, 2004, 1998, 1994; Nickelsen, 2008) and intra-action (Barad, 2003), moving beyond these pitfalls embraces the social and material approach as being integral to- and constitutively entangled in the balancing of everyday life. Moreover, these approaches imply reconfiguring notions of agency and may be called posthumanist, in the sense that they seek to decentre the human subject into a larger and continually moving assembly consisting of associations of humans and nonhumans (sociomaterial). From a sociomaterial perspective, agency is not simply someone's capacity to act, and cannot be defined as such a priori. On the contrary, agency is the capacity to act that is discovered and untangled by studying how sociomaterial assemblies and local truths emerge. In principle, both humans and materials may act, but that action is always materially mediated; thus, taking a closer look at who or what makes decisions about criteria is a more complex affair than it immediately appears. Also from a sociomaterial perspective, prioritization among criteria is seen not as deliberate, predictable and planned, but as derived by continually emerging sociomaterial assemblies. The definition of an emerging sociomaterial assembly is inspired here by Nikolas Rose (1999) as a collection of humans and nonhumans governed by a more or less practical rationality and a more or less conscious goal, whereas the notion of assembly draws on process philosophers such as Gilles Deleuze.

Ingunn Moser and John Law (1999) have done some interesting work on the relationship between subjectivity, materiality and competence, illustrating the making

and the effects of assemblies. They provide the idea that competence is constructed in certain ways as a result of human bodies passing particular sociomaterial assemblies, which accounts for some everyday challenges for Liv, a disabled Norwegian woman who sits in a wheelchair. She is competent in the sense that she can write with her chin on her computer because she uses a clever writing programme, though by contrast she is incompetent at the train station because she cannot get her wheelchair into the train without a bridge, and this bridge is not available. The intermingling of different sociomaterial assemblies produces Liv as a competent subject in certain situations and as an incompetent subject in others. In combination with disabled bodies, robotic eating aids, certain work routines, professional values and politics may all be seen as assemblies constituting certain subjects who are either able to eat by way of their own force or as subjects who continually need comprehensive support during meals. Thus, the feeding assistance robots may co-construct competent or incompetent citizens and good or bad work environments, as well as effective or ineffective institutions (and societies), dependent on how the elements, bodies, parts and pieces in the sociomaterial assemblies all behave and fit together in time and space.

Methodology: Studying the implementation of feeding assistance robots in practice

Having defined and discussed an analytical vocabulary for a sociomaterial approach to the study of implementing welfare technology and the intricacy of criteria, the following questions arise: How can I participate and describe this complexity concisely? How can I study this entanglement? Will it all be a matter of serendipity? The sociomaterial links, and the movements and stabilization of these links and structures, need to be explored. According to Madeleine Akrich (2000), there will always be something that does not quite fit into the initial ideas and plans, as the making of an artefact is based on particular standards. She argues that since particular values, based on the engineers' more or less well-documented knowledge about the user, are inscribed into the materiality of the feeding assistance robot, it is necessary to describe the travel of the technology into the user world, which means observing how it participates in practice and its effects across political levels, in addition to the housing institution in question. At this point, it is relevant to ask: Which criteria and values are applicable, i.e. who does the feeding assistance robot

strengthen and who does it marginalize? According to the sociomaterial perspective, the specific users in practice — the disabled citizens and the care assistants—will to some degree take up the technology differently than it was originally intended by the designers (Akrich, 2000). This makes it less interesting to apply analytical approaches such as discourse analysis, narrative approaches and positioning theory, which would constitute a human-centred meaning making approach that would downplay the actual presence and effects of the welfare technology.

First, based on what in the studied field is seen as a success and a failure, two sequences of events from the case study are discussed: one success and one failure! Following this, I take a closer look at how the disabled, the care assistants and the welfare technology are linked together in practice. What is a success and what is a failure are of course not simply external, non-controversial categories. I use these categories here with a clear reference to the perceptions of the care assistants in the field, who unanimously agree on what constitutes a success and what constitutes a failure. Second, I discuss to what degree, and how, this emerging linking challenges existing and more established work practices. Third, I discuss what this situated interweaving of technology and practice does to professional and institutional values. This last question embraces how prioritization is given among the explicated values of quality (dignity, citizen independence), employee retrenchment and work environment.

Getting access to an intimate technology

During the start-up, I soon discovered that access to the intimate situation of eating with the assistance of a feeding robot is not easily obtained. The typical methodology in a sociomaterial perspective is participant observation, but eating, not least if you are disabled, is a personal affair. I started by sending letters to the four disabled citizens, asking them to allow me to attend and observe three meals. They all accepted. Later, I had a meeting with four care assistants and the local project manager, all of whom refused my wish of carrying out further ethnography in the institution; however, they accepted to take pictures, write a logbook, and present this material at the three following focus group meetings. I used a photo methodology (Warren, 2008), with four care assistants at two separate locations being given a

photo task and equipped with a logbook and a camera. They were asked by me to do the following:

> Take pictures of the things you believe gives the feeding assistance robot value. Take pictures that demonstrate situations and aspects of the feeding assistance robot that you believe work well. Also take pictures of the things you do in the time you otherwise would have spent giving food to the citizen (i.e. the free time you are given by the feeding assistance robot). Be particularly attentive to taking pictures of situations, aspects and possibilities that inspire you to go to work.

The produced material was discussed and further expanded at three following focus group meetings. The pictures taken, the logbooks and the focus group meetings helped to provide the possibility to study the implementation of the technology. The intention was to create a space where the care assistants were not only able to present their photos and logbooks, but also their views on the working environment in relation to the new technology, and even to create the space and possibility of inventing discursive practices in relation to the phenomena studied and the very conditions of their work. Apart from this, a very rich notebook was lying beside each of the four feeding assistance robots. In this crucial notebook, the care assistants scribbled their observations during every meal. I studied this notebook with great interest when I attended the institution, as it constituted rich sources and detailed information from the everyday use of the feeding assistance robot. As such, it is the observation, the photos, the logbooks and the focus group meetings that constitute the core empirical material of the study. For this reason, it is the care assistants who are the primary informants. Apart from one of the disabled citizens, those observed are unable to speak; therefore, I had little direct data from the disabled citizens. However, during observation, I talked quite a bit with the single individual who was able to speak. He talked at length about his striving for competence, e.g. talking about his difficulties with getting food on the spoon and about his need to eat alone, as he desired autonomy and independence. Tina also seemed to strive for competence and independence, and I will return to this point. The other disabled citizens simply endorsed the research project by explicitly accepting my written invitation. However, they all appeared very content with my attendance, as I was very careful here. I did not know whether they agreed with the care assistants who often claimed to speak for them. Thus, I made a decision to not in any way see the care

assistants as spokespersons for the citizens. In this study, they only speak for their own emerging interests.

After having finished my part of the study, I gave two presentations at conferences on implementing welfare technology initiated by, among others, The Ministry of Social Affairs and Integration. At these conferences, I had the opportunity to present my material and talk to several hundred managers, development consultants and other employees at the municipalities and in disability care institutions, which gave me the opportunity to qualify and further expound upon my material. Additionally, I wrote an earlier version of this paper and presented it at the ESA RN 20 at Lund University in Sweden in September 2012. The research project was ethically approved by both The Welfare Fund and The Ministry of Social Affairs and Integration, as well as by the management of the institution studied. The care assistants and the disabled citizens all explicitly agreed to take part in the study and were also given the possibility to reject.

How was the data organized and analysed?

I had a large amount of material that consisted of letters, notes from initial meetings, ethnographic notes, my own photos and video recordings, 80 photos taken by four care assistants, four care assistant logbooks and transcripts of three 120-minute focus groups. The pictures taken, the logbooks and the focus group meetings provided a unique possibility to study the implementation of the technology from the perspectives of the care assistants, and I soon recognized that by concentrating on two of the four disabled-robot-care assistant interactions, i.e. Tina and Annika, I was able to present a both clear and detailed material that demonstrated the span of my material. I have limited my presentation to these two sequences of events, firstly because I find them particularly illustrative and, secondly, because by limiting in this way I helped to avoid too many excursions, which I feared would confuse my assignment. I then concentrated on presenting theses sequences of events as accurately as possible as they appeared through my material observed in a sociomaterial perspective. The initial meeting with the Ministry of Social Affairs and Integration, The Welfare Fund and the project management offered insight into the political-managerial dimensions of the pilot project, and provided me with the

analytically strategic idea of understanding welfare technology innovation as balancing among three different criteria – money, quality and flexibility.

Two case studies

The following discusses the effects of the feeding assistance robots on the manoeuvres of balance between the numbers of values. The consequences of juxtaposition in the practice of robot feeding assistance robots, disabled bodies and care assistance values are then discussed, and I report from some important moments in relation to two of the four sequences of events followed. Those two observations are indeed different, and although they were observed at the same institution, they were observed at different physical addresses. The first constitutes a success from the perspective of the care assistants, while the other is obviously associated with multiple problems. I am particularly interested in how the balancing of criteria on the part of the care assistants is argued and grounded, and how this connects to, supplements and contrasts the values and criteria articulated by the Ministry of Social Affairs and Integration and the Welfare Fund. I am also concerned with how tasks, boundaries, possibilities and conflicts among the personnel emerge and shift as a consequence of the implementation of feeding assistance robots.

Presentation of data: The making of an assembly of independence and flexibility

Tina is a 25-year-old woman, and is the youngest of the participants in the feeding assistant robot project in her borough. Moreover, everyone involved seemed to agree that she has obtained the best results from it. She suffers from cerebral paralysis, and has limited strength and capability in her arms, although in spite of this she has enough power to control the two buttons fastened with rubber bands on her thighs. The button on her left thigh activates the robot arm on which the spoon is placed and makes the spoon go up and down, whereas the button on her right thigh turns the plate around so the spoon continually gets food from the plate (see Picture 1).

Picture 1: Tina connected to the feeding assistance robot

Two care assistants concerned with Tina made photos and logbooks. One of the care assistants' says that Tina is proud of the state of independence she has achieved by way of the feeding assistance robot, and states that Tina would like to demonstrate this. The care assistant emphasizes this by showing a picture in which Tina is eating with a big and proud smile. In another picture, Tina adjusts the robot for the right meal by way of a pointing stick that she wears on her head. The point is that the feeding assistance robot uses different programmes for hot and cold hot meals that have to be adjusted before every meal. While the care assistant demonstrates this picture, she states:

> It has been a success from the beginning for Tina, as well as for the group of care assistants. I have not heard any negative statements from any of my colleagues at any time. Tina is an obvious choice for eating with a feeding assistance robot. She was actively participating in this project from day one and has, ever since, done what she was expected to do. She presses the buttons for the right meal before she starts eating, which means that the care assistants are actually not very much involved. We need to start it and we have developed new rubber bands for keeping the buttons on the thighs. Apart from this, Tina does everything herself. She even tells us if we are doing something wrong.

Recently, she has applied for a battery for the feeding assistance robot, which means that she has the possibility to take the robot to her own apartment behind the dining room and eat there together with some guests. Over the weekend, she brings the feeding assistance robot to her parent's place. Another picture demonstrates a care assistant eating with another disabled client, while Tina eats by herself. Before Tina used the feeding assistance robot, the care assistants had to feed two clients at the

same time, which they consistently argued was disgraceful for both the client and the care assistant. In the logbook, the care assistant noted that this had became easier and also nicer to carry out since the care assistants now only had, at least during the day, to feed one client at a time.

In relation to another picture, the care assistant comments:

> I had somebody else take this picture while I was sitting in Tina's apartment doing the accounts for her, while she ate by herself in the dining room. We had been to town in the morning, and instead of sitting with Tina giving her food, I could now do her accounts while she ate. . . .I have freed up time, which I can apply to this client at another time.

Still another picture shows four happy care assistants at a personnel meeting. These care assistants normally support Tina, and as a written note in the logbook, one of them states: "I have taken this picture because it gives you work pleasure when your colleagues support a project like this 100%."

As should be clear by now, Tina's use of the feeding assistance robot has been predominantly seen as a success in the institution. The complications have been insignificant, which is expounded upon during one of the focus group meetings. Some plates had vanished and there have been periods where there were no plates available at all, and the same has been the case with spoons. By way of the support given by The Danish Centre for Assistive Technology, it is decided that plastic plates and plastic spoons work best in Tina's case. During the periods without plates and spoons, Tina eats together with a care assistant just as she did before.

The making of an assembly of indignity – Annika and the robot do not link well

Annika is a 45-year-old woman, who was involved in a traffic accident as a child. She used to eat independently, but now she is not able to use her arms. She has no ability to speak apart from saying "yes" and "no", though some sounds may give the care assistants indications of Annika's intentions. Before she started on the feeding assistance robot project, Annika had a spoon in her hand and the care assistant physically raised the hand and spoon to her mouth, which provided Annika with some sense of being able to eat.

In Annika's case, the button that activates the feeding assistance robot sits behind her right ear, and is mounted at the neck support on her wheelchair. When she presses the button with her right ear, the spoon goes from the plate, up to the mouth and then back again. She is not able to press the other button, which turns the plate. This means that a care assistant is still sitting with her during all meals, and while showing a picture of Annika with food all over her face, the care assistant states:

> She does not understand when to press the button. Often, the spoon goes up and down without any food on it. She opens her mouth and takes the spoon into her mouth even if there is no food on it. She does not really grasp what is happening. And she does not understand when to press the button and when to open her mouth. We need to sit beside her to help the food back to the plate and onto the spoon, and we need to tell her when to press the button. The food very often falls off the spoon.

It is important that the care assistant sits on Annika's left side. If the care assistant were to sit on Annika's right side the button behind her ear would be involuntarily activated, because Annika turns her head towards the care assistant. Before Annika used the feeding assistance robot she was given food from the right, and it has been confusing for Annika to suddenly be assisted from the opposite side because she is easily disturbed and has difficulties in concentrating. No matter how the food is given to her, she is very interested in what happens in the dining room. She is also interested in what her fellow residents, care assistants and others do, as there are normally eight who eat together, so there is a lot to see.

The following is a note I wrote while I was observing a meal at the institution:

> Annika is proud and happy while I am video recording her sitting by the feeding assistance robot. "Yes, yes," she says. She gets egg and pate on rye bread for lunch [see Picture 2]. Annika controls the spoon with the green button behind her ear, and the care assistant sits during the entire meal by her left side. The care assistant presses the button, which makes the plate turn. This button is lying on the table. Annika gets too much food in her mouth and quite a bit ends up on the table, on her lap and on the floor. Annika and the care assistant are obviously challenged by trying to keep the food on the spoon. Since I am sitting on her right side, I am disturbing her meal. She turns her head towards me in order to find out whether I am looking at her, and while this is going on, she involuntarily presses the button with her right ear. This means the spoon goes up and down without any control.

Picture 2: Food on Annika's plate

After being shown several pictures of Annika with food around her mouth and on most of her face, pictures of food on the table and pictures of food on the floor, the care assistant evaluated that Annika would probably prefer to get the food the old- fashioned way: "She has more food on her face now and loses more food than she did before the feeding assistance robot." According to the care assistant, all this "dirt" during the meal is not ethical and respectful. The care assistants admitted they are often annoyed by the feeding assistance robot, and in this case it certainly does offer either free time or an improvement in the work environment. This means that now and then, when the care assistants are pressed for time, they feed Annika the old way—by hand.

Annika leaves the project due to weight loss

Yet another picture shows Annika's weight form, which documents that Annika has lost 7–8 kilos since she started using the feeding assistance robot. It appears that after having started with the feeding assistance robot, three out of four disabled clients have lost weight. Understandably, the care assistants wonder whether they are doing something wrong, as the clients are obviously not getting enough food and the assistants wonder who is at fault. Little support seems to be offered by the project manager and the management. The experts who now and then attend the institution from The Danish Centre for Assistive Technology also do not seem to provide much support, and this dialogue is an excerpt from the focus group:

A: Every time they came here from the central project, we told them about our frustrations. We found what was going on was disrespectful and unethical.
B: Yes, and many of these things were already written in the notebook, which we knew they would read.
A: Yeah, but we were not sure where it would all end. Did Annika, for instance, need to habituate herself to the particular conditions of the feeding assistance robot? Perhaps over time she would be able to grasp it all and interact correctly with the robot, or perhaps it was not adjusted correctly? Perhaps somebody here has done something that brought the machine out of order?
B. I think we should have cried out loud a little earlier.
A. We also needed to spend some time getting to know the robot. When does one have to press a button and when shall it just go on by itself?!

This passage tells about the difficulties of making a decision in a situation characterized by worry and insecurity. This is a project in which several institutions and a number of people are involved, and the national project needs data in order to achieve further funding. It was difficult to recruit disabled clients and, at the time of this writing, only four users were left at this housing institution. For a long time, the care assistants had talked about the fact that Annika should have been taken off the project, and they worried and nothing happened. The weight form documented the fact that she was losing weight, and this strengthened their reluctance and made other participants listen. The project started in May, and in September it was finally decided to take Annika off the feeding assistance robot project. Although the care assistants found Annika's participation disgraceful from the start, they postponed their own arguments and backed out in order to abide with the project, so as to see what would happen and to submit to the intentions and principles of the national project.

The reason why it was difficult to get Annika off is firstly because one cannot rely on what she says. A care assistant said: "She can say yes and mean no!" Annika is not able to speak for herself, so somebody has to take make decisions for her. This sequence of events sheds light on the fragility and insecurity of the relationship between citizen autonomy and employee retrenchment. Employee retrenchment constitutes a strong political force, and the project must continue in order to collect data. An observation on behalf of care assistants in the notebook about food on the face and food lost on the floor, as well as the attendant indignity, does not appear to constitute a strong argument. Nevertheless, the fact that Annika has lost weight counts as a strong argument. As such, the weight form constitutes an important

element in the decision to get Annika out of the project, and thus seems to provide some dignity and ethical care.

Emerging sociomaterial assemblies provide new conflicts

As is hopefully clear, the two cases differ substantially. Tina is happy and proud since she is able to eat independently. She acts in practice as some kind of super-user on the feeding assistance robot, and makes independent decisions on where to eat (e.g. in the dining room of the institution, in her own appartment or at her parent's place), which provides the opportunity for the care assistants to help other clients, as well as the opportunity to help Tina with accounts. Formerly, the care assistants had to give food to two citizens at the same time, but in the daytime this is not the case anymore. Furthermore, the group of care assistants has been successful in developing a positive and supportive work environment. As a result, the criteria of competence, flexibility and retrenchment all seem to have been realized in this case. In spite of this, the care assistants are increasingly sceptical, claiming that more demanding and time-consuming clients are currently being admitted to the institution. According to the care assistants, there will be some independent clients and still be more time- consuming, heavy and dependent ones. This has to do with the politics of the borough, which demands as much service as possible for the money.

In the case of Annika, the juxtaposition of disabled body and feeding assistance robot obviously appears to emerge as a problematic assembly. Annika does not understand how and when to press the buttons, and too much food ends up on the floor and at the table; consequently, Annika loses weight. In this case, there is no independence to be observed, nor is there any flexibility or other assets concerning the work environment. A care assistant has to sit with Annika and press the plate- turning button during the entire meal, and therefore hardly any time is saved. Hence, the sociomaterial assembly of Annika, her care assistants and her feeding assistance robot generate worry. The care assistants spend time talking behind closed doors about how disgraceful the situation is, and they express worry as to whether it is their fault that Annika is losing weight. An interesting question arises regarding human contact, as care assistants share the observation that some clients using the feeding assistance robot now ask for human contact in alternative situations. For example, one day one of the clients asked the care assistant to come to their room after dinner for a chat. This raised the question among the care assistants of whether clients who

lose weight not only do so because it is difficult to get the food on the spoon, but also because human contact is now lacking during the meal? There are several instances in which clients ask for interaction with the care assistants in new situations, e.g. during bathing, cleaning, when going to bed and so forth. One interpretation is that the dearth of close physical interaction during meals has created new insecurities and worries not only among the clients, but also among the care assistants. The feeding assistance robots seem to introduce new worries as well as new conflicts in the housing institution, and Annika's predicament has obviously led to new kinds of worries and annoyance among care assistants. As such, insecurity about what is going to emerge, not least what losing weight implies in combination with high ethical standards, eliminates hopes of quality improvements and employee retrenchment, while putting to an end Annika's engagement in the project.

Discussion of the data: Prioritizing among criteria and agony during the implementation of a welfare technology

In relation to the specific implementation of feeding assistance robots, I have identified two cases. According to the care assistants, one was clearly a success and the other was clearly a failure, and new opportunities, competences, conflicts and impotencies are identified regarding the implementation of the feeding assistance robot. In the following, I specify and sum up the value arguments and practices of the six crucial participants that my empirical material has given me insight- and access to. In Table 1, I specify the criteria for the disabled citizens, the care assistants and the local management, the borough, The Center for Assistive Technology, The Ministry of Social Affairs and Integration and the Welfare Fund, the point of which is to provide an overview of the balancing of values in relation to the implementation of the feeding assistance robot. What are the criteria of the identified parties, how do they argue and how do they position themselves in relation to arguments put forward by other parties? In accordance with the arguments of Oudshoorn (2011) and Aanestad and Olaussen (2010), Table 1 demonstrates that the implementation of welfare technology is not simply a matter of modernization and rationalization, it also brings with it a new and complicated battlefield and widespread emerging interests. The point here is that the implementation of welfare technology is not simply an instrumental issue of limiting governmental spending; it also changes the site of knowing and care (Nicolini, 2010, 2007).

Although most of the studied disabled citizens are not able to speak for themselves, I have argued that they wish to become independent, and I have demonstrated that they may actually be able to experience new autonomy and competence by way of the feeding assistance robot. Again and again, the care assistants call for the criteria of dignity, respect and ethical practice. Several pictures and written comments in the logbook point to the possibility that it is independent and content citizens who coproduce a fruitful work environment for the care assistants, and in order to realize these criteria, the care assistants must collaborate with citizens, management, the national project, etc. If not, they experience insecurity and worry if the disabled body-technology assembly appears to be problematic. The municipality intends to obtain as much care for their citizens as possible within the financial framework provided.

When flexibility and space for care assistants is generated, this is followed by the introduction in the housing institution of still more demanding disabled bodies. The Danish Centre for Assistive Technology, which delivers the feeding assistance robot, works to realize the values of autonomy and independence for the elderly, the disabled and so forth. The feeding assistance robot may co-construct either competence or incompetence. Moreover, the feeding assistance robot makes it possible in institutions to limit the amount of time used for a meal, and also to collect the entire group of disabled residents around a meal within the existing personnel framework. As I have argued, this is the case because some citizens eat independently with a feeding assistance robot, while the care assistants are given the possibility to take care of other citizens and tasks. The Ministry of Social Affairs and Integration argues consistently for a quality of service and an improved work environment for care assistants. They manage this and a number of other technological welfare projects; they communicate about the vision and potential of these projects, and they plan conferences in order to discuss the challenges. The Welfare Fund and The Centre for Robot Technology argue for employee retrenchment, and they practice this value by insisting on evidence through measuring the outcome of the project (see Table 1):

Table 1
Participant, criteria and positioning

Participant	What is the criteria/value	How do they seek to realize this value?	How do they balance among values?
Disabled citizen	Independence, autonomy, competence	Exercise	Delicacy
Care assis-tants and management	Dignity, respect ethics	Collaboration, Back out	Abide by national project, which leads to worry
Municipality	Most possible service for the money	Admitting increasingly care demanding citizens	-
Center for Assistive Technology	Efficient public Sector	Providing and adapting the right tool	Accept human-tool fragility
The Ministry of Social Affairs	Quality of service, Improved work environment	Project management, Communication of vision	Accept retrenchment as an unavoidable circumstance
Welfare Fund	Employee retrenchment	Measurement and evaluation	Accept complexity of what is, after all, employee retrenchment

Discussion of the data: Acts of positioning and balancing criteria in agony

The care assistants abide by the national project, but they also back out in relation to Annika's engagement in the project. This excuse, which took place by way of the weight form, may be seen as a pivotal act of balancing between several important aspects and goals in relation to the implementation of the feeding assistance robots. This is the case in the sense that what the care assistants are met with, is far from their professional values and ethos. Although the feeding assistance robot challenges the care assistants' work routines, they continue, at least for a while, to help Annika manage the robot. They are confronted with values, with which they disagree, but for a long time they don't know how to react adequately. When the weight form allows them to document in figures the fact that Annika has lost weight, they cry off. The care assistants carry out important balancing in the sense that they

abide by the project set up and do away with their own sense of indignity for some time. It seems that they do this because of the promises from managerial and political levels of welfare technology.

The Ministry of Social Affairs and Integration and the Welfare Fund have to continuously balance their criteria mutually. In their respective roles as project manager and funding institution they work closely together on a number of projects, although their explicit values differ. Whereas the Ministry of Social Affairs and Integration work for quality of service and to create good work environments among care assistants, the Welfare Fund only supports projects financially if employee retrenchment can be documented by figures. Hence, in practice, the projects they manage and finance together need to meet all criteria. This, not surprisingly, leads to a strong governmental alliance, which constitutes a strong force to mobilize and put forward exactly these criteria in the local institutions, which are recruited for the project. In the institution studied, these technical, rational, and efficiency-oriented criteria become unavoidable and seem to constitute a condition for the implementation of the feeding assistance robot, although they are seriously challenged by the delicate and fragile body-robot assembly, and the associated worries as the strong dignity criteria of the care assistants are not met.

During the preparation of one of my presentations at a conference I experienced strong reservations from The Ministry of Social Affairs and Integration in relation to some points about weight loss I intended to present. I understand that The Ministry of Social Affairs does an important job in providing welfare technology, and thus they are skeptical about presentations from researchers that have the potential to strengthen what the Ministry see as “wrong attitudes” on behalf of the local care assistants and institutional managers. This illustrates the strong political dimension in the implementation of feeding assistance robots. I experienced something similar at a meeting with the Welfare Fund. They were indeed curious to get information on how, what, and where I intended to publish about welfare technology. As such, the Ministry of Social Affairs and Integration and the Welfare Fund clearly work for the promotion of welfare technology, and are not supportive of critical presentations and texts.

Discussion of the data: The possibilities of a sociomaterial perspective in relation to other perspectives

Table 1 demonstrates juxtaposition and negotiation among a number of matters of concern and ways to realize those concerns, as well as ways of balancing among the concerns. The balancing of criteria from a sociomaterial perspective is a matter of establishing how certain participants and values are strengthened, weakened, combined, excluded and added. Balancing may therefore be seen as a matter of which sociomaterial assemblies emerge, the tension among them and how they combine or exclude each other. What emerges is not simply a matter of clever arguments, discourses or narratives; rather, it is a matter of how different sociomaterial assemblies perform in practice. Based on observing the implementation of feeding assistance robots, balancing criteria appears as a mundane matter of establishing the effects of the concrete interweaving of body and technology. The body-robot assembly seems to be unpredictable, and exceeds the role given to it by the strong governmental alliance and its politics, and it is the association of body and robot that seems to constitute the weakest link in the chain. If interweaving disabled bodies and the robots constitutes a *good* assembly, an autonomous citizen is produced. This provides the potential for proliferation and for other assemblies to emerge, e.g. a flexible and productive work environment, employee retrenchment, more care for the money, successful welfare technology politics and so on. On the other hand, if it constitutes a *bad* assembly, not only are even more dependent citizens reproduced, but care assistants become worried and even ashamed. This leads to an unproductive work environment and even an unsuccessful institution.

In relation to a techno-centric perspective, a sociomaterial perspective offers insight into the subtle shifts and translations in the environment in which the technology is implemented. These include both intentional and unintentional consequences such as dirt on the face, or evidence of what a lack of close physical encounters may lead to. In relation to the human-centred perspective, the sociomaterial perspective continues to posit the mutual making of technology and humans. Humans and nonhumans alike are treated symmetrically, which first of all leads to the point that humans as well as materials may be seen as acting. Thus, who or what makes

decision about criteria is a more sophisticated matter of concern from a sociomaterial- than human-centred perspective. For instance, meaning making and perception are not simply seen as human capabilities, but rather as mediated by materiality. In this case, sentiments expressed by the assistants are identified as worries by way of focus group meetings, through sound recordings and by the making of this text, which for example may be strengthened by figures on a weight form. Hence, the sociomaterial perspective offers insight into the toilsome work, the nuances and the small achievements that result in certain balancing, the application of technology and organizational outcomes.

Conclusion

This article discusses the multiple values associated with implementing feeding assistance robots in disability care, and observations from a case study are analysed. The analysis unravels the intermingling of a number of criteria from participants such as the disabled, the care assistants, The Ministry of Social Affairs and Integration, the Welfare Fund and others, and discusses how values and criteria are argued and practiced. Balancing criteria is a complicated matter of calibration among interests, and the conclusion is that it is indeed somewhat of a balance to implement welfare technology due to incoherence, ethical questions and the cross- organizational nature of welfare technological projects, as well as the fact that such endeavours are politically endorsed and initiated. Moreover, in the case of the feeding assistance robots, it is difficult to recruit human bodies due to the demands of the technology and the unpredictability of the human-robot assembly.

The study identifies two very diverse sequences of events: one, according to the care assistants, successful application of the feeding assistance robot and one less so. The last instance in particular elucidates the simultaneous importance and fragility of the human-technology linking. The difficulties of predicting and allotting a performative conjunction of disabled citizen and feeding assistance robot stands centrally and embraces the potential to roll back the strong political network, which calls for simple instrumental rationalization and employee entrenchment. When the human-robot assembly works well, the promises of independence, flexibility and entrenchment may all be realized at the same time. If it works less well, professional values of dignity are mobilized and strengthened; thus, the link between the disabled

citizen and the feeding assistance robot is closely related to the production of enthusiasm in the institution, as well as scepticism among care assistants. Feeding assistance robots bring with them new types of flexibility, as well as new conflicts. The controversy between values of dignity among care assistants and the value of employee retrenchment, articulated and forcefully promoted by several governmental institutions, is untangled in the article. In spite of the enormous potential of the feeding assistance robots, the care assistants are sceptical about further applications of welfare technology. Although they praise the potential of encouraging independence, not surprisingly, they find the employee retrenchment criteria a depressing scenario. They report that the time retrenchment already achieved has immediately led to the introduction in the institution of still more care demanding and heavier disabled citizens. This compromises the pivotal criteria of continual development of service and quality, as well as indeed the criteria of improved flexibility and a better work environment for care assistants.

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