Responsible Help at Home: Establishing Indicators for a Product Assessment Methodology

Erik THORSTENSEN[a,1]

[a] *Oslo and Akershus University College of Applied Sciences, Norway*

Abstract. Responsible research and innovation (RRI) seeks to expand the governance of innovations through including social values and beneficial impacts throughout the innovation process. This chapter presents an attempt at addressing how to use insights from RRI in establishing a method for assessment of assisted living technologies. In a current research project, we aim to compare assisted living products developed through an RRI process with such products developed through a different approach. I argue that product assessment is a central part of responsible research and innovation, albeit a less developed part than the procedural dimension of RRI. Based on the literature of assisted living technologies and socio-ethical issues and on a range of stakeholder engagement activities in the research project, I document substantive values and themes that should to be included in an RRI assessment of assisted living technologies. These themes and values are systematised with the aim of aiding in selecting a product assessment methodology.

Keywords. Responsible Research and Innovation, Assisted Living Technologies, Assessment, Stakeholder Engagement.

x.1. Introduction

Governments and transnational institutions alike aim for policies and activities that can lead to fulfilments of the ideals of 'active ageing', 'healthy ageing', and 'successful ageing' (Lund and Engelsrud, 2008). Assisted living technologies are often held to be crucial in addressing these challenges. Such technologies are generally based on Information and Community Technologies (ICT), and are specially developed for assisting persons such as digital calendars, videophones, medicinal dispensers, location and tracking devices, or purpose built robots. However, the adaptation of such technologies is a slow process due to several factors such as 'technology push' (Novitzky *et al*., 2015), emphasis on caregivers' needs rather than users' needs (Topo, 2008), conflicts between the health professionals' aim to empower the elderly and the political goal of solving demographic challenges (Pols and Willems, 2011), and lack of training of users (Dahler *et al*., 2016) or training of health professionals (Saborowski and Kollak, 2015).

Governments and transnational institutions have also recently called for increased responsibility in research and innovation, to the extent that Responsible Research and Innovation (RRI) has now become a well-known acronym. RRI can be interpreted in

---

[1] Corresponding Author. Email: erik.thorstensen@afi.hioa.no

different ways, but many agree that the overall philosophy is captured in the following formulation:

> '[RRI] is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation' (European Commission (EC), 2014:3),

and is specified as having a focus on the following principles: anticipation, inclusion, reflection and responsiveness (Stilgoe *et al.*, 2013).

In the context of a project addressing both the overall societal challenges related to ageing the call for RRI, researchers and PhD students from nursing, nursing ethics, occupational therapy, and ICT, as well as researchers on RRI, have repeatedly visited a facility for independent living in Oslo, Care +, in order to discuss assisted living technologies together with residents and health professionals. The higher goal of these encounters was to develop assisted living solutions in a process conforming to such established RRI dimensions. Prior to these meetings, researchers in the Assisted Living project had studied and planned how to engage persons with Mild Cognitive Impairment (Kennedy and Ter Meulen, 2017) and reviewed literature on RRI and assisted living technologies (Thorstensen, 2017).

The Assisted Living project is a novelty in RRI studies since it poses a fundamental question in RRI: Does an RRI-based process actually improve the product?

The Assisted Living project has in total three aims:

1. to produce a solution –a product– through a developed RRI process

2. to assess whether this product is deemed better (or not) by its users as compared to a non-RRI baseline study, and

3. to assess the project's working process to see how it fulfils the criteria for an RRI process it has set.

This chapter is a first step in fulfilling the second aim of the project: How can we assess a product in assisted living technologies according to RRI ideas and practice? Consequently, it is useful to start answering this question by reminding ourselves of some of the thoughts within RRI on product assessment. Thereafter, I will present two normative sources for the selection of an assessment approach: first, concerns, findings and values expressed in the literature on RRI and assisted living technologies; and second, the valuations of prospective end-users, health professionals and the stakeholder-based reference group of the Assisted Living project. Thereupon, based on these sources, I will specify the concerns under Stilgoe *et al.*'s (2013) questions for assessments of products.

x.2. RRI and product assessment

The relation between an RRI process and its outcome is not mechanistic. Kupper *et al.* described commonly acknowledged process requirements in RRI and have suggested that:

'… it should not be lost out of sight that fulfilling those process requirements is no guarantee that RRI outcomes will be achieved. When it comes to assessing R&I practices, then, this also means that outcomes weigh in on the question of whether or not they meet the standards of RRI' (Kupper *et al.,* 2015:30).

It thus seems that an assessment of what constitutes a good outcome has an important place in RRI independent of the process. Stilgoe *et al*. (2013) proposed the following list of questions concerning the product, process and purpose dimensions of RRI.

Table x.1. Lines of questioning on responsible innovation

Product questions	Process questions	Purpose questions
How will the risks and benefits be distributed?	How should standards be drawn up and applied?	Why are researchers doing it?
What other impacts can we anticipate?	How should risks and benefits be defined and measured?	Are these motivations transparent and in the public interest?
How might these change in the future?	Who is in control?	Who will benefit?
What don't we know about?	Who is taking part?	What are they going to gain?
What might we never know about?	Who will take responsibility if things go wrong?	What are the alternatives?
	How do we know we are right?	

Source: Stilgoe *et al*. (2013:1570)

As illustrated by Table x.1. Stilgoe *et al.'s* (2013) articulated concerns for the consequences of products' positive and negative effects–as well as their distribution. Since the questions are in the future tense, it seems fair to assume that they are questions technology developers should ask themselves prior to launching a product. Likewise, these questions can be asked when assessing a product either at an early phase or even after years of use.

From a different perspective, von Schomberg (2012) articulated RRI as an integrative concept for assessment traditions and separates the process from the product dimension. In addition, von Schomberg (2013) saw the basis for the product dimension to include normative anchor points that should constitute the basics of a product assessment. These normative anchor points are that products should be (ethically) acceptable, sustainable, and socially desirable.

Since my colleagues and myself at a later stage will conduct an RRI-inspired assessment of the product solution from the Assisted Living project and compare this solution to an existing relevant 'non-RRI' product, this chapter focuses mainly on identifying the specific RRI content for an ex post product assessment.[2]

In section x.3., I will briefly explain the methodology for my literature review and elaborate on how the findings from the review can serve to articulate concerns that should be taken into account in the assessment of a product. In section x.4., I present results from our dialogues and focus group interviews. In section x.5., I analyse these concerns

---

[2] The Assisted Living Project is still in its development phase and it is too early to decide the features of the product.

in order to identify what will constitute the specific RRI approach as a prerequisite to selecting a method for product assessment at a later stage in the Assisted Living project.

The reviewed literature consisted of in total 94 articles, theses, reports and other documents collected via cross searches in sets of databases, snowballing from these searches, reading of project documents from current projects in RRI on ICT, ageing or health, and two recent reviews (Hofmann, 2013; Novitzky *et al.*, 2015) of ethical dimensions in assisted living technologies for people with dementia.[3]

x.3. Key concerns in the literature

A central conclusion from the study of the literature on RRI and assisted living is Hofmann's (2013) argument that there is a dearth of information on how people live with assisted living technologies. His position can be illustrated with Pols and Moser's (2009) comparison of two robots: a playful and humorous dog versus a serious and factual cat. It turned out that the users preferred the whimsical dog even if (or because of) it did not serve any strict purpose other than companionship. Furthermore, Hofmann was critical towards the lack of high quality evidence of assisted living technologies' efficiency and effectiveness. Vines *et al.* (2015) suggested that the elderly themselves might be included in deciding the success or efficiency criteria. Topo (2008:29) finds a 'bias toward caregiver needs' and suggested that this is because caregivers are the main source of information in describing the lives and challenges of people with dementia.

In order to address a future demographical change with an increasing number of citizens depending on health services, Prescott *et al.* (2012) wrote that the different factors constituting the needs or challenges must be articulated. Ertner (2016) pointed to the fact that today's users are different from future users, and Mort *et al.* (2009) argued that ageing as a societal challenge should be examined by addressing how such a framing affects the understandings of ageing, and which solutions are sought: What is the relation between the users of the products and the sense of urgency? (Bachinger, 2015). Other framing effects, such as the opposing ideals of 'active ageing', suggesting a healthy and outgoing person, and 'ageing in place', connoting a frail person (Aceros *et al.*, 2015), as well as constructing elderly's relation to technology, as opposed to younger persons' usage as based on aptitude (Mort *et al.*, 2009). Novitzky *et al.* (2015) warned that technology push is likely to be greater than demand in that technologies might be developed without concrete users in mind, as was illustrated by Barlow *et al.* (2006) in a case where professional knowledge encountered business funding without any

---

[3] The searches had two themes and a conjunction, and included two main search strings: one for a narrow search and one for a wider search. Both search strings were used on EBSCO, Web of Science, and Science Direct on 2 February 2016. Since these there databases to a large degree contain articles that are not open access, I also searched the Directory of Open Access Journals on 21 April 2016, as well as Google Scholar that also points to open access articles. In addition, Google Scholar also encompasses PhD and Master Theses as well as research reports–and what is called the 'grey literature'. The narrow search was ('Responsible research and innovation' OR 'Responsible Innovation' OR 'Social studies of science' OR 'Science and technology studies') AND ('Ambient living' OR 'Ambient assisted living' OR 'Welfare technology' OR 'Welfare technologies'). The wide search was ('Responsible research and innovation' OR 'Responsible Innovation' OR 'Social studies of science' OR 'Science and technology studies') AND ('ICT' OR 'Sensor*'). I included inputs based on reading the abstract, and in some cases the concluding section. As space is limited, I will only refer to one source per claim even if this claim is substantiated by others.

connection to local policy needs. On a different level, Constantinides and Barrett (2006) documented how unresolved intellectual property rights contributed to the failure of a tele-health product.

Tinker and Lansley (2005) documented that older people welcomed assisted living technologies to the extent that it addressed a need, but when planning for assisted living technologies, it is vital to know how many persons live in housing with sufficient health and safety standards so that they can benefit from these technologies (Tinker *et al.*, 2013).

'Will it actually work?' is an obvious question to ask, and a hard one to answer. Largely, the degree of certainty of the answer depends on the research quality behind the product and the assessment criteria for this quality, and these should both be thoroughly investigated (Barlow *et al.*, 2006). Another important element is training of professionals and users. Training of health workers can be done by letting them use the products themselves (Nielsen *et al.*, 2013), but since employees and technologies interact, the employees need a situational understanding of the technology–consequently the most fitting learning environment is the workplace (Hellesen and Bisgaard-Nøhr, 2013). However, when involving persons with cognitive impairments, the assessment design needs to be particularly sensitive to their predicament in order for them to be able to speak freely (Meiland *et al.*, 2010).

Both the testing and the implementation of assisted living technologies need to be based on informed consent, and the health professionals should adhere to norms for professional ethics during test periods in order to protect their clients (Nickelsen, 2013). In cases in which there is doubt about competence to give consent, the procedures must be scrutinised with care (Novitzky *et al.*, 2015).

Use of assisted living technologies in public settings might be stigmatising and cause isolation (Novitzky *et al.*, 2015). Likewise, assisted living technologies can cause alienation through medicalisation of the home or introduce an instrumental rationality into homes and peoples' lives in a manner that challenges fundamental values such as care, dignity and vulnerability (Hofmann, 2013).

According to the Ethical Issues of Emerging ICT Applications (ETICA) project, the main ethical issues for emerging ICTs are privacy, security, trust, liabilities and digital divides (Stahl, 2011).[4] The issue of privacy and security reoccurs in all ethical reviews, and accountability in this regard needs to be addressed and solved (Novitzky *et al.*, 2015). Since these issues are distributed among several stakeholders, there is a risk that those in need of care are burdened with most of the disadvantages and are deprived of privacy while others–such as health workers, next of kin or the health service providers–gain (Hofmann, 2013).

Assisted living solutions might create novel risks, especially through false alarms and malfunctioning products (Pritchard and Brittain, 2015), and/or change the lives of the elderly through expected alignment with the services (Aceros *et al.*, 2015). In line with this, Tinker *et al.* (2013) systematised a range of housing alternatives and supplements to assisted living technologies, such as home sharing, retirement villages etc., which should be considered for the system transformation to meet the demographic change. When analysing telecare, Roberts and Mort (2009) found that the traditional

---

[4] The ETICA project identified ethical issues from emerging ICTs and their possible applications and produced recommendations for addressing these issues. See: http://www.etica-project.eu/

notion of 'care' as performed by humans in close proximity to a receiver has been rhetorically compartmentalised into three different forms of care: monitoring or checking, physical care, and socio-emotional care. This has implications for the relations between users or patients and formal and informal caregivers.

Peine and Moors (2015) saw it as vital that assistive living technologies actually empower the elderly in terms of agency. Similarly, Pols and Moser (2009) argued that successful relations to technological devices depend upon the technology being 'scripted'[5] so as to allow the user to create an affectionate bond with the device, and this depends on the extent to which the device can *bring something of value* to the user. Peine and Moors (2015) suggested here that it is of greater interest to reflect on the processes through which users estimate or value something than what they value.

In a study of a sheltered housing scheme for elderly, Roberts and Mort (2009) found that women experienced loss of coping and receiving care as losing independence whereas men saw assistance as loving care. They also address gender as an aspect in the changing nature of care work since female informal caregivers and low-paid females perform this work. Dahler *et al.* (2016) identified gender as one central factor in adapting education and training to professionals and end users.

x.4. Stakeholder events

In order to determine important parameters for product assessment, we did not only consult the literature, but the elderly themselves and other stakeholders. We did this by asking what experiences do current users, health professionals and central experts have with assisted living technologies? In this chapter, I put an emphasis on what was valued– both positively and negatively–by the different stakeholders, professionals and users. I use these valuations as normative criteria for how assisted living technologies ought to be. The Assisted Living project has the responsibility to answer to these concerns. In the last section, I will look closer at which concerns are central in an RRI approach, and use this at a later stage as input to what kind of product assessment the Assisted Living project should apply.

This section encompasses the valuations from two engagements (dialogue cafés) with prospective end users, five focus groups with different health professionals and two meetings with the Assisted Living Project's advisory group. I present here the parts that are relevant for assessing the output of the innovation process. This information is gathered from the transcripts of the events and from the internal reports produced by the consortium.

The setup and the analysis of the different stakeholder engagements were similarly conditioned by RRI: We emphasised that everyone should be able to speak; we were unambiguous concerning the purpose of the event; we took specific note of values and uncertainties; and we returned later with replies to issues raised or questions asked. We held two arrangements of the 'World Café' type with the residents at Care +, two roundtable meetings with our reference group, and five focus groups in Oslo with health

---

[5] Madeleine Akrich explains the notion of a 'script' by comparing it to a film script: 'Thus, like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act' (1992:208).

professionals.[6] We wrote thematic reports from the events with the residents and full transcripts from the other events.

x.4.1. Dialogue cafés

The Assisted Living project reviewed previous studies on how to engage with persons with cognitive impairments in research (Kennedy and Ter Meulen, 2017). The project team then organised two World Café type events at the Care + facility, and called them *Dialogue cafés*. They were structured as to respect the residents' contributions and served to efficiently facilitate discussions between the residents and the research team. We held two events with residents at the Care + facility. The first event aimed to map residents' daily challenges, and in the second event, we presented some general use cases.

The residents emphasised how technological solutions could both include monitoring solutions and solutions of assistance in their daily lives. High on the list of priorities are safety alarms and fall detection, and safety at night with a possibility to control the lights. Everyone had a range of routine situations such as going to sleep, eating, cooking, shopping, going outdoors, watching TV, calling relatives, or receiving visits from friends or care workers. Such routines might require assistance. Furthermore, a good solution should empower the user to feel that she or he is in control of the situation and amplify positive situations, such as socialising and reduce negative situations such as, for example, forgetting one's wallet, pin codes or passwords, credit card, handbag, hearing aid and/or keys.

New technologies call for sufficient training. Every solution might have difficult settings with an array of buttons. Training is not just technical instruction, but adaptation to a person's full life situation. People whom they perceived to be responsible for a device or happenings do not always assume this responsibility. Technologies and care services alike can waste the elderly's time, and technologies should facilitate for communication, for example between services and users. Several of the participants expressed that it was useful with prompts and reminders in the daily life. However, this latter point was contested by others who saw such prompts produced by technological devices as potentially stultifying since they enjoyed training their memory through daily tasks.

The technology itself should be safe and secure. When discussing safety technologies, the elderly emphasised that they need to know that someone will respond to alarms or distress signals. The combination of bodily and mental frailty creates new fears and new safety and security challenges. Solutions should be moveable or useable from a distance; if solutions are fixed in position, a person might not be able to reach them in the event of a fall or accident elsewhere.

On a general level, we in the research group had the impression after the first dialogue café that the residents did not have specific concerns regarding privacy. This, however, was proved wrong in the second dialogue café when we introduced a scenario in which their next of kin could be notified of falls through video and alarms. Here, several of the groups objected strongly to involving their relatives since they perceived

---

[6] Please note that these are only the events in 2016 and that the Assisted Living project continues with engagement activities with these and other stakeholders throughout the project.

them to be too busy or that they would become upset–and that it was a task for the public services. Others saw this solution as having only benefits, and felt that video surveillance could be installed in all rooms as long as they had some say in who could access the video. Some mentioned that it would be an advantage if the images were blurred.

There were several objections to a scenario of notifications on a tablet showing who was present in the cafeteria, as such notifications could be used to 'pry'. They also had concerns regarding who decides what kind of information is distributed where. Furthermore, they wished to be in control over this process of information gathering and distribution. Rather than digital remote surveillance, some wanted night watch and locks that could be opened by others in case of emergency.

x.4.2. Advisory group

The project's advisory group consists of representatives from user organisations, academia, municipalities, government, professional groups and businesses connected to assisted living technology. Due to the mixed composition of the group, there are two main perspectives on assisted living technologies: as part of the health and welfare services and independent of these services.

Relevant for both perspectives are considerations regarding what will happen when a product is scaled up either to the market or as part of the services. Are there strong regional differences in digital literacy or service provisions that might be of importance? A hermeneutic aspect is how to adjust for differences in expectations (and possible disappointments) among users, professionals, service providers, and the public. In line with its central function, the advisory group underlined several important aspects regarding the innovation and implementation process, such as the set-up of the research and innovation process in order to become aware of similar solutions under development.

Some members of the advisory group challenged us to investigate if we have become too reliant on today's views on technologies and solutions rather than trying for more radically novel solutions that might fit better with a situation ten years from now. Every technological solution has a life span. An important point in the assessment will be to try to characterise the expected life span of the different components of a solution. Likewise, the organisation of the services will influence the life cycle of a solution.

Even though the members of the advisory group separated their remarks between technology as integrated with and independent of the services, they are of the opinion that ideally solutions should be compatible for use independently of or integrated into health services. This necessitates that the solution adheres to certain standards.

Future technologies should not only empower citizens to be self-reliant, but ideally also include the networks surrounding the users, such as family and friends. Solutions should ideally be fun and stimulate the users mentally and physically: prevention is preferable to treatment. One of the largest barriers to use is that users find the products ugly–and that taste varies between individuals.

When it comes to developing solutions for use in the health services, the advisory group felt that there is a need to envisage how to integrate the solution into the services as well as to create training opportunities. Training should teach health professionals to work differently, but also how to set up and administer the solution and to train the end users. With deteriorating cognitive capacity, training end-users becomes more

challenging, but it is important to activate and train remaining capacities. However, for persons with diminished cognitive functions, smart technologies that can anticipate and assist decision-making are valuable.

The advisory groups asked if there are specific factors characterising our test group as opposed to our target group–people with reduced cognitive abilities. One particular issue they have raised in this regard is if there are regional and/or cultural differences between our test users and the remaining population that might limit the applicability of the results.

x.4.3. Focus groups

The participants in the five focus groups had different professional backgrounds, but all worked in the home services in Oslo. The sessions lasted for one hour each, and were transcribed afterwards. They mainly emphasised the relations between users, next-of-kin, professions and suppliers; safety; user and professional empowerment and efficiency; and usability.

The health professionals primarily perceived assisted living technologies as increasing personal safety, but there are several ways of assuring safety. In all the focus groups, they mentioned how the next of kin (friends or relatives) are key to co-operating with and on behalf of users, discovering anomalies in disease and/or technology, and in facilitating prolonged independent living:

> 'because it's not only to receive these assistive devices, but who's in charge for support and can the next of kin follow through in the use–one thing is to get them, but who's seeing to that they're used?' (focus group participant #R1-2, 9 June 2016).

Consequently, any solution should be assessed as to how it facilitates involvement of non-formal caregivers. In order for this to be realised, training is necessary, as well as clear distributions of responsibilities: it seems that doubt, insecurity and inefficiency can occur in the quadrangle between users, next-of-kin, professions and suppliers especially when new equipment is installed, something breaks down or just has incorrect settings or functionality for the user:

> 'But then there are the companies, for many companies are responsible for their equipment, so if I fiddle with the equipment of someone else, then I do something I'm not allowed to … it's about guarantees and different things … but it would be nice to have the same knowledge as the user' (focus group participant #R2-12, 9 June 2016).

A central feature is then how good the training is. In many instances, a product cannot be assessed on its own without connection to the training procedure. Furthermore, as is touched upon in the quote, health professionals (and next of kin) are often the first who are asked to fix malfunctioning equipment. They should then have competence in basic troubleshooting and repair. Training should also include sensitivity training in order to uncover whether changes in the user's condition render the product irrelevant to the user.

An important idea is that good technology saves time for the professional and empowers the users at the same time. As is illustrated in the following quote, several

members of the different professions saw possibilities for increased efficiency using technologies that can activate the users:

> 'That you could have a big screen with fitness and exercise programs in the homes of several different people at the same time instead of the physiotherapist having to make all those visits' (focus group participant #R2-10, 9 June 2016).

Technology creates individual and social habits. Some professionals hold some habits to be virtuous, especially those promoting safe behaviour and/or that give the users a feeling of freedom and independence, while others hinder social interaction or movement. Such changes to an individual's life should be considered both according to the degree of change and the quality of that change.

x.5. Systematising values for indicators

Stilgoe *et al.*'s (2013) overarching theme regarding the distribution of risks and benefits is a central issue that reoccurs in several of the sources for this chapter (see, for example, Hofmann, 2013). Consequently, the Assisted Living project would benefit greatly from an assessment methodology that can differentiate between a range of topics and open up for a potential deliberation around them. My central issue in this section is to systematise the different factors that we found to be given importance so that the Assisted Living project knows what the central values are before deciding upon a methodology for assessing assisted living solutions.

x.5.1. The good life

First, what is needed is a methodology that allows for a reflection with the stakeholders on what constitutes a benefit. These are concerns that pertain to the sphere connected to autonomy and dignity–and to the wider question of living a good life. An assessment should open up for a reflection on what form of value (amusement, service, exercise) the user receives, and how the product might connect affectionately to the user (Pols and Moser, 2009) or the health professionals' experiences of how technologies influence or alter social relations. In a similar vein, Hofmann (2013) underlined that technologies might cause medicalisation of the homes where devices replace social solutions, that they instrumentalise the homes and create alienation. The participants in the dialogue cafés saw such an instrumentalization as potentially stigmatising. A necessary question to ask here is whether this form of 'care' is the preferred form of 'care', and how this novel type of care affects the other dimensions of care, such as the physical and socio-emotional aspects (Roberts and Mort, 2009), or if the new care constellation comes from a technology push (Novitzky *et al.*, 2015).

x.5.2. Risks and benefits before use

Before a product is tested with users, one can seek evidence for the product's security as well as what are the most likely privacy issues (Stahl, 2011). The participants in the dialogue café also expressed a wish to control for what kind of information that could be collected and where and how it is distributed. Furthermore, one should investigate the evidence bases for the product (Barlow *et al.*, 2006; Beedholm *et al.*, 2016), and the

health professionals highlighted the need for evidence for its user-friendliness (focus groups). Likewise, one should seek evidence for economic, social and ecological sustainability (von Schomberg, 2013), as well as for potential institutional sustainability (Dahl *et al.*, 2013) Both the stakeholders in our advisory group and the health professionals emphasised the value of early analyses of expected costs and relations to the services for the possibility for up-scaling. Along a different dimension, an assessment should take into account if the research was conducted according to ethical codes (Nickelsen, 2013). There are also juridical and soft law practices that might influence the practical possibility to implement a system such as intellectual property rights and standards (Constantinides and Barrett, 2006; Advisory group).

x.5.3. Risks and benefits in use

In the context of assisted living technologies, it is central to determine what form of predicament is envisioned targeted through the use of the product (Aceros *et al.*, 2015), how and whether this change also empowers the elderly in terms of agency (Peine and Moors, 2015) and how else this change will benefit the elderly, as pointed out in the discussions in the advisory group. They further emphasised that important dimensions for prolonged living at home is both bodily control and cognitive training. In addition to discussing the importance of daily cognitive maintenance through remembering and performing quotidian tasks, the participants in the dialogue cafés also raised the topic of increased social participation as a central benefit. They held the possibility of social encounters as one example of positive situations in a wider sense than just receiving technical task assistance, and brought forward the view that benefits and risks should further be understood as *situations*, i.e. the benefits and risks should be understood in a wider context. A situation where a person sounds an alarm, but without receiving any notification that help is underway, was mentioned as a negative situation even though they receive help in the end. In this case, the benefit is not primarily for the user, but a new risk has been created (Pritchard and Brittain, 2015).

The story suggests a bias towards caregivers' needs which in general seems to be an issue (Topo, 2008). The health professionals also discussed who is the main beneficiary of the increased effectiveness of new assistive devices. This suggests that assessments should be able to distinguish between how different stakeholders are affected. The health professionals warned that devices might cause confusion and that a central goal should be an increase in experienced independency for the primary users.

In the dialogue cafés, the participants saw both experienced and actual safety as central dimensions. Since health professionals in many cases will interact with the users and their devices, the advisory group discussed how the impact on the professionals also should be assessed, whereas the health professionals themselves emphasised that they needed to have training in and access to adjusting the products or performing easy maintenance. The health professionals highlighted the need for proper adjustments or personalisation to individual users as a prerequisite for enjoying the suggested benefits.

x.5.4. The distribution of risks and benefits

The distribution of risks and benefits should be informed by normative criteria. In the reviewed literature and the engagement practices, we found that the following concerns are raised. First, the distribution depends on the alternative to the technological solution:

If there exists a safer and less intrusive method of providing assistance, then the transferal of risks to elderly should be properly justified (Tinker *et al.*, 2013). A central question is also the scope of reach, or how many persons and what groups that can be expected to employ the technology (Tinker *et al.*, 2013). Roberts and Mort (2009) discussed how men and women might have different experiences when it comes to being in need of aid. Hence there might both be a subjective dimension as well as a gender dimension in adjudicating what a fair distribution could be. Likewise, there is also an objective dimension to the distribution, such as Stahl's (2011) observation that digital divides should be addressed.

x.5.5. Distribution of responsibilities

The distribution of risks and benefits can be said to be mirrored in the issue of the distribution of responsibilities among the service providers and/or researchers. From Stahl (2011) and from the focus groups I retain that the distributions of responsibility among all the involved parties for all the elements of the assisted living technology should be explicated and understood by everyone.

x.5.6. Training

Reading through all the normative issues, the continuous emphasis upon learning and training among the stakeholders is striking. The stakeholders in the project refer to training and learning as instruction. Instruction can well be a social event with individualised aspects, but also include manuals or videos. Of course, training is not integrated into a product in the same manner as a processor to a computer so it seems problematic to include training into criteria for product assessment. At the same time, it is difficult to imagine that a person installs a device at home in order to increase safety, coping, and/or quality of life without any introduction. Consequently, I find it legitimate to include instruction into the product assessment.

x.5.7. Reflections

I primarily see the last three questions from Stilgoe *et al*. (2013) as reflexive questions. One way of trying to include these, as reflexive exercises, would be to connect them to some central themes from the literature, such as framing effects (Mort *et al.*, 2009), reconfiguration of trust (Stahl, 2011), the procedural aspects of valuation (Peine and Moors, 2015), and the difference between today's users and future users (Advisory group). Do such issues provide reflection among the assessors? We will open up for discussing these issues with users, health professionals and next of kin in the Assisted Living project.

x.6. Conclusions

One of the next steps for the Assisted Living project will be to select an existing assessment approach that can accommodate for–and be enriched with–all the concerns above, and simultaneously provide grounds for comparison between different products. Based on the findings above, the possibility to include contextual factors and different

stakeholder perspectives are two of the important features in a future assessment methodology.

The limitations of this study have to do with the completeness of the reviewed literature and the framing and the context of the fieldwork. For the literature review I have searched for and read only material relevant for a combination of assisted living technology, ICT, ethics, and Science and Technologies Studies, there is a danger of circularity in the interpretation of the material and the systematisation of the findings. We conducted the fieldwork in an open but structured manner in a socially privileged part of Oslo. This means that we gave much space to persons who might not be representative of the national population of elderly as such.

We addressed these challenges by presenting as openly as possible all the perspectives in the empirical material. This form of grounding of the hermeneutical intuition might help the research project, readers and myself in gaining insight into what is of value and why. Furthermore, these findings have been discussed with project partners so the interpretations have been filtered through their backgrounds as well. Here, the debates on how to understand and proceed with every issue in the process have been discussed intensively based upon both professional and personal logics before we have acted upon them and presented the next step to our partners in Care +. One central challenge for improving lives through technologies is to translate the project members' internal learning into useful products. Such insights might come at different times to individual members: if we close down too soon, then we will not reach the pinnacle, and if we keep everything open too long, we will not provide users and business with anything at all.

Acknowledgements

References

Aceros, J.C., Pols, J., and Domènech, M. (2015), 'Where is grandma? Home telecare, good aging and the domestication of later life', *Technological Forecasting and Social Change* 93: 102–111.

Akrich, M. (1992), The De-Scription of technical objects. In W.E. Bijker and J. Law (eds), *Shaping technology/building society: studies in sociotechnical change*. Cambridge: MIT Press, pp.205–224.

Bachinger, L.M. (2015), *Co-Producing Fragile Bodies and their Technological Fix*. Wein: Universitat Wien. Available at: https://sts.univie.ac.at/fileadmin/user_upload/dep_sciencestudies/pdf_files/publikationen/thesis/Bachinger_thesis.pdf (last accessed 9 March 2017).

Barlow, J., Bayer, S. and Curry, R. (2006), 'Implementing complex innovations in fluid multi-stakeholder environments: Experiences of "telecare,"', *Technovation* 26(3): 396–406.

Constantinides, P. and Barrett, M. (2006), 'Negotiating ICT development and use: The case of a telemedicine system in the healthcare region of Crete', *Information and Organization* 16(1): 27–55.

Dahl, H.M., Pieper, M. and Fahnøe, K. (2013), *First Draft of the Research Agenda*. (Work Package 10, Innoserv). Roskilde: Roskilde University.

Dahler, A.M., Rasmussen, D.M. and Andersen, P.T. (2016), 'Meanings and experiences of assistive technologies in everyday lives of older citizens: a meta-interpretive review', *Disability and Rehabilitation: Assistive Technology* 11(8): 619–629.

Ertner, M. (2016), 'Different generalizations of the elderly in design of welfare technology', *STS Encounters. Research Papers from DASTS* 8(1): 1–28.

European Commission (2014), *Guidance for evaluators of Horizon 2020 proposals.* Version 1.1. Brussels: EC. Available at: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-evaluation-faq_en.pdf (last accessed 31 May 2017).

Hellesen, J.S. and Bisgaard-Nøhr, C. (2013), *Et arbejdsliv med velfærdsteknologier–udfordringer, forståelser og forudsætninger i fremtidens plejearbejde* (Speciale fra Arbejdslivsstudier). Roskilde: Roskilde Universitet.

Hofmann, B. (2013), 'Ethical Challenges with Welfare Technology: A Review of the Literature', *Science and Engineering Ethics* 19(2): 389–406.

Kennedy, M.-R., and Ter Meulen, R. (2017), *Recommendations for involving people with dementia or mild cognitive impairment and their informal caregivers and relatives in the Assisted Living Project*. Bristol: University of Bristol, Centre for Ethics in Medicine and Høgskolen i Oslo og Akershus. Available at: https://assistedlivingweb.files.wordpress.com/2016/04/alproject_methods_recs_v2_f.pdf (last accessed 9 March 2017).

Kupper, F., Klaassen, P., Rijnen, M. *et al.* (2015). *A catalogue of good RRI practices* (RRI Tools No. D1.4). Amsterdam: Athena Institute, VU University Amsterdam. Available at: http://www.mistraurbanfutures.org/sites/default/files/catalogue-of-good-rri-practices.pdf (last accessed 12 June 2017).

Lund, A. and Engelsrud, G. (2008),'"I am not that old": inter-personal experiences of thriving and threats at a senior centre', *Ageing and Society* 28(5): 675–692.

Meiland, F., Dröes, R.-M., Sävenstedt, S. *et al.* (2010), Identifying User Needs and the Participative Design Process. In M. D. Mulvenna and C. D. Nugent (eds), *Supporting People with Dementia Using Pervasive Health Technologies*. London: Springer, pp.79–100.

Mort, M., Roberts, C., and Milligan, C. (2009), 'Ageing, technology and the home: A critical project', *Ageing, Technology and the Home: Researching New Care Configurations/Vieillissement et Technologies: Recherches Sur Les Nouvelles Configurations Du Soin À Domicile* 3(2): 85–89.

Nickelsen, N.C.M. (2013), 'Criteria of implementing feeding assistance robots in disability care: a sociomaterial perspective', *Journal of Comparative Social Work* 8(2): 1–29

Nielsen, J.A., Andersen, K.N. and Sigh, A. (2013), 'Robots Conquering the Homeland of the Vikings', paper presented at *Dansk Selskab for Statskundskab,* Copenhagen, 24-25 October.

Novitzky, P., Smeaton, A.F., Chen, C. *et al*. (2015), 'A Review of Contemporary Work on the Ethics of Ambient Assisted Living Technologies for People with Dementia', *Science and Engineering Ethics* 21(3): 707–765.

Peine, A. and Moors, E.H.M. (2015), 'Valuing health technology–habilitating and prosthetic strategies in personal health systems', *Technological Forecasting and Social Change*, 93: 68–81.

Pols, J. and Moser, I. (2009), 'Cold technologies versus warm care? On affective and social relations with and through care technologies', *Ageing, Technology and the Home: Researching New Care Configurations/Vieillissement et Technologies: Recherches Sur Les Nouvelles Configurations Du Soin À Domicile* 3(2): 159–178.

Prescott, T. J., Epton, T., Evers, V. *et al.* (2012), Robot companions for citizens: roadmapping the potential for future robots In Empowering older people. In: *Bridging Research in Ageing and ICT Development) Final Conference*. Prague: Springer-Verlag.

Pritchard, G.W. and Brittain, K. (2015), 'Alarm pendants and the technological shaping of older people's care: Between (intentional) help and (irrational) nuisance', *Technological Forecasting and Social Change* 93: 124–132.

Roberts, C. and Mort, M. (2009), 'Reshaping what counts as care: Older people, work and new technologies', *ALTER - European Journal of Disability Research / Revue Européenne de Recherche Sur Le Handicap* 3(2): 138–158.

Saborowski, M. and Kollak, I. (2015), '"How do you care for technology?" – Care professionals' experiences with assistive technology in care of the elderly', *Technological Forecasting and Social Change* 93: 133–140.

Stahl, B.C. (2011), IT for a better future: how to integrate ethics, politics and innovation. In: R. von Schomberg (ed), *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Field*. Luxembourg: Publication Office of the European Union, pp.17–33.

Stilgoe, J., Owen, R. and Macnaghten, P. (2013), 'Developing a framework for responsible innovation', *Research Policy* 42(9): 1568–1580.

Thorstensen, E. (2017). *Literature review of responsible research and innovation on assisted living technologies for the Assisted Living Project*. Oslo: Oslo and Akershus University College of Applied Sciences. Available at: https://assistedlivingweb.files.wordpress.com/2016/04/rriandaltforassistedliving.pdf (last accessed 22 May 2017).

Tinker, A., Kellaher, L., Ginn, J. *et al.* (2013), *Assisted Living Platform: The Long Term Care Revolution*. London: King's College London.

Tinker, A. and Lansley, P. (2005), 'Introducing assistive technology into the existing homes of older people: feasibility, acceptability, costs and outcomes', *Journal of Telemedicine and Telecare* 11(Suppl 1): 1–3.

Topo, P. (2008), 'Technology Studies to Meet the Needs of People With Dementia and Their Caregivers: A Literature Review', *Journal of Applied Gerontology* 28(1): 5–37.

Vines, J., Pritchard, G., Wright, P. *et al.* (2015), 'An age-old problem: Examining the discourses of ageing in HCI and strategies for future research', *ACM Transactions on Computer-Human Interaction* 22(1): 2-27.

von Schomberg, R. (2012), Prospects for technology assessment in a framework of responsible research and innovation. In M. Dusseldorp and R. Beecroft (eds), *Technikfolgen abschätzen lehren*. Wiesbadan: Springer, pp.39–61.

von Schomberg, R. (2013), A Vision of Responsible Research and Innovation. In R. Owen, J. Bessant, and M. Heintz (eds), *Responsible Innovation*. London: John Wiley & Sons, Ltd, pp.51–74.