REPRESENTATIONS OF THE OLD AND AGEING
IN THE DESIGN OF THE NEW AND EMERGING

Assessing the design of Ambient Intelligence technologies for older people

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REPRESENTATIONS OF THE OLD AND AGEING
IN THE DESIGN OF THE NEW AND EMERGING
ASSESSING THE DESIGN OF AMBIENT INTELLIGENCE
TECHNOLOGIES
FOR OLDER PEOPLE

PROEFSCHRIFT

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The endless cycle of idea and action,
Endless invention, endless experiment,
Brings knowledge of motion, but not of stillness;
Knowledge of speech, but not of silence.

T.S. Eliot – Choruses from 'The Rock'

Acknowledgements

This is a book about representations. It is only fitting to start such a book with a small comment on a common representation in academia: that of ‘doing a PhD’ as a solitary affair. For a PhD student their thesis is indeed their major project and chief responsibility and in the latter parts of the process it does generally – and certainly did in this case – involve months of semi-voluntary solitary confinement while the ‘writing up’ is going on. However, one need only look at the acknowledgements of PhD theses to see that doing a PhD is also a distinctly social affair.¹ And, indeed, I too owe much to many intelligent, considerate and friendly people.

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¹ Indeed the social study of acknowledgments could be an interesting STS project.

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1. Introduction: The necessity of analyzing user representations of older users

1.1 A representation of two older people

I would like to start this thesis with an invitation: an invitation to take a careful look at Marius van Dokkum's 2006 oil painting entitled *Meegaan met je tijd*² (figure 1).

Figure 1 *Meegaan met je tijd*, Marius van Dokkum, 2006, oil painting on panel, 50 x51 cm

The people in this painting are clearly older people. This is clear as there are a multitude of elements which are associated with older people. They have grey hair, the man has difficulty seeing (and needs extra light), there is a ball of knitting yarn, they are wearing 'old fashioned' clothes, the room has a 'dated' design and is filled with 'old

² *Meegaan met je tijd* is a Dutch expression. It translates literally as 'going along with your time' and it means keeping up with and remaining in tune with your times, being up to date. It can apply for instance to values and norms, but also to fashion and technology.

fashioned' furniture. All of these elements combine to make these people easily recognizable as old.³

However the fact that these are older people is not the salient element in this painting. The salient element is that they are older people who are using relatively new technology, but are seemingly not very competent users. They, for instance, seem to be trying very hard, but also seem rather surprised by what is happening, or not happening, on the screen. The woman presses down hard on a key, possibly in the hope that pressing down hard on a key gives it a better chance of working. This strategy usually only works with mechanical technologies and thus underlines her lack of appreciation of the difference between mechanical and digital technologies.⁴ The woman and the man are both holding an instruction manual or a text book, thus showing that they are not learning by trial and error, which is a common way of learning for younger generations.⁵ But even with the manual they seem to struggle. However, the single most illustrative element which demonstrates their lack of competence as computer users is the mouse. It dangles from its wire and is only being held up by a cup of tea which is placed on the mouse mat. The couple thus have not recognized that the mouse constitutes an interface to operate the PC, and they struggle accordingly. The older people in the painting are thus clearly portrayed as people who, despite their valiant efforts, do not know how to operate a personal computer.⁶ They are portrayed as being out of touch, as being quite hopelessly behind.

Of course, Marius van Dokkum is playing with stereotypes here. By exaggerating the connection between being old and being technologically out of touch Van Dokkum makes us think: how do we think about older people as users of technology? Are older users of information and communication technologies really like this? All of them? Always? I would like to take the issue of images, ideas and views of ageing a step further and focus on one particular group whose views of and ideas about

³ There has been substantial debate within gerontology and related fields in relation to how to address older people with a non-derogatory term. 'Old people' and 'elderly' are often seen as derogatory. In this thesis the term 'older people' will be used primarily. Occasionally, the adjectives aged and elder will also be used. It would also have been possible to use the nouns 'elder' and 'elders' as they have been used extensively in Joyce and Loe (2010b) and are also used in Dannefer and Phillipson (2010b), but the use of these nouns is less common outside (some parts of) the gerontological world.

⁴ Intentionally or unintentionally, Van Dokkum thus alludes to the idea of technology generations (Docampo Rama, 2001; Docampo Rama, De Ridder, & Bouma, 2001). This theory states that the interfaces that people grow up with will remain the interfaces that people are most accustomed to using. Thus a style of use – pushing down hard on a button – belonging to a mechanical or electro-mechanical technology generation is applied to a device that has a software interface.

⁵ Again, this resonates with Docampo Rama's idea of technology generations.

⁶ Interestingly, the painting is from 2006, which makes the portrayed technology also old. The monitor is an 'old' CRT monitor and not a 'flat' LCD monitor. On the books lies a 'diskette', a floppy, an old form of data storage. The PC is thus not new. It might have been a gift or bought second hand. In any case, this further compounds the image of these people as incompetent computer users as this 'old' computer is still too fast for these older people.

older people are of particular importance: designers. How do the designers, and for that matter researchers, engineers, corporate managers and others who partake at some stage in the design of technologies for older people, think about older people? What are the images, ideas and, perhaps, stereotypes that they hold? In their view, how are older people different from other categories of users? What are the salient characteristics of older users and how do these differing characteristics matter for design? How do these images co-evolve with technologies? Do these views lead to different technologies? To *better* technologies? The overarching question is thus: what images and ideas about ageing underlie the design of technologies for older people?

1.2 Ageing as a problem, technology as a solution

This is anything but a trivial question. In order to illustrate the importance of the way in which older people are viewed by designers, it is necessary to have an understanding of the dominant narratives of old age. According to Johnson (2005), there 'are two central global narratives of old age; one ancient, one modern. In their primary forms, they are almost diametrically opposite. The one over-idealised but bearing enough evidence to sustain it for many centuries. The other a mix of apocalyptic demography and politically generated generational conflict, of shifting trends and panic' (Johnson, 2005: 563). According to Johnson, the ancient and benign view of old age is one in which older people are idealised as authoritative, dignified and wise people to be treated with respect and, in turn, to be cared for.⁷ He describes how this image has gradually become less important as it was supplemented, and partly replaced, by an image of ageing in which old age is predominantly seen as a social problem: 'The twentieth century, which saw the lead ageing countries in Europe enter a demographic explosion, soon began to see the phenomenon as a mixed blessing and then as a serious problem' (Johnson, 2005: 567). Indeed, as Johnson makes clear by referring to the work of Thane (2000) on the history of ageing, gloomy predictions about the huge and impending (financial) problems caused by ageing populations were already being made in the 1930s. The emergence of state funded pension schemes in the early twentieth century, coupled with the growth of older age groups and the financial crisis of the 1930s led to the belief that, on the one hand, the cost of pension, care and health care would continue to increase while on the other hand, an increasingly smaller working

⁷ To be sure, Johnson also nuances this view, as this ancient narrative did not automatically mean that all older people were taken care of in earlier times: 'contrary to contemporary beliefs and views about old age and the place of older people in society, in earlier times there was not a single pattern of benign family-based care, reinforced by a compelling philosophy of filial obligation. But that stereotypical view does have a good deal of credence. As we have seen, religions, moral codes, legal systems and family structures did, on the whole, ensure a decently supported last stage of life for the few who were fortunate enough to live beyond their working lives' (Johnson, 2005: 566-7).

population would have to face the burden of these increasing costs. Thus the “unbalanced dependency ratio” argument – also known as the “demographic burden”⁸ argument – already has quite a history. ‘Indeed, old age was seen throughout the twentieth century as “a social problem” (...). It was widely spoken of as “an impending disaster”, “the burden of an ageing population”, “the rising tide” ’ (Johnson, 2005: 567). It is safe to conclude that at the start of the 21st century, not much has changed in this respect: ageing is still viewed as an abstract social problem that is surrounded by panicky messages of future hardship (Van Dam, 2009). Of course, different ideas and images could be and are sometimes given, but they are certainly not as dominant as the “social problem” view of ageing. To quote Hepworth, ‘the predominant images of old age are not derived, as Thompson (1992) argued, from the diversity of subjective experiences of life – that is, from qualitative subjective experience – but from the public imagery of old age as a medical, spiritual, and, increasingly in the contemporary world, a social problem’ (Hepworth, 2004: 20).⁹ The dominant image of ageing is thus one of ageing as a major problem in our societies, a problem that will have serious social and financial ramifications in the near future.

So what are these societal problems associated with ageing? The pervasive view is that there are various large scale developments taking place which are either caused by ageing or compound the negative effects of ageing. The most commonly mentioned problems are (public) finance, and problems related to care or labour, and often a mixture of two or three (see for instance: Van der Kwartel, Paardekoper, Van der Velde, & Van der Windt, 2007; Ewijk, Draper, Ter Rele, & Westerhout, 2006). For instance, one claim is that the increase in the number of older people and the simultaneous general increase of healthcare costs, will result in a steep rise of the cost of both health care and various forms of care at home (Ewijk, et al., 2006). The message is thus that unless we do something, we will soon be unable to afford to pay for this care.

In conjunction with the issue of the affordability of care, concerns about the care labour market are often raised. The claim is that there are already too few care workers to cope with demand; that care work is very demanding; that care workers, both formal and informal, are already overburdened; and that the care labour force itself is ageing, which means that a substantial number of care workers will retire in the coming years (Van der Kwartel, et al., 2007).¹⁰ The projected increase of the number of

⁸ See: <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SL&EN&PA=03766eng&LA=EN>, accessed February 10th 2011.

⁹ For a discussion of the construction of old age as a medical problem, see Joyce and Mamo (2006: 101-103).

¹⁰ It is important to mention that in many Western countries, Asian or African migrant workers, predominantly women, are being brought in to do this care work, which shifts the problems from these Western countries to the countries of origin of these care workers as these women are no longer able to

older people will further aggravate these problems. One factor that is said to compound these care labour problems further relates to the shifts in family structures (Johnson, 2005). Families have become smaller, geographic mobility has increased and divorce rates have also increased, which in turn could lead to a greater number of older people living alone with potentially fewer family members being available to care for them on a regular basis. This could, for instance, lead to decreased levels of informal care by family members and may also leave older people isolated and lonely. However, Johnson (2005: 569) nuances this view, stating that research has shown that relations between generations have changed, but mutuality and support have not been undermined. Indeed, this idea of decline of family care is juxtaposed by an effect called the “sandwich generation” (Bengtson, Rosenthal, & Burton, 1996). The sandwich generation refers to the idea that middle aged people, particularly women, experience the competing demands of being an adult child, parent, paid worker, spouse and/or an informal care giver. To be sure, Bengtson and colleagues critique the idea of the sandwich generation as, amongst other things, it assumes that an older parent is experienced as a (care) burden and that older parents do not contribute positively to the family lives of their children. Nevertheless, the idea of declining family care, leading to a heavier (financial) burden for the state, in addition to the notion of the sandwich generation, which points to increased social and care burdens for middle aged people, comprise two examples of how older people are viewed as people who need to be cared for and, in turn, who are viewed as a burden and a social problem.

This view of older people as a problem has another dimension, as the state not only has to pay for care, but also for state pensions (AOW in the Netherlands). State pension funds and private¹¹ pension funds may face very similar problems; there are fewer people who contribute to the funds while the group of people who are entitled to a pension increases, thus leading to a substantial shift in dependency ratios. As a result, various solutions are being discussed. For instance, the age at which people can go into early or mandatory retirement is being debated in many Western societies, with ages as high as 71 years (Denmark)¹² currently being mooted. Alternatively, “indexation” of pensions – adjusting pensions for average salary increase – may be limited or cut entirely, a move that was made by pension funds in the Netherlands following the

interact with and care for their own parents (apart from providing financial contributions from a distance). This issue thus globalizes the problems of the Western care labour market (Dannefer & Daub, 2009; Dannefer & Settersten, 2010; Foner, 1994).

¹¹ Like public pensions, private pension systems differ from country to country. The example described here applies to the Netherlands. In countries where private pension schemes collect an individual's contributions and return it to that individual when he or she is retired, the problems described above do not apply.

¹² See for instance: “Deense regering: pensioenleeftijd naar 71 jaar”, Robin van der Kloor, Elsevier Online (January 26th 2011), accessed January 26th; “Deense regering wil pensioenleeftijd naar 71”, anonymous, Trouw, (January 26th 2011).

financial and economic crisis of 2008-2010.¹³ A further option may see pensions subjected to taxation, a measure which has also been proposed in the Netherlands (Van Dam, 2009). Irrespective of what financial measures are taken, all these measures stem from, and contribute to, the view that demographic ageing will lead to major problems with affordability of pensions, the cost of care and the (care) labour market. All of these developments combined lead to an overall message that ageing societies face a crisis and something needs to be done. Based on the ideas of Ney, Mort and Roberts have called this type of reasoning the ‘crisis account of ageing’ (Mort & Roberts, 2010; Ney, 2009).

It is important to mention at this point that there are also authors who question the connection between demographic ageing and the projected resulting crisis. These authors, who derive from various backgrounds, state that our current understanding of demographic ageing and its consequences is incomplete, flawed or stems from particular political stances and is used for the political goals of particular groups (see e.g. Van Dam, 2009; Van den Heuvel & Olaroiu, 2010; Johnson, 2005; Kinnear, 2001; Ney, 2009; Sanderson & Sherbov, 2010). Nevertheless, despite the efforts of these authors, the common-sense appeal of demographic ageing and shifting dependency ratios is great. The spectre of a bleak future which is hurtling towards us, albeit already since the 1930s, is enough to convince us that something must be done to deal with the consequences of demographic ageing, and consequently leads to a framing in which older people are genuinely a problem.

1.2.1 Investing in technological solutions

Many social and political solutions are being proposed to deal with this impending crisis and in the context of independent living and care for older people, a substantial and increasing number of these solutions are technological (Mort, Milligan, Roberts, & Moser, 2008; Roberts & Mort, 2009). Designers, engineers and researchers, but also politicians, policy makers, managers and chief executive officers of large technology companies have realized that the diverse and complex problems posed by ageing also generate opportunities for the design of new technologies. One of the most clear examples of this increased focus is the European Action Plan “Ageing well in the Information Society”, a joint European Union research programme with a, rather substantial, budget of 1 billion Euro’s.¹⁴ The press release accompanying the announcement of the action plan emphasises the necessity of this investment:

¹³ See: http://www.abp.nl/abp/abp/u_bouwt_pensioen_op/wat_is_pensioen/abp_pensioen/volgt_uw_pensioen_de_loonontwikkelingen.asp, accessed February 9th 2011.

¹⁴ See press release IP/07/831, which can be found at <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/831&format=HTML&aged=0&langua>

By 2020 25% of the EU's population will be over 65. Spending on pensions, health and long-term care is expected to increase by 4-8% of GDP in coming decades, with total expenditures tripling by 2050. However, older Europeans are also important consumers with a combined wealth of over €3000 billion. ICT will increasingly allow older people to stay active and productive for longer; to continue to engage in society with more accessible online services; and to enjoy a healthier and higher quality of life for longer. The majority of older people do not yet enjoy the benefits of the digital age - low cost communications and online services that could support some of their real needs.¹⁵

In this statement, and in many statements like it, a particular rhetorical structure can be found. The view of ageing as a problem is indeed invoked here, but it is complemented by two other elements. On the one hand, this view is complemented by stories about the social, medical or care needs of older people and the way in which new technologies might contribute to satisfying them and thus substantially enhance the lives of these older people. On the other hand, the view of ageing as a problem is complemented by stories about older people as wealthy consumers. Older people are seen as a new market, as people who are happy to buy into – the right kind of – innovations, or who can be supplied with technologies that will, for instance, provide better and more efficient care. Thus the societal problems associated with ageing can be resolved, managed or reduced by introducing new technologies into the lives and practices of older people, their relatives and carers, simultaneously improving the lives of older people and creating new markets for innovations. A rhetoric of a “triple win” situation is thus invoked. Society benefits, the economy in general and companies, universities and research institutes in particular benefit and finally older people benefit as well. Thus the problem is solved, everybody is happy and we are making a buck (or Euro) in the process.

This type of rhetoric and accompanying ways of imagining older people are dominant in many publications on technologies for older people (see for instance the chapters by De Ruyter and Van Breemen in Aarts & Diederiks, 2006 for such views in relation to Ambient Intelligence and; Montemerlo, Pineau, Roy, Thrun, & Verma, 2002; Roy et al., 2000; Wada, Shibata, Saito, & Tanie, 2002 for such views in robotics). But can we take these images at face value? Are these imaginations just empty rhetoric to generate legitimacy and support for developing new technologies or

ge=EN&guiLanguage=en (accessed February 10th 2011) or http://ec.europa.eu/information_society/activities/einclusion/policy/ageing/launch/index_en.htm (accessed February 10th 2011).

¹⁵ Ibid.

are these images actually the basis for the design of technologies for older people? To what extent do the researchers, engineers and designers adhere to these images? To what extent do they question them? What are the implicit politics in these images? Do these images matter? Moreover, how do these images match the actual lives of older people and their self-perceptions? It is thus pertinent to inquire into the images which underlie design processes of technologies for older people.

1.3 Theoretical perspectives on images of ageing in design

Although there are several theoretical perspectives which can help to answer these questions, there is no single perspective which is sufficient on its own. In this section, a brief overview will be given of the existing work on representations of users developed in STS. Following this, an overview will be given of key insights from social gerontology¹⁶ on representations of older people. Although these two sets of literature have so far remained largely unconnected, this section will show how bringing together these two sets of literature provides a heuristic tool that is sensitive to both issues of representing users in design, as well as the wider cultural and societal representations of ageing which affect all parts of society and thus also design practices.

1.3.1 Semiotic perspectives on representing and configuring the user

Over the last decades, various concepts and theories which deal with the idea of representation of users in design processes have been developed in STS.¹⁷ Underlying these ideas is a rejection of the view that users and technology should be treated as separate objects of research. Instead, scholars in STS study the ways in which technologies and users are co-constructed. One key way of doing this is to look at the way in which users are represented or configured, which in turn relies on an adaptation of semiotics to the study of user-technology relations.¹⁸ Oudshoorn and Pinch (2008)

¹⁶ Ageing is studied in various social science disciplines. Dannefer and Phillipson, editors of the *Sage Handbook of Social Gerontology* (Dannefer & Phillipson, 2010b) emphasize the multi- and interdisciplinary nature of the field in their definition of social gerontology 'as the application of social science disciplines (e.g. demography, economics, social anthropology, and sociology) to the study and understanding of ageing individuals and ageing populations and the interrelation of each with social forces and social change' (Dannefer & Phillipson, 2010a: xxi).

¹⁷ See Oudshoorn and Pinch (2003a, 2008), Konrad (2008) and Hyysalo (2011: 12) for overviews and discussions of these concepts.

¹⁸ It is important to mention that there is another strand of research, which addresses various types of processes, such as the representation of users, that influence the design of a technology: the social learning perspective (Hyysalo, 2011; Pollock & Williams, 2008; Stewart & Williams, 2005). According to Stewart and Williams (2005), scholars in technology studies and user-oriented computer scientists have focused too much on designers who inscribe particular views of the user into their designs, which, according to them, leads to inadequate and misleading views of the user. By carrying out detailed ethnographic studies, these scholars aim to understand processes of social learning which take place

state that an important ‘aspect for understanding user-technology relations has been introduced by scholars in STS who have extended semiotics – the study of how meanings are built – from signs to things’ (Oudshoorn & Pinch, 2008: 548). The central concepts in this tradition are “configuring the user” (Woolgar, 1991), “user representations” (Akrich, 1995) and “scripts” (Akrich, 1992; Akrich & Latour, 1992).

One of the first authors to address the issue as to how images and imaginations of the user affect the design of a technology, and in turn the ways in which these images and imaginations affect the user is Woolgar (1991), who analysed the development of a computer by using the metaphor of machine as text. He showed that in design processes a figure called “the user” is not only constructed but the limitations on the actions of the user are also constructed in the same process. He writes ‘the emergence of a new range of microcomputers crucially entails the definition, delineation and emergence of The User. We could say that this process amounts to the (social) construction of the user. However, it is not just the identity of the user which is constructed. For along with negotiations over who the user might be, comes a set of design (and other) activities which attempt to define and delimit the user's possible actions’ (Woolgar, 1991: 61). Thus by giving the user an identity and by setting parameters for the action of the user, Woolgar states that the user is effectively configured by the designer and, in turn, by the machine he or she designed.

The notion of configuring the user, however, has been criticized for describing configuration as a one-way process with the power lying with the designers. Mackay et al. (2000) have shown that designers do not only configure users, but they are themselves configured by users, organizations, methods and procedures, while Jelsma (2003) and Stewart and Williams (2005) have made similar points. Indeed, Oudshoorn

during the entire design cycle and appropriation of a technology. They stress that design virtually never starts from scratch, but instead often entails artful combination of pre-existing components. Likewise, the representation of the future user is also a configuration of already existing and new elements and often involves processes of “designing out” references to specific users. The heterogeneity and evolution of the requirements of various users is taken into account by emphasising that innovation is not restricted to design, but innovation continues throughout implementation and use (Stewart & Williams, 2005). While a study like this could also have been done from this perspective, this thesis nonetheless opts for a semiotic perspective. There are four main reasons for this: first, the social learning perspective requires a single case, long term perspective with an ethnographic methodology, requiring a time span that exceeds the time span of a PhD track. Second, the social learning perspective assumes unbridled and long term access to the empirical domain, which can only be achieved in rare cases (and would not have been achieved in the cases discussed here). Third, in contrast to the social learning perspective, semiotic analyses of the way users are represented in design have already been sensitized to diversity and gender issues. The semiotic perspective thus provides clear steps which one can follow. Fourth, and perhaps most important of all, the objective of this thesis is not to improve the understanding of representation processes by gaining an even more fine-grained understanding of the design process as the social learning perspective aims to achieve, and indeed does achieve. Rather this thesis aims to improve the understanding of the way in which *older people* are represented in design processes by engaging with and combining social gerontological insights with insights from STS. The semiotic perspective is more suited to this end as it fits more easily with the kinds of concepts and theories in social gerontology.

and Pinch (2008) list several studies that have shown the influence of organisations and people in mediating between the production and design side on the one hand and the consumption, use and treatment side on the other. Thus the configuring agency is not solely limited to the designers and the designers are more constrained in their actions than the original chapter by Woolgar suggested. An important message, therefore, is that a more nuanced view of the designer should be adopted. While it is tempting to credit the designer for a successful technology, or blame the designer for the trouble caused by a technology in a use practice, the literature which reflects on Woolgar's original article has shown that the designer is not as omnipotent as is often assumed.

A second concept that addresses the way the prospective user of a technology is imagined is the concept of “user representation” (Akrich, 1995). Akrich argues ‘that innovators are from the very start constantly interested in their future users. They construct many different representations of these users, and objectify these representations in technical choices’ (Akrich, 1995: 168). These user representations matter as ‘[T]he creation of successful artifacts depends on the ability of innovators to generate user representations and integrate them into their designs’ (Akrich, 1995: 169). Thus, according to Akrich, designers, engineers and other “innovators” involved in the design of a technology devise representations of the prospective user of a technology, integrate – or “write” – those representations into the design of that technology and, in turn, such user representations become one of the determinants for the success of that technology.

The way in which a user representation finds its way into a technology and subsequently acts in use practices is captured by the script concept (Akrich, 1992; Akrich & Latour, 1992). The design of telephones for older people (see figure 2) may serve as an example to explain how user representations are scripted into technologies. A common user representation of

Figure 2 Two telephones by the Swedish company Doro, who specialise in telephones for older people. The top model has relatively few buttons and picture dialling, the bottom model has extra large buttons.

older people is that older people have problems using (mobile) telephones. In this reasoning, older people are often said to have problems with telephones which offer too many functions, or they are said to have problems with their eyesight or manual dexterity, which would, for instance, make it hard to operate small buttons. These views of older people, whether based on research or simply on assumptions about older people, serve as input for the design of a telephone which the designers view as suitable for older people; for instance a telephone with few and very clear functions, or with big buttons and clear numbers and letters (see figure 2). The views of what older people are like and what their problems in using telephones are, thus become part of the design of a telephone, making it a markedly different telephone than, for instance, an iPhone or office phone. On the one hand, the script written into such telephones enables older people who have the difficulties envisaged by the designers to use a phone, but on the other hand, the script also constrains older people and others who would prefer the added functionality that modern telephones offer.¹⁹ The script concept thus functions as a bridge between design and use and facilitates explanation of how an object enables or constrains the relations between artifacts and people, and the relations between people. Via a script, specific competencies, actions and responsibilities are delegated to the user or the technology, and thus create, reinforce or alter existing 'geographies of responsibilities' (Akrich, 1992: 207-8). Studying these user representations, scripts and geographies of responsibilities is particularly important as on the one hand, the life world and indeed the behaviour of people can be shaped by these user representations and scripts, while on the other hand, this shaping remains obscured as technologies are quickly seen as part of "the way things simply are" Akrich (1992: 222) states that technologies have political strength. They may, for instance, change social relations or introduce new power relations, but also reinforce existing relations, depoliticize (and standardize) formerly contested decisions, or translate social and political decisions into other media.

Both the script and user representation concept are routed in Actor Network Theory (ANT), a semiotic theory of analysing relations between humans and things.²⁰

¹⁹ Indeed, the effect of such a phone goes further than enabling and constraining use. Clearly, the design of such a telephone is also related to issues of identity. While, in this case, we do not have direct access to the user representations of the designer, it is not hard to interpret the script of such a telephone as a telephone for older people. It may thus stigmatise its users as old, a subject which will be treated in chapter 3. Interestingly, Doro, the company that makes the phones shown in Figure 2 also has a range of phones that are less obviously phones for older people, with a stronger "design element." This could thus be a response to the problem of stigmatization. See <http://www.doro.com>, accessed March 1st 2011.

²⁰ Actor Network Theory is a well-known and much debated theory/ontology. For our purposes here the most important point to take from ANT is that it does not start from a distinction between humans and things but starts from a radical analytical symmetry between humans and non-humans, addressing them all as actors which are bound within and in turn constitute networks. In turn, the differences between human and non-human actors can be analysed. This, for instance, leads to the conclusion that agency is

The concept of user representation thus shares a background in semiotics and an emphasis on imagining users with configuring the user. However, unlike configuring the user, user representation focuses solely on the way the user is imagined and thus allows analytical separation of imagining users and “scripting” these images into technologies.²¹ Woolgar’s concept has also been criticised for treating designers as active, and users as passive in design processes, whereas the conceptualisation of “script” and “user representations” allows a conceptualisation of ‘both designers and users as active agents in the development of technology’ (Oudshoorn & Pinch, 2008: 551). Indeed, de-inscription as interpretation of a technology like a text – with accompanying freedom – and the user’s ability to devise anti-programs (Latour, 1992, 1997) counteract the (more or less) forcing nature of scripts and provides opportunities to develop alternative ways of using a technology.²²

Script and user representation have been refined and adapted for use in different contexts and for different purposes. Two directions in which these concepts have travelled are particularly interesting: the work done by feminist STS scholars and the work done to adapt ANT to a more prescriptive use in the context of environmentally friendly design. To address this latter scholarship first, Jelsma (Jelsma, 1999, 2003, 2005) and Ganzevles (2007) have adapted ANT to give a voice to the environment, which has often been a silent actor in design processes. Jelsma’s (2003) script analysis of the effect of the design of the push button of toilets has shown that the type of script written into such an interface can affect the amount of water that is used and has gone on to show how such scripts come into being. These studies have shown that ANT and the script approach can be adapted to a more prescriptive, activist agenda. Indeed, in line with this agenda, Jelsma and Ganzevles have used ANT to engage with designers and policy makers with the objective of achieving more sustainable designs.

not automatically reserved solely for human actors, but instead is distributed over networks of non-human and human actors (Latour, 1997, 1999).

²¹ That is, if we say the user is configured, is he or she just imagined or are these imaginations also written into the design? Not all user representations affect the design in equal measure, or at all, thus analytical separation of user representations and scripts is useful.

²² Despite this emphasis on agency of the user, ANT’s view of the user has nonetheless been criticized for neglecting the options open to users in everyday life. Oudshoorn and Pinch state that “script” and “configuring the user” conceptualize the successes and failures of technologies mainly in terms of the extent to which designers adequately anticipate users’ skills and behaviour. In this view, users tend to be degraded to objects of innovators’ strategies’ (Oudshoorn & Pinch, 2003a: 15). The only options open to users seem to be the choice as to whether to accept or reject the technology, whereas it is well known that users often modify technologies or use them in unforeseen ways. Indeed, when analysing use practices, different theoretical perspectives, such as the domestication perspective (Lie & Sorensen, 1996; Silverstone, Hirsch, & Morley, 1992) can be more suitable. As this thesis focuses on the influence of user representations on design, these comments, while important, are less relevant in this context.

ANT has also been adapted by feminist scholars who have made the script approach sensitive to the gender dimension of design and innovation, and have shown how renegotiation of gender relations takes place in innovation processes, how gender identities are articulated and performed in relation to technology, and have highlighted the ways in which women are excluded from design and use practices (Berg & Lie, 1995; Van Oost, 1995, 2003; Oudshoorn, 1996a, 2003; Oudshoorn, Rommes, & Stienstra, 2004; Rommes, 2002; Stienstra, 2003). Oudshoorn and Pinch state that: 'this scholarship emphasises the importance of studying the inscription of gender into artifacts to improve our understanding of how technologies invite or inhibit specific performances of gender identities and relations. Technologies are represented as objects of identity projects, which may stabilize or destabilize hegemonic representations of gender' (Oudshoorn & Pinch, 2008: 550). The combination of a gender perspective and the script approach has thus broken new ground in both the gender and user studies world.

A second important contribution from feminist scholars of technology is their emphasis on the diversity of users. Cowan (1987), in her analysis of the consumption junction, already stressed 'the obvious fact that consumers themselves come in many different shapes and sizes; indeed any single given human being can enter the consumption junction under a number of different guises, depending on what it is that is being consumed' (Cowan, 1987: 263). Thus, diversity is an issue that needs to be dealt with in design,²³ particularly as only so much complexity can be encompassed in a particular design and user representation.²⁴ Oudshoorn et al. (2004) add to this the view that various groups involved in design may also have different views of who the user could or should be and they attempt to inscribe these views into a design. Thus different types of users are already recognized and represented in design, but, in the words of Oudshoorn and Pinch, 'these different types of users don't necessarily imply homogeneous categories. Gender, age, socio-economic and ethnic differences among users may all be relevant. Because of this heterogeneity, not all users will have the same position in relation to a specific technology. For some users, the room for maneuvering will be great; for others, it will be very slight' (Oudshoorn & Pinch, 2003a: 6). In this way, these feminist scholars highlight the power differences between actors involved in the design of technologies as well as the differences in terms of options (e.g. social, financial, health etc.) to deal with the effects of the user representations and scripts that are written into technologies.²⁵ The contribution of these scholars, whether

²³ Joyce and Mamo (2006) acknowledge the importance of diversity and explicitly call for analyses of the diversity of older people in relation to technological design.

²⁴ Indeed, user representations – particularly methods like persona etc. – can serve to reduce complexity.

²⁵ The emphasis that feminist scholars put on the differences that develop between people clearly resembles the life-course perspective on ageing (see e.g. Dannefer & Settersten, 2010).

employing a script approach or not, is particularly important in this context as they have shown how gendered ideas and images shape design and how, in turn, those designs and the resulting technologies alter, stabilize, reinforce, depoliticize or problematise gender relations and identities. They have thus shown that theories of technology-use relations can be fruitfully combined with a focus on gender and that doing so creates relevant insights that would not have been acquired by ever more intricate analyses of the way in which the user (implicitly seen as a gender neutral figure) is represented.

The theoretical discussions about, and criticism of, concepts like configuring the user and user representations have further deepened the theoretical thinking in STS about the notion of the user in design. Indeed, the work done to develop the semiotic perspectives of configuring the user and user representation provides us with refined ways of understanding the ways in which user representations are formed, how they change, and the way in which they influence, or do not influence, the design and use of technologies.²⁶ The main point formulated here is that this ever finer grained theoretical understanding of the processes and effects of representing users has led to a rather lopsided view in the case of representations of older users. If we were to use the heuristic of user representation to analyse the way older users are represented, this would be a heuristic that would partly be very sensitive, as a result of the substantial theoretical work on representing users, but would partly also be very insensitive. This is because analyses of user representations of older people in particular, but also many – but not all – studies in STS in general, have often failed to acknowledge the extensive and highly relevant work done on ageing – and particularly on the imagery of ageing – in social gerontology. It is time for STS to open the “grey” box of ageing.

1.3.2 Opening the grey box of ageing

If we were to treat older users of technologies as “just another type of user” or perhaps as a “regular” user with some differing physiological requirements, this would negate important differences in the cultural and societal representations of older people vis-à-vis other groups, and the way in which older people are positioned in society as a result of these representations. There are many unfounded, pre-conceived and stereotypical ideas about older people (Bytheway, 1995; Laws, 1995; Wilkinson & Ferraro, 2002). This section will show that – along with the diversity of the everyday lives of older people – these cultural and societal representations have been studied extensively in social gerontology. These insights from social gerontology are highly relevant to understand how older users are represented in design processes, but the literature about

²⁶ Obviously the same goes for the work done from the social learning perspective.

(stereotypical) images of older people has so far not been taken into account in socio-technical studies of representations of older users. The images of ageing themselves have thus remained a black – or “grey” – box. Opening the grey box thus sensitizes STS to the conceptual and empirical insights generated in social gerontology.²⁷ This section will address three key ways in which the social gerontology has addressed issues of representation of older people: cultural and societal imagery of ageing, ageist views of older people and the diversity of ageing.

One of the central themes in the interdisciplinary field of social gerontology is the cultural representation of later life (Featherstone & Hepworth, 1993, 2005; Hepworth, 2004). Such studies address a wide range of images of ageing. For instance, the volume edited by Featherstone and Wernick (1995) contains chapters on such varying issues as representations of ageing from a historical and comparative perspective (Achenbaum), images of positive ageing in a retirement magazine (Featherstone & Hepworth), images and the status of ageing in Japan (Wada), ageing, identity and consumer culture (Sawchuk) and images of ageing and death (Wernick).²⁸ These images matter, as Featherstone and Hepworth explain: ‘the images [of ageing] we use in our conversations, our relationships with elderly people, and our subjective attitudes towards ourselves as we grow older, include a mixture of folklore, medical knowledge, media images and the like. The images act as *reference points* to give structure and meaning to our everyday lives’ (Featherstone & Hepworth, 1993: 326).²⁹ While Featherstone and Hepworth also stress that these images do not provide rigid programmes from which people cannot veer away from, these cultural representations of ageing do structure the way older people are thought of and treated.

In a later book chapter, Featherstone and Hepworth (2005) address several key components of these representations. One of the particularly powerful images comes from consumer culture. It is the image of young, fit and beautiful people juxtaposed with images of overweight, sickly and ugly bodies. Older people, according to Featherstone and Hepworth, are often included in this second category and are caricatured as frail, forgetful, shabby, out-dated, senile and nearing death. Although there are alternate images, sometimes even deliberately made to counter these negative views, the view of older people as frail, sickly and out of date is a dominant public image of old age.³⁰ Such negative views of ageing, and for instance notions like talking

²⁷ To be sure, some scholars in STS are sensitive to and making use of insights of social gerontology, see section 1.4.2 for examples.

²⁸ Despite the wide variety of studies presented in this volume, there are no studies that analyze the images of older people in design processes, which is illustrative of the fact that technology is often not taken into account as a relevant area of enquiry in social gerontology.

²⁹ Emphasis by Featherstone and Hepworth.

³⁰ It should be noted, however, that deliberately positive images like the idea of successful ageing are also not unproblematic (Joyce & Mamo, 2006; Katz, 2001; Twigg, 2004). Indeed Calasanti and King (2005)

about older people primarily in terms of biological decline (Featherstone & Hepworth, 2005) can deeply affect the image of the body and the self-image of an older person: 'The formation of our own body image and self-image take place in a cultural context in which images cannot be seen as transparent and neutral. Our perception of our own bodies is mediated by the direct and tacit judgements of others in interactions and our own reflexive judgements of their view, compounded by what we think we see in the mirror' (Featherstone & Hepworth, 2005: 356). Thus the cultural representations and the ways in which other people view and treat a person can also affect the appreciation of the self in terms of young or old. This can lead to a situation called "the mask of ageing" (Featherstone & Hepworth, 2005; Hepworth, 2004) in which the outward appearance, appreciated by others in terms of negative public imagery of old age, does not correspond with the subjective experience of the inner self. Thus while the body may outwardly display signs which result in a person being grouped into a category of old age, the person may still feel young (Hepworth, 2004; Thompson, 1992). Nevertheless, this person will have to deal with being treated as old, as if he or she were wearing a mask that they cannot remove. It is thus evident that many ways in which older people are thought of, spoken of and imagined are negative and ageist: 'As Bytheway (1995) shows, ageism is closely associated with a particular form of collective social imagery which ignores the diversity of individual experiences of ageing and lumps all older people together under a limited range of social categories' (Featherstone & Hepworth, 2005: 356-7). The cultural and social ways of representing older people are thus not innocent as they can easily constitute, lead to and reinforce ageist notions about older people.

The term ageism was coined by Robert Butler in the late 1960s (Butler, 1969). In a widely quoted definition Butler (1975) states that:

Ageism can be seen as a process of systematic stereotyping of and discrimination against people because they are old, just as racism and sexism accomplish this for skin colour and gender. Old people are categorized as senile, rigid in thought and manner, old-fashioned in morality and skills... Ageism allows the younger generations to see older people as different from themselves, thus they subtly cease to identify with their elders as human beings (Butler, 1975: 35, quoted in Bytheway (2005): 338)

Bytheway (1995, 2005) called this the narrow definition of ageism and introduced a wider definition. This wider definition sees ageism as a set of beliefs about how the

have called these images ageist, because they introduces new norms of youthfulness and (e.g. sexual) activity that older people need to adhere to.

biological differences between people result from the ageing process (Bytheway, 2005; Bytheway & Johnson, 1990). 'These beliefs underpin the actions of organisations and individuals. They generate and reinforce a lifelong fear of the ageing process, and they underpin presumed associations between age and competence and the need for protection (...). They legitimate the use of chronological age to mark out classes of people who are systematically denied resources and opportunities that others enjoy and, conversely, who are granted concessions for services and benefits they are assumed to need' (Bytheway, 2005: 339).³¹ Authors in social gerontology stress that these age categories should not be seen as a biological given, but emphasise instead that they are, and subsequently analyse them as, social constructions (Bytheway, 2005; Featherstone & Hepworth, 1993; Markson, 2003). From that perspective, it quickly becomes evident that our world is built up around age categories such as ages at which you can drive or vote, but also at which you must retire or at which you are deemed unfit to become an (adoptive) parent. Age categories, i.e. viewing chronological age as a way to distinguish between people, thus forms a basis for ageism. Wilkinson and Ferraro, in their review of thirty years of ageism research, state that ageism can be, and is, present in many areas of our societies: 'Within the social structure, ageism occurs within our culture, economic and health care systems, public policy agendas, and social relationships' (Wilkinson & Ferraro, 2002: 354). Laws analyses 'five sites of struggle around ageist identities: the labor force, the household, popular culture, the state, and the built environment' (Laws, 1995). Moreover, Joyce, Williamson and Mamo (2007) identify ageism in technology and medical contexts. Ageism thus permeates society and is often seen as the most common and accepted and thus unrecognized form of discrimination and prejudice (Wilkinson & Ferraro, 2002).³²

The bitter irony of ageism is that while it is based on the assumption that people, older people in particular, of one age category are all the same, social gerontological research has shown that in fact the opposite is true; older people are diverse and with age this diversity only increases. Indeed, in many social studies of ageing, this view of older people as diverse has become so commonplace that it hardly needs mentioning. Thompson (1992, 1993) refers to the work of Taylor and Ford (1981), Johnson (1976), Rapoport and Rapoport (1975) and Clark and Anderson (1967) to emphasise the variety and heterogeneity of life patterns among older people. The fact that older people are diverse, and are likely *more* diverse than other groups, is thus well-established.

³¹ Thus, according to Bytheway's broader definition, ageism does not necessary solely apply to older people. Any chronological age category can be defined as "too young" or "too old."

³² Moreover, ageism can and often does intersect with other forms of discrimination and/or inequality as feminist gerontologists have shown (Calasanti, 2004; Calasanti & King, 2005; Calasanti & Slevin, 2006a; Laws, 1995; Sontag, 1978).

A major reason as to why diversity increases with age is provided by the life-course perspective. The life-course perspective focuses on the lifelong ageing process of individuals and recognises that ‘the physical, psychological, and social aspects of individual ageing are often not dictated by chronological age per se, but instead shaped by a host of factors that cumulate in individuals over decades of living’ (Dannefer & Settersten, 2010: 3). Thus the contingencies of life in combination with the already diverse backgrounds of people with regard to wealth, health, gender, class, education, race, ethnicity etcetera, and the (gradual) reduction of possibilities to remedy or compensate for such differences, for instance due to loss of employment or poor health, makes the differences between people grow progressively larger as people age (Calasanti, 2004; Calasanti & King, 2005; Dannefer & Settersten, 2010; Thompson, 1992, 1993). The commonly accepted view of older people as a more or less homogeneous category is thus a gross simplification of the diversity which characterizes older people.³³

The tension between the homogeneous and negative ways in which older people are represented and viewed in various areas of our culture and societies on the one hand and the self perception and diversity of older people on the other hand, is of fundamental importance for understanding the design and use of technologies for older people. The user representations that are formed in, and shape, design processes do not exist in a realm separate from the cultural and societal representations of older people, but they are rather part and parcel of it. The user representations that inform design processes are – and this will be shown in the empirical sections of this thesis – influenced by such cultural and societal representations and can in turn reinforce such views in a powerfully obdurate material sense. It is thus essential that a heuristic of user representations is sensitive to the insights social gerontology has generated with regard to the images of older people and the impact those images have on the lives and practices of older people.

1.4 Contributions to the social study of ageing and technology

The question as to how older people are represented in design processes is, however, not on the agenda in social gerontology, nor are the ways in which user representations, once scripted into technologies, in turn naturalise, legitimize and reinforce particular images of ageing. Indeed, social scientific analysis of older people and technology is only recently beginning to receive some attention, but both in STS

³³ Moreover, this view is not only a generally accepted view, but also a rather implicit one, by which I mean that older people are generally not deliberately positioned as a homogeneous category, but this is an engrained viewpoint, a common way of talking about older people, which is generally not up for discussion.

and social gerontology it largely remains a marginal subject, as will be demonstrated below.

1.4.1 Technology in social gerontology: an analysis of handbooks

To illustrate this point from the perspective of social gerontology, a brief analysis of three handbooks in (social) gerontology was made. One such handbook is the *Cambridge Handbook of Age and Ageing* (Johnson, Bengtson, Coleman, & Kirkwood, 2005), a substantial volume of some 770 pages, which deals with a comprehensive set of issues related to – primarily social – studies of ageing. Among the 72 chapters, there is only one that deals with technology. This chapter is authored by Charness and Czaja (2005) who are primarily involved in quantitative psychological (usability) research. In their chapter *Adaptation to New Technologies*, new technology is equated almost solely with IT and older people are primarily seen as having problems using such technologies. However, this distinction between new information technologies and technologies in general quickly becomes blurred. For instance, Charness and Czaja state that ‘Technology is also increasingly being used in healthcare delivery (...) and in the performance of routine activities such as banking, shopping and driving’ (Charness & Czaja, 2005: 664) as if healthcare, banking, shopping and driving have only become technological with the introduction of information technologies. Furthermore, in a sub-section entitled *Technology in the Home: Healthcare*, Charness and Czaja equate technology in the homes of older people with care and state that new – IT based – technologies hold great promise in enhancing the well-being of older people and in the efficient provision of health services, but they refrain from reflecting critically on the potential effects that the introduction of such technologies may have. The *Cambridge Handbook of Age and Ageing* thus does not treat technology very extensively and to the extent that it does, it does so in a rather simple and uncritical way.

A second handbook is *The Sage Handbook of Social Gerontology*, edited by Dannefer en Phillipson (2010b). Like the Cambridge Handbook, this is also a substantial volume comprising 50 chapters over 712 pages, and it also contains just one chapter on technology: *Technology and Older People* by McCreadie (2010), which is placed in the section on ageing and social policy. In her chapter, McCreadie raises four critical issues: older people and exclusion from technology, technology design and user-friendliness for older people, developments in technology in relation to ethical issues, and, importantly, ‘Does technology shape us, or do we shape technology?’ (McCreadie, 2010: 613). Although McCreadie does, under this heading, take a critical stance towards enthusiast visions of technologies, she only addresses the questions as to what

impact ICTs have had on older people, whether older people should be part of the digital age and whether technologies should be adapted to older people instead of the other way around. A focus on the co-construction of technology and ageing could have provided a very different, and arguably much more detailed, answer to this question, but unfortunately the link to the STS literature is not made.

However, this does not mean that McCreadie is not open to cooperation with other disciplines. At the end of her chapter she asks ‘to what degree have gerontologists thought adequately about technology and technology change?’ (McCreadie, 2010: 615) and ‘How can gerontologists link most appropriately with other disciplines, notably technology researchers?’ (ibid.) Thus the fact that technology has not been given sufficient attention in social gerontology is clear to McCreadie: ‘It is striking that textbooks and handbooks on gerontology have invariably not included technology as a topic, that most discussion of older people and technology is in terms of their dependency and ‘need for care’, and that the scientific community follow this lead for funding’ (ibid.). McCreadie ends her chapter by stating that ‘the issue of technology, in a range of contexts, is likely to develop as a key topic for research and debate within gerontology’ (ibid.). While the McCreadie chapter is more instructive than the Charness and Czaja (2005) chapter, and asks many pertinent questions, it still stands alone in *The Sage Handbook of Social Gerontology*³⁴ and, unfortunately, does not make the connection to STS.

The final handbook that will be discussed here is the 6th edition of the *Handbook of Aging and the Social Sciences*, edited by Binstock and George (2006), which is a 514 page, 25 chapter handbook. Apart from being seen as one of the key handbooks, the *Handbook of Aging and the Social Sciences* is interesting because it is in its 6th edition, the 1st edition having been published in 1976.³⁵ While older versions of this handbook do not contain chapters on technology (e.g. Binstock & George, 1996) or, like the 5th edition, only treat technology in passing as one of several “emerging social trends” (see Cutler & Hendricks, in Binstock & George 2001), the 6th edition does have a full chapter on technology. Cutler, the author of this chapter, makes it clear that attention to technology in social gerontology has been lacking: ‘Despite a longstanding substantive interest in applied dimensions of technology, theory development in social gerontology has for the most part neglected technological

³⁴This can be illustrated with a look at the subject index of this handbook. Technology is included in the index, but all entries refer back to the McCreadie article. Thus, like the Cambridge handbook, *The Sage Handbook of Social Gerontology* also does not include technology as a central topic of inquiry.

³⁵ Recently, a 7th version of this handbook has appeared. It was not possible to obtain this version in time to incorporate it in this chapter. Although it is prudent to reserve judgment, this version (that is judging from the table of content on amazon.co.uk) does not seem to give particular focused attention to technology as it no longer contains a separate chapter on technology and ageing. Attention to technology in social gerontology may thus be a bit haphazard. Also see footnote 37.

change' (Cutler, 2006: 258). Cutler continues by referring to several important social gerontological theories such as 'environmental press and person-environment fit theories' (Cutler, 2006: 258) which have their origins in the 1970s (see e.g. Lawton & Nahemow, 1973). These theories, according to Cutler, did analyse technology at least to some extent, but he then concludes that: 'the role of technology has been at best on the periphery of social gerontological theory' (Cutler, 2006: 258). Cutler does, however, see a starting point for an inclusive theoretical perspective on technology. He proposes to base this on Riley and Lawton's ideas about structural and individual lag (see Lawton, 1998)³⁶ and couples this to situations where the pace of technological change is not matched by a similarly paced social and normative change (with the examples predominantly taken from health care). The work by Cutler provides some good inroads into the subject of ageing and technology, but it also only provides a 1½ page discussion of the theory of technology and ageing,³⁷ and again, makes no reference to the vast literature on technological change in STS.

To be sure, the message here is not one of laying blame on individual authors in social gerontology for not finding and using literature which could have provided valuable insights (nor for that matter blaming the STS authorship which does not address the insights from social gerontology in ageing). It is simply to point out that a gap exists between social gerontology and science and technology studies which, when filled, could provide valuable insight into the way in which ageing and technology are being co-constructed. On the one hand, this brief analysis has shown that technology is now seen as an emerging topic in social gerontology. Whereas technology used to be almost entirely neglected as a topic of enquiry,³⁸ it is now starting to generate some interest, however on the whole its role is still marginal, it remains unconnected to other topics, and, importantly, social gerontology does not make use of the insights or literature developed in STS and as a result its analyses of technology remain relatively unsophisticated. This is an important problem as in these handbooks, and for that matter in many social gerontological studies, technology is definitely not absent empirically. Indeed, technology is omnipresent in the chapters in these handbooks, and studies in social gerontology in general. For instance, such studies treat issues like

³⁶ The idea of individual and structural lag is an interesting entrance point for crossing the boundaries between social gerontology, gerontechnology and STS; see e.g. Peine and Neven (forthc.).

³⁷ Cutler acknowledges this and calls for 'far more theoretical attention to technology as both a causal and an outcome variable' (Cutler, 2006: 269).

³⁸ As mentioned, the 4th edition of the *Handbook of Aging and the Social Sciences* (Binstock & George, 1996), does not contain a chapter on technology, nor is it mentioned in the subject index. Markson (2003), in her 507 page introduction to social gerontology does not treat technology as a topic of enquiry. Wilkinson and Ferraro (2002), in their review of 30 years of ageism research do not mention technology as a topic in ageism research in the last 30 years, nor do they include it in their outlook for new research topics. This further supports the observation that the topic of technology in social gerontology has only been receiving (some) attention relatively recently.

work, leisure, health care, disability, home care and dying, all of which are practices and events in which technologies figure prominently. Nevertheless, despite the omnipresence of technology in these practices, these technologies are often treated as a given, as a neutral backdrop against which the actions of humans and institutions take place, which warrants no analysis itself. Furthermore, it is striking that at the end of several chapters in these handbooks, new technologies are given rather deterministic agency with regard to the future of ageing (see for instance Charness & Czaja, 2005 on telemedicine and; Johnson, 2005 on nanotechnology). Whether viewed in a neutral, instrumental or deterministic fashion, the role and effects of technology are seldom questioned. It is interesting to note that – similar to STS – many social studies of ageing start from a distinctly constructivist basis, stating that ageing is not to be understood as biologically determined, but instead should be analysed as a process which is constructed by individuals and society (e.g. Dannefer & Settersten, 2010; Featherstone & Hepworth, 2005; Markson, 2003). Complementing this constructivist view of ageing with a constructivist view of technology, could lead to fruitful analyses of the ways in which ageing and technology are co-constructed.

1.4.2 Ageing and technology in STS

The study of ageing and technology is a relatively new issue in STS. There are, however, several authors in STS who have published work on ageing and technology. While not claiming to be exhaustive, this section will highlight several key authors who have published work concerning the intersection of science, technology and ageing. This section will further show that the work being done to address this intersection is relatively recent, and will also describe the kind of work that has been done and the inter-disciplinary connections that have been drawn in that work. Most importantly, this section will show that while some authors underline the importance of studying user representations of older people, not much work has been done in this respect, and it will show that the work that has been done differs markedly from what this thesis sets out to do.

One of the early publications in STS on ageing is the 2004(2) special issue of *Science Studies*. This contains an editorial and three articles on ageing: one on older people, ICTs and the digital divide (Jaeger, 2004), one on collective and distributed aspects of technology utilization by older people (Hyysalo, 2004) and one article by Östlund (2004) titled: ‘Social Science Research on Technology and the Elderly – Does it Exist?’ Östlund concludes that social scientists are indeed supporting the technical development of technologies for older people, but are not

addressing the design practices of such technologies, nor the views of older people regarding such technologies, in a critical and independent way.

Another pertinent call for the critical analysis of the science, technology and ageing intersection comes from scholars with a background in feminist gerontology, sociology and STS. In their chapter in *Age Matters, realigning feminist thinking* (Calasanti & Slevin, 2006b), Joyce and Mamo call for studies of the way in which science and technology constitute the meaning of ageing and the way it is experienced by older people. Joyce and Mamo show how old age is increasingly constructed as a medical problem and how norms of youthfulness as well as blurring lines between health and illness are redefining the ageing body, making it into a project that requires increasing medical and technical attention. Subsequently, they argue that a critical analysis which combines STS and feminist perspectives on gerontology would offer insight into contemporary aging and they continue by outlining three directions for research that analyses ageing and technology. They state that ‘STS rarely takes up aging and ageism as a central concern, we argue that many of their conceptual tools are ripe for such investigation. We outline three here that we think are useful for future analyses of aging, technology, and intersectional feminism: (1) configuration of the user, (2) material practices and negotiations, and (3) technological design’ (Joyce & Mamo, 2006: 109). For Joyce and Mamo, a critical analysis of the way ageing and technology are co-constructed thus explicitly includes the study of the way in which technologies for older people are designed and how older users are represented in those processes. In any case, they strongly advocate combining insights from (feminist) gerontology and STS.

Joyce and Loe (2010b) follow up on this agenda by editing the volume *Technogenarians, studying health and illness through an ageing, science and technology lens*.³⁹ In this volume, they bring together authors with backgrounds in sociology, anthropology, biomedical ethics, social gerontology, gender studies and STS to study the concurrent trends of the biomedicalization of the ageing body and the rise of gerontechnologies. The authors in this volume for instance provide historical and sociological analyses of the rise and effects of anti-aging medicines, but also investigate how technologies and medical procedures affect views of the end of life. Several studies in this volume focus on the construction of sexuality and femininity, for instance focusing on how images of healthy or successful ageing combine with sexual medication or cosmetic surgery to reinforce new standards of later life sexuality and ageless femininity. In the section on gerontechnologies, the authors study technologies such as robots for older people,⁴⁰ or technologies for people with dementia and look at

³⁹ This volume was published in the *Sociology of Health and Illness* monograph series. Consequently all the chapters in this volume have also been published in *Sociology of Health and Illness*, 32:2.

⁴⁰ See chapter 3.

how these technologies affect views of identity, independence or safety. Other authors focus on more everyday life technologies such as pedometers, computers, cookers and cars to show how ideas about health and care work affect views of these technologies. This volume thus provides a rich understanding of how the trends of biomedicalization and “gerontechnification” are shaping the way people age, and, in turn, how older people are shaping these trends and the technological environments in which they live. However, apart from the chapter by the author of this thesis, this volume does not contain any further chapters on the understudied area of the design of technologies for older people.

Another interesting publication on ageing and technology is the volume edited by Mort, Milligan, Roberts and Moser: *Ageing, Technology and Home Care: New Actors, New responsibilities*. (Mort, et al., 2008). This book offers ‘insight into exchanges that took place during a two-day conference on the emergence of new technologies and responsibilities for healthcare at home across diverse European systems and cultures’ (Mort, et al., 2008: 1) and it consists of two parts. In part one, Mort and colleagues provide an overview and a discussion of key issues raised in the literature about technologies and responsibilities for health care at home, incorporating work from a range of disciplines. They conclude that the trends of demographic ageing, combined with the policy decision to favour care at home over institutional settings offer a context in which care technologies find a natural place. Mort et al. do not accept this development uncritically and raise questions about who is designing these technologies and for whom; how care is reshaped by these technologies; how these technologies shift who cares and in what way; how these technologies shift where care takes place; how care is becoming remote as a result of the introduction of these technologies; and how this will fit with various European care models. In the second part of this volume, Mort and colleagues summarise the discussion on these questions held at a participative conference and conclude with a set of implications for policy and design.

This necessarily brief discussion of several interesting publications was solely meant to illustrate the current growth of an interesting body of work.⁴¹ It is also interesting to note that many of the authors mentioned above hold “hybrid” positions, positioning themselves in STS, but also, for instance in sociology, anthropology, geography or ethics. Moreover, as a result of these hybrid positions, these authors incorporate insights from, for instance, feminism and social gerontology (Joyce & Loe, 2010a; Joyce & Mamo, 2006; Joyce, Williamson, & Mamo, 2008) or , for instance, from disability studies and geography (Mort, et al., 2008; Mort & Roberts, 2010;

⁴¹ Other interesting work can for instance be found in the volume edited by Schillmeier and Domènech (2010), or in the final report on the EFORTT project on ethical frameworks for telecare technologies for older people (Mort, 2011).

Mort, Roberts, & Milligan, 2009) and combinations of these. Although their number is still relatively small, these studies are theoretically and empirically inspirational and they represent a trend that this thesis aims to contribute to. However, although the authors mentioned above have done work on ageing from an STS perspective, the design of technologies for older people has by and large not been addressed and studies of representations of older users in design processes are almost completely absent.

The only author to address user representations of older people is Hyysalo (e.g. 2003; 2006, 2011). Hyysalo has done extensive research on design processes in general and the way in which users are represented in particular. He has focused on older people to do his studies. Hyysalo's work is geared towards gaining a refined understanding of how representations emerge and the heterogeneity of backgrounds and sources they stem from, how they influence (or do not influence) design, and how user representations change, fade, erode or are reinforced from the early design stages to the final product. Hyysalo has also focused on how users make sense of these products and representations and how they reject, adapt, modify, selectively use or do not use these technologies (Hyysalo, 2011). Hyysalo thus aims to understand the entire process from design to use. For Hyysalo, older people present a suitable case study to study this process.

However, in this already lies a first difference between the work by Hyysalo and the work presented in this thesis: Hyysalo does study the way in which older people are represented, but his interest is not in the way *older* people are represented, but in processes of representation in general. Perhaps as a result, Hyysalo does not engage with social gerontology. For instance, while Hyysalo (2011) provides an outstanding and exhaustive analysis of processes of representation of users, he discusses demographic ageing in rather uncritical terms, not engaging with critical analyses from social gerontology (Hyysalo, 2011: 63). While there is definitely value in gaining deep understanding of representation processes in design, for instance by making use of a social learning perspective or a semiotic perspective, there is also value in understanding the way in which social and cultural representations of ageing influence these representations. This latter part, however, has remained underexplored in the work of Hyysalo and others, just as class, race and ethnicity remain underexplored. Indeed of these categories, only gendered user representations have been explored extensively by feminist scholars (Berg & Lie, 1995; Van Oost, 2003; Oudshoorn, 1996a; Oudshoorn, et al., 2004; Rommes, 2002; Stienstra, 2003). The final difference between the work of Hyysalo and the work proposed here is closely related to the differences already mentioned before: it is a difference in terms of audience. While Hyysalo aims to develop theory from a social learning perspective and reach scholars in STS and related fields, this thesis aims to cross disciplinary boundaries and reach

scholars in social gerontology and gerontechnology, in addition to STS and related fields.

In sum, the following points can be made about the existing literature on ageing and technology. First of all it is important to acknowledge that there is excellent work being done on ageing and technology. While a decade ago there were very few authors that addressed ageing and technology, nowadays conferences are being organised,⁴² and special issues and books are being published on this topic. Social studies of ageing and technology thus represent a trend in social scientific thinking; a trend that this thesis aims to contribute to by focusing on the design of technologies for older people. Second, in the area of user representations of older people, there is considerable work left to be done. On the one hand, the body of literature on ageing and technology that makes use of insights from social gerontology, but also feminism, gerontechnology, disability studies and ethics, has not addressed the way in which older people are represented in design processes in an in-depth manner. On the other hand, the work that has addressed the way in which older users are represented in design processes has treated older people as an ideal kind of user to study processes of representation in design. The focus there has thus been on how the user is constructed, but not on how the *older* user is constructed.

1.5 Conceptual approach and research question

This thesis will use the heuristic tool of user representations to analyse the way in which older users are imagined in design and the manner in which these representations influence the scripts of technologies for older people. Or, to formulate this in terms of the research question for this thesis:

What user representations of older users are created in design processes and scripted into technologies and how is the diversity of older people taken into account in these processes and scripts?

In order to make this more specific, I will use the following theory-based conceptualisations of how user representations emerge in design practices:

- User representations influence the design processes and the scripts written into technologies.

⁴² For instance, in September 2010, a track on ageing, health and technology, which lasted the full length of the conference, was organized at the 2010 EASST conference in Trento. A few days later, the EFORTT conference on ethics and telecare technologies for older people took place in Barcelona.

- Social and cultural representations of ageing have an influence on user representations generated in design processes of technologies for older people (and can thus be incorporated in design).
- Designers are also configured, e.g. by their organisations, design methods, prior projects, artefacts like programming languages etc.
- Users should be seen as diverse, active and creative; older people are no exception to this rule.
- Users have a degree of creative freedom with regard to the script of a technology, going beyond simply accepting or rejecting a technology.

1.6 Methods

This section describes user representations in a methodological context, the manner in which data was gathered and analysed, the type of case that was selected and the rationale for selecting it, and the specific sub questions that the individual chapters aim to answer in order to answer the research question described above.

1.6.1 Sources of user representations and collection of data

How can user representations of older people which figure in the design processes of technologies be studied? Akrich reconstructed user representations by analyzing what designers said about users and how in their discussions particular choices were justified with reference to the user (Akrich, 1995; Rommes, 2002). User representations can thus be reconstructed by analysing what designers, researchers and engineers say about the user and how the user figures in their argumentation, but this is clearly not the only way in which user representations are generated. Akrich (1995) suggests that we should study implicit and explicit representation techniques. Explicit techniques of representing the user can for instance include market surveys, consumer tests and feedback on experience. These techniques thus rely on people who are not part of the design process to provide information about their needs, preferences etc. Implicit techniques, on the other hand, are statements made on behalf of prospective users, for instance, use of experts to gather information about users, adopting or rejecting user representations present in other (similar) products, or what Akrich describes as “I...”, but which has become more well-known as the I-methodology (Oudshoorn & Pinch, 2003b; Rommes, 2002) where the designer uses his own experience as a user to configure a technology (often leading to an implicit user representation of a highly educated, technologically savvy, young to middle aged, white male). All of these techniques can thus be examined empirically for the user representations that they contain.

However, Rommes (2002: 44-47) makes clear that these are not the only ways to reconstruct user representations. For instance, Rommes uses a strategy of confronting and comparing user representations of diverse actors to illuminate the different views of actors regarding the user, a technique that has also been used by Lindsay (2003) and Van Kammen (2000). Like Van Kammen, Rommes also distinguishes between explicit and implicit user representations. The concept of implicit user representation sensitises us to representations that are the result of 'seemingly neutral technical choices [as they] can contain references to characteristics of users, which imply certain users and not others' (Rommes, 2002: 46) and to the fact that skills required for use can also contain user representations. The work by authors like Akrich, Rommes and others thus highlights that an analysis of user representations cannot rely solely on interviewing designers, engineers and researchers and noting how they speak about the user. Indeed, it can be argued that while there certainly should be a place for interviews, other forms of data collection are equally valuable and may be compared with user representations found via interviewing. As a result, a data collection strategy will be followed that focuses on multiple data sources.

This thesis relies on four types of sources: interviews, observations/fieldwork, publications that are in the public sphere and internal documentation. Semi-structured interviews were conducted with the designers, researchers and others involved in the development of a particular technology.⁴³ As these projects tended to be rather small, the number of interviews was not large. When possible, observations were carried out. This applies in particular to chapter 3, which describes user testing with older people in a laboratory. Regarding the two types of documentation, the following can be said: first, scientific publications, public relations material, newspaper articles, books, book chapters and other publications generated by the companies or research institutes which were available in the public domain were gathered. Second, internal documentation not intended for publication outside of the respective companies and institutes were also gathered and analysed.⁴⁴ These documents included, for example,

⁴³ To be more precise, in chapter 3 two people were interviewed, a middle-aged male engineer who worked as a senior researcher and a young psychologist who worked as a junior researcher. In chapter 4, five people were interviewed. These five interviewees had the following backgrounds: a researcher for a Dutch knowledge institute for protracted care who served as an intermediary between parties, a manager of a care organization for older people, an engineer/designer with a PhD in electronics who worked for the technology institute, a researcher from the technology institute who specialises in user research with older people, and a researcher from a Dutch university for applied sciences (hogeschool), who had a technical background and was brought in for an independent evaluation of the system. Further details about these interviewees can be found in the respective chapters.

⁴⁴ This thus resembles the difference between primary and secondary historical sources (Lorenz, 1998). The publications intended for the public sphere and to an extent, the information gathered from interviews, can be reflexive and strategic about the way they represent the user, for instance in order to avoid public relations mishaps. The internal documentation and the observations are less likely to be influenced by this effect. As with primary and secondary historical sources, there are advantages and

minutes from meetings, updates on the project, technical documentation, documentation on preparatory research for user tests, original notes from user tests and meetings with prospective users, consent forms, questionnaires, reports of test results and intermediary and final reports of the respective projects.⁴⁵ As a rule, data was gathered via a snowballing method, which was pursued up to a point of saturation. In all cases, the collected data was read systematically and statements in which older people were represented in any way were copied into a data file. The data file was subsequently used to generate and check categorisations of user representations.

This thesis will adopt a case study approach (Yin, 2003). Rommes (2002: 29) points out that such an approach is suitable for an explorative analysis, in her case of the mutual shaping of gender and technology. For the purposes of this thesis, the approach is suitable for an explorative analysis of the way in which user representations influence the co-construction of ageing and technology in design processes. However, as Rommes also states, the disadvantage of such an approach is that it generates local contextualised results. As a partial compensation for this, this thesis will analyse three cases, which represent different stages of the development of a technology and thus include different ways in which the user is represented at those sites of knowledge production.⁴⁶

1.6.2 Ambient Intelligence

Which technology would provide a good case to study these processes of representing the older user? Many of the technologies that are currently being developed with an older user in mind are information and communication technologies (ICTs); these can range from digital pill boxes, to home automation, to monitoring technologies and even to robots for older people. A dominant paradigm in the development of ICTs in the Netherlands, which will be the focus of this PhD thesis, is Ambient Intelligence (AmI). A key definition of this “new and emerging” technology is provided by Aarts, Harwig and Schuurmans (2001). It reads: ‘ambient intelligence refers to the presence of a digital environment that is sensitive, adaptive and responsive to the presence of people’ (Aarts, et al., 2001: 239). AmI is quite similar to various other technological

disadvantages of both types of data; combining both types provides the best assurance of a balanced view of the user representations present in these projects.

⁴⁵ The specific type of data collected will be discussed in each chapter respectively.

⁴⁶ To be sure, I do not wish to invoke the view that design follows a “linear” path with clearly distinguishable phases which a project runs through successively on its way to success. However, there is still a difference between the work performed, and the way the user is represented, when technological visions are made, and, later on, when trials with early design prototypes are done, and yet later when the last pilot testing of a technology in actual use practices is carried out. These stages should thus be seen as different sites of knowledge production that partly take place in a sequential order, but also partly simultaneously.

concepts like Ubiquitous Computing and Pervasive Computing. Mark Weiser is credited with laying the basis for this technological concept with the term ubiquitous computing, about which he started publishing in the early 1990s (Weiser, 1991). Emile Aarts, a key author in the area of AmI, explains the difference between Ubiquitous computing and AmI: “Ambient intelligence aims to take the integration provided by ubiquitous computing one step further by realizing environments that are sensitive and responsive to the presence of people. The focus is on users and their experiences from a consumer-electronics perspective” (Aarts, 2004: 12). AmI also differs from ubiquitous computing as it does not focus so much on increasing professional productivity, but emphasises instead the enhancement of the personal environment (Aarts, et al., 2001: 237).

Thus the emphasis of AmI is much more on aiding the user with personal tasks, enhancing leisure activities and creating new experiences for and with the user. Authors in the area of AmI envisage a particular kind of use: the user should be able to do what she or he wants without the technology getting in the way (Aarts & Diederiks, 2006; Aarts & Marzano, 2003). AmI should be unobtrusively present, even up to the point of being invisible, while responding appropriately to the user when needed and being easy and intuitive to use (see e.g. Marzano, 2003). Indeed this goes so far that AmI should adapt to the user and eventually anticipate the user’s needs, much like an ideal butler (see e.g. Aarts, 2003). These promises thus requires an intimate knowledge of the prospective user, which makes processes of representing the user in the development of AmI particularly important.

One of the key prospective users of AmI technologies are older people. Under the Ambient Assisted Living programme, already mentioned in section 1.2.1, vast amounts of research are being done to develop ambient technologies for older people. But AmI for older people is not solely being developed in the context of the European Union and in the context of universities and research institutes. Indeed, a company like Philips⁴⁷ – the major corporate proponent of AmI – is also increasingly focusing on older people as potential AmI users (see chapter 2). Governmental and corporate actors alike see AmI technologies as a technology that has many potential benefits in the context of use by older people; one of the dominant themes relates to care. AmI technologies for older people are said to simultaneously reduce costs and improve the quality of care. They may also help older people live in their own homes for longer – and in greater comfort and security – by providing health and safety monitoring and by

⁴⁷ Philips is a multinational technology producing company with a history in lighting and consumer electronics. Philips has recently been reducing its dependency on the consumer electronics market and has strengthened its focus on lighting and has been reorienting itself towards producing medical technologies for hospital as well as home environments. As a result, many AmI products and research projects being developed at Philips Research involve lighting, a medical or health related application or (still) a consumer electronics application. See chapter 2 for more detailed information about Philips.

aiding them in various everyday life activities. Examples of these kinds of technologies are the Independent LifeStyle Assistant (ILSA) (Aarts & Diederiks, 2006: 207), a lighting system adapted to the needs of older people (Aarts & Diederiks, 2006: 211-3), an intuitive robot programmed to play games designed to improve cognitive health (see chapter 3), and AmI monitoring systems which allow older people with severe illnesses to remain living at home (see chapter 4). Apart from being positioned as useful for older people, AmI is also seen as an ICT that is ideally suited to older people. The promise of AmI is that it is easy and intuitive to use; it does not require the user to adapt to the technology nor does it necessitate the user having to learn to use a (new) computer interface, which might be difficult for older people who have a different technological literacy. AmI may also serve as a convenient entry point for older people into the digital age, and thus curb fears of an emerging digital divide.⁴⁸

The final reason for choosing AmI is a methodological one. AmI is a new and emergent technology. Therefore what AmI is and who its (older) users will be is still flexible. This new and emergent technology thus allows the study of user representations of older people before such representations are totally black-boxed and without an outcome bias, i.e. knowing beforehand what type of user representations have become dominant and subsequently tracing back how those user representations came into being.⁴⁹ For these reasons, AmI constitutes a suitable technology to study the questions that this thesis sets out to answer. However, within the world of AmI there are various projects in various stages of a design trajectory; a choice for a set of specific projects thus needs to be made.

It is important to state straight off that it was not possible, nor desirable, to follow the design trajectory of one specific AmI technology for older people. Although Hyysalo (2003, 2011) and Pollock and Williams (2008) favour this long term single case, biographical approach, it does have its drawbacks. The trajectory of a technology from its very conception to the uptake in use practices is generally very long, and is indeed much longer than the time allotted for a PhD thesis. The AIMS project (see chapter 4) is a case in point. The very first ideas and projects which led to the development of this system hark back to the late 1990s and work on getting the system to the market is still ongoing. The pace at which these technologies are developed would require data gathering over periods which are more likely to be decades than years, an endeavour which was simply not feasible.

⁴⁸ See press release IP/07/831, which can be found at <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/831&format=HTML&aged=0&language=EN&guiLanguage=en> (accessed February 10th 2011) or http://ec.europa.eu/information_society/activities/einclusion/policy/ageing/launch/index_en.htm (accessed February 10th 2011).

⁴⁹ An in-depth look at what AmI is and how the (older) users of AmI are represented will be given in chapter 2.

A second issue which may seem a rather trivial element of social scientific research practice but which does significantly affect the potential to study one single technology throughout the design trajectory is gaining and maintaining access. Indeed Sampsa Hyysalo commented that it was due to the idiosyncrasies of the company which he was following that he was able to gain complete and in-depth access to the entire development of the technology (a wrist care watch) (see Hyysalo, 2003, 2011). He states that this is the exception rather than the rule (personal communication February 9th 2011). The empirical parts of this thesis reflect the difficulty of gaining and maintaining access. While it was possible to gain access to projects of two prominent companies and research institutes, it was only possible on a short term basis and by providing assurances about the anonymity of these two projects.

A third reason to choose three distinct cases instead of following one project is the reduction of the effect of the idiosyncrasies of a single project on the overall conclusions, allowing for comparison between cases (see chapter 5). Thus a wider range of potential issues with regard to the representation of older people in the design of AmI technologies can be found by contrasting different projects, access is more readily achievable and this approach makes it possible to study user representations in the design of AmI technologies in various stages of the design process.

1.6.3 Cases and sub-questions

As is clear by now, this thesis aims to study how user representations emerge and develop in design processes. However, design processes may span years and even decades from the point of inception of a technology to the point where a product goes on the market, and during this time user representations develop, evolve, change, are played down, etc. It is thus important to analyse the user representations of older people at an early stage in the development of an AmI technology, but also in the middle stage of development and towards the end. As a result, this thesis will analyse visions of AmI as a means of covering the early stages of development of AmI, laboratory tests with a AmI robotic prototype, and will finally analyse a pre-market pilot test with an AmI monitoring system.

The first empirical chapter will focus on the way in which the older (and younger) users are represented in visions of the future of AmI. By visions, I mean publications which are published when a particular actor, a company, institute etc., wishes to make known and elucidate, guide, legitimize or gain support for a new technological concept; or, indeed, later on, to explain and reinforce it further, or highlight changes in the way the technology should be developed. These visions are thus publications that outline the promises and potential future development of a

technology. For AmI, the actor that has been most active in outlining and refining its vision, and is a very dominant force behind the development of AmI, both within and outside the Netherlands, is Philips. This chapter will focus on the AmI visions of Philips in the period 1999-2009 in order to trace how the older user is represented in those visions. Moreover, in order to highlight how representations of older people differ from those of other, younger, AmI users, this chapter will also analyse how these other (younger) users are represented in these AmI visions, and provide a comparison between these two ways of representing the AmI user. The sub question that the second chapter aims to answer is thus:

How do user representations of older users in Philips AmI visions compare to representations of younger users?

In the third chapter and fourth chapters, this focus on visions will be replaced by a focus on testing of AmI technologies. Woolgar (1991) already underlined the importance of studying the testing of technologies, as tests are an important site to study the co-construction of a technology and its users. When designing a technology and subsequently manufacturing and testing a prototype, the user representations that might have been rather general, noncommittal, and perhaps implicitly incompatible up to that point, have to become more distinct and concrete, and choices need to be made. As a result, chapter 3 will focus on a set of laboratory tests with a AmI human-interaction robot and older test participants. The robot was developed by the research department of a Dutch multinational firm that specialises in healthcare and wellbeing related technologies.⁵⁰ The robot they developed, which, for the purposes of this thesis, will be called iRo, was intended initially to keep older people mentally active and to maintain their cognitive health. Later on, when the older users became frail, ill, or less mobile as they aged, this robot was envisaged to work as an assistive technology to which a variety of applications could be added. The research question for the third chapter will thus be:

How are older users, and in particular their health, represented in a set of laboratory tests with an AmI robot, and how did the test users respond to these representations?

The fourth chapter also deals with an analysis of user representations in test situations. However, these are markedly different tests than those described in chapter 3. The

⁵⁰ As will be explained in more detail in chapter 3, it proved necessary to anonymize this company. A more detailed description of this company and their robot can be found in chapter 3.

fourth chapter analyses the final pre-market pilot tests with an AmI monitoring system which will be called AIMS. AIMS does not only differ from iRo in the sense that it is a completely different technology – monitoring/sensor technologies versus robotics – with a completely different application – allowing people to live at home by monitoring their safety versus maintaining cognitive health and providing entertainment – but also with respect to the stage of development and, in turn, with respect to the type of tests performed. The tests with iRo were done in a laboratory (and later continued with a relatively small field test), with the objective of learning about users and developing concepts that could potentially lead to a product at some point in the future. These tests thus fall under the category of what Pinch (1993) has called prospective testing.⁵¹ The tests with AIMS on the other hand were long term field tests carried out in the actual everyday life use practices of older people with severe health problems, and the practices of their formal and informal care givers. The objective of these tests was to validate whether AIMS would work and to fit the system to the practices of the older people and their carers. These tests thus straddle the boundary between prospective and current testing (Pinch, 1993).

The AIMS chapter also differs from the robot chapter in its main focus. Whereas the third chapter investigates user representations and representations of health, the fourth chapter focuses on another important aspect of user representations of older people: the home and the view of older people as people who want to live at home at any cost. The guiding idea behind the AIMS system is to allow older people to live at home for as long as possible. This idea of allowing older people to live at home for longer by introducing new (care and surveillance) technologies is a central tenet in the world of gerontechnology. This idea warrants special attention as the link between older people wanting to live at home and a technological intervention should not be taken for granted. The question that takes centre stage in the fourth chapter is thus:

How do the designers and other actors involved in the design and use of AIMS link the view of older people as people who want to live at home to the development and use of the AIMS system and what is the

⁵¹ Pinch (1993) distinguishes three forms of testing. According to Pinch , ‘prospective testing may be carried out on scale models (...), on mock-ups on prototype models, and on the final manufactured product before it is released into wider use’ (Pinch, 1993: 27). Current testing, on the other hand, ‘occurs once a technology is up and running. It may be carried out in order to assess performance, to make improvements, to compare it with rivals, for legal and safety reasons (...), or to ascertain any special operational difficulties’ (ibid.) Finally, there is retrospective testing, which is done after major accidents or malfunctions to establish what went wrong. Different forms of testing thus occur at different times during the design and use of a technology, have different goals and relate in different ways to the user of a technology (if any).

effect of this user representation on the design and use of the technology?

The fifth chapter discusses an issue that is particularly important in the context of design for older people. As mentioned earlier, the tension between homogeneous views of older people and the diversity of the lives of older people is a key empirical tension in this thesis. Moreover, design often involves reduction of complexity. Dealing with a diverse representation of older people in design adds complexity to the design processes, whereas homogeneous simplified images provide much clearer guidance for design. Nevertheless, in order to achieve a design that is suitable for many older people, the diversity of older people needs to be addressed in design. The final empirical chapter will thus address the question:

How do designers and researchers deal with diversity in visions and designs of AmI technologies for older people?

This question will be answered by taking the empirical data of the first three empirical chapters and analysing it from a diversity point of view.

1.7 Thesis outline

To sum up, a brief outline of the thesis will be given. In chapter 2, user representations in visions of AmI will be addressed. This chapter will not only address how older users are treated in visions of AmI but will also give a general introduction to the main ideas behind AmI and will analyse the differences between the way in which younger users of AmI are represented vis-à-vis the manner in which older users of AmI are represented. This chapter will show that older users of AmI are mainly defined in terms of illness and decrepitude, which will be related to the dominant discourse on ageing and innovation. Chapter 3 will subsequently analyse how older users and their health were represented in a set of tests with an AmI robot for older people. This chapter will show that the researchers were not the only ones making representations of the user; the older test participants also reflected on and created their own representations. For them the robot signified dependency, inactivity and vulnerability and they subsequently found ways to present themselves as active, healthy and helpful older people. However, as these representations were not deemed relevant by the researchers, they were not taken into account by the researchers. Chapter 4 analyses the development and pilot use of an AmI monitoring system. This chapter will show that, despite the fact that the monitoring system held different meanings for all the actors

involved, all the actors could unite behind one representation of older people: older people want to live at home, which allowed the technology to be positioned as undeniably good. However, this chapter will subsequently show that while the older people could stay at home, the meaning of the home itself is subject to change as the monitoring system contains a “passive compliance” script and the home is reconfigured by the introduction of new technologies. In the conclusion of this chapter these reconfigurations will be viewed in the context of neo-liberal (care) politics. Chapter 5, the final empirical chapter, analyses and compares the way in which the diversity of older people was treated in the cases that the previous three chapters dealt with. The analysis of the vision case will show that dealing with diversity lies at the very heart of the mission of AmI. However, dealing with diversity turns out to be more difficult in the testing practices of AmI technologies for older people. The designers, researchers and engineers behind the robotics and monitoring system turned out to have a very different approach to testing which in turn led to marked differences in the way diversity was or was not encompassed in these testing practices. Chapter 6, 7 and 8 form the conclusions to this thesis. In chapter 6, the findings of the four empirical chapters will be interpreted in the light of the main research question and the theory discussed in the introduction. Conclusions with regard to the way in which older people are represented in design processes and the wider societal importance thereof will be drawn. This in turn links up with chapter 7 in which a set of seven suggestions for design will be discussed in detail. This set of suggestions is partly based on the findings of this thesis and partly on a combination of insights from STS, social gerontology and gerontechnology. Chapter 8, finally, is a very brief summary of chapter 7, intended to be a convenient entrance point to this thesis for a design audience.

2. The Pampered Gadget Lover and the Decrepit and Dependent Other: User representations of younger and older people in visions of Ambient Intelligence

2.1 Introduction

The early stages of the development of a new (type of) technology are often accompanied by the publication of reports, scenario studies, books, (semi-)scientific articles, newspaper and magazine articles about what the future will hold for these technologies and how the future will be changed by them. These publications – which will be called visions in this chapter⁵² – are not simply neutral predictions of possible future developments, but also guide those developments.⁵³ For instance, in visions, definitions of what a technology is or should be may be offered, useful or attractive applications may be presented, enticing futures may be painted, possible ethical or societal problems can be played down, consequences of not complying with the future can be listed, directions of promising or necessary (technological) developments can be outlined, and images of prospective users of the technology can be created. All be it not in a straightforward or linear fashion, statements like these influence the innovation process.

Such visions thus become actors which influence, and are influenced by, the emerging network of a new technology. The statements made about users in these visions can have important consequences. As described in the previous chapter, Madeleine Akrich (1992) has shown how images or ideas about users are “scripted” into technologies and has shown how – although a user is never powerless – these scripts can affect everyday life use practices. In her thesis on dealing with the increasing number of products that are returned to the manufacturer, Den Ouden (2006) has shown that consumer complaints about products can be ‘traced back to decisions made in all phases of the business creation process’ (Den Ouden, 2006: iv). She goes on to show that the non-technical “soft” failures of technologies in particular – that is,

⁵² The reason for referring to these publications as visions, and not, for instance, as expectations or promises, which are more common terms in the sociology of expectations (see e.g. Borup, Brown, Konrad, & van Lente, 2006), is mainly that the authors of these documents consistently refer to these publications as visions and in those publications and elsewhere consistently refer to “the AmI vision.” Although closely related to promise and expectation, the word vision brings with it a specific – and ambivalent – set of connotations. On the one hand the word vision implies a grand, encompassing, purposeful and positive view of the future, but on the other hand vision also has connotations with a lack of clarity, mystification and metaphysicality (i.e. the difference between creating and having a vision). This ambivalence of the word vision can (and is) exploited by the authors of the vision at a later date.

⁵³ Although this chapter will mostly draw on the work of Van Lente (1993), an extensive body of literature on the sociology and philosophy of expectations has been developed. See for instance: Van Lente (1993), Van Lente and Rip (1998), De Wilde (2000), Borup et al. (2006), Oudshoorn (2011).

technically functional products being returned because they do not match the expectations of users – can be traced back to the early stages (strategy and product definition) of the development of a technology. Thus decisions made early on in the development of a technology matter, as they keep influencing the further development of a technology and can thus be inscribed in the technology and act in the use practices of people. Vision statements accompany the early development of technologies and reflect the way key actors think (strategically) about the development of a technology. If one wants to study the way in which images and ideas about the user emerge and are written into technologies, then the user representations in vision statements are an important place to start.

This chapter will focus on the question of how the older user of AmI is represented in AmI visions. In order to answer this question, and also provide some more in-depth context about what AmI is positioned to be, the question that needs to be answered first concerns how the user of AmI is represented in general. Thus a detailed look at the way the user (in general) is represented is offered and an analysis is made of the structure of these representations. Subsequently, this chapter will focus on representations of older users and will then – making use of the categorisation of ways of representing the user developed in the first part of the chapter – compare the way older people are represented to the representations of (younger) users in the AmI visions.

2.2 Research Methodology

In order to study the ways in which the users and older users of AmI are represented, a study was made of a selection of vision statements. These vision statements have in common that they stem from Philips Research and are (co)-authored by prof. dr. Emile Aarts, vice-president of Philips Research and a key proponent of AmI. This focus on the AmI visions by Emile Aarts and his colleagues is not arbitrary. First of all, AmI as a concept originated at Philips,⁵⁴ and Philips Research is still a dominant force behind the development of AmI.⁵⁵ From its conception in 1999, Philips Research,

⁵⁴ Ambient Intelligence was first introduced during a presentation in 1999 by Roel Pieper, a member of the board of management at Philips Electronics at the time. In that same year it was mentioned first in a publication, co-authored by Emile Aarts (Aarts & Appelo, 1999). A short overview of the history of AmI can be found in Aarts and Encarnação (2006: 6-8).

⁵⁵ The only other actor which has produced much cited visions of Ambient Intelligence is the ISTAG, the Information Society Technologies Advisory Group. This advisory body advised the European Commission in matters regarding information and communication technologies (see <http://cordis.europa.eu/ist/about/about.htm>, accessed last August 3rd 2010). ISTAG's 2001 scenario report (Ducatel, 2001) has also been a key vision for AmI. However, ISTAG has not produced as many vision statements as Philips Research, in particular after the 6th Framework Programme (FP6) finished (in 2006). Although the EC and ISTAG had a major influence on the development of AmI, the Philips visions span a longer period (a period which comprises a significant shift in emphasis at the end).

Emile Aarts and his colleagues have consistently published visions of AmI futures. These visions build on each other and can thus be seen as a coherent set of evolving visions, which thus makes it possible to study how the user was represented. The ten vision statements were selected because they were much cited by authors related to Philips in later visions.⁵⁶ The ten visions are nicely spread over the period 1999-2009, thus enabling an analysis of the development of visions of AmI and the development of the positioning of the (older) user in those visions.⁵⁷ The ten visions are:

1. Emile Aarts and Lisette Appelo (1999) *Ambient Intelligence Thuis*. A 4 page article in Dutch, the first in which Ambient Intelligence is discussed. It is published in *IT-Monitor*, a relatively small Dutch professional IT journal.
2. Emile Aarts, Rick Harwig and Martin Schuurmans (2001) *Ambient Intelligence*. A 16 page book chapter in an edited volume on the future of embedded computing.
3. Emile Aarts and Berry Eggen (eds.) (2002) *Ambient Intelligence in HomeLab*. A 24 page booklet published by Philips Research on the occasion of the opening of HomeLab, a facility for researching user-technology interactions.
4. Emile Aarts and Stefano Marzano (eds.) (2003) *The New Everyday, views on Ambient Intelligence*. A 352 page edited volume with contributions from a wide range of disciplines and perspective. Also contains descriptions of 24 “first step” projects. Intended for both academic and wider audiences.
5. Emile Aarts (2004) *Ambient Intelligence: A Multimedia Perspective*. An 8 page article in *IEEE Multimedia*, a journal for computing professionals. The article was listed in the category “Visions and Views”.
6. Emile Aarts and Elmo Diederiks (2006) *Ambient Lifestyle: From Concept to Experience, visions, insight and 41 mind-boggling projects from the Philips Research Laboratories*. A 213 page book predominantly written by Philips Research employees with a strong emphasis on AmI projects. The book was published on the occasion of the fifth anniversary of HomeLab and the opening of ShopLab and CareLab (the three of which were dubbed ExperienceLab).
7. Emile Aarts and José Luis Encarnação (2006) *Into Ambient Intelligence*. A 16 page article in an edited volume. Introductory article in the volume *True Visions, the Emergence of Ambient Intelligence* edited by the authors.
8. Emile Aarts and Boris de Ruyter (2009) *New Research Perspectives on Ambient Intelligence*. A 10 page article published in the *Journal of Ambient Intelligence and*

Moreover, the impact of the Philips visions is more immediate, as Philips Research is geared far more towards developing technologies that can be turned into products and profits.

⁵⁶ Obviously this does not apply to the last three visions statements. They were included because they are the most recent examples of AmI visions.

⁵⁷ The slides of this presentation can be found on http://www.ctit.utwente.nl/ctit_symposium2009/presentations/aarts.pdf, accessed August 25th 2010.

Smart Environments, outlining new directions in technical and (methodologies of) user research.

9. Emile Aarts and Frits Grotenhuis (2009) *Ambient Intelligence 2.0: Towards Synergetic Prosperity*. A 13 page article published in the conference proceedings of the 2009 *Ambient Intelligence European Conference*.
10. Emile Aarts (2009) *AmI 2.0: Towards Synergetic Prosperity*. Keynote lecture at the 2009 CTIT symposium at the University of Twente.⁵⁸ Contains some other examples and slightly different reasoning, but otherwise comparable to the previously mentioned publication.

All vision statements were systematically read and statements in which users were represented in any way were copied into a data file. Specific attention was given to representations of older people as users of AmI technologies. The data file was subsequently used to generate and check categorisations of user representations.

2.3 Philips' AmI visions in broader context

Although the various proponents would argue that there are significant differences, as a concept for the future of computing Ambient Intelligence is quite similar to various other technological concepts such as Ubiquitous Computing and Pervasive Computing. The term Ubiquitous Computing was coined by Mark Weiser in the late 1980s and early 1990s (Weiser, 1991). Emile Aarts explains the difference between Ubiquitous computing and AmI as follows: 'Ambient intelligence aims to take the integration provided by ubiquitous computing one step further by realizing environments that are sensitive and responsive to the presence of people. The focus is on users and their experiences from a consumer-electronics perspective' (Aarts, 2004: 12). Another difference between AmI and other approaches is – as Aarts, Harwig and Schuurmans put it – that 'Most of these [other] approaches are aimed at increasing professional productivity of humans' (Aarts, et al., 2001: 237). They go on to state that 'not all of us are prepared to use the productivity gain for productivity volume increase. It is well known that many persons, especially in the well-developed part of the world, are willing to trade productivity for personal time, which they can spend for their own benefits' (Aarts, et al., 2001: 237). Thus instead of a focus on new IT for increased productivity in the workplace, AmI is focused on the personal environment – often the home – and on personal tasks or leisure activities. Potentially related to this focus is another salient difference between AmI and other approaches: the emphasis on design.

⁵⁸ The slides of this presentation can be found on http://www.ctit.utwente.nl/ctit_symposium2009/presentations/aarts.pdf, accessed August 25th 2010.

Many of Philips' AmI prototypes have been given careful attention by designers (see e.g. Aarts & Diederiks, 2006; Aarts & Marzano, 2003) and *The New Everyday* (Aarts & Marzano, 2003) was edited by Emile Aarts, vice president and scientific program director of Philips Research, and Stefano Marzano, CEO and chief creative director of Philips Design. A final difference between AmI and the other approaches is that AmI is a distinctly European undertaking, with Philips and EU funded projects⁵⁹ being the main drivers behind the development of AmI.

The Philips visions from the period 1999 to 2009 can be divided into three phases. The first phase can be called *Building the Vision*. In this phase, AmI existed mainly on paper, at least for the outside world. Technological work was going on behind the scenes, but there were very few products or prototypes. Visions that belong to this period are *Ambient Intelligence Thuis* (Aarts & Appelo, 1999), *Ambient Intelligence* (Aarts, et al., 2001) and *Ambient Intelligence in Homelab* (Aarts & Eggen, 2002). The second phase can be called *Early Developments*. By 2003, the vision was becoming clearer and was gaining momentum. *The New Everyday* (Aarts & Marzano, 2003) can be seen as a bridge between the first two periods. *The New Everyday* has been very influential in spreading the idea of AmI and this seems to be its main focus. Nevertheless, it also contains 24 short sections explaining various AmI projects. While none of these technologies were available for sale at the time, their description in *The New Everyday* marked a shift from descriptions of the visions of AmI to demonstrating some of the early developments in AmI technologies. This becomes evident with the publication in 2006 of *Ambient Lifestyle From Concept to Experience, Visions, insights and 41 mind-boggling projects from the Philips Research Laboratories* (Aarts & Diederiks, 2006). In this period, the first AmI products such as the experience enhancing television *Ambilight* were successfully sold.⁶⁰ However, the change between the first and the second phase is a gradual one as there is still vision work going on in this phase (e.g. Aarts, 2004; Aarts & Encarnação, 2006).

The third phase represents a more radical break and can be called *Crisis and Repositioning: AmI 2.0*. This repositioning occurs against the background of the global financial crisis and a resulting major reorganisation at Philips,⁶¹ and against the background of an increasing shift of Philips towards health and well-being related technologies. Whereas Aarts and De Ruyter (2009) outline new research perspectives in rather guarded methodological terms, Aarts, Grotenhuis (2009) and Aarts (2009) depart on a far more radical tangent. Reflecting on the technological and business

⁵⁹ See, for instance, the AmI programme under the 6th Framework Programme or the Ambient Assisted Living funding programme (<http://www.aal-europe.eu/> accessed August 5th 2010).

⁶⁰ The Philips 2006 annual report proudly states that 1,000,000+ Ambilight TV's have been sold (Philips, 2007).

⁶¹ 'Reorganisatie van Philips kost 6000 banen' (Volkskrant, January 26th 2009).

achievements of AmI, they conclude that, despite the promises of focusing on the user, the developments have still centred too much on “technology push” and ‘did not lead to any business activity, for the simple reason that it could not be made clear what the true added value for people would be’ (Aarts & Grotenhuis, 2009: 3). They go on to propose a new focus – a focus on balance between body, mind, community and environment – and new methods to learn about users and their context. Thus the user has been the focus from the start, which will be clearly exemplified in the AmI visions discussed in this chapter, but it has proven difficult to translate that focus into technologies that make a difference to the lives of people. The response to this is an even greater focus on the user, with new, more comprehensive methods to learn about ‘what people really want and to build solutions that really impact their lives’ (Aarts & Grotenhuis, 2009: 2). Thus the emphasis on learning about – and thus representing – the user has been substantial in the development of AmI and is still growing.

2.4 The user in visions of AmI

The way in which the user is represented in the Philips AmI visions cannot be captured in a few simple statements. The visions evolve over time and particularly in the two books⁶² (Aarts & Diederiks, 2006; Aarts & Marzano, 2003), the individual sections and chapters have been written by dozens of authors, from different disciplines and backgrounds. Some are technologists, others are designers; some are social scientists while others are business experts, some work for Philips, others do not. Thus, the visions do not give, nor do not aim to give, one coherent view on the future of AmI. Therefore they also do not offer one single image of who the user of AmI is, what his or her characteristics are and how he or she will be affected by the advent of AmI. Nevertheless, despite the fact that all the authors have their own views of AmI – or of one particular aspect of AmI – there are patterns to be found in the way in which the authors of the Philips visions of AmI think about the user. When the data file was analysed, a number of clear and unambiguous user representations emerged. These form one – albeit partial – answer to the question as to how the user is represented in the AmI visions.⁶³

⁶² In terms of the number of pages, *The New Everyday* (Aarts & Marzano, 2003) and *Ambient Lifestyle* (Aarts & Diederiks, 2006) comprise the bulk of the data. In addition, these two publications contain the vast majority of articles regarding concrete technological projects. For this reason, these two references are more dominant in this chapter.

⁶³ As it is impossible to quote or reference every example of the user representations mentioned in this chapter, I have decided to give a selection of salient examples which best summarize the respective user representation. The representations mentioned are present in many, if not all, of the vision statements. The salient examples have thus been chosen to reflect this spread.

2.4.1 Homogeneous user representations

The two authoritative definitions of AmI offer a good site from which to start looking for these unambiguous user representations. In all the visions, a reference is made to at least one of these definitions⁶⁴ and none of the authors write anything which goes against the grain of these definitions. The first definition stems from the book chapter by Aarts, Harwig and Schuurmans (2001). It reads: ‘ambient intelligence refers to the presence of a digital environment that is sensitive, adaptive and responsive to the presence of people’ (Aarts, et al., 2001: 239). The second definition is the list of five key characteristics of AmI given by Emile Aarts in *The New Everyday*. These characteristics are: ‘1. Embedded – many networked devices are integrated into the environment. 2. Context-aware – these devices can recognize you and your situational context. 3. Personalized – they can be tailored towards your needs. 4. Adaptive – they can change in response to you. 5. Anticipatory – they can anticipate your desires without conscious mediation’ (Aarts & Marzano, 2003: 14). Both definitions incorporate several unambiguous images of the user. For instance, users of AmI do not mind being recognized by the system and, conversely, actually want their technology to recognize them and their context. The user also wants the system to learn about them and to adapt to their needs and wishes, preferably in a pro-active, anticipatory way, much like – as Aarts (2004) puts it – a butler.

Ultimately, when the system gets to know the user so well that it can detect behavioral patterns, adjustments are possible over a very long period of time. For this last feature (anticipation), you might think of the classical Victorian butler—a person whom the family members did not know very well but who often knew the family members better than they knew themselves, at least with respect to certain rituals or stereotypical behavioral patterns. So anticipation could help them just at the point when they concluded that they needed some support. (Aarts, 2004: 15-6).

Thus the first user representation in the visions of AmI is that users want to be recognised by the system and have the system anticipate and adapt to their needs and wishes.

Aarts’ characteristics in *The New Everyday* indicate a second representation. According to Aarts, AmI is supposed to be embedded and integrated into the environment. Partly, this is due to the positioning of users as people who think current

⁶⁴ That is – of course – in all vision statements *after* the publication of the vision statement which contains the definition. In practice, this means that only the vision by Aarts and Appelo (1999) does not contain a reference to one of the two definitions.

ICTs are ugly and bothersome, or in one word, obtrusive. In his part of the introduction of *The New Everyday*, Stefano Marzano explains: 'Much of today's material technology is still obtrusive in our homes and offices, in the shape of grey and black boxes – televisions, computers, appliances... These are set to disappear, as the technology becomes incorporated in our material environment' (Aarts & Marzano, 2003: 8). Marzano goes on to state that the home of the future will be like the home of the past in the sense that there will be no "grey boxes" and wires. However, although it may look similar to the past, the user will have access to every digital service imaginable: '[T]his is surely closer to what we want: knowledge, excitement, entertainment, education, productivity, social contact – without the obtrusive prominence of the technology that delivers them' (Aarts & Marzano, 2003: 9). In addition, in the visions the users are portrayed as viewing current ICTs to be relatively hard to use, taking a lot of conscious effort and being non-intuitive. Recalling developments in the late 1990s, Aarts and Diederiks write in the introduction of *Ambient Lifestyle*: 'the information society had resulted in an overload of products and services for which the user benefits were unclear. There was a call to design things that were easy to understand and simple to use' (Aarts & Diederiks, 2006: 13). This stance – that users find current ICTs ugly, bothersome, obtrusive, hard to use and non-intuitive – is shared widely by the authors of the AmI visions.

Of course, AmI subsequently provides an answer to this problem, as Manon Verbücken underlines in her section in *The New Everyday* titled "towards a new sensorality": 'Ambient Intelligence proposes a world in which our interaction with products will become increasingly intuitive, using technologies that are sensitive to the way we communicate, the way we talk, feel, touch and use our body language. These technologies make new interactions possible by providing new sensorial points of contact between our environment and ourselves' (Aarts & Marzano, 2003: 54). In many of the vision statements, for instance in Aarts et al. (2001), Aarts and Marzano (2003), Aarts (2004), Aarts and Diederiks (2006), this is related to Reeves and Nass' (1996) theory on human-computer interaction, which states that humans tend to interact with computers in the same way as they interact with other humans. Aarts et al. (2001) state that Reeves and Nass therefore 'argue that the interaction between humans and machines should be based on the very same concept that interaction between humans is based. For instance, it should be intuitive, multimodal and based on emotion' (Aarts, et al., 2001: 242). This, then, is the basis for the second way of representing (and positioning) the prospective user. The user is seen as somebody who is fed up with ugly, obtrusive, hard to use ICTs and instead wants intuitive, natural, emotional interfaces, enabling him or her to interact naturally with the technology by using speech and gestures, as this is the way he or she is inclined to interact anyway.

A third user representation which is often reiterated in visions of AmI is that users want more and better experiences. Clout et al. in Aarts en Diederiks (2006) summarize it nicely: 'One of the cornerstones of the Ambient Intelligence Vision is that consumers will increasingly be looking for more 'soft' or 'emotional' values in products and services. They will look for appealing and enjoyable experiences, over and above functional benefits' (Aarts & Diederiks, 2006: 127). Just what these experiences should comprise can remain a bit ambiguous in the AmI visions, as it will differ from application to application. Despite this ambiguity, the authors make it clear that users want more and better experiences and that these users are willing to pay for such experiences. With respect to the economic side of ambient experiences, the authors of the visions – in this case Aarts and Encarnação – often refer to the “experience economy” (Pine & Gilmore, 1999).

Ambient Intelligence could contribute to the development of new business and greater wealth to all people in the world. Pine and Gilmore (1999) describe in their compelling bestseller a new economy, which they call the *experience economy*. They position this economy as the fourth major wave following the classical economies known as the commodity, the goods, and the service economy. The general belief of the experience economy is that people are willing to spend money on having experiences, and from certain enterprises such as the holiday economy, one indeed may conclude that this might be very well true. A salient property of an experience is given by the fact that it can feel real, irrespective of whether it has been generated by a real or a virtual cause; what counts is the belly feeling.' (Aarts & Encarnação, 2006: 4).

The added value of AmI can thus lie in its capabilities to generate experiences that are valued by its user. The promise of economic gains is only possible by employing a view of the user as a person who is prepared to part with money to have more and better experiences.

The three user representations described above are strongly linked to the basic technological ideas of AmI. For instance, the fact that AmI should retreat into the background is linked to ideas about what users want and need, and conversely, users are positioned as having wants and needs which derive from problems with older technologies. Thus there is a co-articulation of who the user is and what AmI is in essence. By explaining these basic views of the user, the authors explain what AmI is. These views are widely shared and often reiterated by the authors of the AmI visions. Nevertheless, they present a rather abstract, non-specific image of the AmI user. In the AmI visions, there are many, more explicit, ways in which the user is represented. In

contrast to the user representations mentioned above, these more specific user representations are not homogeneous but present us with a more diverse picture of the prospective users of AmI.

2.4.2 Diversity of user representations: Gadget Lovers vs. The User as Everybody

While attempting to discover how the user of AmI was represented, some very homogeneous user representations which virtually all the authors of the visions could subscribe to were found. However, in these attempts to distil clear and unambiguous user representations out of the AmI visions, I frequently came across representations which were quite clear and distinct, only to find other representations in other sections, or even in the same sections, which were equally clear and distinct, but in complete opposition to the first representation.

For instance, one common image that is given of the user of AmI is that he or she is young, (relatively) affluent, highly educated, and infatuated with gadgets. An example of this can be found in section 8.23 of *The New Everyday*, where wearable electronics are introduced. Wearable electronics are for instance T-shirts that you can download music to or ski-jackets with GPS and communication technologies. In addition, it is also made quite clear at whom these garments are aimed: 'the Icd+ range consists of four jackets for young professionals – active, modern and always on the move' (Aarts & Marzano, 2003: 344).

There are many examples of this kind of technology and prospective user. For instance, in *Ambient Lifestyle* Jan Kneissler states that 'one of the most annoying problems in the home today is the complexity of the way we interact with technology. This is apparent, for example, from the fact that we are accumulating an increasing number of remote control units on our coffee tables' (Aarts & Diederiks, 2006: 117). He then proposes one universal pointing remote control which allows the user to 'zap stations with a slight flick of the wrist, to turn on and off lights by 'shooting' at them, or even to drag and drop content between devices. (...) It (...) will be a bit like a sorcerer's magic wand: an instrument that will enable you to exert power over the environment as if by will alone' (Aarts & Diederiks, 2006: 118). Other technologies allow the user to send text messages to a pillow equipped with photonic textiles which will then scroll the message across its surface (Aarts & Diederiks, 2006: 145). Yet another proposed technology is an interactive mirror which gives beauty tips to the 'young fashion-conscious woman' (Aarts & Diederiks, 2006: 154). In addition, there is a plethora of selection and content management technologies for digital media (e.g. Aarts & Diederiks, 2006; Aarts & Marzano, 2003).

These envisaged technologies contain clear representations of a user. The users are either “cool youngsters” in their early twenties or “young urban professionals” perhaps with a family (see e.g. the scenario in Aarts, et al., 2001). In general this proposed user is a relatively young adult, quite affluent, apparently well educated,⁶⁵ but definitely technologically savvy and infatuated with gadgets. This image is, however, opposed by other statements in which the user of AmI is not a gadget loving young urban professional, rather a child, an older person, a person with health problems, or a person with some sort of disadvantage. These representations are also common in the AmI visions.

Reddering and Scholten – in their chapter in *The New Everyday* – stress that users are diverse and that personalisation should not imply generating simplified profiles of people. They go on to state that ‘in understanding cultures, people, their needs and how to develop meaningful technology for them, the first challenge is open-mindedness: not to make too many assumptions, to display genuine curiosity about people’s needs, wishes and feelings, and to allow for wide diversity’ (Aarts & Marzano, 2003: 32). Thus, according to *these* authors, AmI is not intended for one specific group of people, but should be able to cater to a diverse group of people. Aarts and Grotenhuis, emphasizing the importance of community, add a participatory and egalitarian note: ‘“*Community*” refers to common welfare and taking care of each other. Every person should be able to participate and to make use of his or her capabilities, and so to contribute to our society’ (Aarts & Grotenhuis, 2009: 7) and, of course, AmI allows them to do so. Another clear example comes from Stefano Marzano who argues in *The New Everyday* that AmI has capabilities to overcome the limitations of time and space:

In the remoter parts of Brazil or Africa, where schools are few and students far apart, the introduction of Web-based education could be a relatively inexpensive way of raising educational standards rapidly. The same technology could also be adapted to provide an Ambient Intelligence service in the industrialized world for older people, in the form of online health monitoring or home diagnostics or a shopping and delivery service for them, or for others who have too little time for conventional shopping or food preparation.

In one case, we overcome the distances of the students from schools, and help to narrow the educational gap between the developed and the developing world. In the other, we solve another distance problem – the distance of the consumer from

⁶⁵ The types of jobs these AmI users are envisaged to have is a good indication of the implicitly envisaged education level of users: they are portrayed as busy managers, architects, or as having a non-descript high-ranking office job (all of which would require university-level training), and they are definitely not portrayed as garbage men, cleaners or as doing any other type of menial labour.

the hospital or shop, as well as the gap between those who are fit and healthy in society and those who are less so. In both cases, the technology is the same, but the group served is quite different. If we know how to look, we can see many more instances of shortage and deprivation that could be relieved in this way, both in the developing world, and closer to home (Aarts & Marzano, 2003: 11).

While we now know some of the services that Marzano describes by names other than AmI, the important thing is to recognize the marked difference between the way the user is positioned here and in the previous paragraphs.⁶⁶ No longer is the prospective user of AmI solely a young, technologically savvy, gadget loving person; other people – notably disadvantaged people – are seen as prospective users too. This is a common way of representing the user in the visions of AmI. These two types of representations can thus be called: gadget lovers vs. the user as everybody.⁶⁷ Both representations are common in the AmI visions. This is interesting as both user representations are given, but cannot be caught in one single homogeneous statement like the ones given in section 2.4.1. The gadget lover vs. the user as everybody is not the only set of opposing user representations. Many more can be, and indeed were, found, but I will limit myself to the remaining two most dominant ones.

2.4.3 Individualization & Personalization vs. Communication & Community building

This set of opposing user representations deals with the prospective user as an individual in a personalised AmI environment versus the view of AmI as an opportunity for communication and community building. One common image, clearly related to the homogeneous user representations, is that AmI-systems ‘will adapt themselves to the user and even anticipate the user’s individual needs’ (Aarts, et al., 2001: 235), thus becoming personalized or customized to a great degree. The third chapter of *The New Everyday*, which centres on the ability of AmI systems to learn and adapt, contains a section by Andrews, Bueno and Cass, titled “Deep customization.” Here we find the following quote: ‘It [the Open Tools strategy] aims to provide people with tools which can become truly customized to their unique environment, needs, desires and patterns of use over time’ (Aarts & Marzano, 2003: 116). In the marketing and branding section of *The New Everyday*, Damian Mycroft

⁶⁶ Other examples of this type of user representation are for instance AmI for people with impaired vision or people who are illiterate (Aarts & Marzano, 2003: 11), for children in western and developing countries (Aarts & Grotenhuis, 2009: 8-10), for people with disabilities (Aarts & Diederiks, 2006: 201) or for older people suffering from serious cardio-vascular diseases (Aarts & Grotenhuis, 2009: 10-11).

⁶⁷ The term ‘user as everybody’ stems from Oudshoorn et al. (2004).

discusses the intelligence and adaptability of AmI systems. He writes: "The benefit of increasing the system intelligence (...) is to better support the needs, priorities and lifestyles of individuals. As individuals, we have rational, functional needs to accomplish particular tasks. We also have emotional needs for self-actualization, self-expression, belonging and a host of 'softer' factors. The increased level of intelligence in the system can provide advantages on both levels' (Aarts & Marzano, 2003: 258). Further examples are personal (digital) content management (Aarts & Diederiks, 2006: 177), personalised lighting schemes (Aarts & Diederiks, 2006: 142) and personal virtual fitness coaches (Aarts & Diederiks, 2006: 158). One clear way of thinking about the user, then, is to see him or her as an individual with specific needs and desires, and AmI as being tuned in specifically to those individual needs and desires.

However, another type of user representation exists in parallel with this representation. These are representations involving the user in contact with others and as part of a community. AmI is no longer precisely fitted to the single user, but is attuned to the needs of the community and becomes a link between users, enabling and enhancing their interactions. Examples of this can be found in the fifth chapter of *The New Everyday* which is titled "Commune, Integrate, Trust" and deals with the enhancement of community life with AmI and issues of balance and trust which may result from the introduction of AmI. In this chapter, the first section titled "community, memory and ambient intelligence", addresses the relation between communities and AmI. It is in this section that we find statements like:

Ambient Intelligence is about meaningful technology for people. No two communities are the same, and the design of an embedded connected community solution must be tailored to the specific needs and requirements of the community in question. This requires an ethnographic community analysis on many levels, and close collaboration and co-creation with the members of that community (Aarts & Marzano, 2003: 188).

The emphasis is thus no longer on fulfilling individual needs and desires by personalising an AmI application, but on having AmI applications enable and enhance communication and community life. Aarts et al. (2001) state that AmI may lead to new types of global communities. They base this on the assumption that for instance:

a Dutch computer scientist has more in common with a Japanese computer scientist than with his computer-illiterate neighbour. In more general terms, the world may develop communities of people that share similar cultural and professional interests. Ambient intelligence is aimed at developing and enhancing

such communities through its natural interaction, thereby providing means to people to serve their basic technology desires of staying in touch and in control (Aarts, et al., 2001: 246-7).

A final example can be found in a section by Mark Verberkt in *Ambient Lifestyle*, titled “The experience of being connected”:

People have a strong basic need to express themselves by associating with or dissociating from certain social groups. Important social groups could for instance be the family, a group of friends, sports companions and colleagues. In the real world, social interaction within groups is often facilitated by specific physical locations. For instance, people generally meet up with their family at home, with their colleagues at work, with their friends in the pub, etcetera. Broadband networking could enable social interaction in such a group despite the members of this group being in different locations (Aarts & Diederiks, 2006: 67).

Thus the user of AmI is clearly not just an individual whose personal tastes and needs need to be catered to; the user is also a person who is part of many communities, and wants to be in (constant) contact with other people.

2.4.4 Task-oriented AmI vs. Co-creation, Inspiration and Personal Growth

The third and final pair of oppositional user representations is concerned with the difference between AmI working *for* the user or AmI working *with* the user. This opposition deals with the view of the user as a passive person who is pampered by the – butler-like – AmI system versus a view of the user as an active person who engages in co-creation with AmI, who is inspired by AmI and who seeks – and finds – personal growth by engaging with AmI.

In part, the user is viewed as somebody who is to be assisted, whose life should be made easier by removing tedious tasks or annoyances. A simple example can be found in Waffenschmidt’s section in *Ambient Lifestyle* on the “powerpad” (Aarts & Diederiks, 2006: 181). This is a flat surface which will charge a mobile device placed on it, thus eliminating the use of several chargers with cables. A more complex example comes from Aarts & Encarnação (2006), who give a scenario of an AmI car system that can ‘manage incoming telephone calls in accordance with the current driving situation, thus preventing the driver from engaging in dangerous driving behavior’ (Aarts & Encarnação, 2006: 15). In Aarts and Appelo (1999), a scenario is given of a future home. In this scenario Saskia comes home and the AmI home system

immediately performs various tasks for her. It starts with recognizing Saskia and accordingly turning off the alarm. When Saskia hangs up her coat, the system “knows” Saskia will stay home for a while and turns on the heating and lighting in the home. When Saskia walks into the kitchen she is informed about incoming messages and she sees that the system has compiled a list of groceries, which is waiting for Saskia’s approval before being sent off to the supermarket. The system then informs Saskia about recipes which she can make with the available food in the refrigerator, while the TV in the living room has selected and recorded television shows for Saskia to watch (Aarts & Appelo, 1999: 11). Thus AmI is envisaged to perform a variety of tasks for the user.

However, as could already be seen in the Saskia scenario, AmI systems are not just performing tasks for the user, they can also “pamper” the user. Lashina and Horsten state this difference quite clearly in *Ambient Lifestyle* as they introduce their research into interactive AmI applications: ‘The scope for interactive applications was explored with a focus on the end-user benefits, both functional and hedonic’ (Aarts & Diederiks, 2006: 153). Ultimately, their research led to an interactive mirror which can, for instance, give beauty tips, turn the light on gradually ‘simulating the sunrise that will gently trigger your natural awakening’ (Aarts & Diederiks, 2006: 154) or allows the user to ‘multitask in the hectic morning rush’ (Aarts & Diederiks, 2006: 154) by giving a weather forecast, a traffic report and a suggestion for what to wear. Another example comes from the ‘Saskia scenario’ mentioned above. In between being informed about the groceries list and about potential recipes for the evening dinner, the system had also sent Saskia a message from her husband, who is at an art fair in Cologne buying some “old Corneilles.”⁶⁸ A painting catches his eye and he sends Saskia a picture of the painting via a camera in his jacket; she approves and deals with the transaction by briefly contacting the bank via the system. Thus the AmI system does not only take care of the everyday tasks, but also allows Saskia to do a little art shopping in between in a quick and convenient way.

More examples of the pampered user can be found throughout the visions, in particular in relation to media management systems. The title of a section 8.9 in *The New Everyday* is called ‘Easy Access and Lisy – ask and you shall receive, hum and you shall hear’ (Aarts & Marzano, 2003: 308). There are two technologies which are presented in this chapter. The first is “Easy Access” which is intended to organize music collections without ‘laborious cataloguing or physical searching on the part of the user’ (Aarts & Marzano, 2003: 308). The section continues: ‘You’re in a nostalgic mood and want to hear one of your favourite Beatles songs. You know which one, so you simply say to your Ambient Intelligence system, “Maestro! Lucy in the Sky with

⁶⁸ Corneille is a Dutch painter from the cobra movement. His paintings are expensive.

Diamonds, please”. The system “wakes up”, finds the song and plays it for you’(Aarts & Marzano, 2003: 308). LISy, the Living room Information System, does a similar job for video and speech content. A subtitle in the part on LISy reads: ‘Let’s cut to the chase – just give me what I want ...’ (Aarts & Marzano, 2003: 310). This is exactly what LISy is supposed to do; select the right media file out of a vast amount of content and do it quickly too. Thus, the goal of these systems is to please the user, to fulfil his or her every wish.⁶⁹ This way of positioning the user, as a person for whom tasks are performed but also as a person who wants to be pampered by the system, is a clear instance of how the user is represented in the visions of AmI.

References to the user as a co-creator provide a contrast to these user representations. The user is no longer passive and pampered by the system; the system provides options for the user and invites the user to partake in a collaborative effort at making or fine-tuning something. The user is thus positioned as an active and creative person:

Within Ambient Intelligence, people should be seen as ‘protagonists’ and co-creators rather than passive end-users or consumers. Ambient Intelligence products and services should aim to provide innovative and enabling means for us to improvise and move freely and creatively across situations and environments. They should respond usefully to the effort we invest in them, be sensitive to our current needs and leave control firmly in our hands, enriching daily life and human interaction (Aarts & Marzano, 2003: 217).

This statement derives from the sixth chapter of *The New Everyday*, which is titled “Transform, Grow, Become.” This chapter deals with how humans will be transformed by AmI, in terms of possibilities for becoming more human and leading more fulfilling lives in which they have meaningful or even poetic relations and interactions with AmI systems. In her chapter “The People Age” in *Ambient Lifestyle*, Josephine Green observes that ‘the emergence of people as authors and creators of their own environments, through and with the ambient technologies, means that they are becoming participators in our research and innovation’ (Aarts & Diederiks, 2006: 24).

Beyond co-creation, AmI also aims to provide opportunities for reflection, inspiration and personal growth. In Slava Kozlov’s section in *The New Everyday* on human personalities, AmI is portrayed as a technology that ‘may contribute to the “Guided transformation” of its users’ (Aarts & Marzano, 2003: 37). Kozlov elaborates on what this might entail:

⁶⁹ Examples of such media systems are by no means limited to the examples above. Articles on similar systems can for instance be found in sections 3.2, 3.12, 3.13, 3.15, 3.31, 3.32 of *Ambient Lifestyle*

Ambient Intelligence could (...) provide its users with valuable insights about their own behaviours and the strategies they use to form meaning. By providing smart tools for self-reflection and the co-creation of imagined selves, the system helps users understand the patterns of interactions exhibited by their own multiple I-positions. In that way, it furthers and participates in the self-development, or transformation, of its users. This capacity for helping people discover new aspects of themselves and thus develop their personalities in new directions could potentially become one of the most valuable propositions of Ambient Intelligence (Aarts & Marzano, 2003: 37).

This focus on “softer” personal values increases in importance over the years.⁷⁰ In Aarts and Grotenhuis (2009), the focus on mind, body, community and environment is shifted to the centre of what AmI should be. Aarts and Grotenhuis explain that ‘*“Mind”* is related to *Balanced Lifestyle* and focuses on an integral way that brings peace of mind in a demanding society. Balanced lifestyle addresses the need to cope with the personal, mental, and physical demands of a modern lifestyle’ (Aarts & Grotenhuis, 2009: 7).⁷¹ Thus AmI exists to allow people to co-create, get inspired, reflect on life and themselves, lead a balanced life, transform and search for personal growth.

Thus, on the one hand, there are AmI applications which serve the user and even pamper the user like an ideal butler. On the other hand, there are visions of AmI in which the imagined user is searching for co-creation, inspiring experiences, personal growth, harmony and balance. In these cases the user is addressed as a creative, emotional and spiritual person whose search for creativity, harmony and personal growth is assisted by AmI. Again, these ways of representing the user are clearly contrasting, but both are also very evident in the visions of AmI.

2.4.5 Guiding and supporting user representations

The analysis of user representations in the visions of AmI has shown that there are clear homogeneous user representations, but that there are also sets of oppositional user representations. This finding might provide an answer to the first question this chapter set out to answer, i.e. how is the user represented in Philips’ AmI visions? However, it is clear that the coexistence of homogeneous and oppositional representations begs a question, as one might view this structure as being somewhat paradoxical. Thus how

⁷⁰ See for instance, Aarts and De Ruyter’s discussion of co-creation in end-user programming: (Aarts & De Ruyter, 2009: 10).

⁷¹ The authors’ emphasis.

can the coexistence of homogeneous and oppositional user representations be explained?

In order to explain this structure, I took the concept of “guiding principle” introduced by Smit (1989) and elaborated by Elzen, Enserink and Smit (1990), Smit, Elzen, Enserink (1998) as a starting point. The guiding principle is a concept from the sociology of military innovations. In their studies on arms control and on the design of a European fighter aircraft and its radar, the authors introduced the concept of guiding principle as both an analytic and a normative, prescriptive concept. They claim that guiding principles such as “non-provocative defense” can help prevent destabilization of the equilibrium between the military super powers, which was clearly an important issue in the second part of the last century. Elzen, Enserink, Smit (1990) explain the concept:

The concept of ‘guiding principle’ has been developed to facilitate further elaboration of the idea of decentralized steering and regulation of military R&D within the framework of arms control. (...) The central premise behind the concept can be expressed as follows: various actors in the processes in which military technology is developed and implemented, act on the basis of ‘guiding principles.’ These guiding principles function as a strategy for problem solving, including criteria of evaluation, that guide military research, development and procurement (Elzen, et al., 1990: 173).

Based on a socio-technical network analysis, Smit (1989), Elzen, Enserink and Smit (1990), and Smit, Elzen and Enserink (1998) conclude that the network in which military innovation takes place cannot be controlled by one single actor, such as the Ministry of Defense. Guiding principles, however, are shared by the different actors in the network, and while actors may have their own reading of the guiding principle, the guiding principle plays a key role in the interactions between actors/organizations. As such, the guiding principle also functions as an intermediary between military doctrine and strategy, on the one hand and actual shaping of weapon systems, on the other.

While it is not possible to use the concept of guiding principle directly, it can serve as a source of inspiration, as interesting similarities exist between the concept of guiding principle and homogeneous user representations in the AmI visions. First, guiding principles and the homogeneous user representations both function at a higher level of abstraction. Smit (1989) states that the guiding principle of non-provocative defence should be ‘translated into concrete criteria regarding stability, offensiveness, defensive, non target, and so forth’ (Smit, 1989: 67). These criteria demonstrate a clear

resemblance at the level of abstraction with regard to, for example, anticipatory, adaptability, intuitiveness, unobtrusiveness and enrichment of experiences which are important elements in the homogeneous user representations. Both guiding principle and the homogeneous user representations do not point directly to what engineers and scientists should develop, but offer criteria for technological development on a higher level of abstraction.

This links up with the second resemblance between guiding principle and the homogeneous user representations: they may steer actions in a similar way. Guiding principles steer through a decentralized form of control from a position within the network. A guiding principle provides a general direction, a bandwidth of possibilities that allows various options, but also has a considerable limiting force (i.e. in the case of non-provocative defence, clearly aggressive, provocative military solutions should be excluded). The homogeneous user representations are the core AmI user representations which no author of the AmI visions contests. Thus the steering effect of these representations is rather similar; indirect, decentralized, from a position within the network, i.e. by actors who do not have total control, but who do hold key positions, like Emile Aarts. Via the homogeneous user representations, these actors do not directly and resolutely shape the specific technological projects, but they do steer their creation.

The third resemblance is related to mobilization of actors. In both military innovation and in AmI, many different actors need to be mobilized, both intra- and inter-organizational. A clear example is that, in the case of AmI, people with very different backgrounds need to adhere to the vision. Designers, social scientists, engineers, marketing strategists etc. are all needed to develop AmI, and the vision has to appeal to all of them. In addition, an R&D department like Philips Research will also have to legitimize and defend its plans and visions vis-à-vis the board of directors of a company like Philips and mobilize these directors to support the AmI vision. However the vision also needs to go beyond the context of Philips and generate awareness of and support for AmI with a wider range of societal actors such as university researchers, policy makers, other businesses and eventually consumers.⁷² In the military context, a guiding principle also has to appeal to and mobilize various actors within and outside of an organization like the Ministry of Defence or a weapons manufacturer. Due to these similarities, the homogeneous user representations can thus be seen as fulfilling a guiding role similar to that of a guiding principle. As a result, the homogeneous user representations found in the AmI visions can best be seen as guiding user representations.

⁷² This external support can, in turn, be used to gain internal support and legitimacy.

These guiding user representations have several characteristics. The three homogeneous user representations in the AmI visions, are, for instance, of a general nature and far less specific than the oppositional user representations. This non-specificity also makes it easier to let these guiding user representations function as ideographs or to incorporate ideographical terms. Ideographs (Van Lente, 1993; McGee, 1980; De Wilde, 2000) are terms which we quickly recognize as good and which we feel we should strive for, though they are often poorly defined and multi-interpretable (De Wilde, 2000). Freedom can serve as an example. We recognize freedom as being “a good thing”, but it can still mean or be used for a variety of causes. In the homogeneous user representations, we can find terms that are perhaps not clear-cut ideographs like freedom, but that do function in an ideographical manner. Who would not want intuitive, natural, non-obtrusive interfaces as opposed to non-intuitive, non-natural, obtrusive interfaces? It is presented as the “best” way to go. Thus guiding representations are quite general in nature and easily recognizable as a “good” development.

In addition to the general nature and the ideographical terms, the fact that there are several guiding user representations, allows for foregrounding and backgrounding of some user representations vis-à-vis others. An application may focus on intuitive, emotional interfaces and on improving experiences and focus less or perhaps not at all on adaptability or anticipation, but still comply with the guiding user representations. Thus, the general nature, the use of ideographical terms and the option of foregrounding and backgrounding of guiding user representations facilitates a high degree of interpretative flexibility (Pinch & Bijker, 1987) , in addition to a coherent and persuasive set of user representations.

This high degree of interpretative flexibility, coupled with the image of a coherent and persuasive set of user representations, can be related to the indirect form of steering of guiding principles. In this context it is useful to turn to Van Lente’s (1993) idea of expectations as resources for legitimization, mobilization and reduction of uncertainty. These can be seen as components of attempts to steer the direction of an innovation. Legitimization refers to the justification and backing of the technology which is proposed in the expectation or vision. Mobilization refers to, for example, mobilization of funds, attention, participation of actors and so on. Uncertainty is inherent in technological development and the reduction of uncertainty is important for the actors driving the development of a technology. The guiding user representations may fulfil a legitimizing role. Giving a coherent and homogeneous set of user representations makes it clear who the user, and consumer, of AmI is and what he or she can expect from the technology. In turn, such a coherent and persuasive image can justify the investment of time and money of an R&D department like

Philips Research (e.g. towards a board of directors). The guiding user representations may also mobilize actors and funds. Many different actors may be involved in developing AmI technology, both within and outside Philips. While not determining exactly what every actor should think about the prospective user of AmI, the guiding user representations do give a general perspective on the user, which influences – at least to some extent – the way in which different actors involved in the innovation process think about the user. Finally, guiding user representations can be said to reduce uncertainty. When a coherent and persuasive set of characteristics about the user in relation to the technology is given, this can provide clarity about what AmI is and who it is for, it can narrow the range of potential options, remove concerns, while simultaneously painting persuasive and enticing futures for the options that are kept open, thus portraying AmI as a credible and successful technology.

The guiding user representations present in the AmI visions thus have specific characteristics. They can be said to be of a more general nature (than the oppositional user representations), may contain ideographical terms, be flexibly interpretable and may steer in an indirect manner by legitimizing, mobilizing and reducing uncertainty. This can thus serve as a partial explanation of the way in which the user is represented in visions of AmI. However, there were also user representations which were in clear opposition to each other. The coming section will show how such opposing user representations fulfil several important *supporting* roles for the AmI vision.

In contrast to the guiding user representations, these supporting user representations are more specific; they are more a showcase of various user types and they make it easier to imagine different AmI applications. In order to shed light on the kinds of roles the supporting user representations may fulfil, I return to the three functions of expectations, given by Van Lente (1993). The supporting user representations may serve as legitimization, as they point to a diversity of possible users and uses of future AmI applications. This may legitimize the vision of AmI, as it may become harder to point to – disadvantaged – users who are left out. The guiding user representations may also help to mobilize funds and actors, especially actors that are not yet included in the network. For instance to some, AmI may seem to be just about gadgets. In such cases it is useful to point out that everybody could potentially be a user, including older people, children, the chronically ill, people in developing countries etcetera. This may then interest, for example, a Ministry of Health, building societies or health insurers in AmI, each of whom could be a key actor for the success of a particular application. Supporting user representations can play a role in reducing uncertainty as well. While the guiding user representations may be clear and unambiguous, they are also relatively abstract. Reading only these abstract statements about the user may make it difficult to understand the kinds of prospective users and

practical uses AmI may have. The supporting user representations give both tangible and wide ranging images and ideas about the prospective user and use practices and thus reduce uncertainty. In this sense they also provide flexibility; if circumstances require it in the future, a supporting user representation may be played down, changed, withdrawn, strengthened or updated, without having to alter the core guiding user representations. Generating a wide range of user representations can thus be useful. Indeed, if one of the proposed AmI technologies (and accompanying user representations) becomes successful, the vision can serve post hoc as a prediction, thus legitimizing the effort being put in at that time. Conversely, if one of the user representations becomes problematic due to some unforeseen event or development, it can be downplayed or dropped altogether. The supporting user representations can thus serve as a resource with which to deal with the uncertainties of developing a new technology.

By viewing the homogeneous and oppositional user representations as guiding and supporting user representations, the contradictory nature of homogeneous and oppositional disappears and a more productive structure of guiding and supporting user representations takes its place. Guiding user representations are relatively unambiguous and more easily recognized as “the way forward.” They are, however, not very specific and do not facilitate the inclusion of concrete examples. This task is taken up by the supporting user representations; although they may at times be at odds with each other and can probably not be applied to every AmI application, they do give substance and flexibility to the representations of the prospective users of AmI, giving the option of further – and other forms of – legitimization, mobilization and reduction of uncertainty.

2.5 Changing visions

This chapter focuses on AmI visions from their origins in 1999 until the latest visions at the time of writing, which date back to 2009. It will come as no surprise that the visions of AmI have also changed – and in no small part – with regard to the way in which the user is represented. The core idea of AmI and the guiding user representations have changed remarkably little. However, the way in which AmI is positioned, the kinds of technologies envisaged and indeed the (emphasis on particular) supporting user representations have changed. In the early days of AmI, the emphasis seemed to be on developing technology for the “gadget lover”; on pampering the user with personalised technologies. This is exemplified by the Saskia scenario in

Aarts en Appelo (1999: 11) mentioned above.⁷³ While a representation of the user as “the user as everybody” was never completely absent, it has gradually become more important. In *The New Everyday* and in *Ambient Lifestyle* explicit attention is, for instance, given to for instance children, older people, people suffering from heart disease or other illnesses and people in developing countries. In Aarts and Grotenhuis (2009) and Aarts (2009), these representations of the user have moved centre stage, almost eclipsing the “gadget lover.” Aarts and Grotenhuis claim that ‘our society calls for an approach different from the technology push of the past decades. The key issue is that AmI solutions simply should make sense. Technology should support and enable meaningful balanced lives’ (Aarts & Grotenhuis, 2009: 6). In their view, this implies a focus on health and wellbeing, personal healthcare, balanced lifestyles, “peace of mind in a demanding society”, participation in communities, responsibility for the environment, participation and inclusion of all people in society, taking care of one another and contributing to society (Aarts & Grotenhuis, 2009: 6-7). To be sure, the view of the user as a gadget loving person in search of hyper-personalisation and pampering still remains important, especially in the technological projects under development,⁷⁴ however the more inclusive supporting user representations, which have greater emphasis on community, creativity, and living a balanced life, have decidedly become more prominent.

A second major change in the visions of AmI over the years is the increased emphasis on health and well-being. This is related to the shift that Philips made in 2004 when the company decided to increase its focus on health and wellbeing related technologies, such as CT and ultrasound scanners for the hospital setting, and remote monitoring, such as various heart monitoring systems, and personal fitness coaches for the home (Anonymous, 2004a, 2004b; Scholtens, 2004; Stil, 2004; Van Weert, 2004). This change also had its effect on Philips Research and the AmI visions they produced. While a significant number of the exemplary projects in *Ambient Lifestyle* are media management systems and other gadget-like technologies, a sizeable portion of technologies have an explicit focus on health and well-being, such as a smart bed which can unobtrusively monitor people with heart diseases while they sleep (Aarts & Diederiks, 2006: 203-5), an intelligent home monitoring system for older people (Aarts & Diederiks, 2006: 207-9), a lighting system adapted to the needs of older people (Aarts & Diederiks, 2006: 211-3) and a fitness coach (Aarts & Diederiks, 2006: 156-8). In addition, in several of the more gadget-like projects a different application

⁷³ It is interesting to note that there are (very) similar scenarios to the Saskia scenario in Aarts et al. (2001: 237-8) and Aarts and Marzano (2003: e.g. 330).

⁷⁴ There could be an element of lag here, as the development of actual technologies will lag behind the development and positioning in visions. It will thus be interesting to see whether and what kinds of technologies will be developed on the basis of the “AmI 2-0 paradigm” in the coming years.

of the same technology is envisaged which would move it into the realm of health and well-being. An example is the remote control – already mentioned above – that allows the user to ‘zap stations with a slight flick of the wrist [and] to turn on and off lights by ‘shooting’ at them’ (Aarts & Diederiks, 2006: 118). Near the end of the chapter this uWand remote control technology is also envisaged as an interface for radiologists and cardio surgeons.⁷⁵ There is thus a clear increased focus on health and well-being within Philips and in Philips Research’s AmI visions. It is in this context of moving towards health and well-being related technologies and, in turn, a strengthening of the “the user as everybody” representation, that older people as potential users of AmI technologies become more prominent.

2.6 Discovering the older user

In earlier visions (Aarts & Appelo, 1999; Aarts & Eggen, 2002; Aarts, et al., 2001), older people are virtually absent, whereas in later visions (most notably Aarts & Diederiks, 2006; Aarts & Grotenhuis, 2009) the older user is much more visible. To be sure, the older person as the user of AmI is never dominant as a prospective user in the AmI visions, but it is interesting to observe that in the ten years that the AmI visions span, the older user has become a more important prospective user.

2.6.1 Defining older people in terms of illness and care

A clear indication of the increased prominence of older people as potential AmI users – and indeed of the intimate relation being drawn between older people and (health) care – is the opening of CareLab in 2006. *Ambient Lifestyle* (Aarts & Diederiks, 2006) was published to mark the opening of Philips’ ExperienceLab. ExperienceLab is an extension of the HomeLab testing facility, which is a laboratory in the guise of an average home. The concept of ExperienceLab is that people can interact with AmI products and prototypes in a “normal” everyday life setting, while they are being observed by Philips’ researchers, via sensors and cameras in the home. In 2006, HomeLab was extended and renamed ExperienceLab. Two extensions were made: ShopLab, focusing on technologies and prototypes for retail purposes and CareLab. As Van Loenen, De Ruyter and Teeven explain in *Ambient Lifestyle*, CareLab has a specific focus: ‘The CareLab research programme will focus on ‘elderly care.’ A senior apartment block has been built’ (Aarts & Diederiks, 2006: 53). Thus this investment in

⁷⁵ This also illustrates why it is useful to generate a range of supporting user representations. A technology envisaged for one particular use, may have applications in another area. It is easier to switch if other supporting user representations are already in place.

a new laboratory is made to facilitate research and development of care technologies for older people; here we see a (first) relation being drawn between older people and care.

In the visions of AmI, the connection between (health) care and older people turns out to be a very common link. When older people are the subject of vision statements, a distant and medicalized way of talking about older people can often be found. One recurring theme is lighting innovations for older people, which is discussed in a specific way:

Ageing is accompanied by changes in visual performance. A large proportion of elderly people suffer from significant visual impairment under seemingly 'normal' lighting conditions. In order to compensate for their reduced eyesight, elderly people may require between three and five times higher lighting levels than young people (...). What's more, they are also more sensitive to glare. Visual impairments reduce elderly people's ability to function independently and increase the risk of depression and injury from falls (Aarts & Diederiks, 2006: 211).

The authors – De Beer et al. – continue by stating that lighting is important for regulating the biorhythm, which 'is particularly important for the elderly as many elderly people suffer from sleep disturbances' (Aarts & Diederiks, 2006: 211).

Subsequently, they argue that loss of biorhythm can degrade 'the experienced quality of life for both the individual concerned and their family' (Aarts & Diederiks, 2006: 211).

Whereas lighting applications for other users are often discussed in terms of creating attractive experiences, lighting applications for older people are related to medical problems such as impaired vision or sleeping disorders. An example of this is provided by the article by Van Loenen et al. in *Ambient Lifestyle*. They discuss the (technical) requirements, applications, testing and experience of a virtual window, a lighting concept which creates the impression of a window, for instance in windowless rooms. In this article, the importance of lighting for "a pleasant atmosphere" is emphasised and the salient elements of "a window experience" are discussed, up to the point of explaining how to create a "beach feeling" or a "sunset feeling." Older people are only mentioned at one point in the article: 'additional functionality [of the virtual sunlight window] might be included by adding blue light for better stimulation of melatonin production to improve sleep/awake cycles for elderly people' (Aarts & Diederiks, 2006: 150). Thus experience and atmosphere are swapped for sleep/wake cycles and melatonin production.

This way of describing older people in distant medical terms is of course not unproblematic. It is a clear example of the construction of old age as a medical problem (Joyce & Mamo, 2006) and it highlights a particular and rather narrow view of older

people. Specifically, in the visions of AmI, an overwhelming majority of references to older people treat older people as people who could be classified as being in their fourth age. The third age and fourth age are distinctions first made by the historian Peter Laslett (1987, 1989). In a 1997 article, Laslett states that ‘the populations of now-developed countries are uniquely old. There have never been populations as old before anywhere else in the world’ (Laslett, 1997: 1806). This ageing has taken place relatively suddenly. Laslett shows that between 1000 AD and the mid to late 1800s, life expectancy at birth oscillated between 30 and 40 years, only to begin an explosive rise in the second half of the nineteenth century. By 1950, the life expectation at birth had risen to over 65 years. According to Laslett, before this shift ‘retirement was rare because older people were few and worked until they dropped’ (Laslett, 1997: 1808). He states that from the 1950s onwards, a new stage in the life course of people in developed countries emerged: ‘After a ‘first age’ of youth, dependency, education and maturation, a ‘second age’ of maturity, earning and responsibility, there now arrives a ‘third age’ of personal achievement and fulfilment – the crown of individual life, as enthusiasts tend to call it, a ‘third age’ brought to an end though, for some people only, by a ‘fourth age’ of dependency and decrepitude’ (Laslett, 1997: 1808). Thus the third age emerges as a period of activity, enjoyment, and personal growth, without the responsibilities of the second age or the physical deterioration of the fourth age.⁷⁶

In the visions of AmI, people in their third age are remarkably absent. Images of people in their first or second age are common and in the later visions older people have emerged as prospective users, however these are nearly always people with (serious) health problems or those who are dependent on technologies and (in)formal carers.⁷⁷ In the AmI visions, older people are thus seen as people in – or at least very near – their fourth age. One way in which the older person is positioned as a person in their fourth age is the association with being tied to the home. For instance, in *Ambient Lifestyle*, a “smart” interface is proposed that interacts through speech, vision and movement: ‘[D]evelopers can shape Smart Companion to carry out countless tasks

⁷⁶ The idea of a third and a fourth age has given rise to much debate. Some authors deny the existence of a fourth age (see e.g. Laslett, 1997: 1808 for examples). Others have tried to give the third and fourth age chronological connotations (see Laslett, 1995 for examples). To be sure, the border between the third and the fourth age can be vague as people may grow progressively more dependent and develop more health problems. Nevertheless, the distinction between the third and the fourth age is important, as it emphasizes differences between older people, i.e. that older people should not be seen *a priori* as dependent people with poor health.

⁷⁷ I came across one clear counter example. In an article in *Ambient Lifestyle* by De Ruyter, an AmI assistance system for older people is envisaged. On the basis of sensors in clothing, mobile devices and in the home, this system can gather information and ‘this information can be used to support people in maintaining an active and independent lifestyle that includes social, wellbeing, health and entertainment elements’ (Aarts & Diederiks, 2006: 207). In addition to the standard references to health, well-being and maintaining independence, a reference is made to entertainment and the word “lifestyle” is used in the context of older people. References to older people in this broader way are, however, very rare.

– from searching the Internet and providing language training to serving patients and the elderly in their homes’ (Aarts & Diederiks, 2006: 165). In *The New Everyday*, Stefano Marzano describes how web-based technologies can solve problems of distance, place and mobility. As mentioned earlier in this chapter, he mentions various groups of (disadvantaged) users, including older people: ‘The same [web-based] technology could also be adapted to provide Ambient Intelligence service in the industrialized world for older people, in the form of online health monitoring or home diagnostics or a shopping and delivery service for them’ (Aarts & Marzano, 2003: 11). Older people are once more viewed as being tied to the home and as people with poor health. Living at home can also be part of stereotypical views of older people, as the following quote from the article by De Beer et al. in *Ambient Lifestyle* exemplifies: ‘as elderly people often spend a very limited amount of time outdoors, they rely a lot on windows and artificial lighting for body clock regulation’ (Aarts & Diederiks, 2006: 211). The authors go on to emphasise that these ‘new lighting concepts should fit seamlessly within the – usually quite rigid – daily routines of elderly people’ (Aarts & Diederiks, 2006: 212). The older person is thus seen as somebody who does not get out much and has strict daily routines. While these stereotypical views are not widespread, the idea of older people as being tied to the home, as having health problems and as being dependent on others is very common.⁷⁸

This link between older people and poor health, being tied to the home and being dependent on others is also apparent when monitoring technologies for older people are discussed. One such technology is the SmartBed. When discussing the uses of presence detection that SmartBed offers, an example of automatic lighting is given, but another example is also offered: ‘another example is presence surveillance in professional elderly care, where information on people leaving their beds can be transmitted to the night nurse so that accidents, such as falls, can be prevented’ (Aarts & Diederiks, 2006: 205). It is thus seen as acceptable to send information about nightly behaviour to care workers if a fall can be prevented. Occasionally, the transfer of information gathered by monitoring systems to relatives, physicians or care workers is presented as a choice:

Besides providing a feeling of safety and protection to the seniors, [ILSA] provides a remote monitoring service that alerts care centres or relatives, as desired by the occupants. The ILSA project is targeted at developing interactive solutions

⁷⁸ Though not mentioned very explicitly, the underlying idea seems to be that older people are not only tied to the home, but that the home is also their preferred place to live, with strong links to independence. The home as the ideal and preferred place to live for older people is a very dominant theme in AmI and other (telecare) technologies for older people. This notion of older people and the home is discussed more extensively in chapter 4.

for people who might need assistance, like elderly people, who have experienced a major event, such as losing their partner, or who are at risk, for instance of falling (Aarts & Diederiks, 2006: 207).

However, generally, having such a monitoring technology is (implicitly) seen as in the best interest of the older person and no reference to choice is made. For example, when discussing the merits of the intelligent house, Aarts & Encarnação comment that ‘the needs of the elderly receive special consideration’ (Aarts & Encarnação, 2006: 15). This special consideration subsequently consists of two parts; a telephone system that does not require older people to come to the phone and a house that ‘contacts the relatives or the physician in case the person’s vital functions experience a change for the worse’ (Aarts & Encarnação, 2006: 15). After that there is no further mention of older people in this chapter by Aarts and Encarnação. Thus, the only time older people are mentioned in that chapter is in terms of people who are unable to come to the phone, as people whose health situations are so bad that they require constant monitoring of their vital functions and as people who are prepared to surrender this information to relatives and physicians. Such a situation is imaginable, but only for people in their fourth age.

Thus the rhetoric of choice, lifestyle, experience and pampering has disappeared virtually completely. Instead there is a rhetoric of acting in the best interests of older people, helping them to live at home, to deal with their illnesses and monitoring them for their own good. Importantly, this is often positioned as good for the older person. But also for society.

2.6.2 The Ageing-and-Innovation Discourse

As mentioned in the introductory chapter of this PhD thesis, a specific kind of discourse can often be found in publications about new technologies for older people; this discourse positions older people, or rather the ageing population, as, or as related to, a major societal problem. According to this discourse, ageing will result in major financial, care and labour related problems; the ramifications of our ageing populations will lead to a crisis and some action needs to be taken. This type of reasoning has been called the ‘crisis account of ageing’ (Mort & Roberts, 2010; Ney, 2009). One of the key ways which is proposed to totally or partially resolve this crisis situation is the introduction of new technologies into the lives of older people (Mort, et al., 2008; Mort & Roberts, 2010; Mort, et al., 2009). The visions of AmI are no exception. This “ageing-and-innovation” discourse is a key way in which older people are represented in the AmI visions. In *Ambient Lifestyle*, a chapter by Boris de Ruyter called “An

Intelligent Home-monitoring System for Seniors” provides several examples of this discourse. The chapter starts as follows:

Ambient Assisted Living constitutes a research field within Ambient Intelligence that is currently attracting much attention. The objective is to study smart sensor-based environments that can assist ordinary people in their daily life activities. Elderly people constitute a special target group within this domain since the size of the aging population is growing rapidly and therefore the cost of healthcare and well-being has reached a level that requires global action. It is generally believed that smart environments may provide a solution to this problem because they can increase the period of time during which elderly people can continue to stay in their homes and maintain an independent lifestyle (Aarts & Diederiks, 2006: 207).

De Ruyter goes on to give an example of such a smart environment: ILSA, the Intelligent LifeStyle Assistant. Despite the use of the word “lifestyle”, the ILSA system still positions older people as people in their fourth age. Moreover, there is an intimate interweaving of societal benefits and benefits for such older people, which is typical of the ageing-and-innovation discourse:

The primary goal of the ILSA project is to enable people to maintain an active, healthy and independent lifestyle. To that end, numerous benefits could be envisioned at the various levels of the healthcare supply chain. As the initial focus of the project is the elderly segment of the population, anticipated benefits for this segment and their relatives are:

- Helping the elderly maintaining an independent lifestyle.
- Enhancing the feeling of safety and wellbeing.
- Reducing the caregiver load and the risk of burnout.

The ILSA system will not only contribute to the wellbeing of seniors, but will also result in cost reductions at various levels in the healthcare supply chain in the following way.

- For the elderly by delaying or possibly eliminating the need to live in alternative but expensive care facilities.
- A reduced burden on the healthcare system by allowing care providers to spend time on other high-risk patients.

- Reducing the number of visits to hospital by elderly people for check-ups as remote monitoring reduces the needs for such visits.

The value of systems such as the ILSA system lies in their success in addressing manifest user needs (Aarts & Diederiks, 2006: 208).

These “manifest user needs” coincide happily with the perceived needs of society and, of course, with the needs of companies developing AmI. For these companies, this positioning of older people and society in this way creates an opportunity to make and sell technologies as Van Breemen et al. clearly state in *Ambient Lifestyle*: ‘For instance, in the area of products for senior citizens an enormous market (...) will be created due to the rising cost of health care, manpower shortages and the aging population’ (Aarts & Diederiks, 2006: 162-3). The reasoning is thus that older people win, society wins and the manufacturer wins: the rhetoric of the ageing-and-innovation discourse is thus one of “triple-win.” However, in order to invoke this triple-win rhetoric, an image of older people as dependent and in poor health is necessary, for without this image, the societal benefits disappear and what is left would simply be a consumer product.

2.7 Conclusion

This chapter dealt with the question as to how users in general and older users in particular are represented in AmI visions. In the first part of the chapter, the user representations in the AmI visions were analysed using the distinction between guiding and supporting user representations. In the AmI visions, the user was attributed certain key characteristics which were shared by all authors and never challenged; first, users want to be recognised by AmI systems and have the system adapt to and even anticipate their needs; second, users do not want obtrusive, ugly, hard to use technologies, but rather prefer technologies with intuitive, natural and emotional interfaces; And finally, users want more and better experiences. While these representations guide the development of AmI, they are quite broad and their meaning is closely related to the technology and how the user interacts with it.

The supporting representations provide a more detailed and diverse view of the prospective user of AmI which is more closely related to user identities. These supporting user representations allow the user to be positioned in various ways. On the one hand, the user could be a gadget loving, active younger, person. On the other hand, a far more inclusive view of the prospective user was also adopted which included children, people in developing countries, people with disabilities or older people. Two other supporting representations were dominantly present in the AmI visions; AmI

may focus on personalization for the individual or on communication and community building. Furthermore, AmI may focus on performing tasks for the user, pampering him or her as the perfect butler, but AmI may also provide opportunities for creation, inspiration and personal growth. Thus by representing the user with guiding and supporting representations, a strong guiding image of the user could be given, but a diverse set of more specific images – and thus technologies – also remained possible.

Older people were never a dominant prospective user in the visions of AmI, although in later visions more attention was given to them as potential AmI users. When, in the later visions, older users are positioned as potential users of AmI technologies, they are often seen as people who are tied to the home, in poor health and dependent on other people and technologies. This representation which centers on dependency and decrepitude is thus a strong image of people in their fourth age. Older people who would be classified in social gerontology as being in their third age are not seen as prospective AmI users. To be sure, some older people are indeed in their fourth age, being dependent on others and suffering from poor health, however the majority of people who are retired are in relatively good health and live independently. Thus representations of older people in their fourth *and* third ages, would, on the one hand, have provided a broader and more inclusive view of older people, and on the other hand, could also provide Philips with an additional market.

Moreover, it is peculiar that this more inclusive view was not adopted, as the structure of the AmI visions is ideal for it. First, such an inclusive view fits in well with the guiding representations in the AmI visions. People who are in their third and fourth ages derive from a different technological generation (Docampo Rama, 2001; Docampo Rama, et al., 2001) than, for instance, people who are currently in their twenties, thirties or forties. This means that older people are more accustomed to and can work more easily with a type of user interface that was common when they were younger. Conversely, they may experience the interfaces of current technologies as being obtrusive. The natural intuitive interfaces based on speech and gesture that AmI promises might offer a solution. In addition, the emphasis on experience and lifestyle, which is central to AmI, fits in well with the idea of the third age as a phase for experiencing new things and personal development.

Second, a view of older people as people in both their third and fourth ages also matches the structure of supporting user representations found in the AmI visions. By positioning older people as ill and dependent, they are firmly placed in the ‘User as Everybody’ category. The claim is not that older people could or should become “gadget lovers” – though there is no reason why they should not either – but that developers of AmI could tap into the image of older people as active people with a zest for life. A focus on (luxury) leisure products, tapping into repertoires of successful

ageing (Baltes & Smith, 2003; Calasanti & King, 2005) could have been a natural extension of the “gadget lover”, pampered user vision of the user of AmI.⁷⁹ Indeed, it is easy to envisage how AmI for older people could also be related to both task-oriented AmI technologies (e.g. performing digital tasks) as well as technologies focused on co-creation, inspiration and personal growth (e.g. in line with ideas about successful ageing). The same is imaginable for personalization and communication and community building. What is at stake here is not what exactly to imagine – what kind of technologies and applications – but that it *could* have easily been imagined, if older people were not solely viewed as people in their fourth age. Thus we end up with the question: why not?

A partial answer to that question was already offered above as the triple win rhetoric of the ageing-and-innovation discourse which necessitates an image of people in their fourth age. Of course, one could argue that Philips could choose not to invoke this rhetoric, but that would negate how powerful and commonplace this rhetoric has become. By invoking this rhetoric, the development of AmI technologies for ill and dependent older people is easily legitimized and it becomes much easier to enrol actors in innovation processes who would otherwise be much harder to enrol. Such actors could for instance be building societies, municipalities, governments, the EU (e.g. via the Ambient Assisted Living funding programme) etcetera. The rhetoric can also reduce uncertainty as it makes use of demographic trends, which are seen as very reliable predictions of the future, and extrapolates from these demographic trends that the development of a technology is necessary to avoid a societal disaster. Moreover, this allows the proponents of such technologies – in this case the authors of the AmI visions – to position the development of a technology for – fourth age – older people as a “good” thing.

The rhetoric of the ageing-and-innovation discourse contains elements which point to an underlying reason as to why older people are only seen as people in their fourth age. In the AmI visions a distance is created between an “us” that the designers belong to and “them” which older people belong to. This can be illustrated with a brief return to some of the empirical parts mentioned earlier in this chapter. In *Ambient Lifestyle* there is a section – by Brauers et al. – on the SmartBed project, a monitoring technology which can monitor people while they sleep. A clear example of the creation of this distance is given: “The Smartbed is for taking care of people while they are asleep. It can help you stay fit, but it can also increase the quality of life for people with

⁷⁹ To be sure, I am not saying that successful ageing is an unproblematic stance towards ageing. Particularly it can be seen as a subtle form of ageism (see Calasanti & King, 2005 for an interesting analysis of the problems of successful ageing including successful ageing as a form of ageism). However, like so many companies operating on the US market, Philips could have easily tapped into this repertoire of successful ageing. It is remarkable that they did not.

heart disease and increase their life expectancy' (Aarts & Diederiks, 2006: 203). Note the remarkable shift in the way this is phrased: Smartbed can help *you* stay fit, but it can also *increase the quality of life* for people with heart disease and *increase their life expectancy*. "You" are supposed to be looking to achieve fitness – a lifestyle choice – while "you" are not an (older) person with a heart related illness. This (older) ill person is, by contrast, discussed in abstract terms of *quality of life* and *life expectancy*. At the end of the section another instance of this kind of distancing is given:

Even the simpler features, like presence detection in bed, can be used to great advantage. One example is the control of bedroom lighting, e.g. floor lighting that guides you when you get up in the night. Another example is presence surveillance in professional elderly care, where information on people leaving their beds can be transmitted to the night nurse so that accidents, such as falls, can be prevented (Aarts & Diederiks, 2006: 205).

Again there is a formulation with "you" followed by far more distant approach to older people in terms of professional care and fall prevention. In other words, older people – and, for that matter, people with serious or chronic illnesses – are seen as the "other." They are not seen as "normal" consumers, but as a special category of users with special (medical) needs and special characteristics – such as being tied to the home and being dependent on others – that need to be taken into account.

At no stage in the AmI visions is an older person treated as "one of us." This othering (Bytheway, 1995; Oudshoorn, 1996b) is mostly achieved by objectifying older people in two ways. First, there is a distinct medicalized way of speaking about older people; it is common in the AmI visions to speak of older people in terms of heart failures, melatonin levels and sleep/wake cycles. Second, older people are discussed as a societal problem, in terms of ageing societies and speculation about future costs of (health) care and how "we" are going to afford all of this. These are thus discussions in abstract medical, demographical or economical terms and in such discussions older people are turned into the objects of discussion, someone or something different from "us."

Older people are thus treated as "the other", and this is a decrepit and dependent other. A slightly speculative conclusion is thus that it seems difficult or not sufficiently interesting for the authors of the AmI visions to cast aside this image of the old, ill and dependent other (even though this would be very easy within the given structure of guiding and supporting representations and even though different and perhaps profitable images of third age older people are easily imaginable). Nonetheless this homogeneous image of an older person as the decrepit and dependent other is the

dominant user representation of older people in the AmI visions. This is remarkable as it is a common conclusion in various social studies of ageing that older people are in fact likely to be *more* diverse, *not less* diverse than people from other age categories (Thompson, 1992, 1993; Wilkinson & Ferraro, 2002). These homogeneous, fourth age views of older people may not only be a missed business opportunity – as employing a third age view of older people and tapping into repertoires of successful ageing may well have provided an additional market – but these fourth age representations could well be the seed for future problems with the acceptance of AmI technologies for older people, as they may not recognize themselves in this “decrepit and dependent” view of older people. Indeed, the fact that this can become an issue can be seen in the next chapter.

3. 'But obviously not for me': robots, laboratories and the defiant identity of older test users⁸⁰

The tragedy of old age is not that one is old, but that one is young

Oscar Wilde - The picture of Dorian Gray

3.1 Introduction

Whereas visions can afford its authors a wide range of possible user representations, to be used in a rather free non-committal way, actual design practices have to deal with the user in a much more concrete and pronounced way. The testing of technologies, in this case of an AmI human-interaction robot, is an ideal venue to study these concrete user representations.

In popular⁸¹ and academic⁸² discussions of robotics for older people, and, as has been argued in previous chapters, in discussions of other technologies for older people as well, one can often find a specific set of claims. These claims include several related statements: populations are ageing across the world, costs of aged care and healthcare are increasing, qualified staff to care for old people is increasingly getting scarce, and old people prefer to live independently as long as possible. This crisis-account of ageing (Mort & Roberts, 2010; Ney, 2009) often concludes that ageing populations lead to unprecedented challenges around the world. Robotic technology is one of the key technologies that is said to solve or mitigate one or more of these challenges (Sparrow & Sparrow, 2006). The point here, in line with the previous chapters, is not that these challenges and demographic trends are not real or problematic, nor that the proposed technologies cannot play important roles in helping to solve or mitigate these problems. In this ageing-and-innovation discourse, however, older people are often

⁸⁰ This chapter is based on an article published by the author in *Sociology of Health and Illness* (Neven, 2010).

⁸¹ This can be seen in articles from major newspapers in the Netherlands. For instance: 'Robot veroverst steeds meer terrein', Mathilde Sanders, *Volkskrant* (December 14th 2001). 'De opmars van de zorg- en dweilbots' Rob Zeeman, *Trouw* (April 16th 2002). 'Hightech houdt Japanse bejaarden zelfstandig' Margit Kranenburg, *Trouw* (February 11th 2005). 'De robot wordt huisvriend, maatje, partner; maar hoever gaat die liefde?' Monique Snoeijs, *NRC Handelsblad* (May 21st 2005). 'Technische snuffes helpen oude Japanners', anonymous, *Trouw* (October 5th 2007). 'Een robot in elk huis', anonymous, *Volkskrant*, (October 21st 2008). Interestingly, many stories about robotics and older people are reports and reflections on developments of robotics for older people in Japan. In these articles Japan is often seen as both an extreme as well as a view of a possible future for the Netherlands.

⁸² See for instance: Montemerlo et al. (2002), Roy et al. (2000), Wada et al. (2002), Heerink et al. (2008), Pollack et al. (2002).

positioned as having deteriorating health and needing costly care, which in turn will drain limited healthcare resources. This is a narrow portrayal of older people in which old age is strongly related to illness, frailty, lost competences, and expense.

Given this portrayal, an important question arises: what user representations of older people and their health underlie design processes of these robots? If ideas like the ones discussed above are underlying, then the resulting technologies may implicitly or explicitly position older users as frail, ill, or in need of care, and in turn script such user representations into those robots. In this context, an important link can be made between user representations (and script), and studies of ageism (Butler, 1969; Bytheway, 1995, 2005; Calasanti & King, 2005; Calasanti & Slevin, 2006a; Joyce & Mamo, 2006; Laws, 1995; Minichiello, Browne, & Kendig, 2000). When user representations are ageist, such ideas may be inscribed in the technology and may act in materialised form in society, while at the same time becoming nearly invisible and seemingly part of the natural order of things. Part of understanding 'the gray cyborg' (Joyce & Mamo, 2006) involves becoming sensitive to and analysing potential ageist (or age) scripts. Examining how ageing users are imagined in design processes is thus the starting point for understanding the age scripts of technology and the subsequent socio-technical practices of older people.

This chapter focuses on test users and designers' user representations in tests with a human-interaction robot. For the purpose of this chapter, the robot will be called iRo.⁸³ A Dutch firm's research department developed iRo: the firm specialises in developing healthcare and wellbeing related technologies such as telemedicine and medical imaging technologies. The designers imagined iRo as a technology that could initially keep older people mentally active and preserve or enhance their cognitive health, and then later serve as an assistive technology to which a variety of applications could be added if the older users became frail, ill, or less mobile as they aged. Various representations of older people, of their health and their ideas about technology, are present in the iRo research project. These tests thus provide an opportunity to study the ways in which older users are represented and how these ideas of older users and their health are being integrated in material objects.

3.2 Research methodology

In order to study how researchers and test users imagined robot use and ageing, a multi-method, qualitative approach was adopted. First, semi-structured in-depth interviews were conducted. I had informal conversations – partly via e-mail – with four

⁸³ The name iRo is fictitious. A brief check was conducted and no robot named iRo was found. Any reference to a robot actually called iRo is therefore accidental.

researchers (two psychologists and two engineers). The researchers were all in their mid-twenties to early forties. The two researchers who were particularly active in the project were interviewed in-depth. I did one interview during the laboratory phase where both researchers were present and one interview after the field tests at which only one of them – “Marjolein” – was present. Both interviews were taped and fully transcribed. In this chapter the two main researchers will be called Johan and Marjolein. Johan, a middle-aged male engineer, is a senior researcher who supervised the project. Marjolein, a young woman, is a junior researcher with a background in psychology. She conducted the laboratory tests and co-ordinated daily affairs. I was not allowed to interview participants as Johan and Marjolein were concerned that they should not be overburdened.

Secondly, I conducted fieldwork by observing people aged between 62 and 79 as they interacted with iRo and researchers in the laboratory. In total, I observed six tests which lasted about half an hour to one hour each. I also observed six interviews between Marjolein and the test users, which lasted about half an hour each and took place directly after the tests. I interviewed the researchers about six other tests and the field tests conducted at users’ homes to gain information on the researchers’ perspective on these tests and on the behaviour of older participants. Interviews and fieldwork were conducted between August 2007 and January 2008.

Finally, I analysed how older users are represented in documents and publications produced by the research department. These documents included technical documentation about iRo, publications from earlier research with iRo, preparatory research for these tests, consent forms, questionnaires, and a full report of test results. All data were systematically read and statements in which old people were represented in any way were copied into a data file. The data file was subsequently used to generate and check categorisations of user representations.

It proved necessary to anonymise the research project and the company. Thus it is not possible to refer directly to or quote publications, though summaries will be given. As already noted, the names iRo, Marjolein and Johan are fictitious. However, quotes from interviews and observations, translated by the author from Dutch into English, are provided. All quoted statements from Johan and Marjolein stem from interviews. All quoted statements from older participants stem from observations.

3.3 The co-construction of iRo and representations of iRo’s older user

As described earlier, iRo was developed by the research department of a Dutch profit-based company that operates on an international market. The company focuses on developing technology in the area of health and wellbeing, but is also (still) involved in

other technological markets. Within this company, there is an increasing focus on (health-related) technologies for older users. This increasing focus on older users is a world wide trend, as exemplified by MIT's Age Lab, the Georgia Institute of Technology's Human Factors and Aging Laboratory, the European Ambient Assisted Living project and the creation and marketing of robots intended for, or tested with, older people, like Aibo, Ifbot, Wakamura and Paro.⁸⁴ These robots range from robotic animals (Paro) or pets (Aibo) to robotic companions and assistants (Ifbot, Wakamura). Although most robots are not designed solely with older users in mind, companies do imagine these robots as (health) technologies for older people and hope they will help prevent cognitive decline, combat loneliness, or provide reminders to take medication as people age. Robot use is hoped to help individuals age at home, and thus alleviate the healthcare costs associated with the move of older people into nursing homes or hospitals.

3.3.1 iRo as a tool with which to gain knowledge about older users

The researchers initially developed iRo to understand the ways in which users interact with socially intelligent robots. Though iRo has a polished appearance, Johan stressed that iRo was not a product and was solely intended 'as a research prototype', at least for now. However, based on the iRo research project, the researchers envisaged the future development of robots which could be sold to aged consumers as both preventative technologies that help maintain cognitive health and as assistive technologies to be used when cognitive skills or mobility decline.

iRo is a brightly coloured, relatively small, immobile robot that usually sits on a table. It cannot physically manipulate its environment, but it can speak to people and can manipulate other digital technologies. Depending on iRo's programming, it can perform tasks itself but it can also serve as an intermediary between people and digital technologies. For example, in other tests iRo was used to set alarm clocks and operate audio equipment. It is easy to communicate with iRo. No commands need to be learned. Instead, a user can speak plain Dutch to iRo and iRo responds likewise. Like Kismet (an anthropomorphic robot that mimics human facial expressions)⁸⁵, iRo has the ability to blink, nod, frown, smile and grimace. The development of iRo is thus in

⁸⁴ See respectively: <http://web.mit.edu/agelab/index.shtml>, <http://psychology.gatech.edu/hfa/>, <http://www.aal-europe.eu/>, <http://ieeexplore.ieee.org/Xplore/login.jsp?url=/iel5/4352184/4352185/04352666.pdf?temp=x>, <http://www.reuters.com/article/inDepthNews/idUST29547120070920?feedType=RSS&feedName=inDepthNews&rpc=22&sp=true>, <http://www.telegraph.co.uk/news/worldnews/asia/japan/1421359/Robot-nurse-will-care-for-Japans-lonely-old-people.html>, <http://www.mhi.co.jp/kobe/wakamaru/english/know/index.html>, <http://paro.jp/english/index.html>, (all accessed March 4th 2009).

⁸⁵ <http://www.ai.mit.edu/projects/humanoid-robotics-group/kismet/> (accessed March 4th 2009).

line with trends in social robotics towards ordinary conversation and displaying and reacting to emotions (Weber, 2008).

Though iRo is built out of plastics, electronics, and servomotors, iRo's most fluid component is its software. The researchers can change iRo's software, which turns it into a robot with a different application. For the tests with older participants, the researchers programmed several cognitively challenging games and puzzles into iRo and wrote conversational software which allowed iRo to make game-related comments like: 'I'll have to think of a clever move now' or 'you have to jump'. The researchers also added a digital game board, which was connected to iRo and placed between iRo and the participant. Together, this turned iRo into a game companion for older users. The board games and puzzles were designed to be both entertaining and cognitively stimulating in order to help maintain older peoples cognitive health.

The researchers went to considerable lengths to increase their understanding of older users. This is in line with the research department's vision of AmI (which is stated in various publications and vision statements) in which technology should "know" and adapt to the user. Adhering to this vision, the researchers' focus was directed towards understanding the older user, which was considered integral to technical research. This is reflected in their user-centred design approach,⁸⁶ the use of scientific literature on older users, the interdisciplinary composition of the research team, and the design of their laboratory. By making the laboratory look like a middle-class older persons' apartment, it was hoped that participants would feel relaxed and behave naturally.

The researchers' attention to the importance of users can further be seen in their decision to conduct two week-long tests in people's homes. Concerned about methodological shortcomings of laboratory testing, Johan mentioned, 'if people come for two hours – like with Marjolein's tests now – they all like it, but what happens after longer periods of time?' Therefore, field tests – placing iRo in older peoples homes – were deemed necessary. With every research project, the researchers gathered more information about user behaviour in relation to iRo, and they thus progressively built up an image of older users. Interestingly, despite this concern for understanding users, the researchers would struggle to incorporate the participants' alternative views on iRo which emerged during the tests.

⁸⁶ Access was obtained partly because the researchers were interested in an outside view on their user-centred methodologies.

3.3.2 Initial ideas of older users and their health

The researchers initially developed their views about (health) robots and older people by carrying out an exploratory literature review and organising a workshop in which ideas were generated for specific tasks or activities which iRo could perform, such as being a game companion. In both the literature review as well as the workshop, researchers imagined old people as varied; older people were imagined as having differences in preferences, needs, lifestyles, mental and physical abilities and social environments. They were thus not simply imagined as frail, lonely, or forgetful.

Based on the workshop findings, all ideas for applications were evaluated with the help of experts in the area of aged care⁸⁷ together with other experts: staff members of a nursing home. These two groups considered the application that would make iRo function as an opponent or a companion in playing games the most promising, so it was developed further. These games would be entertaining, but Johan explained that they were ‘not just games for fun, which is what you would focus on with children, but [the games had] the goal of stimulating their cognitive abilities.’ The game application was thus designed to support the cognitive health of iRo’s older users. The long-term view for developing iRo was also health related, in particular to a possible transition to frailty or illness in later life. Marjolein explained: ‘The idea is to get an iRo into their homes as early as possible, so that they get used to it, but also so that it can be adapted to their skills. A person of 65 perhaps doesn’t need anybody to keep his agenda, but five years later it may be necessary for him to check what he should do every day, or for him to be reminded that he should take his medication. Research has shown that it is better if [iRo] has a different function at the beginning and that he can adapt to the skills of people. In that case, people will be more likely to accept it than if you say at 70: here’s your iRo, it will help you to remember now.’

Thus, even though the board games and puzzles would be fun and cognitively stimulating, in the future, iRo could play additional assistive roles in the maintenance of the health of older people. iRo could, for instance, remind them to measure their blood pressure or take their medication. The combination of assistive and cognitively stimulating applications illustrates the researchers’ idea of health — one that includes physical, mental, and cognitive dimensions and imagines these as interrelated and changing. In addition to these ideas about health, the researchers also reflected on acceptance and rejection of (health) technologies and devised strategies to entice older people to accept a health robot in their lives.

⁸⁷ The researchers did not disclose what kind of experts these were.

3.3.3 The tests

The criteria for selecting participants were strict. Marjolein explained: ‘There are a number of requirements. First, 65 years and older, to be sure they are retired and home all day, so they have time to play with it [iRo]. Secondly, living in a single-person household, to make sure that no one else can play with it’.⁸⁸ (The researchers focused on single-person households as multiple users would render their data unusable.) The age of participants was evenly spread between 62 and 79 years and the number of male and female participants was equal. The researchers screened for physical disability, colour blindness, and early signs of dementia. The focus of this test was on cognitively healthy older users, as the researchers wanted to develop and test technologies for maintaining cognitive health. In addition, the researchers judged people with declining cognitive health less capable of completing the tests.

The researchers were mainly interested in the long-term interactions between ageing users and iRo, as they had previously only conducted short-term research projects in the laboratory. In addition, they wanted to know whether, as Marjolein put it, ‘relationship building strategies, that have been shown in literature from human-human, human-robot and human-animal interaction to foster relationships’ could be used to create and deepen relationships between iRo and older people. In order to answer their questions they chose to do two rounds of tests; one round in their laboratory and another more extensive round of field testing a couple of months later in which the participants would have iRo in their home for several weeks. The objectives of the first round of tests were to check whether iRo functioned well technically, whether the participants perceived iRo as appealing and easy to use, and whether they enjoyed playing games with iRo. However, as the final report mentioned, the most important objective of the laboratory test was to ‘recruit participants for the field test.’

On the whole, the older test users turned up early at the laboratory. Marjolein would welcome them and chat with them over a cup of coffee. Following completion of a consent form, a questionnaire, and a test for colour-blindness, Marjolein retreated to the “bedroom” of the laboratory and left the participant to interact with iRo. She would only intervene if the interaction ground to a halt. This happened, for instance, when a test user inadvertently made a wrong move during a game and subsequently did not understand iRo’s suggestions for correcting this. When the games were finished, Marjolein returned to interview the participant. While some participants experienced some difficulties interacting with iRo, they were generally enthusiastic about iRo. They said that they liked the games, and thought iRo looked fun. One woman said, she liked ‘the way he flutters his eyelids.’

⁸⁸ One man was aged 62, but as he was retired and lived alone the researchers decided to include him in the tests.

All but one of the participants who were asked decided to take part in the field test. This test comprised two periods of two weeks in which the participants would have two variations of iRo – a version with and a version without relation-building software. The test users could play as much as they liked. On average they played for about 40 minutes a day, mostly when there was a gap in their schedules. Marjolein reported that, irrespective of the version, test users enjoyed having iRo in their homes. ‘They admitted that they talked to it’, noted Marjolein, something she had not expected. Some participants got emotionally attached to iRo. ‘Most of them said that they were going to miss it. It was a question in the interview, but a few said that without me asking the question’, Marjolein explained. After two sessions of two weeks, the researchers picked up the iRos from the participants’ homes. The data logged by iRo’s programs were analysed along with other types of data, including test user diaries in which participants were free to write down relevant events and thoughts. Subsequently, the researchers’ report concluded that interactions with iRo could be sustained for longer periods if the applications were varied and compelling. Furthermore, strategies to build relationships between users and the robot were relatively effective.

3.3.4 Researchers imagine older people as needing and wanting iRo

The researchers’ views linked up with, but also went beyond, the ageing-and-innovation discourse mentioned in previous chapters. Referring to demographic data provided by the World Health Organisation and the United Nations, the researchers acknowledged that the number of old people is growing, especially in developed countries, that the cost of (health) care will increase, and that there will be a dearth of qualified staff to care for ageing people. A research department publication concluded that older people want to live independently as long as possible, but also that their quality of life is reduced when they live alone. Robots were presented as a technology that can play an assistive role in the everyday lives of older people, providing practical assistance that allowed users to stay in their homes and that could potentially function as an emotional and intellectual companion. In a preparatory document the researchers recognised that loneliness was a taboo, and the final report concluded that older people felt positive about a robotic companion if they could develop a bond with it; furthermore, it is possible for researchers to devise strategies to develop these bonds. The researchers agreed with Reeves and Nass (1996) that people tend to treat computers and robots as social actors and react emotionally to them, despite the fact that they may rationalise their behaviour afterwards. A research project leading up to the tests concluded that acceptance of technology by older people was also improved if

they understood that the technology could help them live independently. The researchers had learned in another research project that the combination of entertainment and a cognitively stimulating activity benefits older people; they also feel positive about this, as they worry about their mental health, creating a need for the application which was tested with iRo.

Thus, ageing users were portrayed in a specific way. The company researchers had a scientific approach to design; using scientific methods, fostering links with universities and publishing their results in scientific journals. The researchers methodically built an image of older people and their relation to technologies like iRo. This image consisted of two main parts. First, the researchers found that old people needed (health) robots, if not now, then certainly in the near future. The second part went beyond the ageing-and-innovation discourse, stating that older people would accept (health) robots, see their benefits and even bond with them. In effect, the researchers believed that older users not only needed such a robot but that eventually they would *want* it too. Despite complexities like diversity of older users and the taboo of loneliness, this combination of societal and personal need for robotic technologies and the older users' willingness to accept such technologies and eventually bond with them, allowed the researchers to make a strong case for developing (health) robotic technology for older people.

This 'need and want' representation was largely in place before the tests were conducted and the tests mainly reinforced it. This representation thus provides one answer to the question of how the user is represented in these tests. Leaving it there, however would render invisible another group actively making their own user representations: the older participants themselves.

3.3.5 Test users' representations: how not to be old and lonely

Generally, it is assumed that only researchers, designers, engineers and other professionals involved in creating technology form user representations. Test users apparently do not play an active role in this process, only passively providing input for the work of researchers, designers and engineers. However, users are seldom passive and test users have been shown to be no exception (Epstein, 1995; Feenberg, 1995; Oudshoorn, 2003). The older participants in the user studies of iRo were also active. They reacted to images of old people, and, as will be shown, actively created their own images of the prospective user of the technology.

During conversations with Marjolein, the test users would state that they liked iRo, liked playing games with it and thought it worked very well. However, they also repeatedly, and often without provocation, mentioned that iRo was not a robot for

them. For instance, one woman said: 'I still lead too much of an active life; I've always been amongst people. I don't need an iRo, not yet anyway.' One of the men related it to his hobby: 'At home I am still very active, I really don't have spare time. I collect old army radios, you see. That takes time and I like doing it. It's creative work, so that's good as well. It keeps me busy.' Later he added: 'Maybe if I was all washed up [incapacitated], but I don't need to be kept busy. But I think there are plenty of old people sitting behind their geraniums who need to be kept busy, for them it would be good.' Another man said: 'If you were, say, old and growing demented, than I could imagine this being a good thing, but for me?' and 'You'd have to be a lonely old person, chained to your home with few contacts. I still go to my checkers club.' Another woman reported: 'I play games with people, with my friends (...). Therefore I don't have an iRo. I am not lonely, so I'm not planning on getting one of these. If people are lonely and have difficulties getting in touch with other people, they'd go out and get one, but I don't need it.'

While Marjolein mentioned that 'there was one woman who said: this is something for me, but she was very housebound', in the end, 10 out of 12 participants in the laboratory test reported that iRo was not for them. Most participants felt that the intended user was housebound, old, lonely, feeble and in need of care and attention, and they did not want to be equated with this person.

In part, this equation resulted from the participants knowing that they were selected to test this prototype on the basis of their age and the fact that they lived alone. They thus assumed that iRo was intended for older people with few social contacts. But Johan and Marjolein attributed a substantial part of this interpretation to the way in which robots for old people were portrayed in newspapers and on television: 'This positioning of iRo for only old and lonely people could have been due to the fact that iRo was in the media a bit before the test [as] a robot exclusively for older people', Marjolein said. She added: 'they had just seen on television that robots, similar to iRo, are placed in retirement homes, for some entertainment.' There was also a newspaper article about Aibo in retirement homes; thus, according to Marjolein, 'the image of a robot for lonely older people, they just got that from the newspaper.' This portrayal of robots meant that the researchers were faced with a problem. Marjolein explained, 'You've got to change that image. The fact that they saw on television that iRo is just for old people, is just an unfortunate coincidence. Otherwise, they perhaps would not have kept so stubbornly to this notion, that this is only for really old people. People who are very lonely, can't do anything and just sit at home.'

Despite the researchers' attempt to explain away the association of iRo with dependence and loneliness as a short term effect of media stories, test users felt that iRo was a signifier of old age, loneliness and needing care. The older test users did not

see themselves as such. Instead, they made it clear to the researchers that they were (still) active and independent. Furthermore, they presented themselves as possessing sound physical and cognitive health and as (still) having a wide social network. Thompson (1992, 1993) and Minichiello et al. (2000) have shown that ageing people can create an image of 'old' people and actively dissociate themselves from that group. The test users did exactly that; they made the prospective user of iRo into somebody else, somebody older, lonelier and in need of care, and they actively dissociated themselves from this user.

3.3.6 Test users imagine themselves as helpful and not old

Interestingly, when asked at the end of the laboratory test, all but one of the test users agreed to take part in the field test. This seems counter-intuitive: why would you want a robot in your house for four weeks if it is a signifier of old age, poor health and loneliness to you, and you actively want to position yourself as not old, frail and lonesome?

A first indicator is that nearly all the older test users, as Marjolein explained, 'had participated in prior research or were persuaded [to participate] by their children because they work here.' Thus, this particular set of test users was inclined to participate because they knew the company and perhaps because they did not want to disappoint their children. In addition to this, the older test users mentioned that they participated in the test to help other older people. One woman said 'I think it's fun and interesting, not because I want one but to help somebody else. I like that (...) I think I am helping people with this.' One of the men told the researchers that he thought he was 'still too good' for an iRo, but he made it clear that he knew 'enough people who would benefit from one.' The older test users positioned iRo as 'a good thing' which they wanted to associate themselves with as a test user (though not as the prospective user). The older participants thus displayed altruistic motives for participating in the tests, which has also been observed for test users in drug testing for AIDS patients (Epstein, 1996) and for male contraceptives (Oudshoorn, 2003). Thus, the participants created another image – one of themselves as helpful older test users.

Thus, they embraced the idea of "successful aging" (Baltes & Smith, 2003; Calasanti & King, 2005; Calasanti & Slevin, 2006a), as they tried to position themselves as active, healthy, altruistic, helpful old people, seemingly (still) untouched by the negative consequences of ageing. This image of themselves as successfully ageing older test users, allowed them to further widen the gap between themselves and the perceived prospective user of iRo, while simultaneously allowing them to use and enjoy iRo.

3.3.7 Researchers' responses to older test users' ideas

Test users thus also created user representations, either in accordance with who they thought the prospective user of the technology was, or in accordance with what they thought a good test user should do. The researchers had to deal with these alternative images of the (test) user. On the whole, the researchers tried to remain focused on their initial research questions, in spite of the participants' additional responses. There was, for instance, no mention in the final report of how test users' distanced themselves from the perceived prospective user of iRo. In the interviews, the defiant responses were acknowledged as relevant, but were simultaneously seen as a relatively small incident, caused by media attention on robots for older people and as something that could be addressed by an early introduction of iRo into the lives of people, meaning when people were in their late fifties or early sixties, and iRo would then still only be, in Johan's words, 'just for fun.' In the end, the representations made by test users added little to the researchers' understanding of potential meanings attached to the technology.

Instead of taking the participants' user representations into account, the researchers saw these responses as a side issue that presented them with some difficulties and additional work. Marjolein found that getting 'helpful' older test users to provide the desired information could prove difficult. She mentioned that the participants gave 'please-me answers' or that they reasoned not from their own perspective, but 'tried to reason from a consumer perspective, so: "Oh, if iRo does this, then this offends the consumer, so you should maybe change this"', assuming that this perspective was most valuable to the researchers. Also, the researchers made changes to iRo between the two phases of the field test, to give the impression to the older participants that their input was taken into account, because the researchers, as Marjolein said, 'did not want to disappoint them.' The researchers had to perform additional forms of work to cope with older participants behaving according to what the older people thought were helpful test users.

Thus, the researchers held another user representation; an image of what old people are like as test users and how to work with them. According to Marjolein and Johan, working with older test users is different from working with other age categories. Marjolein explained: 'First of all, I think you can find more test users in other target groups. It is simpler, they're more open to something like this.' Johan thought they might be 'insecure'; Marjolein added that the word research might make them 'a little scared' and she also felt that 'they might be afraid that we're going to sell them something.' The researchers reserved extra time for the older people who were

willing to partake in the tests. Johan explained: 'They all show up early, sometimes even half an hour. With people aged, say, up to 50, that just doesn't happen.' He added: 'you've got to put more time in, making contact, making appointments, phoning them again. But also during the experiment, (...) the people like to talk, it's an outing for them.' Nevertheless, the researchers made sure the tests would not be too long, as they did not want to overburden the participants. Explanations for using iRo were also modified. Marjolein explained: 'you've got to do it slowly, give an example, demonstrate it first, and then let them do it'. Johan added: 'These are just people who interact less easily with technology than younger generations. You've got to take that into account' and 'people gradually forget the instructions.' Marjolein continued: 'But you can't underestimate them. They'll also see how far they can go.' She recalled one older man who ignored the instructions to find out 'what iRo can and can't do.' Coping with these differences meant work for the researchers. The researchers had to find older participants, schedule more time, persuade them to stick with what they were asked to do and interpret and make selections in the information put forward by the participants to stay focused on their research questions. The researchers thus also held a "craft representation", a set of images of what old people are like as test users and the craft, i.e. the specific skills and changes in testing practices, required to work with them. They thus created a setting in which they could negate the test users' ideas about the imagined user and their rejection of him/her.

3.4 Conclusion

This chapter focused on participants and researchers who actively tested iRo, a robot intended to enhance the health of older users. This study has shown how age-based assumptions lay at the heart of technology design and implementation, both for technology designers and prospective users. In this case, designers expected that old people would have a need for and could benefit from robots, particularly when it came to physical, cognitive and mental health maintenance and support. Older people would see these benefits, accept robots in their lives and bond with them. Thus, older users would need and eventually also want such robots. During the tests, however, the older participants also created a representation of the prospective user of iRo. This user was old, lonely and physically or mentally frail, and the participants actively dissociated themselves from this imagined user. This was a reaction to the type of user that they felt the tests required and also to the way in which iRo and similar robots were portrayed in documentaries, news programmes and newspaper articles. However, instead of becoming defiant 'rejecters' (Wyatt, 2003), the participants tapped into a repertoire of successful ageing, positioning themselves as healthy, active, older people

who were helping needy old people. This representation allowed the participants to distance themselves further from the supposed prospective user of iRo. The researchers took these representations into account, but virtually exclusively in a craft representation; a representation of old people as test users and the specific craft of working with them. Thus, the participants' representations had little influence on the researchers' view of older users of (robotic) technology.

As already discussed in the introductory chapter, Joyce and Mamo (2006) argue that it is important to study how older people are configured or represented as technology users. They emphasise how science and technology studies (STS) 'rarely takes up aging and ageism as a central concern' (Joyce & Mamo, 2006: 109). Indeed, barring a few exceptions like (Hyysalo, 2003, 2006, 2011), there has been little attention for user representations of older users. This chapter described the ways in which older users were represented by the researchers, the user representations devised by the participants, and the ways in which they used these representations to dissociate themselves from old people (Minichiello, et al., 2000; Thompson, 1992, 1993). This chapter has also shown how researchers adapted their testing practices to accommodate aged participants and negate their ideas about the prospective user. This is thus in line with, and gives extra weight to, the point put forward by Mackay et al. (2000), that designers are not just configuring the user, but are also configured by their organisations and, as this chapter has shown, by the behaviour of test users and the portrayals of technologies in the media.

The researchers based their work on scientific principles and methods. They carefully and methodically built up a representation of older users, emphasising the need for a robot like iRo, but also that older people would accept and eventually want iRo. This combination allowed them to legitimise the development of (health) robots like iRo. Nevertheless, the different gloss provided by the representation work performed by the older test users, can be considered as an unexpected alternative source of information about older users and should ideally be taken into account in the researchers' user representations. Even if technology could be beneficial to the health and wellbeing of older users, older users who feel that they are being positioned as old, lonely and frail may rightly refuse to be positioned as such and consequently refuse to use the technology. Recognising and taking into account user representations formed by older users, for instance in user tests, is important as it could help prevent ageist scripts, and resistance to and non-use of technology by older users by charting positive and negative interpretations of the supposed prospective user of a technology. This information could then serve as input for more reflexive (re)design of technologies.

The engineers, researchers and designers should, however, not be solely held accountable for the representations formed by older users. This case also shows that the

media played an important role in forming images of older users of robotics, which in fact went against the grain of what the researchers meant to achieve. Ideally, a number of parties – for instance, journalists, but also policy makers, politicians and scientists – should share the responsibility for creating more refined, non-ageist images of older users, which could thus lead to more refined user representations.⁸⁹

⁸⁹ While finalising the article version of this chapter, I learned that the company had, along with several other projects, cancelled the iRo project. However, iRo is still being used for researching and developing robotics elsewhere.

4. Older people want to live at home: linking the development of an AmI monitoring system to a dominant representation of older people

‘It is [about] making it possible for people to live independently for as long as possible. In any case that’s good for society as a whole. It saves costs of course. It is the only really affordable way to deal with the ageing population. If you think about it, you’ll see that it is much nicer for the people too. Everybody wants to live in their own surroundings, really’ (Tomasz, chief designer of AIMS).

4.1 Introduction

Whereas the previous chapter dealt with user representations, images of health and ageing and the testing of an AmI robot, the focus of this chapter shifts towards an analysis of a dominant way of representing older people in the design of AmI technologies and other technologies for older people: the representation of older people as people who want to live independently in their own homes for as long as possible. In order to analyse this user representation, this chapter focuses on an AmI monitoring system which was tested in the homes of older people with severe health problems. For the purposes of this chapter, this ambient intelligent monitoring system will be called AIMS.⁹⁰ AIMS is one such system in which this older-people-want-to-live-at-home user representation takes centre stage. AIMS is a monitoring system that aims to allow older people with severe somatic or psychogeriatric illnesses to live at home safely. It does this by unobtrusively monitoring the older people with, for instance, motion and chair sensors. This chapter focuses on a pilot (trial) test with the AIMS technology. During this test, the system was used in actual use practices of older people with severe health problems. At the end of the test period, the designers and researchers involved in developing AIMS concluded that the system does allow older people to live at home for longer, or even remain at home until death despite their health problems.

The question in this chapter is not whether this image of older people as people who want to live at home is true or not. Indeed many older people express the wish to live at home.⁹¹ The older people in this project were no exception to this and were, in fact, selected for the project on that basis. Thus this wish to remain living independently in the own home is a relatively common and straightforward wish, and

⁹⁰ AIMS stands for Ambient Intelligent Monitoring System. The name is fictitious. Any reference to a system actually called AIMS is therefore accidental.

⁹¹ This wish to live at home is partly the result of pejorative views of care homes among older people (interview Sophie, personal communication prof. Christine Milligan May 4th 2010).

it seems equally common and straightforward to link this representation of older people to a technological intervention: older people want to live at home and systems like AIMS allow them to do so. However, other, non-technical, interventions could also allow older people to remain living at home independently. Perhaps older people prefer those other (social) solutions to technical solutions? However, the actors involved in the development of gerontechnologies make it seem very straightforward and natural to link the wish to remain living at home independently to a technological intervention. This chapter questions this link and asks: how do the designers and other actors involved in the design and use of AIMS link the older-people-want-to-live-at-home user representation to the necessity of developing and using the AIMS system? Do all the actors involved in the development and use of the system attribute the same meaning to AIMS and make this connection in the same way? Moreover, does a technology based on this older-people-want-to-live-at-home user representation allow older people to live at home for longer?

In order to answer these questions, this chapter will first explore what AIMS is and how its designers adapted its design to the representation of older people as people who want to live at home. Subsequently, the focus will turn to the other actors involved in the design and test use of AIMS and to what AIMS means to them and how they link AIMS to the older-people-want-to-live-at-home user representation. This section will conclude by showing how the older-people-want-to-live-at-home user representation is linked to the development of AIMS and how, in turn, actors are aligned in this process. Then, attention will be given to how AIMS reconfigures the home and introduces new scripts into it and the way in which these changes to the home are rendered invisible. In the conclusions, the general argument will be summarized and the research questions answered, after which the implicit political choices which underlie innovations like AIMS will be discussed.

4.2 Research Methodology

In order to study the questions outlined in the introduction, a multimethod, qualitative approach was adopted. First, semi-structured in-depth interviews were conducted. In all, I conducted five interviews, four of which were recorded and transcribed. One interview was not recorded, but extensive notes were made. The five interviewees were: Simon⁹², who works for a Dutch Knowledge Institute for protracted care. In this role, he brought the Technology Institute and the care organization together to pilot test AIMS. The interview with Simon was not recorded. The second interviewee was Sophie, who is a manager at the care organization. The care organization aims to

⁹² All the interviewees' names are fictitious.

provide a full range of care for older people, from care at home up to running small scale and large scale care homes. Sophie managed the contacts with the care workers, informal carers and the clients concerning the pilot test with the AIMS system. Tomasz, the third interviewee, has a PhD in electronics and works for the Technology Institute. He was the main designer and project manager of the AIMS project. The fourth interviewee, Juliette, also works for the Technology Institute. She specialises in design for older people and conducted the user research at the start of the development of the AIMS project. She consulted with older people and “stakeholders” about what form the system should take. Finally, Mark, the fifth interviewee, who is an independent researcher at a Dutch “hogeschool”, a university of applied sciences. He was asked to do an independent evaluation of the system, which included two rounds of interviews with the older people in their homes. The interviews with Mark, Sophie, Simon, Tomasz and Juliette were conducted between April 2009 and November 2009.

I was not permitted to interview older people, nor was I permitted to contact the children of the older people. Sophie mentioned that a Dutch news television program had been unsuccessful in persuading the children to participate in an interview so she was hesitant to ask them. I was also not permitted to interview care workers. The Knowledge Institute had already tried to interview them⁹³, but many of the care workers, struggling with a heavy work load, declined to participate in those interviews. Sophie did not dare to ask them again for interviews. She did however cooperate in an attempt to get a response via a questionnaire. Unfortunately, this attempt was unsuccessful. However, in the interviews with Mark and Sophie and in both the intermediary and the final research report, the views of older people, their children and of the care workers receive ample attention.

Finally, I analyzed how older users are portrayed in documents and publications produced by the research department. I gathered 58 documents in total. These documents included the final report of the pilot test, the intermediary report, public relations material of the project (from the care organization, the intermediary organization and the Technology Institute), updates on the project, a newspaper article, a book chapter, a scientific article (published by Mark) about the project and Juliette’s documentation of the user research which took place prior to the technological development of AIMS.

As in the previous chapter, it is necessary to anonymize the research project, the Technology Institute, the Care Organization, the Knowledge Institute and the company involved. The names of the interviewees, the involved organisations and the technology are fictitious. However, when during this chapter a reference is made to one

⁹³ The results of these interviews were included in the final report on the pilot tests (Knowledge Institute, 2009).

of the documents that is available in the public domain, a (partly anonymized)⁹⁴ reference will be provided. While some documents were in English, most documents were in Dutch. All quotes from Dutch documents and interviews have been translated by the author from Dutch to English.

4.3 The Ambient Intelligent Monitoring System (AIMS)

AIMS was designed to detect when older people or people with Parkinson's or multiple sclerosis fall or to prevent older people suffering from (severe) dementia⁹⁵ from leaving their homes and getting lost (see the final report on the AIMS tests: Knowledge Institute, 2009). It does this by sensing where people are in their homes and how active they are in certain rooms. For instance, if a person does not move in the hallway for 15 minutes, the system will call that person on their home phone. If this person does not answer the phone, the system sends an alarm call to a "mobile care team", which will receive it on their mobile phones. The care workers are then able to set up a video and two-way audio link between their mobile phones and the cameras in the home from which the alarm originated. They can thus determine whether the person has fallen or whether there is another type of emergency. They may also determine that it is a false alarm and no action is required. If the care workers cannot determine whether there is an emergency, they will visit the home to make sure.

AIMS is unique in the sense that users do not have to wear a wristband, a watch or a pendant. The designers found that such devices have caused problems in the past, as older people suffering from dementia tended to take them off and some somatic patients could no longer operate the alarm buttons. AIMS works on the basis of motion sensors, door-, bed- and chair-sensors, smoke alarms and two cameras (which can only be operated in case of an alarm). The system is connected, via the internet, to the care home and, as mentioned, to mobile care teams.⁹⁶ The system is an addition to the regular care provided by the care organisation, which involves care workers visiting up to nine times a day for various tasks, such as getting in and out of bed, delivery or preparation of meals, cleaning etc. (interview with Sophie).

⁹⁴ This means a normal full reference with the exception of the names of the people, organizations and technologies which have also been anonymized throughout this chapter.

⁹⁵ The (medical) characteristics of older people with dementia versus multiple sclerosis and Parkinson's disease differ considerably. Although the interviewees often referred to patients as 'somatic' or 'psycho-geriatric', they clearly acknowledged the great differences between individual clients. Some clients who were classed as 'somatic' also had early symptoms of dementia, or were diagnosed as having psychiatric problems in addition to their physical health problems, which influenced their behaviour. Thus, for the purposes of this chapter, it does not suffice to make a distinction between people with 'somatic' and 'psycho-geriatric' health problems. Instead, when appropriate, I will refer to the specific problems of an individual.

⁹⁶ The manner in which AIMS works and its defining characteristics were described by all of the interviewees and is also described in the intermediary and final report (Knowledge Institute, 2009).

The use of the system was part of a (pre-market) pilot test, in which the system would be used in the actual lives and (care) practices of older people with severe health problems and their formal and informal carers. While the designers of the system encountered various problems during the test, they felt that the technology performed relatively well. The input from the pilot test allowed the designers to develop the system further. A major multi-national technology firm and the Technology Institute have come to a license agreement, which allows the company to market the system. Currently, this company is preparing a version of AIMS to go on the market.

4.3.1 How AIMS came into existence

The development of AIMS started more than a decade prior to this current commercial development. Tomasz explained:

At the end of the nineties, we really discovered that we have a huge problem. The ageing society, it's coming. Our management saw that and said "hey, we should be looking for the problems in the care market and at how we can solve them." In the year 2000, we made an inventory of those problems and on the basis of that we wrote a project proposal (...). It worked out all right. That's how it came about. It has everything to do with the mission of [the institute], solving societally relevant problems.

Thus Tomasz and his colleagues started to think about developing a monitoring and safety system, which they had previous experience with, but this time applied to care for older people.

Before starting the technological development of AIMS, Juliette – based in another branch of the same institute in which Tomasz worked – was brought in to study the potential users and their practices. Juliette explained that a 'user committee' was formed. Experts on the subject of older people – including representatives from the police, fire services, home care organisations and a consultant specialised in giving advice on older people – sat on this committee (but no potential older users were on this committee at this stage). This panel evaluated early concepts and ideas and discarded a great deal of technical novelties outright. Using this information, a number of concepts were developed further. These were evaluated in four sessions with potential older users. While Juliette was busy doing this Tomasz had to wait, as he explained:

I am a boffin. I notice constantly that we're inclined to make technology. (...) I'm very glad we got other people from [the Technology Institute] involved, because they helped me tremendously with a proper professional test of these user concepts and technological ideas. When you do that in the early stages, that's boring and annoying, because you have to wait a long time before you can start the implementation work, which is what we like to do. But really, it pays off.

The feedback from these older people was used to develop the system further, which resulted in a prototype. This was tested in an initial small pilot test in two homes. Another round of modifications was made, after which the much larger pilot test in sixteen homes was carried out.

In this process, Juliette and Tomasz learned a lot about the potential users of the AIMS system. Even though the ageing society was presented as a big problem and a technological challenge, this framing was interwoven with the needs of older people as Tomasz emphasized when he discussed the goals of AIMS:

There are two important [goals], if you look at really high level goals. It is making it possible for people to live independently for as long as possible. In any case that's good for society as a whole. It saves costs of course. It is the only really affordable way to deal with the ageing population. If you think about it, you'll see that it is much nicer for the people too. Everybody wants to live in their own surroundings, really. It's the familiar surrounding, so that's just nice for the people too. And the second important goal is to improve the quality of life of older people.

Thus, the needs of older people and the needs of society coincide if older people can remain in their own homes; this is something that can be achieved by introducing technologies such as AIMS. The link between the older-people-want-to-live-at-home user representation and the development of AIMS is thus drawn by making use of the triple-win rhetoric of the ageing-and-innovation discourse (see introductory chapter and chapter 2). The introduction of AIMS benefits society as it provides an affordable alternative to care for older people, but according to the designers of AIMS, it also benefits older people as AIMS allows them to continue living at home, with the home being positioned as the preferred place to live. Following this reasoning, designing a technology which would allow older people to live at home safely became a key goal for the designers at the Technology Institute. The researchers and designers thus focused on developing a monitoring system that had to be tailored to the home environment and to the practices of older people living there.

4.3.2 Designing AIMS for older people who (still) live at home

The designers thus aimed to design a technology which would fit in well with the practices of older people living in their own homes, along with those of their formal and informal carers. Tomasz: ‘Our aim was to test as quickly as possible whether our ideas matched with the target group. What are the chances for success and failure? That’s what we did in the beginning’. The aim of adapting to the practices of older people – reflected in the process outlined above – was translated into the design of AIMS.

One of the clear instances of designing AIMS to encompass the characteristics of older people and their practices was that the system was designed in such a way that it did not require the older users to take many actions: ‘If you look at how we set this up, this is a real ambient intelligence concept. We were warned at the start that you really shouldn’t expect too much from the residents (...). This group of users, it is very broad. Some people can handle technology very well, others can’t. So we set this up in a way that we really aren’t expecting much from this group. Everything runs automatically’ (Interview Tomasz). Older people were thus envisaged as not having to learn new technological skills.

In fact, the designers promised that older people would not need to change their ways at all: ‘The nice thing about AIMS is that people don’t have to adapt to the system. So, yes, for them there were relatively few changes’ (interview Tomasz). Indeed, rather than having the older people adapt to the system, it was Tomasz, in conjunction with Sophie, who spent a lot of time during the tests adapting the settings of the system to adjust to the daily routines of the older people. Tomasz and Sophie would start with a standard setting which would work well for the majority of the older participants. If the standard settings caused problems, Tomasz and Sophie would adjust them. The main parameter that was changed was the amount of time a person was allowed to be inactive before the inactivity was judged to be abnormally high, thus indicating a potential emergency like a fall. The problem with the version of AIMS used for the pilot (Tomasz stressed several times that this problem would be much reduced in the commercial version, though tweaking of settings remain possible in that version too) was that some older people tended, for example, to sleep in the living room, thus appearing as inactive to the system. Tomasz explained how they proceeded to solve this: ‘we started with a time-out of two hours and then we would progressively lower it. If we do not see any alarms with two hours, we’ll lower it for a couple of days to one and a half hours, and then to an hour and ten minutes, an hour, fifty minutes and at some point you’ll get far more false alarms. At that point we’ll say “well, we’ll raise it a bit and leave it like that”’. This tweaking of the minute settings was only possible due to a very intensive cooperation between Tomasz and Sophie. Moreover,

once set, there was no guarantee that it would not need changing again, as Sophie and Tomasz found that the conduct of the older participants also changes, meaning that the system would have to be adjusted accordingly. Thus the design of the system did not require older people to learn new skills, but would allow them to live in their own homes as they were accustomed; instead it was the system that was – painstakingly, during the pilot (also see chapter 5) – adjusted to the (changing) everyday life practices of older people.

A second design decision that reflects the adaptation of the system to older people living in their own homes centres on the designers' realization that AIMS had to be easy to build into an existing home. Simon explained that this was a distinguishing feature of AIMS. He explained that, while other systems require older people to move to a new home which is equipped with the monitoring systems, with AIMS older people could stay in their own homes. The system can be built into a home within a day and no major changes to the home such as re-wiring or removal of furniture are necessary. The system can be removed again within half a day. This quick placement and removal were deemed important, as older people (with severe health problems) would probably only use AIMS for a short while. Sophie explained: a 'special thing of AIMS (...) is that the system is removable, because our clients can of course sometimes be in our care only for a short while. One year and then they pass away, or they have to move to a care home, you don't know, and then the system has to be able to be passed on to the next person.'

A third way in which designers attempted to adjust to the practices of older people – in line with the basic idea of Ambient Intelligence – involved making the monitoring as unobtrusive as possible. This was translated into concerns over privacy of older people and the visual impact of the system when installed in the homes of older people. The visual impact of the system is relatively small. The motion sensors are small and blend in with the background. The two cameras are more visible, but still quite small. The designers specifically chose to use as few cameras as possible and made it clear to the older users that these cameras could only be used in case of emergency. In addition, they chose to use a type of camera that had a clearly visible red light when it was turned on, so the older users could see whether a camera was on or off. Nevertheless, they chose to use very few cameras and relied mainly on motion sensors and chair, bed and door sensors instead, as these were deemed to be less intrusive. This was a specific choice, as the designers were concerned with the privacy of older people. Juliette explained that some older people 'couldn't care less' about their privacy and clearly valued safety over privacy, but other older people were very worried about their privacy and were adamant that they did not want constant camera surveillance in their

homes. The designer thus chose to use as few cameras as possible.⁹⁷ In addition, privacy was put on the agenda in the evaluation research, to see how the older clients felt about this in relation to the AIMS system (see final report: Knowledge Institute, 2009). Mark recalled their reactions: ‘We asked them [the older clients] very specifically about privacy. (...) But it was no issue at all. The people were well aware that the cameras could only be used in case of an emergency. Concerning the other sensors they said “well, there’s no filming. Motion sensing? Oh well”’. Mark mentioned that other older people simply forgot that the sensors were there or treated them like the sensors of their burglar alarms. The designers thus aimed to design a system with a strong focus on keeping older people safe in their own homes, monitoring them in an unobtrusive way, with respect for their privacy.

However the designers did not see the older people as the only users of the system. When asked, Tomasz said the following about the users of the system: ‘Well there are two of course. On the one hand there are the residents, the older residents, they will be using the system too. (...) That’s one group, but the second group are of course the carers; the informal carers and formal carers. With this system we are giving the carers a number of instruments to make care more efficient’. The system thus also had a strong focus on aiding formal and informal carers who were helping older people to live at home. The designers’ view of the formal carers was that they are very busy and overburdened. AIMS could save them the work of visiting homes to follow up on an alarm. Juliette commented that the number of false alarms was a ‘trigger’ to develop AIMS. The remote checking could save the care workers time and reassure them about the safety of their clients. Relieving the burden for informal carers was also considered important: ‘AIMS and our care are there to give the informal carers some relief. “You aren’t responsible anymore [for constantly keeping an eye on a parent]. Go and do something fun with your mother”’ (Interview Sophie). Thus the designers considered all actors in the ‘triangle of care’ – clients, formal and informal carers – (Colombo, Vitali, Molla, Gioia, & Milani, 1998; Mort, et al., 2008) to be users of the system and tried to adapt it to their practices in the home of the older client.

In the end, the design of AIMS was geared towards helping older people who wanted to live at home to do just that. The designers tried to facilitate this by adapting the technology to the characteristics, preferences and practices of older people living at home and their formal and informal caregivers. However, the designers are just one group of actors involved in the design and test use of AIMS. Do the other actors

⁹⁷ Juliette also mentioned that during the rounds of consultations with experts and panels of older people they had discovered that the functionality which was required most could be achieved with cheaper and more privacy friendly motion sensors instead of ‘intelligent’ cameras. The issue of whether or not to include (intelligent) cameras in the design of AIMS will be discussed more extensively in chapter 5.

attribute the same meaning to AIMS as the designers? Do they link the older-people-want-to-live-at-home user representation to AIMS in the same way?

4.4 Linking a user representation to a technology

This section thus explores different meanings of AIMS held by the actors involved in the design and test use of AIMS and focuses on how and whether these actors link the view of older people as people who desire to live at home to the development and use of AIMS.

4.4.1 The Knowledge Institute

While the Knowledge Institute – which brought the Technology Institute and the Care Organization together and organized the evaluation research – is financed for a substantial part by the Ministry of Health, it would be wrong to assume that it simply represents the policy interests of the ministry. Rather, for the institute, policy related views are intimately intertwined with views on care practices and everyday life practices of older people. The introduction of the final report of the AIMS evaluation research – which is written by the Knowledge Institute for the Ministry of Health – accordingly starts with the following statement:

As the Dutch population ages, the number of older people and with that the group of people with dementia will show a strong increase. By 2030 the number of people with dementia will have increased by 65% with respect to 2005. This means that there is a rapidly growing demand for older people's housing and nursing home care. Furthermore, the preferences of older people with a care demand are changing: an increasing amount of clients wants to live in an extramural setting, preferably in the own home. That development asks for smart solutions for dealing with the demand of intensive unplannable care, coupled to 24-hour supervision. Technology can support care and can reduce the deployment and workload of care workers. For that reason, [the Technology Institute] (...) started to develop a new home alarm system for older people. (Knowledge Institute, 2009: 8).

In an interview, Simon mentioned that the goal of the technology was to enhance the safety level and the feeling of safety – which, according to him, is a big part of the safety level – thus allowing people to live at home for longer. According to Simon, that should lead to the ultimate goal, i.e. delaying admission into a care home, which is good for both the older people and society. After stating the benefits for older people –

safe living in their own environment – and for the care organisation – reducing demands on care workers, while reassuring them of the clients’ safety – the final report addresses the benefits to society: ‘The [AIMS] system makes the delay of intramural care of clients possible or can eliminate this need altogether. The [AIMS] system offers a solution to reduce the shortage of suitable older people’s housing. The [AIMS] system also offers possibilities to reduce the pressure on the care labour market by efficiently deploying care workers’ (Knowledge Institute, 2009: 54). Thus there is a very clear economic and societal benefit to AIMS. This benefit is further underlined in the conclusions of the final report:

‘When a care organization is willing to invest in purchasing a home alarm system for care at the clients home, then the benefits of the [AIMS] system are relatively great. By using [AIMS], care workers’ work loads are reduced and they are deployed very efficiently. Clients, family and care workers have a heightened sense of safety as a result of [AIMS]. In addition, the [AIMS] system is a means to achieve that clients can live at home. This makes the social and emotional benefits of the system considerable in addition to the expected cost efficiency with regard to the deployment of care workers’ (Knowledge Institute, 2009: 56).

Thus the Knowledge Institute views older people as people who want to live at home (for as long as possible) and that this desire can be facilitated by technologies such as AIMS, in which case older people, care workers, care organizations, and society as a whole benefit. They are in fact not saying – like Tomasz suggested – that it is outright cheaper to care for older people at home, but they do stress that AIMS is a way of addressing the shortage of suitable older people’s housing and that the care of older people at home can be made more efficient, potentially costing less money and reducing the workload of the care workers by introducing AIMS. The technology is positioned partly as a way of catering for the changing preferences of older clients but clearly also as a solution to the (policy) problems of care for older people in particular. Although the Knowledge Institute attributes a slightly different meaning to AIMS, they also tap into the ageing-and-innovation discourse and the triple-win rhetoric⁹⁸ to link the older-people-want-to-live-at-home user representation to the development of AIMS.

⁹⁸ It is interesting to see that only the benefits for society and for older individuals receive attention here. There is, of course, a third group that benefits from the introduction of technologies like AIMS: the actors who are involved in developing and selling AIMS.

4.4.2 Care organization

The care organization made it its mission to allow their older clients to live at home if they chose, as Sophie explained: ‘The goal is, of course, to offer something to a client who wants to live at home, that will allow them to realise that. That’s our goal, to keep a client – at their request – out of a care home’. Sophie found that many of the clients of the care organisation indeed wanted to stay at home: ‘It is plain to see that the group of people who want to live at home independently as long as possible is substantial and I expect that this group will grow further’. The care organization thus found that a substantial group of older people want to live at home and allowing them to do so is a central value for this organization. Nevertheless, there are limits to accommodating this wish to live at home independently, and these limits relate to safety. Sophie recalled a situation where a man with a severe condition of the nervous system (who at that point did not have the AIMS system) fell and could not reach the alarm button on his pendant: ‘he could not press the button and thus had to wait until the next morning’. Sophie also mentioned the problems caused by people with dementia who still lived at home (in relation to the potential for technologies like AIMS):

They do leave the home. You don’t know what time they left, so you don’t know how many hours they’ve been on their way before it is discovered. Those are limits [to allowing older people to live at home]. So we started looking: “how can we stretch those limits?” Technological developments pop up very quickly and you start following that, what can we get out of that area? The pendant doesn’t do anymore, we need something else.

Technology is thus not necessary *per se*, but often some form of technological aid will prove necessary at some point. When clients, formal carers or informal carers feel that it is no longer safe for an older person to live at home unaided, a technology like AIMS can help to avoid a move to a care home, at least for several months, but hopefully altogether. According to the care organization, technological aids like AIMS can thus help older people to achieve their goal of living at home independently for longer, despite serious health issues.

In addition to this, the care organization envisages that older people will *need* to live at home, aided by technologies, however not because it is cheaper. Sophie:

Intramural care costs a day, well (...) let’s say it costs 160-165 euro a day. If you’ve got somebody who’s got the full care package at home, and that’s what you’re talking about with this intensive group of people, then somebody has to visit them eight or nine times a day and some things will have to be adapted in the home to

keep somebody there. It will cost the same, if not more. You just can't argue that anymore. (...) You can argue that there are no places in care homes. That's a reason. It all stops very quickly then, however expensive it is. Full is full. We've got a waiting list of two or three years. And if we look at the numbers: how many have we got now? I think we have something like 130 – 140,000 people with dementia in the Netherlands. In 20 years that will be 400,000. We won't be building care homes in the same way as we have before, we haven't even got the space, and we certainly don't have the money or the staff for so many people with dementia. Those are your reasons.

Thus, according to the care organization, living at home is not only what many clients want, but it will also become a necessity, not because it is cheaper, but because there are simply not enough places in care homes.

Like the Knowledge Institute, the Care Organization also attributes a slightly different meaning to AIMS, seeing it as an important technology to deal with the shortage of suitable housing for older people, but not as a cheaper way to care for older people. However, the Care Organization and the Knowledge Institute are in agreement with the designers that older people living at home is best for the older people themselves, but is also best from a societal perspective and technologies like AIMS are considered an important part of making this a reality. They thus link the view of older people as people who want to live at home to the development of AIMS in a similar way. Although the Care Organization does not favour technological solutions *per se*, the link to a technological solution is quickly and easily made. There is thus substantial alignment between the designers, the Knowledge Institute and the Care Organization. However, these are not the only relevant actors in the design and test use of AIMS; do the relevant actors in the triangle of care – the care workers, the older people and their children – make a similar link between AIMS and the desire of older people to live independently at home?

4.4.3 Care workers

In line with the views of the organization that they work for, the care workers are primarily concerned with good care and the safety of their clients and are committed to keeping their older clients at home for as long as possible. However, as Simon explained, the care workers will demand an immediate move to a care home if there are indicators that the safety is no longer guaranteed. Such indicators would include leaving the gas on or when older people with dementia start wandering about. The “limit-stretching” promise of AIMS is that people who display such behaviour can stay

at home. For the care workers, this meant that they had to learn to trust the system, as Sophie explained:

They've gotten used to the system. Daring to rely on such an image, that's difficult, because on the one hand you've got technical difficulties, so you can't rely completely on the system. On the other hand: an alarm comes in – it proves to be a false alarm, that happens – you get the image on your phone and you see the lady quietly eating her supper sitting at the kitchen table. You set up a two-way connection with this lady [and talk to her and understand that everything is all right], but *still* you visit her, because you did get an alarm. That happened at the start of the project and it doesn't happen anymore. That's a real development, daring to rely on the image that you see.⁹⁹

Thus the care workers learned to trust the system. Nevertheless, trust in the system plummets when breakdowns or too many false alarms occur. Sophie explained:

Our care workers – some of them – would communicate to everybody: “it's just not working” and a week later this same employee brings in a new person for the project, “because this woman falls so often, she *has* to have the system. She *has* to have the system, can that be organized very quickly?” Yes, people do speak with two voices. But I'm sure that's inherent to a project like this which, on the one hand, is confronted with technical difficulties, and on the other hand people have high expectations of and it does promise a lot of good, of course. That's what they cling to.¹⁰⁰

Thus the views of the care workers are rather mixed: they want older people to live at home, but only if their safety can be guaranteed. AIMS can help older people to live at home and provide assurances about the safety of a client, and thus reduce work loads, but only if it operates flawlessly. The care workers definitely supported the view that many older people want to live at home and strived to allow them to do so. However, the link between the view of older people as people who want to live at home and the development and use of a system like AIMS is far more ambivalent and frail than for the previously mentioned actors. The introduction of AIMS leads to a transgression of the boundaries of what care workers previously perceived as the limit of clients living safely at home, which meant they had to learn to rely on new (and sometimes

⁹⁹ Emphasis made by Sophie.

¹⁰⁰ Emphasis made by Sophie.

malfunctioning) technology, resulting in violent swings in their opinions about the system from time to time.

4.4.4 Older people's sons and daughters

The family of the older person using AIMS, mainly their children, were primarily concerned with the safety of their parents; they would like their parents to live at home, but only if it is safe. As their parents grow more frail, the children increasingly worry about their parent's safety. If there is a technology that would keep their parents safer they would like them to use it, and they will go to some length to persuade their parents, as this excerpt from my interview with Sophie illustrates:

- L I read in the intermediary report that subtle pressure had been exercised to get the older people to accept the system for the duration of the pilot test.
- S Pressure by whom?
- L By the children.
- S Oh, undoubtedly, undoubtedly. The children, they want it. It is difficult, of course, for the children, especially when it concerns somebody with dementia. You want your mother to remain at home. And your mother says the same, she definitely does not want to move to a care home. She doesn't want to move, anywhere. They are very clearly aware of that. As a daughter you really don't think that this is wise, that your mother lives at home alone like that, but your mother doesn't agree. She says: "I'm perfectly capable of doing this." Well... Well, then it happens of course that the children will say "Mum, I think you should have this system."
- L As an intermediary solution?
- S Well, if it does improve safety and because of it your mother can live at home safer, then you would prefer it. I get that. This would be my preference, I think. And I think I would also put some pressure on my mother. Something like: "Just do it, just try it."

According to Sophie, AIMS thus gives the children peace of mind; they feel better knowing that the system is there to safeguard their parent(s). Mark underlines this: 'The most important thing I saw with regard to [older people] participating in the project was actually the will and desire of the children. The children would be so worried about their father, mother or both parents that they said things like "just sign up, it's good for you"'. It can also take a substantial part of the burden of care away from the children. Mark again: 'a few of them visited dad or mum twice a day and they

were saying things like: “they will always be my parents, and I’m fully willing to do this, but it can be tough at times”’. The children thus clearly subscribe to the view of older people as people who want to live at home. They want their parents to live at home – if their parents wish to do so – but it is conditional upon the guaranteed safety of their parents. Thus, for the older people’s sons and daughters, the link between the view of older people living at home and AIMS is drawn via the promise of the improved safety of their parent(s).

4.4.5 Older people themselves

All the older participants in this project were older people who had expressed a wish to live at home. Nevertheless, the meaning that the older users of AIMS attached to the technology varied. First, there was a category of users that clearly wanted to take part in the test, as they were worried about their safety or the safety of a spouse. Mark remembered an older couple who asked whether they could participate in the tests:

They had seen a television show about the system and they were very enthusiastic. The man was almost deaf, the woman virtually blind. He had a history of cancer and heart failure and she was just very scared that her husband would have a heart attack and she wouldn’t see it because she was blind. (...) They wanted nothing else than to participate. Also because she had been in line for a special care home for blind people, but then he couldn’t join her there. So he would have to live at home [alone]. That was not an option.

The system thus allowed this couple to continue to live at home safely, and – importantly – still together.

A second meaning attributed to AIMS by the older people was that it provided the older people with some extra opportunities for social contact. While these older people were visited as often as eight or nine times a day by care workers and many were regularly visited by family or friends as well, some of the older participants greatly enjoyed the extra visits by the technicians who installed, maintained and repaired AIMS. Mark – a researcher with an engineering background – recalled one particular man: ‘He was a mining engineer. Such a fun guy. He said, “finally some technology people for a change. All those nurses, they know nothing about technology”’. For this man, a breakdown of the system was a treat, because engineers would come to his home and he could talk to them about technology. It thus provided him with a form of social contact that he would otherwise not have had.

A third meaning of the technology was strongly related to the older people's children. The older participants 'said something like: "Yes, the system, I actually don't notice that it's there anymore. But it makes the children so happy"' (interview with Mark). Other than making their children happy, the system could also serve as a bargaining chip in negotiations between the older people on the one hand, and their children and care workers, on the other. Mark recalled the form these negotiations could take:

The way this usually went is that the older people were thinking "well, I don't know about this", that they had their doubts. That's something you might see more often with older people, weighing up the pros and cons. Do I want this or not? And in the end they decided against it. Then the children would, well, apply a bit of subtle pressure. Like: "mother, I think you should take it, it's good for your health." That was the usual excuse. "You don't want to go to a care home?", I've heard that one with some regularity, "and with these boxes you can stay at home longer, but otherwise you might have to go to a care home." They did paint a few doom scenarios. But it wasn't very forceful, or put in a horrible way, it was usually said with a bit of laughter.

Thus the system played a role as an intermediary solution in resolving issues between older people and their children.

A fourth meaning attributed to AIMS was that it was not the preferred kind of intervention in the home. Mark commented that he was 'continuously hearing, "I would rather have a bigger shower than the [AIMS] system.", "I would really like to have a stair lift", "I'd rather have them take out that door", or "take out that doorstep." There was a lot of that'. Nevertheless, the older people did not always choose to openly criticize the system. Mark sensed some had a particular reason for this:

They didn't say this very explicitly, this is my interpretation, but with some of them, they seemed to have the idea: "well, if I'm very critical, they won't only take it all away, it might also affect the quality of the care I'm currently getting." And if you are old and vulnerable and 80+ and you can't do that much anymore and you're dependent on the care of others, then this is your last straw to stay in your own home, you would be thinking "well, I had better stay friends with these people. If I'm too critical about them and I'll find fault with them or I really criticize the system, then they'll think "what an ungrateful person" and that might impact on the quality of care I'm currently getting".

You just don't know, stuff like that. It was something I sensed lying underneath.

While there was also a category of older people that hardly knew or instantly forgot that they had accepted the system, for many older people in the project the technology could take on a wide variety of meanings. While remaining to live at home was definitely important to the older people in these tests, the link between staying at home and having a technology like AIMS was not always obvious to them, or at least rather indirect. Instead, the meaning of the technology could differ substantially, though that could still lead to good reasons for accepting the system.

4.4.6 Aligning actors behind the development and use of AIMS

The previous paragraphs have highlighted the wide variety of meanings that were attributed to the AIMS system. For instance, AIMS could be:

- An opportunity and a legitimization to develop and sell a technology (designers).
- An opportunity to contribute to the mission of the Technology Institute (designers).
- A way of giving older people what they want and simultaneously answering a societal (policy) problem (designers, Knowledge Institute).
- An innovative way of contributing to the mission of letting older people live at home (care organisation).
- A more efficient and reliable way of caring for older people living at home (care organisation, designers, Knowledge Institute).
- A promise of a safer life (All).
- A bargaining chip in ongoing discussions about whether it is still safe to live in your own home (older users).
- A way to keep your children happy (older users).
- Not the preferred technological intervention in the home (older users).
- A way to get some piece of mind (care workers, older people's children).
- An assurance of the safety of mum or dad (older people's children).
- A way to get some relief from care tasks (older people's children).
- As long as AIMS works, an assurance that a client is safe at home, and that you are meeting your professional obligations (care workers).

The various actors involved in the pilot test thus have substantially differing ideas about what AIMS means to them. In technology development, it is by no means certain that such differing views can be brought together in a single design of a technology. Nevertheless, for AIMS, all involved actors could agree on one idea, one view of older people: older people want to live at home. In turn, all the actors were able to link this view of older people to the development and use of a technology like AIMS (albeit in different ways, for different reasons – depending on the meaning attributed to AIMS – and in some cases perhaps not as strongly or durably). Thus the user representation of older people as people who want to live at home functions as a boundary object (Star & Griesemer, 1989) aligning actors behind the development and test use of the AIMS system, even though the meaning attributed to the technology – and indeed the enthusiasm for a technology like AIMS – differs among the actors.

However, there is another essential aspect to this alignment, to why all actors seem to agree so easily on the view of older people as people who want to live at home, and that is related to the moral content of the older-people-want-to-live-at-home user representation. This can be explained by returning to the concept of ideograph (Van Lente, 1993; McGee, 1980; De Wilde, 2000). As explained in chapter 2, ideographs are notions which are quickly and easily recognized as “good”, like freedom. However, as De Wilde (2000) has shown, words like “smart” can also function as ideographs and developers of technologies can make use of this ideographical content for instance by advocating “smart technologies.” Older people want to live at home, *certainly in the context of gerontechnological design*, also functions in an ideographical manner in the sense that it is a solid marker; it is considered a good thing and it is not up for debate. If you can allow older people to live at home (with technology), then this is a goal worth pursuing. Older people want to live at home obviously falls short of being an ideograph like democracy, freedom or indeed smartness, but morally it does function in a similar way.

However, in the discourse around AIMS there is a word that is more clearly identifiable as an ideograph: innovation. The actors involved in the design of AIMS viewed AIMS as an innovative technology, and the wider AmI and tele-care (design) community saw AIMS in a similar manner. Simon mentioned that AIMS had won several prestigious prizes at industrial conventions and was praised for its ‘innovative character.’ Mark added: ‘Of course, they won those prizes for “best innovative care project”, so there is prestige involved. “Look at us being innovative.” So there are all of these interests. For [the Knowledge Institute] there was an interest too: it’s an interesting innovative care project that they would love to be involved in’. The actors also praised each other for their innovative stance: ‘Most care institutes have too little knowledge [of Ambient Intelligence] and they are not interested in building up this

knowledge (...) But [the care organization] has always been very, very innovative. And we were really lucky with [Sophie]. She doesn't have a technical background, but she was very interested and she picked it up very quickly' (interview Tomasz). Thus AIMS as an innovation, and being innovative by playing a part in the project, united the technology developers, the Knowledge Institute and the care organization. Being involved in an innovative project like AIMS was seen as a good and prestigious thing.

Clearly, the moral discourse around the older-people-want-to-live-at-home user representation and AIMS is strengthened further by referring to the ageing-and-innovation discourse. As became clear in sections 4.3 to 4.4.2, the designers, researchers from the Knowledge Institute and managers from the Care Organization all used the rhetoric of the ageing-and-innovation discourse, stating that cost of care is increasing; personnel to care for older people is scarce and already overburdened; there are already too few places in care homes; and that this shortage will grow further. In turn, AIMS allows older people to live at home which leads to benefits for society, but also for the older users of AIMS who are able to live at home independently. Thus the older-people-want-to-live-at-home user representation and AIMS as an innovation that allows older people to do so are embedded in a moral discourse. This development is seen as undeniably good, which further aligns the involved actors around this representation of older people and the development of the technology.

4.5 Underlying Reconfigurations

Further adding to the appeal of the idea of AIMS is the promise that the older users of AIMS need not adapt to the system or change their ways. Indeed, as was shown in section 4.3.2, the designers tried to design the technology in such a way that it would fit in well with the practices of older people, as the designers found that one cannot ask older people to change their practices, or ask them to learn new skills or handle new technology, especially older people with psycho-geriatric complaints. For instance, Sophie mentioned that older people do not have to wear or carry technology: 'the special thing about [AIMS] is that the client does not have to wear technology on the body. That suits people with dementia very well, they don't want that and they'll take it off'. Juliette explained how the phone of the older users – a technology that the older users were used to – became the interface of the system:

One [new] button is enough to operate it incorrectly. Even if you make it red or green and everybody would think that it is very clear for what you need to press red and for what green, in a panic situation people will still press the wrong button or hesitate and press nothing at all. Then we said their phone –

their own phone – they are used to that. Those aren't unfamiliar buttons, that's something they operate every day, for a fun purpose, communication. That's an interface that they can use with ease.

Answering the phone and following the instructions – i.e. pressing a certain digit if everything is okay – is the only new requirement and this is not required for people suffering from dementia nor for people who cannot operate the telephone for another reason. Thus the overall idea is that older people do not have to adapt to the system very much and that their lives remain more or less the same. The final report mentions: 'There do not seem to have been any major changes since the introduction of the [AIMS] system with regard to the home- and living surroundings. The biggest change as a result of the [AIMS] system, is the increase in feelings of safety with clients, family and care workers' (Knowledge Institute, 2009: 40).

However, studies in STS have shown that the socio-technical arrangement always changes to some extent when a new technology is introduced into the lives of people. The reasoning of the actors involved in the designing and testing of AIMS that nothing changes for the older users thus warrants some closer scrutiny. In this section an analysis will be made of the ways – if any – in which the introduction of AIMS reshaped the lives and practices of its older (test) users. This analysis will involve an analysis of the script (Akrich, 1992) of AIMS from the perspective of the older people¹⁰¹, in addition to an analysis of how the home was reconfigured by the introduction of AIMS.

4.5.1 A passive compliance script: putting up and giving up

Despite taking the older people's practices seriously, and claiming that the older people need not learn any new skills or change their behaviour in any way, AIMS does have a script and this script does have distinctly forcing elements. This becomes clear when one looks at how difficult it is for an older user to devise a strategy to resist using the system. As shown earlier in the chapter, some older people wanted to use the system, but others were subjected to subtle pressure to accept the system. Once the system is in place, there is no way to avoid being monitored without setting off an alarm.

In order to highlight the lack of options for resistance, it is interesting to compare AIMS to the pendant system it is partially replacing.¹⁰² The pendant affords the older person more options for resistance. It can be used selectively, or not at all

¹⁰¹ AIMS most certainly also has a – quite strong – script for the care workers as well. This script is certainly important to analyse. However, as this chapter is concerned with representation of older users of AIMS, I will limit myself to the analyses of the script from the older people perspective.

¹⁰² In order to obtain ethical approval the pendant system was still functioning during the pilot test.

(e.g. can be left in a drawer), while the older people can accept it, for instance to make their children or (in)formal carers happy. On the other hand, it can also be used to call in staff for other things than an emergency as Mark explained: 'You also had people, because they all still had the personal alarm, the pendant, who would press the alarm because they thought their meals tasted vile, or because their food was cold or late. Hup, pressing that button and voicing their complaint. That's not what it is meant for'. While other actors, such as the care organization or the children of the older people may view this as unwanted behaviour, the pendant does afford its older users a distinct amount of agency.

With AIMS there is very little room to make unintended use of or resist the system. Sophie reported that one older woman had deliberately hung a towel over one of the cameras, but other than that she could not think of any such instances (and hanging a towel over a camera would not stop the monitoring via the motion sensors). When asked about whether AIMS could be used in an unintended, creative way, Sophie remarked:

It is hardly possible with [AIMS]. I don't think it happened, but [AIMS] is autonomous, of course. It generates an alarm by itself, following a particular type of behaviour of somebody. You could have people who would lie down on the floor deliberately and lie still for a long time, until you get an alarm, but that didn't happen. It doesn't really fit in with this group. If you're over 80, you are not going to lie on the floor for fun, just to make somebody come over. We did have one lady who did lie down on the floor, but that wasn't her intention.

The only way to resist the system is to become a non-user by having it removed altogether. However, this may have consequences. As mentioned before, Mark got the distinct idea that older people feared to lose 'proper care.' It may also imply a forced move to a care home, as children or care workers may no longer think it is safe to let the older person live at home; or children and care organization could further negotiate with or even pressure older people to keep the system. One strategy that older people did employ was to complain about the system. Keeping people in the project thus took particular skills and patience on Sophie's side:

- S It is difficult. You know, [some] clients would call me every week and say "is it still not working?" and "you can just as well come and take it all out." And I would try to talk them round for a bit.
- L Did you have to do a lot of that kind of work?

- S Yes, that takes a lot of time. And when you say: “well, if you really want to have it taken out, we’ll have to make an appointment and we’ll have it taken out” then they back down “yes, but I can’t do without either.”

In the end, the complaints are a limited way of resisting the system and they also highlight the felt dependency of the older users on the system. Thus, while the script of the system does not require the older users to do much else than pick up the phone when it rings¹⁰³, it also does not afford them many possibilities to use the system in creative, unforeseen ways.

The older people thus had to put up with being monitored. Among other things this meant that they were unwittingly giving up previously private information. Sophie explained how this came about:

- S We generally assume that people are just sleeping at night. We’ll see that some people are passive or tired during the day, but then again, that’s the way you get to know somebody. By installing [AIMS] we found out, because you can just see it in the log files, that during the night the front door had been opened up to eight times. And you’re just seeing, this [woman] is walking about the home. This lady, she never slept more than two hours at a stretch. That gave us a lot of information about why she was so tired during the day, so passive.
- L Did you adapt your care practices to this? Maybe a change in the medication, or rather, asked a doctor to change it?
- S I’m not sure what was done exactly in that case in terms of adaptations and for how long, but there had definitely been attention for this. And with the doctor too.

Although in these cases it matters substantially whether an older user has psycho-geriatric difficulties or somatic problems, for both groups this form of relinquishing control over intimate information holds true and there were very few ways to prevent giving up this information without having the system removed altogether.

Overall, for the older people, the script of AIMS has distinct elements of “giving up” – e.g. control over previously private information or access to rooms which

¹⁰³ If the older people refuse to pick up the phone, an alarm will be generated. Older people who cannot pick up the phone received a version of AIMS which worked fully autonomously and thus did not require them to pick up the phone.

were not equipped with sensors¹⁰⁴ – and “putting up” – e.g. with being monitored and with changes in care – and the autonomous nature of AIMS affords very few opportunities to resist this. Indeed, just as the designers envisaged, the older users did not need to learn new skills or actively change their behaviour because of AIMS, thus they did not have to adapt actively to the script. However, the “giving up” and “putting up” nature, combined with few opportunities to resist the system does make for a “passive compliance” script, in the sense that older people had to adapt to AIMS by passively accepting the way AIMS changed their lives. These changes can be further shown by focusing on the way in which the home of the older users was reconfigured by the introduction of AIMS.

4.5.2 The reconfigured home

As has already been shown, older people are represented by designers – and others involved in the development of AIMS – as people who want to live at home. The home thus takes a central place in this user representation of older people. It is embedded in (moral) discourses about the best way and place to care for older people and simultaneously, about where older people prefer to live. Designing technologies that enable older people to stay at home is presented as a (noble) cause worth pursuing. The home is thus central to these designers’ ideas about older people. However, as will be shown in this section, in these views the home is positioned as an “essentially unchangeable good place”, but in contrast to this positioning of the home, and despite the promises of the designers, the introduction of AIMS does not leave the home unchanged, but reconfigures it in important ways.

The first way in which the home is viewed by designers – and this is a strong underlying assumption in the development of AIMS (and many technologies like it) – is that the home is a “good place” and the preferred place to live. It is important to remember – especially in situations where older people do not decide autonomously, but in a triangle of care about whether they will or will not make use of systems like AIMS – that the home may not be a “good place”, but a site of loneliness, neglect or even elder abuse (McGarry & Simpson, 2008; D. K. Taylor, Bachuwa, Evans, & Jackson-Johnson, 2006). Thus, while for most older people the home certainly is a good place and worth staying in, it can also be otherwise. Second, the home is seen as a place that may be augmented technologically. However, the reaction of AIMS’ older users has shown that the wish to live at home does not automatically necessitate the use of new technology, let alone what Milligan (2009) calls ‘disempowering’ monitoring

¹⁰⁴ Some of the participants in the tests lived in relatively large homes with rooms that they nearly never visited. These rooms were not equipped with sensors, which in turn meant that the older people could no longer visit these rooms (at least without causing an alarm).

technologies such as AIMS. However, the home is not just seen as a technologically augmentable place, but as a place that will not be changed *in essence* by the technological intervention. In the rhetoric of the AIMS project, the introduction of new care technologies in the home does not seem to change what the home *is* or how it is experienced by older people. Technology is added to the home, but the home remains essentially unchanged. In addition to viewing the home as a good place, the home is seen as an essentially unchangeable good place.

Milligan (2009) and Oudshoorn (2011) have shown that the introduction of new care technologies in the home, does, in fact, not leave the home unchanged, but can change it to the point that the house in which people live is no longer recognized as or equated with the home. It is thus worth while asking how the home was reconfigured as a result of the introduction of AIMS. While taking into account that it was not possible to visit the homes of older people, in which case a more detailed analysis of the reconfigurations of the home would have likely been possible, a reconfiguration of the home can nonetheless still be discerned on three levels.

The homes are physically reconfigured. Sensors are put on walls and doors and in beds and chairs. Two cameras are placed in the most frequently used rooms. Although the cameras are quite small, they are more visible than the sensors. For the pilot test, some wires lay on the ground and a computer was present in the home. However, according to Tomasz, in the market version the wires would disappear and the computer would be integrated in the meter closet. In addition, certain rooms became off-limits. These rooms were the least used rooms, which were hardly ever visited by the older people. Nevertheless, as there was no sensor in those rooms, the rooms were now completely off limits.¹⁰⁵

The homes were also reconfigured on a virtual level, that is, with respect to the consequences of installing digital technology. One element of this was that the sensors did lead to new – digital – ways of extracting information about the older person. While the cameras in the home cannot be operated at will by the care workers, the motion, bed and door sensors in the home – ironically judged to be less intrusive – actually provided the care workers and medical staff with information that was previously unknown. In the example given in the previous section, the care workers gained information about a client's nightly behaviour which would otherwise have remained private, but which did result in changes in medication. Another example of such learning was that some forms of "erratic" behaviour which went unnoticed were now being picked up. Mark recalled one woman, who had a habit of lying down on the floor when she was feeling dizzy. The system registers this as a fall and sets the alarm

¹⁰⁵ The interviewees did not specify how the rooms were made off-limits, but – especially for people suffering from dementia – this means, in all probability, that they were locked.

procedure in motion. Moreover, not only did the care workers learn about older people's behaviour which had previously been private, this was actually a goal of the project. The final report poses the question as to whether 'an improved insight in the day and night situation of the client' (Knowledge Institute, 2009: 43) could be achieved, as this would be one means of giving care workers peace of mind in relation to ensuring care for a client in the home setting. While care workers could indeed feel more reassured about the safety of their clients, this digital reconfiguration was simultaneously a significant change to the home.

The home of older people underwent a further digital reconfiguration; it became vulnerable in new ways. Usually AIMS did not lead to any problems and its workings often went unnoticed by the older users. However, in cases of technological issues, the new configuration became apparent. While the AIMS system itself did not generate many significant malfunctions – it generated the odd false alarm, but overall generated far fewer false alarms than other systems – a video-communication system that came with the system (virtually never used by the older people during the project) did cause trouble. In some homes, this video system developed a malfunction during the night, causing it to generate a lot of light and noise effects (according to Mark the sound was much like an old fashioned phone-line based modem, but very loud) which the older users (obviously) considered a nuisance. A problem which the older people considered more serious was the interference of this video-communication system with the home telephone. Mark explained that 'the system, not [AIMS], but the other part, it caused an interference with the telephones people had. They experienced that as very aggravating. It took a little while to solve it. They solved it in the end, but you'll understand that if you are very frail and you can't use your phone, that's very annoying. It was not that good for the acceptance [of AIMS]'. Although this video communication system will not be included in the market version,¹⁰⁶ it does highlight how dependent older people can be on their phones and how their feeling of the home as a safe place is severely undermined when their phones are not operating in the usual fashion.¹⁰⁷ Overall, the system introduced new types of technical malfunctions and technological vulnerabilities, creating new concerns and disturbing the life of older people at home in ways which did not exist prior to the installation of the system.

Finally, there was also a reconfiguring of the home that can be termed emotional reconfiguring. One of the older people developed what the project team dubbed 'sensor fobia' (interviews with Sophie and Tomasz): she – a woman with

¹⁰⁶ It is interesting to see that, despite the fact that these two systems were independent in the eyes of the designers, they were viewed as one system by the older people. Mark pointed out that failures of the video communication technology, which was only a side project, affected trust in the AIMS system as the older people did not make this analytical distinction between these two technologies, but blamed the entire system.

¹⁰⁷ This also highlights the risk of using existing familiar interfaces.

somatic problems – developed a fear, not of the cameras but of the sensors. She complained about seeing lights inside the sensor. According to the researchers, there were no lights in the sensors. They did not know what this older woman saw, but speculated that it could have been the reflection of the sun on the sensor (interview with Tomasz). Nevertheless, these “lights” caused the older woman to believe that the sensors were “seeing” her. She started hiding from the system, e.g. in a broom cupboard, which triggered alarms. In the end, the system had to be removed from her home. She had lost all trust in the system and felt like she was being watched constantly in her home.¹⁰⁸

As already mentioned, the meaning of home as a safe place was also jeopardized when the auxiliary observation system caused the house phone to malfunction. Disturbance in access to emergency services led to anxiety and many complaints. Mark explained:

There were technical disturbances, also with the phones of people which led to people being unable to use their telephones, or it took 21 seconds before the first dialling tone was audible. That doesn't work with vulnerable people, they are afraid that they won't be able to call 1-1-2 [the emergency number]. There were really a lot of complaints about that. That caused really a lot of people to think “I want to get rid of this contraption”.

While this malfunction was not caused by AIMS itself, older people were struck with fear and clearly angered. The home as a safe place can thus come under strain as a result of a technical intervention in the homes of older people.

While more in depth investigation of how the home is reconfigured by the introduction of AIMS would have been ideal, it is clear from the examples above that the home was indeed socio-technically reconfigured as a result of the introduction of the system. In addition, the monitoring system does contain a script, and this passive compliance script does affect the lives of the older users. The central tenet of AIMS is that it aims to allow older people to remain living in their own homes and indeed, it lives up to this promise. However, while the older users of AIMS are able to stay at home, it is no longer the same home. It is a reconfigured and re-scripted home.

¹⁰⁸ As it was a single person out of a set of sixteen participants, it remains to be seen whether this was solely an exceptional response or whether this type of response might turn into a significant issue when these types of systems are implemented on a larger scale.

4.6 Conclusion: making implicit political choices explicit

This chapter has focused on a particular way of representing older people: as people who want to live at home independently for as long as possible. This view of older people is a dominant user representation underlying the design of many technologies for older people. This chapter has focused on the design and test use of one such technology, an AmI monitoring system, that aimed to allow older people with severe health problems to remain living at home. As described in the introduction of this chapter, the aim of this chapter is not to question the fact that many older people prefer to live at home for as long as possible. This chapter instead questions the seemingly straightforward and natural link of this desire of older people to the development of technologies for older people like the AIMS monitoring system. Continuing to live at home does not automatically necessitate the need for new technologies; other solutions could also be envisaged. This chapter thus asked the following question: how do the designers and other actors involved in the design and use of AIMS link the older-people-want-to-live-at-home user representation to the necessity of developing and using the AIMS system? Do all the actors involved in the development and use attribute the same meaning to AIMS and make this connection in the same way? And, does a technology based on this older-people-want-to-live-at-home user representation allow older people to live at home for longer?

This chapter has shown that the meanings attributed to the AIMS monitoring system did, in fact, differ for all the actors involved in the design and test use of AIMS. However, despite these differences, all of the involved actors could agree on the view of older people as people who want to live at home, and, importantly, all the actors could in some way connect this view to the necessity or usefulness of developing and using AIMS. Thus the user representation of older people as people who want to live at home functions as a boundary object as it aligned actors behind the development and test use of the AIMS system, despite the differing meanings attached to AIMS. However, there was another factor contributing to this alignment, that is, the moral/ideographical content of the discourse around AIMS. AIMS is not presented as neutral. It is presented as a good thing, as a technology that allows older people to live at home, which is what everybody wants, and as an innovation which will benefit society as well as the older users of AIMS. Innovating to allow older people to live at home is thus positioned as “undeniably a good thing to do.” Even so, as this chapter has shown, new technologies like AIMS *do* change the lives and homes of older people, in ways that were likely unforeseen and not clearly explained to older people when they (co-)decided whether or not to have AIMS. The rhetorical strength of innovating for older people to allow them to live at home is so strong that these changes are easily rendered invisible. It is thus important to make the changes to the

lives and practices of older people visible precisely because innovations like AIMS seem so evidently “the right thing to do.”

This chapter has drawn attention to the fact that while the older users of AIMS were able to stay at home, it is not the same home. For older people, AIMS contains a script which indeed does not require many new actions or behaviours on their part, but does require passive compliance and acceptance, while affording very few options for resistance. In addition, while the home was positioned as an essentially unchangeable good place – positioning it as the ideal site for life and care – the homes of older people were reconfigured on a physical, emotional and virtual level. There is a paradox here: while the older people were able to stay at home, the home itself is at risk of being progressively lost. With the introduction of AIMS the home further changes into an extramural care facility, an extitution (López & Tirado, 2004; Milligan, 2009). On the one hand, one could argue that such a change in the lives of older people is part of the ageing process and thus just a tragic fact of life.¹⁰⁹ Indeed, this phenomenon of extitutionalisation is not specific for AIMS as it is well documented in other cases (Milligan, 2009; Oudshoorn, 2011). On the other hand, it is important to note the effects of the – semi-forced – introduction of such technologies on the perception of the home (Milligan, 2009) or on the identity of older people (see chapter 3). Moreover, it is important to search for ways to make such technologies less intrusive or at the very least, to find ways of drawing the attention of older people and their children to the ways in which these technologies may change the lives of their older users.¹¹⁰

However, such changes to the lives of older people and their homes remain implicit, because allowing older people to live at home seems so obviously the right thing to do. It is important to keep in mind that it is always only “the right thing to do”, from a certain perspective. To put it another way, the ways in which older people and their homes are represented and the technological choices which are subsequently made are all implicitly political. More specifically, there are three strands of neo-liberally inspired thinking underlying AIMS .

First, facilitating freedom of choice (of the consumer or client) is an essential element of neoliberal thinking (Harvey, 2005). In the AIMS case, freedom of choice

¹⁰⁹ It is important to recognize that care practices such as those described in this chapter can be ethically very complicated (Moody, 2005). There are no easy choices between right and wrong and sometimes tragic choices need to be made. This thus warrants some caution, also for the analysis in this chapter. It would be wrong to make easy judgements from the perspective of an uninvolved social scientist. Nevertheless, it remains important to analyse how the idea of “older people want to live at home” figures in the design of and support for care technologies such as AIMS and it is equally important to see what is rendered invisible by such a discourse.

¹¹⁰ Indeed in the AIMS project, it has been a central concern to make the monitoring as unobtrusive as possible – in line with core ideas on ambient intelligence. Some older people have reported that they did not notice that the system was in place, thus the AIMS project achieved a considerable success in this regard.

was central to the design. AIMS was positioned as a technology for older people who *choose* to live at home, and AIMS was intended to facilitate this particular way of living. Sophie emphasized the element of choice: 'We allow both people with a somatic complaint such as Parkinson's or multiple sclerosis and people with dementia to live at home. They could go to a nursing home, but they choose to live at home'. However, this chapter has also shown that it may not be as straightforward as an individual making a personal choice. The choice for AIMS was generally not made solely by the older person, but in the triangle of care (Colombo, et al., 1998). In addition, it has been shown that the logic of care and the logic of choice do not match well (Mol, 2008). The question thus concerns how free this choice really is if older people are subject to negotiations about safety, "subtle" pressures etc.. Nevertheless, a rhetoric of facilitating the freedom to choose where to live is central to AIMS and is thus in line with a neoliberal ideology.

Second, innovation and neo-liberalism go very well together. Harvey (2005) has shown that the entrepreneurial drive to create new products, production methods and organizational forms is so strong 'that it becomes a fetish belief: that there is a technological fix for each and every problem' (Harvey, 2005: 68). Thus there is a strong preference for dealing with personal or societal problems by innovating. In the AIMS case, the actors involved in the design and testing of AIMS prided themselves in the innovative character of AIMS. As already discussed, innovation functioned as an ideograph, a clear and undeniably good thing. This emphasis on and appreciation of innovation thus also fits nicely with neoliberal thinking.

Third, and perhaps most important, the proposed type of care and the representations of older people and their homes match perfectly with neo-liberal care ideologies (Esping-Andersen, 1990; Milligan, 2009; Oudshoorn, 2011). In a neoliberal care ideology, the relation between the state on the one hand and the care recipient and their family on the other is subject to rethinking; the role of the state is diminished in favour of a 'mixed economy of welfare' (Milligan, 2009: 12), in which state, private and voluntary parties play a role. In this ideology, care recipients are seen as clients or consumers, informal carers become both co-workers and co-clients, and interventions are aimed at relieving carer stress (Esping-Andersen, 1990; Milligan, 2009). In such an ideology the home quickly replaces a state run institute as the ideal site of care. AIMS is designed to make living at home (for longer) possible. Older people are viewed as clients who want to live at home. Formal and informal care are seen as intermeshed and both essential. The system aims to relieve the burden on informal carers and aims to make formal care more efficient. Thus the ideology underlying the development of AIMS is clearly in line with a neo-liberal ideology.

In the end, the argument of this chapter is not against technologies such as AIMS, and not against neo-liberal care ideologies *per se*, but strongly in favour of making explicit the social and political choices underlying the design of technologies for older people. Other solutions – e.g. social solutions – could also have been developed, which could, and probably would, have had totally different merits and drawbacks. *Things* could have been different. The social and political choices underlying the development of AmI (monitoring) technologies like AIMS are materialized in sensors and software and are thus naturalized to the point that we hardly recognize them as choices. The plea of this chapter is thus that these choices should be made explicit and should be made clear to older people and their carers when they are presented with a technology like AIMS. Although, as mentioned above, it is important to recognise that choice is a complicated matter in the context of (aged) care, an explicit clarification of the politics and choices underlying the design of technologies like AIMS could allow older people and their carers to make more informed choices about using certain technologies. Facilitating informed choice should appeal to all, especially the neo-liberally minded.

5. One technology to suit many older people: the difficulties of dealing with diversity in design

The relation between diversity and design is problematic. Studies on the relation between gender and technology have shown that designs often imply or favour a male user, distribute gender coded roles, competences and actions (Oudshoorn, 1996a; Oudshoorn, et al., 2004; Rommes, 2002), or even position women as uninterested in technology or incapable of handling or mending technologies (Cockburn & Ormrod, 1993; Van Oost, 2003). Designers are often white, highly educated, *young* males; implicitly they design with themselves in mind, a phenomenon which has been called I-methodology (Akrich, 1995; Oudshoorn & Pinch, 2003a; Rommes, 2002). Thus, encompassing diversity in design may often not be very high on the agenda of designers and this has consequences for users who are not white, highly educated, young males. However, even if designers are willing to look beyond an (implicit) image of the white, young, well-educated male user, dealing with diversity in design is still inherently difficult. Encompassing diversity means adding complexity, but there is also a strong need to reduce complexity in design processes. User representations are often simplifications of the complexity of and differences between people in the real world. Indeed, as Suchman (2007) points out, the construction of “the user” itself is already a reduction of complexity, collapsing multiplicity into a singularised, hypothetical, but apparently knowable entity. Identifying multiple users and making multiple representations would add complexity, but this would still easily fall short of encompassing the diversity of people encountering the envisaged technology in their everyday lives. Moreover, Stewart and Williams (2005: 40) have shown that ‘real design processes more often involve “designing out” references to specific users and their contexts in the creation of generic solutions’. There are thus various ways in which diversity is kept at bay or actively reduced in design processes. Encompassing diversity is thus at odds with the practices and constraints of design processes.

Diversity becomes even more problematic in design for older people. Social gerontological research on the diversity of older people has shown that older people are very diverse and perhaps more diverse than other groups (e.g. Thompson, 1992; Thompson, 1993; Wilkinson & Ferraro, 2002). Indeed, studies that make use of the life-course perspective on ageing have focused on the ageing process of individuals and have shown that chronological age does not dictate the way people age; rather a multiplicity of factors which come into play over decades of living combine to shape the way in which an individual ages (Dannefer & Settersten, 2010). These ageing trajectories are thus highly individual and, as means to compensate for differences decrease, the differences between people may increase or become more pertinent.

However, there is simultaneously a common stereotype that all older people are the same (Bytheway, 1995; Thompson, 1992; World Health Organization, 1999). There is no reason to assume that this stereotype could not be common in design circles as well. Designing for a particularly diverse group such as older people from the implicit perspective that all older people are the same is likely to generate problems. If a design starts from the premise that all older people are the same, and can thus be captured in one set of criteria or design guidelines, technologies may be developed that do not fit in with the lives and practices of a substantial number of older people who are different in terms of, for instance, their bodies, identities, technological literacy etcetera. Thus, designing technologies for older people is a problematic activity from a diversity perspective and the problems are compounded even further in the design of AmI technologies. AmI technologies aim to adapt to the user and to anticipate the user's needs and wants. It is thus an explicit aim of AmI technologies to deal with the differences between individual users, which, in the case of older users, may not be particularly easy. If one wants to study the relation between diversity and design, the design of AmI technologies for older people is an ideal case.

The research question for this chapter will consequently be: given the problems that diversity poses for designers of AmI technologies, how do designers and researchers deal with the diversity of older people in visions and designs of AmI technologies? This chapter will make use of the data sets used for the previous three chapters, but will analyse this data from a diversity point of view. Although some overlap with the empirical material of previous chapters is inevitable,¹¹¹ this chapter will provide new references to the data which will illustrate how the AmI designers, researchers and engineers dealt with diversity in the AmI visions and designs. I refer to the method section of those chapters for the specific methods used in gathering that particular data. This chapter will first look at the way in which diversity of older AmI users is dealt with in AmI visions. Subsequently, the chapter will describe how diversity was progressively lost in the testing of an AmI robot. The chapter will proceed to show that diversity was treated very differently in the case of AIMS, the ambient intelligence monitoring system for older people. Finally, the conclusion offers an analysis and discussion on the striking differences in the way in which the designers and researchers dealt with the diversity of older AmI users.

¹¹¹ The choice to allow some overlap is also made to allow this chapter to be read without prior knowledge of previous chapters.

5.1 Diversity in Visions of Ambient Intelligence

In providing an analysis of ten AmI vision statements from the period 1999-2009, the second chapter set out to answer the question as to how the user and the older user of AmI is represented in visions of AmI. In those visions, considerable attention was given to the diversity of users. However, this emphasis on diversity – rather remarkably – did not extend to older people as prospective AmI users.

5.1.1 Guiding and supporting user representations and diversity

Considerable attention was given to diversity of users in what was termed the guiding and supporting user representations. The term guiding user representations – adapted from the term guiding principle (Elzen, et al., 1990; Smit, 1989; Smit, et al., 1998) – was introduced to explain a particular way of representing the user in the AmI visions. These user representations were unambiguous, relatively abstract statements about the user which were supported in all of the vision statements. These representations were closely related to the core (technical) ideas behind AmI. These user representations guide the development of AmI by linking the abstract idea of AmI to the user and by providing a means to (indirectly) steer actions and mobilize actors.

Three guiding representations were identified. First, an unambiguous and universally supported representation of the user was that users want to be recognized by AmI systems and that they want the system to learn about their behaviour, needs and preferences, adapt to them and even anticipate what the user will want or need. A dominant definition of AmI is for instance: ‘ambient intelligence refers to the presence of a digital environment that is sensitive, adaptive and responsive to the presence of people’ (Aarts, et al., 2001: 239). Stefano Marzano – CEO and chief creative director of Philips Design – elaborates: ‘This technology will recognize us, notice our habits, learn our likes and dislikes, and adapt its behaviour and the services it offers to us accordingly’ (Marzano in: Aarts & Marzano, 2003: 9). Doing this requires the AmI systems to be able to adapt to different people. It even goes so far that AmI should be able to deal with differences in behaviors and preferences of one and the same person as Kozlov explains:

To be able to respond to people sensitively, Ambient Intelligence systems will need to take the complexity of personalities into account. Designers of such systems will therefore need to consider this model of the multiple Self. Even the simple understanding that a single individual can exhibit varying behaviours and ‘voices’ at different times can lead to the design of a system that can recognize such differences and react accordingly (Kozlov in Aarts & Marzano, 2003, p.: 35).

Thus, AmI should be able to recognize and adapt to differences between people, and even be able to deal with differing preferences and behaviours of one person; in other words, AmI should be able to deal with diversity.

The second guiding user representation was that people have had enough of ugly, obtrusive and hard to use (IC) technologies. Instead they want technologies that are intuitive and easy to use – technologies that interact with us in natural and emotional ways. Clearly, in order for AmI to provide this intuitive and easy use, to provide such natural and emotional interactions, intimate knowledge of the user – and thus of differences between users – is necessary. Thus, AmI needs to be able to recognize and deal with the differences between people.

The third guiding representation in the visions of AmI is that people want more and better experiences. Referring to the experience economy (Pine & Gilmore, 1999), many of the authors of the AmI visions express the importance of providing users with enriching experiences. However, in their chapter in *The New Everyday* titled “Experience Design”, Lorna Goulden and Paul McGroary stress that experiences are highly personal:

No two people have exactly the same experience or interpret in exactly the same manner. Feelings about experiences vary greatly from culture to culture and change substantially as we age. Is it therefore possible to actually design experience? Maybe not; perhaps we can enable people to create or augment their own experiences. The actual experience itself is a personal interpretation and a distinctly individual choice.

Only by creating personal connections with people and by offering the experiences that they will enjoy, appreciate and pursue can we hope to create a truly lasting, qualitative approach to the design of Ambient Intelligence. Through this approach, people’s experiences and actions, rather than technological capability, become the guide for innovation (Goulden & McGroary in Aarts & Marzano, 2003, p.: 48).

This is one example of how experiences are seen in the visions of AmI – as highly important for the success of AmI, but also as distinctly personal. AmI thus must be able to deal with the differences between people; in this case, differences in preferred experiences, and how those experiences are valued.

Recognizing, learning, adapting and anticipating; being intuitive, natural and easy to use; and providing more and better experiences: all of these attributes point to the need to know the individual user and his or her idiosyncrasies intimately. By

expressing this need for intimate knowledge, the authors of the AmI visions thus express that they recognise that people are different and that AmI should be able to deal with these differences. Moreover, the value of AmI, vis-à-vis other (smart) technologies, lies precisely in the ability to deal with those differences. Whereas Ubiquitous Computing, for instance, mostly focuses on productivity on the work floor, where employees are more likely to be forced to comply to pre-planned tasks, procedures and roles, AmI mostly focuses on personal use and experience, often in the home, i.e. in situations where people are more likely to express and be themselves (Aarts, 2004). Thus diversity is of fundamental importance to the development and success of AmI.

This importance of diversity for AmI is further emphasised by the authors of the visions in the supporting user representations they produced. While guiding user representations are relatively unambiguous and abstract, they lack specificity; this role is taken up by the supporting user representations. The supporting user representations provide the reader of the AmI visions with more concrete ideas about potential users and uses of AmI and, importantly, about differences between these users and uses. While the guiding user representations were clear, unambiguous and acknowledged and supported by all the authors of the visions, the supporting user representations presented messier, conflicting, diverse views of the users and uses of AmI. Three sets of supporting user representations were identified. While “individualisation and personalisation versus communication and community building” and “task-oriented versus co-creation, inspiration and personal growth” also point towards an emphasis on diversity, the importance of diversity in the supporting user representations is highlighted most clearly in the set of representations called “gadget lovers versus the user as everybody.” For the sake of space and so as to avoid being too repetitive, only this last set of representations will be expanded upon here in more detail, while the other two will be discussed only briefly.

First, there is the “gadget lover.” This is a common way of representing the user in the AmI visions in which the user is a relatively young, quite affluent, probably well educated person with a great interest in and knowledge of new technologies and gadgets. Examples that were given in the second chapter included ski-jackets with GPS and communication technologies for the active young professional, and people who would like remote controls that allow you to “shoot” at the lights or pillows to which they can send text messages. Although the gadget lover does include both men and women and both young and more middle aged people, the image does not represent a very diverse view of the prospective user of AmI. However, these rather humdrum images of the prospective AmI user are offset by the “user as everybody” representation.

In addition to the common “gadget lover” representation, there is a slightly less common¹¹² trend in the visions of AmI which emphasises the importance of other users. In these statements, particular attention is given to what can be called the disadvantaged prospective user. For instance, children and students in remote parts of Africa or Brazil are seen as potential AmI users. Older people, children (in Western countries), or people with poor health, disabilities or learning difficulties are similarly seen as potential AmI users. In this reasoning, values like participation, contribution, communication, inclusion, and ameliorating deprivation take a central role. The overall message is that everybody should be able to participate in the AmI world. Thus encompassing diversity is a key issue from this perspective.

Indeed, the very juxtaposition of different user representations, such as the gadget lover versus the user as everybody already highlights the visions authors’ acknowledgement of differences between potential users. Moreover, some of the authors in the AmI visions explicitly stress the importance of diversity for AmI. Reddering and Scholten, for instance, translate diversity into an explicit question: ‘How can we make adaptive solutions that can cope with the diversity and unpredictability of human needs and desires?’ (Reddering & Scholten in Aarts & Marzano, 2003: 29). They go on to state that in order to develop meaningful technologies, researchers and designers need to be curious and open-minded about what people want and need without making too many assumptions, which, according to them, equates to allowing for diversity (Reddering & Scholten in Aarts & Marzano, 2003, p.: 32). The need to deal with diversity is thus expressed explicitly by authors like these, but it is also visible in the juxtaposition of different user representations, and, explicitly, in representations of the user as potentially everybody.

While “the user as everybody” is diversity embodied, the other supporting representations also add to this image of diversity. For instance, AmI can adapt to the individual and offer “deep” personalisation –thus dealing with diversity as mentioned in the paragraphs on guiding representations – but AmI also aims to cater to communities and communication. Similarly, AmI can be oriented towards performing everyday life tasks or can be an assistant – or even a partner – in co-creating, inspiring people and helping people to achieve personal growth. Thus a wide range of possible technologies are envisioned, leaving many options open and apparently excluding few prospective users and types of use. The supporting representations make it clear that the authors of the vision do see various prospective users and uses for AmI technologies. Thus from the perspective of both the guiding and supporting user representations, dealing with

¹¹² An analysis of how prevalent the “gadget lover” and “user as everybody” representations were in *The New Everyday* (Aarts & Marzano, 2003) showed that for every three “gadget lover” statements, there were about two “user as everybody” representations.

diversity is a key concern, one could even say a mission, for the authors of the AmI visions.

5.1.2 The lack of diversity of older people in AmI visions

However, this idealistic mission of dealing with diversity is not further reinforced when one takes a more detailed look at the way in which older people are represented in the AmI visions. Indeed, the whole focus on diversity was replaced by a rather monolithic image of older people.

This monolithic, homogeneous image of older people is one of illness, decrepitude and dependency. In the second chapter, this image was analysed with the distinction between third and fourth age (Laslett, 1987, 1989). While the first age is characterised by dependency, education and maturation and the second age by maturity, earning and responsibility, the third age – generally beginning at retirement – is seen as a period of activity, enjoyment, personal growth, achievement and fulfilment. The first three ages are relatively distinct age-based categories, but the fourth age is based on the health status of the body. It is marked by illness, decrepitude and loss of independence. In the visions of AmI, older people are overwhelmingly seen as people in their fourth age, as people who are frail, dependent and in need of medical attention and (constant) monitoring by family or health professionals. Older people are, for instance, often spoken of in medical terms, i.e. in terms of “melatonin production,” “visual impairment” and “body clock regulation.” Older people were also seen as being prone to falls, requiring health monitoring, as having quite rigid routines, and as people who need services and goods delivered to their home as they do not get out much. While this fourth age image of older people is common in the visions of AmI, a third age view, with an emphasis on AmI technologies for enjoyment, interaction, and personal growth was virtually completely absent.

As already described in chapter 2, this omission is remarkable as a third age view of older people would fit in well with both the guiding and supporting user representations. A technology that adapts to people instead of people adapting to it and that is easy and natural to use might, for instance, be useful for some older people, as differences in technological literacy and technology generations (Docampo Rama, 2001; Docampo Rama, et al., 2001) may make current technologies hard to use for older people. AmI could thus fit in well with people in their third age, not only from the perspective of the guiding user representations, but also from the supporting user representation perspective. The authors of the visions could have tapped into a repertoire of successful ageing (Baltes & Smith, 2003; Calasanti & King, 2005; Calasanti & Slevin, 2006a; Rowe & Kahn, 1997), imagining older people as active

people with a zest for life and developing, for example, accompanying (luxury) leisure products. Although successful ageing is recognized as a subtle form of ageism – implicitly imposing the norms of middle age on older people (Calasanti & King, 2005) – this rhetoric of successful aging is commonly used by companies (e.g. in the United States) and would also have given Philips an additional market for selling AmI technologies, however the authors of the AmI visions did not use this image.

This omission can be attributed partly to the triple-win rhetoric of the ageing-and-innovation discourse. In this discourse, technological innovations are presented as a way with which to help older people achieve certain goals (often the ultimate goal is maintaining independence) and simultaneously achieve societal benefits such as reducing the cost of (health) care. Thus a rhetoric of triple win is invoked; the older people win, as they can stay at home, society wins, as money is saved, and the company wins, as they get to sell, and make profit on, a new technology. By referring to demographic predictions, older people are often recognized in this rhetoric as the largest and thus primary group who are in need of care and thus such innovations. The threatening demographic predictions combined with the positive connotations of care and innovation make for a powerful rhetorical combination. However powerful this rhetoric may be, it can only be invoked if the prospective user is in serious need of care; as a result older people are positioned as frail, dependent, ill and in need of care. This thus leads to a very homogeneous view of older people.

Underlying this ageing-and-innovation discourse is a more fundamental homogeneous view of older people – a view of older people as “the other”. This othering¹¹³ is achieved by speaking about older people in medical terms or as a societal problem. Older people are discussed in abstract medical, demographical, economical and sociological terms, objectifying them and positioning them as a distant other. A language that positions a potential AmI user as “one of us” is very common in the AmI visions, but it is never used with respect to older people. This “othering”, however, is the converse of a diverse view of older people. In the end, despite the obvious possibilities for adding additional – diverse – user representations to the image of the older person as a dependent and decrepit person, the image is a homogeneous image of older people in their fourth age.

A more detailed analysis of one group of users out of the “user as everybody” category presented here thus counters the promises of encompassing diversity which were made in the AmI visions. Conceivably, this might also be the case for other groups like the chronically ill or people in developing countries (although such a statement requires research which does not fall within the scope of this thesis). Overall,

¹¹³ The term ‘othering’ was first introduced by feminist scholars (see Oudshoorn, 1996b).

the status of diversity in the design of AmI technologies for older people is thus rather conflicting.

5.1.3 The complexity of diversity in visions of AmI

As described in the introductory section of this chapter, diversity and design are a problematic combination. Dealing with diversity is never going to be easy and this is also true for the designers of AmI. Nevertheless, in the AmI visions – both in the guiding and the supporting representations – diversity is positioned as a mission for AmI. However, in the nitty-gritty detail of the views of the authors of the visions on older people, the emphasis on diversity quickly disappears and is replaced with a homogeneous view of older people in terms of illness, decrepitude and dependence. It thus seems that dealing with diversity by designing for the “disadvantaged other” is the aim, but only to a point. To be sure, the emphasis in the AmI visions is not only on designing technologies for the young white, well-educated male, but also for older people, children, people in third world countries or people with some kind of disadvantage. However, the views of older people – and likely of other (disadvantaged) groups as well – are still virtually solely as “the other”, which in turn is seen as a monolithic, homogeneous group. This perspective does not bode well for the design of AmI technology. Thus a closer look at the way in which diversity is treated in the design of AmI technologies is warranted: how did the designers and researchers involved in the laboratory and pilot tests studied in chapter 3 and 4, deal with the diversity of older people?

5.2 *Desired, defied, denied: how diversity was progressively lost in the development of an AmI robot*

In order to answer this question, it is necessary to take the particular characteristics of technological testing into account. MacKenzie (1989) and Pinch (1993) argue that technological tests are fundamentally problematic and full of internal tensions. One key example of such problems is whether a technological test is sufficiently like the real world in which the technology is supposed to function and, at the same time, sufficiently like other tests to be valid, or as MacKenzie puts it:

Judgements about *similarity* are as crucial in technological testing as they are in science. One typical issue involved in judging the validity of test results is whether the particular artifact(s) tested are sufficiently *like* others of their class to allow inferences to flow (...). Another is whether test situations are sufficiently *like* use to allow inference. There will *always* be ways in which test artifacts can be seen as

differing from “the real thing,” or test situations from actual use, given sufficient ingenuity in seeing them. No amount of modification of test procedures can wholly remedy this (MacKenzie, 1989: 415).¹¹⁴

Downer (2007) addresses this tension with the terms “reproducibility” and “representativeness,” emphasizing that technological tests need to be reproducible, controllable and comparable, but also authentic and representative of reality.

A key aspect of that reality in the testing of AmI technologies for older people lies in the differences between individual prospective users and the ability of the technology to deal with these differences; that is, in order to carry out a test that is sufficiently representative of reality, the designers and researchers need to take the diversity of older people into account. However, technological tests also need to be reproducible, controllable and comparable to a certain extent in order that results can be compared to other tests and validity established. However, putting greater emphasis on reproducibility may quickly come at the expense of the representativeness. The question thus becomes, how is the diversity of older people dealt with in tests that are subject to this fundamental tension? This chapter will continue by taking a closer look at the way in which diversity was treated in the development of iRo,¹¹⁵ an AmI robot tested with older test users. Subsequently the same approach will be taken for the pilot tests with the AIMS¹¹⁶ monitoring system.

5.2.1 IRo, an AmI human-interaction robot

IRo is a small human-interaction robot developed by the research department of a Dutch company that operates on the international market. The development of iRo was in line with the research department’s guiding vision on AmI. In this vision – much like the AmI vision statements presented earlier – AmI is seen as a technology that should be easy and natural to use. Moreover, AmI should adapt to the user and anticipate her or his actions as well as enhancing the experiences of its users. IRo can

¹¹⁴ Emphasis added by MacKenzie.

¹¹⁵ It proved necessary to anonymize this research project and the company. Thus it is not possible to refer directly to or quote publications, although summaries will be given. As already noted in the third chapter, the names Marjolein and Johan are fictitious, as is the name iRo. With regard to the name iRo, a brief check was conducted and no robot named iRo was found. Any reference to a robot actually called iRo is therefore accidental. Quotes from interviews and observations, translated by the author from Dutch into English, are provided. All of the quotes from Johan and Marjolein stem from interviews. All of the quotes from older participants stem from observations.

¹¹⁶ AIMS stands for Ambient Intelligent Monitoring System. This name is fictitious. Any reference to a system actually called AIMS is therefore accidental. The names of the interviewees – Mark, Sophie, Tomasz, Juliette and Simon – are fictitious as well. For a more detailed explanation of the interviewees’ affiliations, see chapter 4.

be seen as a good example of an AmI technology. It was designed to be a human-interaction robot which could serve as an assistant or companion in its own right, but also serve as an interface to other – more difficult to handle – (digital) technologies. The capabilities of iRo depend on iRo's programming, i.e. the applications uploaded on it. The user interacts with iRo simply by talking to it, in plain Dutch. No new interface needs to be learned, nor is it necessary to learn specific spoken commands. iRo communicates by speaking plain Dutch as well, but also by mimicking human facial expressions such as frowning, nodding, smiling, etc. The researchers worked from the premise that 'emotional expression and appropriate personality characteristics are key elements of (...) natural interfaces'¹¹⁷ Thus the researchers aimed to make interactions between iRo and its user easy and natural, based on emotions; completely in line with the AmI vision.

iRo was intended as a robot for – and tested with – different user groups, from differing age categories. It was tested with children, middle aged people and older people. Interestingly, the applications for these differing age categories were different. Johan – an engineer and senior researcher who supervised the project – explained that following experiments with iRo as a game-companion for children, they also developed an application for older people: 'Subsequently we also did it for older people. That also led to a game-companion, but with the focus on training cognitive skills'. As was already explained in chapter 3, the games that could be played with iRo were thus not only intended to provide entertainment, which would have been the focus for an application for children, but also had the goal of stimulating the cognitive abilities of its prospective older users, which in turn would help maintain the older person's cognitive health.¹¹⁸

iRo had an ambivalent status. In the long run, robots for older users were seen as a potential but future market. The central focus for the researchers in the short term, however, was to build up knowledge about users based on "proper scientific" research. This scientific approach can be seen in a number of ways. For instance, the company hired psychologists to do this user research, and there were equal numbers of psychologists and engineers on the project team. The people at the company also presented themselves – quite forcefully – as researchers, *not* as designers.¹¹⁹ These researchers fostered relations with universities, for instance, by having master students do research projects. They also made use of scientific methods, referenced their work,

¹¹⁷ 2006 publication on iRo.

¹¹⁸ Cognitive health and ageing were thus seen as strongly related, which in itself can already be seen as a statement about the diversity of older people, as the association between declining cognitive health and ageing is easily made, whereas cognitive decline may start at various ages, or simply not at all.

¹¹⁹ Personal communication – via e-mail – with one of the researchers involved in the iRo project (there were four researchers involved in the research project – besides Johan and Marjolein, there was another engineer and another psychologist. This statement stems from the other psychologist).

and published their results in scientific journals and at scientific conferences. There was thus a strong emphasis on a scientific style of research; indeed the researchers felt that this style would aid the long term development of iRo and would ensure that the knowledge gained in the tests would be valid. In line with this view, they presented iRo not as a product, but as a *research* tool with which to study human robot interactions (even though, at the same time, iRo was a potential future product).

The researchers carried out two rounds of tests. The initial round took place in their laboratory. This laboratory was a near-to-real testing facility designed to look like an older person's apartment. The objectives of the laboratory test were to see whether iRo functioned well technically, whether the participants perceived iRo as appealing and easy to use, and whether they enjoyed playing games with iRo. However, the most important objective of the laboratory test, according to the final report, was to interest participants in signing up for the field test. This was important because the researchers were mainly interested in the long-term interactions between ageing users and iRo as they had previously only conducted short-term research projects in their laboratory. In addition, they wanted to know whether relationship building strategies could be employed to foster and deepen relationships between iRo and older people.

5.2.2 Diversity and the laboratory

When, prior to the tests, the researchers were asked about the diversity of older people, the researchers readily acknowledged that older people were very diverse and recognized the importance of diversity for design.¹²⁰ This view of diversity is supported by the way in which diversity is treated in vision statements. For instance, iRo is positioned as an easy and natural to use emotional interface, making it suitable for many users, also for those who are less technologically savvy. Indeed, iRo was conceived for various users and programmed with various applications. Older people were also seen as a particular group which could benefit from using iRo – but were also seen as ‘a huge market’¹²¹ – and were thus explicitly included in the iRo vision statements. Thus, from the outset, it was clear that dealing with diversity was seen as very important in the development of iRo.

Accordingly, the researchers who conducted the laboratory and field test with iRo, took several differences between people into account. For instance, the researchers were careful to include an equal number of male and female participants and they also

¹²⁰ Informal conversation with the researchers. Later, in an interview, Johan acknowledged this point of view, and explained their stance towards diversity further (see below).

¹²¹ In this 2006 publication on iRo, the market for domestic robots is discussed (alongside results from research with iRo). The publication states that due to the rising cost of health care, the aging population and dearth of care professionals, the area of robots for older people will become ‘an enormous market’ by 2015.

achieved an even spread in terms of age.¹²² Furthermore, they acknowledged the diversity of older people in terms of personal preferences, differences in educational and occupational backgrounds and differences in cognitive abilities. Johan commented: 'We're mainly taking diversity in cognitive ability into account, [for instance] in the difficulty levels of the games'. Johan explained the differences between the participants and how these differences related to the required difficulty level of the games and the willingness to play: 'There is also a difference in technical background. The women don't have technical backgrounds. The men sometimes do, but not *per se*. Some people play a lot of games, others don't play at all. Some people are very enthusiastic, others are not. So there are quite a few opinions about [iRo]'. Thus the researchers realized that older people are diverse and that the design of (the application of) iRo should be able to deal with this diversity, for instance, by making the difficulty of the games selectable or having the game adapt automatically.

Diversity was thus something the researchers were aware of and wanted to take into account. However, at the same time, they also felt that they needed to restrict the diversity of older users in order to be able to do the tests properly. For instance, the tests focused solely on relatively healthy older people, both in a physical and cognitive sense. The researchers screened for physical disability, colour blindness (the participants needed to be able to distinguish colours in order to be able to play games with iRo) and early signs of dementia. Johan explained this last part: 'We also check whether they are showing early signs of dementia. That wouldn't be very useful – we're deliberately focusing on a group of healthy people. That [choice] is primarily related to the choice for our target group'. Practicalities and reducing the number of variables also ruled out another group, as Johan made clear: 'you've also got diversity in terms of physical ability, so to speak. We're not going to take that into account. Everybody will get the same set-up'.

There were further criteria for selecting participants. Marjolein – a junior researcher with a background in psychology – explained that people had to be retired, which, in the researchers' eyes, ensured that the older participants would have enough time to play with iRo. The researchers also only selected people who lived in a single-person household, which would, according to the researchers, improve the chances of the participant being the only person who would play with iRo. The researchers

¹²² In addition to age and gender, it is of course also important to mention race, ethnicity and class. The participants in the tests were all white and probably middle class, although I cannot be sure about this last characteristic. I have no reason to assume that the researchers deliberately chose white middle class participants. Instead, this choice seems to be an emergent effect, dependent on the demographics of Dutch society (although older people are becoming more racially and ethnically diverse, the majority of older people in the Netherlands are white) and on the fact that most of the older participants were recruited through their sons or daughters who worked for the company, a fact which may partially account for the (probable) middle class background.

focused on single-person households, not because they wanted to focus on potentially lonely older people, but as a methodological measure. As Marjolein explained, they focused on single person households ‘to reduce the chance that other people will play with it. We need to keep an eye on how it will work when, for instance, grandchildren come to visit and the participants decide to show [iRo] to them, but the chance that somebody other than the test subject plays with it, is much reduced’. Ensuring that only the test subject plays with iRo during the field test was important to the researchers as the researchers were interested in when, how long and how often the older people would play (and all of this information would be logged by iRo). A final reduction in diversity was reflected in the selection of participants living nearby; most of the older people who participated in the laboratory test and all of the people who participated in the field test lived nearby. The researchers felt that it would be too cumbersome for them to travel a distance to install, trouble shoot and retrieve iRo during the field test stage.¹²³ In the end, the researchers acknowledged the importance of diversity and actively tried to include it in their research, but simultaneously diversity was also restrained by the practicalities and methods of doing proper research.

5.2.3 Dealing with the views of older participants

After completing the test with iRo in the laboratory – i.e. after playing the required games – Marjolein would interview the older participants. The participants cooperated fully during these interviews, answering all of Marjolein’s questions and generally trying to be helpful. However, many of the participants, often unprovoked by Marjolein’s questioning, also wanted to make clear that they did not see themselves as the prospective user of iRo, stating that they did not (yet) need an iRo. This became clear in chapter 3 as the older participants gave typical responses like: ‘I don’t need to be kept busy. But I think there are plenty of old people sitting behind their geraniums who need to be kept busy, for them it would be good’, as one of the older men put it, and ‘I still lead too much of an active life; I’ve always been amongst people. I don’t need an iRo, not yet anyway.’, as one of older women remarked. In the end, ten out of twelve of the older participants gave this defiant response. These older participants thus saw the prospective user of iRo as somebody who was old and lonely, in poor health and in need of care and attention, and they wanted to make it clear that they did not see themselves as such. The participants were thus trying to tell the researchers

¹²³ For instance, one of the participants in the laboratory test lived in the north of the Netherlands, in a place which was a considerable distance away from the laboratory where the researchers are housed. The researchers could not decline his participation in the laboratory tests for ‘social reasons’, meaning that he was the father of one of the people who worked for the company. Nevertheless, he was not asked to participate in the subsequent field test as he was judged to live too far away.

how they perceived their own lives and identities in relation to the kind of life and identity they associated with the prospective user of iRo.

The researchers did not consider this response very important, seeing it as a relatively small incident¹²⁴ and as something that was mainly the result of the way in which iRo had been presented in the media prior to the tests. As explained in greater detail in chapter 3, Marjolein mentioned that there had been a TV documentary, which some of the participants had seen, which had shown robots like iRo being used in retirements homes to provide entertainment to the older people there. According to Marjolein, this gave the older participants the impression that iRo was ‘only for really old people’ who were lonely and not capable of doing much more than sitting around. For the researchers, the defiant response of the older people was merely a minor incident; there was no mention of this response in the final report of the project.¹²⁵ Moreover, they treated this response as something that could be remedied with relative ease by introducing iRo to people at an earlier age – for instance when people were in their late fifties or early sixties – when iRo would still be viewed as just a fun gadget, but would not, in the eyes of the researchers, generate negative age-based connotations with iRo. In any case, the information regarding the identities of older people put forward by the older participants was not taken into account in the research project.

Apart from this defiant presentation of themselves as not being old or frail, the participants in the laboratory tests devised another view of themselves. This was a view of themselves as helpful altruistic test users. Despite their defiant responses during the laboratory test, all but one of the participants in these tests decided to participate in the subsequent field tests. This might seem rather paradoxical, as the participants had made it clear that they thought iRo was a robot for old, lonely and dependent people. It can be explained, however, in terms of a typical reaction on the part of the older participants which can be illustrated by the following response from one woman: ‘I think it’s fun and interesting, not because I want one but to help somebody else. I like that (...) I think I am helping people with this’. Thus – and this observation is explained in more detail in the third chapter – the older participants positioned themselves as helpful altruistic test users, which allowed them to further widen the gap

¹²⁴ Personal e-mail communication with Johan.

¹²⁵ The document I refer to here as the “final report” is an extensive document written for an academic – psychological – context and audience. This may thus partly explain why the defiant responses were not mentioned as the report sticks strictly to the research questions, hypotheses, methods and required structure for such a report. The company also produces a range of internal – and therefore classified – documents which I had very limited access to (I had access to only one, under strict conditions). It is thus impossible to be absolutely certain how the researchers decided to treat this particular response. However, based on the available data – i.e. the reports published and the reactions from the researchers – it is only possible to conclude that they did not consider this response as a major problem.

with the perceived prospective user and simultaneously allowed them to use – and enjoy¹²⁶ – iRo for a few weeks.

However, this positioning as a helpful altruistic test user was not necessarily a help to the researchers. Marjolein mentioned, for instance, that she found that the participants tried to please her with their answers, giving the answers that they thought she would like. In addition, some of the participants tended to reason from the perspective of the consumer, thus commenting on iRo as if it were a finished product, highlighting elements which were irrelevant to the current research project. Both the defiant and helpful reactions are seen as a mild nuisance, as these responses drew the attention away from what the researchers really intended to achieve, that is, the collection of data that would provide answers to their research questions.

Nevertheless, the researchers had to deal with the older participants' alternate comments and identities. Both the defiant and the helpful responses implied work for the researchers. For instance, they had to prevent the test users from skewing the results. A striking example of this was the older participants' response to the difference between the two versions of iRo. One version of iRo had relation building strategies programmed into its software. The other "neutral" version did not have this software. Half of the participants received the neutral version first, and the other half received the version with relation building software first. However, the responses of the older participants to these versions could not simply be taken at face value by the researchers, as Marjolein explained:

M What I assume they did is... For one question they gave an answer that they thought would please me. I asked them which of the versions they preferred. So I said, do you prefer [iRo] or whatever name they gave to the other one, and all of them would choose the last version they had. Four of them chose the relational version, because they had it last and the rest would choose the neutral version because they had it last. But this is also because they all thought that it was a user test concerning the application of the games. We also did not want to disappoint them in that, so when they suggested some improvements, we implemented them for the second time they got [iRo].

L This made them think that the second version was better?

M That the second version was an improved version. So if I asked them which one did they like better, they think, okay the second one has to be better

¹²⁶ Many of the participants said they enjoyed having iRo in their homes and many of them said they were sorry to see it go and that they would miss iRo.

because it was not here for two weeks and they made changes to the system.
So this is now a better version than the first one.

The researchers did take several of the suggestions put forward by the older participants into account, but only to give the impression that they had done something with their suggestions. This was a methodological measure to prevent the older participants from guessing – and adjusting to – the true purpose of the tests: testing hypotheses around the question as to how the interaction with iRo would develop over the long term and whether relationship building strategies were effective. The changes to iRo were thus deliberately minor – just enough to give the impression to the older participants that they were being taken seriously. Marjolein again:

They were only minor changes. Just to create the impression that what they were saying was being taken into account. Because they didn't know it was actually about the name giving and some other changes we made. There I think they gave a please-me answer, because I could see in the log files and from the preliminary results that they played more with the relational version.

Despite the fact that half the participants had the “neutral” iRo last (which is the version *without* the relation building strategies and the version which, according to the researchers, the participants played with to a lesser degree than the “relational” version), *all* the participants said they preferred the version of iRo they had last to the one they had had before. This response did not matter much to the researchers as they relied on other data they had gathered. Thus the responses made by the older participants were not taken at face value, but had to be interpreted and used selectively in order to prevent the older participants from skewing the results.

In addition to this, and explained in more detail in chapter 3, the researchers also had to invest extra time and effort to find older participants, schedule more time when they visited, persuade them to comply with what they were asked to do and – as shown in the example above – interpret and make selections in the information put forward by the participants in order to stay focused on their research questions. The researchers thus also held a “craft representation,” as it was called in the third chapter, a set of images of what old people are like as test users and the specific craft required to work with them. They thereby created a setting in which they could interpret, discuss and negate the test users' ideas about the prospective user. The alternate views were thus not taken into account, as it was considered more important to focus on the research question and to ensure that the older participants did not skew the results of the test.

The researchers thus proceeded with their research. The next step for them was to finish this particular project by writing reports and articles. In line with the particular psychological type of research they were doing, this meant that data was analysed with the use of statistical methods. The results of these analyses formed a substantial part of the final report and the conclusions put forward therein. At the end of the final report, an agenda for further research was outlined. In previous projects these outlines were important, as the subject projects did pick up on them.¹²⁷ With that, the researchers finished the research project.

5.2.4 Intermediary Conclusion

How did the researchers developing iRo deal with the diversity of older people? Overall, during the testing of iRo, the focus on diversity was progressively lost. In the AmI visions, which the researchers adhered to, diversity is a key element. Indeed, at an early stage, the researchers acknowledged the importance of diversity. However, they also interpreted, translated and divided up the AmI vision into researchable parts, for instance, by formulating specific psychological research questions. In this process, diversity was narrowed down in order to create doable research and obtain usable results. Subsequently, deviant responses and defiant identities brought forward by the older test subjects were downplayed and not taken into account. Indeed, it became an objective of the researchers to prevent the older people from interfering with them acquiring the desired information; the differences between older people were increasingly translated into a methodological problem of doing this particular kind of research. Furthermore, the type of research the researchers decided to do required quantified results, which implied further decontextualisation of the outcomes of the research, stripping the results of more of the complexity and information about the diversity of older people. The final report concluded that it is possible to sustain the interaction between iRo and its user for longer periods of time and that the relation building strategies – which were not noticed by the participants – were effective. The report ended with an outline for future research, calling for more of the same kind of research.

During this project, the meaning of diversity shifted from an idealistic mission at the beginning, to a methodological problem at the end. If we return to the distinction introduced earlier in this chapter between reproducibility and representativeness (Downer, 2007; MacKenzie, 1989; Pinch, 1993), we can see, in these technological tests, an emphasis on scientific method taking precedence over

¹²⁷ The iRo research project was scrapped following a major reorientation at the company. Although the researchers often continued where the previous project had left off, this was not the case on this occasion.

representing the complexity of reality (in this case the diversity of older people). In this project, there was a clear techno-scientific mode of gaining knowledge about the prospective user by doing “proper scientific” research, which, in this case, meant a particular kind of psychological research. This generated results that were valid and usable from a psychological perspective, but also meant that a diverse view of the prospective older user was progressively lost.

5.3 AIMS: Tweaking and other encompassment work

As already described in chapter 4, the AIMS system is an advanced monitoring system that aims to allow its – mostly older – users to live at home for longer. AIMS was developed by a Dutch technology institute and it is designed to detect whether (older) people with Parkinson’s disease, multiple sclerosis, or dementia have fallen or to check whether people suffering from dementia are still at home and prevent them from getting lost. Making use of the same distinction between reproducible and representative testing outlined earlier in this chapter, this section will analyse the way in which the designers and researchers involved in the AIMS project dealt with the diversity of the older (pilot test) user of AIMS. This section will show that they dealt with diversity in a markedly different way than the researchers involved in the iRo project.

In order to be able to carry out this analysis, a brief recap of how AIMS works is in order. The AIMS system is based on a network of wireless sensors. These sensors are mostly motion sensors, but the network also includes bed and chair sensors, door sensors and smoke alarms. The AIMS network is equipped with two cameras which can only be turned on if the system generates – or the older person presses – an alarm. AIMS works by sensing how active a person is in a specific room and compares this with the present level of inactivity, which would be set a little higher than the normal level of inactivity. If a person is not sensed by a bed or a chair sensor, and is inactive for too long in a specific room, the system will start an alarm sequence by calling the person on their home phone. If the person answers and follows the instructions, the alarm is cancelled; if not, the alarm is dispatched to mobile care teams, who will receive it on their mobile phones. Using these phones they can access the cameras and set up a two-way audio link to establish whether and what kind of emergency there is, and whether they need to go to the older person’s home.¹²⁸

The AIMS system was studied while it was being tested in a relatively large scale pilot test in sixteen households in the Netherlands. It was thus in actual use by older people and care professionals. In parallel, the Knowledge Institute was carrying

¹²⁸ For further explanation of the AIMS system, see chapter 4.

out an evaluation of this pilot test and the Technology Institute was learning from the use of AIMS in practice. While some issues had to be resolved along the way, the pilot test was considered very successful. The AIMS technology was eventually sold to a major company specialising in electronic components and systems. The researchers from the Technology and Knowledge Institutes proceeded with the development of a more advanced monitoring system, partly based on the AIMS system.

5.3.1 Diversity in the development of AIMS

The diversity of older people was an issue that surfaced during the development of AIMS and was also taken into account by the designers and researchers while making (technical) decisions during the development of AIMS. The aim of this section is not to give another account of this development of AIMS – I refer the reader to the fourth chapter for such an account – nor is the aim to give a completely exhaustive list of the ways in which the designers and researchers incorporated diversity in their designs. Instead, three important ways in which they did incorporate diversity into the design of AIMS will be elaborated on here.

One way in which diversity was encompassed can be called lowest-common-denominator design. As already alluded to in the previous chapter, Tomasz – an engineer and chief designer of AIMS – had learned not to expect too much from the older users of AIMS:

This group of users, it is very broad. Some people can handle technology very well, others can't. So we set this up in a way that we really aren't expecting much from this group. Everything runs automatically. If you want to, you can switch some stuff on, but if you notice that the people can't handle it, you can switch it off.

This low expectancy of the capabilities of the prospective users also extended to the interface. As already mentioned in the previous chapter, Juliette – a senior researcher at the Technology Institute, specialised in conducting user research with older people – explained that they judged that the home phone would be the best interface, as any new button on a new interface can be operated incorrectly, or not at all, in a panic situation. An interface that the older people were already accustomed to would be more familiar and thus reduce the risk of the older people being unable to manage the interface. Thus the researchers chose a system that operated highly autonomously, and decided against introducing a new interface. Instead they relied on a design that required very little input from the older user, and in the one case that it did require input, the older users could make use of an interface they already knew very well. Even

if they could not manage to get to the phone or to operate it, the system would still function (although this increased the risk of potentially unnecessary alarms).¹²⁹ While some older people would have been perfectly capable of dealing with the new technologies which might have been incorporated in AIMS, the designers chose to make the basic system such that all prospective users – even those with a low technological literacy and, critically in this case, even those with advanced stages of dementia – would be able to use the system.

Taken at face value, this lowest-common-denominator design strategy may appear to be a rather limited way of dealing with diversity in design. However, in the case of AIMS it was combined with a design strategy of “modularity and adaptability”, which can be seen as the second way of dealing with diversity in the design of AIMS. Tomasz already highlighted this above when he stated that the system allows the system operator to turn additional functions of the system on. Moreover, if the older users cannot handle these options (anymore) or they set off too many false alarms, they can be turned off again. Juliette recalled that one of the most important conclusions they had drawn from the consultations with the intermediaries – people who had specific knowledge related to specific aspects of the lives and practices of older people, e.g. police men and fire men who could provide information about the safety of a home and people from “ouderenbonden,” older people unions – and consultations with older people who participated in workshops organised by the Technology Institute, related to the need to make a system modular:

I thought the most important input was: it has to be modular, because every user wants a different combination of services. So you shouldn't sell this like: “Buy this and then you've got six services.” No, what you've got to say is: “Buy this and then you have one *or* two *or* three *or* four *or* five *or* six services, but you can choose yourself what kind of combination.” That package, people should really be able to compose it themselves.

Indeed, the AIMS systems that were used in the tests comprised three different variations of the system. These three configurations – by which the engineers and researchers meant a specific set of sensors and equipment – differed as a result of the mobility of a person and whether somebody was able to use the phone. There were thus three configurations and six possible services. Depending on the person's particular needs, wishes and cognitive or physical capabilities, a particular configuration and selection of services was installed and could be changed at a later stage, depending

¹²⁹ For people who were physically unable to come to the phone, or who were – as a result of dementia or hearing loss – no longer able to operate a phone, there were different versions of AIMS, which did not require this “phone-step” but worked completely autonomously.

on evolving needs, wishes and capabilities. Thus AIMS' modularity and adaptability provided a means of dealing with the diversity of the prospective user of AIMS.

The third way in which the AIMS designers dealt with diversity in the development of AIMS is visible in their choices for specific types of technological components. As already briefly mentioned above, the designers and researchers endeavoured to learn about older people and the differences between older people by involving intermediaries, and, later on, by involving older people in workshops. One clear example of the varying views of older people which the designers and researchers learned about, related to the tension between safety and privacy, as Juliette explained:

There were, of course, a lot of questions regarding the cameras. Questions like, can we do this? How about privacy? That was very important to us too, but what we found in the feedback [report] from the users, well, it differs so much from person to person. One person couldn't care less about his privacy. I think it said in that report that one person said "I'd would rather be dead than [seen] naked" and the other person said "I'd rather be naked than dead, you know. You can hang as many cameras in my bathroom as you like. If it means that you find me here before I die, then, yes please." But the other one said "no, no, no." Quite literally "Over my dead body. Just leave me lying there then, but I'm not having cameras in my bathroom. The very idea of being seen somewhere – I do not want that." The users can differ so much.

This statement thus expresses a diverse view of older people. Such views had an influence on the technical choices that the designers made. Juliette explained that at the start of the AIMS project 'we were fairly hopeful that we could do something by using intelligent cameras which can interpret images themselves. That was a core technology that the project was built around, but later on that sort of disappeared. The camera, it all didn't work as we had hoped and it turned out we could actually get enough information with no cameras at all'. Both the technical difficulties and the views of some of the older people pointed to dispensing with the intelligent cameras, a technology that had been central to the project from the start. In the end, only two – non-intelligent – cameras were placed in the homes; these cameras would not record constantly, and could not be turned on at will by the care workers, but would only be turned on in case of an emergency. In addition, the cameras were made in such a way – that is, with a bright red LED – that the older people would know whether these cameras were turned on or off. Thus the initial high-tech intelligent camera – a technology that the project initially revolved around – was dropped, partially as a way to encompass the views of some older people. There were thus three ways in which the

designers anticipated and dealt with the diversity of older people during the design of AIMS – i.e. prior to the pilot tests; these were lowest-common-denominator design, modularity and adaptability and the willingness to “kill” some technological darlings to make AIMS fit in with the views and preferences of older people.

5.3.2 Encompassing diversity in practice: the art of minute tweaking

However, despite these efforts of the AIMS-team in dealing with diversity, their efforts were not limited to the design of AIMS. Indeed, additional work had to be carried out during the pilot tests in order to make AIMS fit in with the diverse use practices of some older people. Whether or not AIMS “worked” was dependent on three factors, as Simon¹³⁰ explained: generating *very few* false alarms, while registering *all* genuine emergencies and guaranteeing the *shortest* response times possible. He explained that the system worked because all emergencies (falls) were picked up, and people who were wandering off were also detected by the system, while there were few false alarms. At one point during the test, the number of false alarms had dropped to one every two weeks, which was a very good result, as Simon commented that with the current pendant systems the incidence of alarms is much higher, while 90% of these alarms turn out to be false. Combining these three factors meant that the researchers and designers could position AIMS as a resounding success.

Although the designers and researchers boasted the autonomous nature of AIMS, attaining this working status in the pilot test involved a specific form of work on the part of the care manager – Sophie – and the chief designer – Tomasz. This work involved a collaborative effort at tweaking AIMS’ minute settings. Tomasz explained: ‘We started off with a particular setting that worked reasonably well for, I would say, some 70% of the people in the pilot. For those we had to change relatively little. But there were a number of people who were different’. The settings had to be changed for these people. The main problem was that people would fall asleep in the living room, exceeding the inactivity threshold while they were – safely – asleep. This would generate an alarm which was a nuisance to both the older people and the care workers. As described in the previous chapter, Sophie and Tomasz solved this problem by first raising the minute settings to a high level and then progressively lowering them again. At some point the number of false alarms would go up, at which point the minute settings would be raised slightly again which resulted in a balance between few false alarms and (relatively) low response times. Setting the minute settings very high, however, would also mean that it could take very long before a person who had actually

¹³⁰ Simon works for a Dutch Knowledge Institute for protracted care. He put the Technology Institute in contact with the care organization in order to do the pilot test with AIMS.

fallen would be found. Sophie explained that false alarms were not appreciated by the care workers, but that long response times were not the solution either:

These are the things we ran into in this project. That somebody would sleep every afternoon on their sofa, for at least one and a half or two hours. So we set the interval time for the living room to two and a half hours. Simultaneously, that means that she will then also have to wait two and a half hours before she is found and that is unacceptable for the client, but our care workers think that is unacceptable too.

No one, not the designers, researchers, care workers, family, nor the older people themselves, was in favour of long response times. However too many false alarms were also unacceptable. Thus Tomasz and Sophie had to tweak the minute settings to find a balance between generating very few false alarms and simultaneously keeping response times as low as possible. While additional chair sensors would be installed in the market version, making this problem significantly less prominent, the settings of the system had to be managed in the pilot test, and even if a workable setting had been found, there was no guarantee that it would remain that way.

Indeed, the tweaking work to encompass the diversity of the older AIMS users had another temporal dimension. Once a workable setting had been achieved, there was no guarantee that it would not need changing again, as Sophie explained: ‘And what’s more, the conduct of people changes as well. After three weeks this lady will no longer sleep on the couch, but in bed and we do have a bed sensor. So you’re paying very close attention to the client and their care request and the changes therein’. Thus keeping AIMS in tune with the everyday lives of the older people required intensive cooperation between Sophie, who knew the clients and their changing habits well, and Tomasz, who knew the technology well. Ultimately, it was due to the flexibility of AIMS and the willingness of Sophie and Tomasz to learn and relearn about the everyday lives of the older clients and adjust the settings accordingly, that made AIMS work, i.e. keep the older people safe with a minimum number of false alarms and low response times.

Nevertheless, this was not the only way in which the diversity of older people and the complexity of their use practices needed to be encompassed during the AIMS pilot tests. Sophie and Tomasz also had to deal with unforeseen and sometimes mysterious false alarms. The false alarms caused by “Willem,” an older woman’s cat, provide one example. Tomasz explained:

From the start we said: “this system is not suitable for people with big pets. Small pets, that’s okay.” We tested that here, in-house. We also picked the right sensors for this, the ones that actually shouldn’t detect small pets. But, well, if you’re doing such a trial, such a pilot in so many homes, you are bound to run into a number of scenarios you hadn’t anticipated. And sure enough, during this pilot we had a troublesome cat. And that’s good. We had expected certain scenarios which we hadn’t anticipated. (...) We had a cat that was walking around a lot at night, really a lot. The biggest problem with pets is: if we hang a sensor above something and the cat stays here [on the ground, far away from the sensor], then there is no problem. It is small, the distance to the sensor is big, no problem. But (...) nasty things can happen. (...) Suppose that there is a cupboard here and the cat jumps up on the cupboard, then all of a sudden it is very big for the sensor. Then it is just seen as a human being... At night...Not terribly handy.

Sophie recalled the second problem caused by Willem. She started by explaining that, when caring for people with dementia, strange things do happen:

Every person is unique, of course. So you never know – and this applies almost exclusively to people with dementia – you never know what somebody is going to do. So also in the future, in any situation, you mustn’t be surprised if something really strange happens. The cat would walk up the stairs and at the top of the stairs there was a sensor, because this lady still had her bedroom upstairs and she was still walking up and down those stairs. Well, a 87 year old lady with dementia who is still walking up and down her stairs, that’s an unsafe situation. So an extra sensor was installed [at the top of the stairs], to make sure that any fall would be detected quickly. But this cat would walk right past this sensor, time and time again. Well, the AIMS system is made in such a way that anything beneath 40 kilos or something like that, is not detected. Unless, of course, you pass it like this [Sophie makes a hand gesture that indicates passing at a few centimetres]. So what happens, this cat appears to AIMS and disappears again. So AIMS thinks “that’s a fall”. “Briefly there was a second person, and now this person is gone again, so this person must have fallen, we’ll send out an alarm.” And then of course nothing would be wrong. So after a lot of false alarms, we were thinking “what’s going on there?” And of course it takes forever to find out that it is the cat. And it irritates the care workers, because you are the other side of twenty alarms before you notice it is the cat. [Tomasz] built a so-called cat-filter into the software. In all future AIMS-systems this can’t happen anymore. So this was a good example of why you need this test. You can’t think of something like this in advance.

Thus the designers and others involved in the testing of AIMS anticipated the possibility of the everyday life practices of people as being different than expected. Apart from the animals, the houses of the participants differed, some being very big, others being smaller. In addition, the health care and care requirements of the people differed as well. Thus the differences between people and their practices led to various issues with which the researchers, designers and care workers had to contend.

There were various ways of dealing with these problems, from cat filters to chair sensors, and sometimes these problems led to dilemmas, for instance in the choice between fewer false alarms and short response times. However, as the pilot test progressed, Tomasz and Sophie encountered fewer problems, although they still had to adjust some settings occasionally, for instance, as the behaviour of some of the older people changed. Nevertheless, Tomasz believed that this encompassment work would decrease in importance in the market version of AIMS as this would for instance include additional chair sensors and the cat filter. However, if necessary, the care workers would be able to change AIMS' settings as Tomasz explained:

T The system comes with a webpage-to-GUI [Graphic User Interface]. (...) In principle, you can connect to it to your laptop, simply via Internet Explorer. Then you get a nice webpage in Internet Explorer. And with that you can adjust just about everything, including the reaction speeds per room, the time-outs that I just mentioned.

L What other parameters are there?

T In any case, you can activate and deactivate various services. So you can say "I want fall detection" or not. If you turn on the fall detection, then you can say "I want fall detection between eight o'clock in the evening and six o'clock in the morning, but not during the day". They're the kind of settings you can choose. And furthermore, all the services that will generate an alarm at some point. Per alarm type you can select what the system should do with it. You can say, maybe it should first try to call the resident on their own phone (...). For people with dementia, you really mustn't select that option. It will go wrong, I can guarantee it. Suppose people don't answer the phone, or respond badly, then the system will send the alarm on. Per alarm type you can set what it should do, whether it should send a text message and to whom. That can be a neighbour or a relative or it could be sent to the operator [of the care organization]. You can set an entire list of, what we call, reporting actions, per alarm type. You can do all that via this GUI.

Thus, even when the designers have moved on, the system will remain adaptable to the particular needs of a person. Clearly, this also implies new types of work and (ethical) decisions on the part of the care workers. The system could even lead to a new type of digital care worker, solely responsible for managing these kinds of systems and settings.

5.3.3 Limits to the encompassment of diversity

Despite the efforts of the researchers, designers and care workers, they could not or did not want to incorporate every type of behaviour or difference between people. For instance, some behaviour could not be accommodated, simply due to the way in which an emergency was defined by the designers of AIMS, i.e. lying still on the ground for too long; for instance, on feeling dizzy, a woman lying down on the floor would set off alarms. Changing the system to deal with this possibility would have required a change of the very premise of the system. Other types of behaviour that were detected with the system – for instance nightly behaviour – were seen as unwanted behaviour. The design of AIMS was not changed to accommodate this behaviour; instead it was the behaviour that was modified by a medical intervention.¹³¹

In addition to these instances of not being able or willing to adapt to the differences between older people, the researchers and designers also found that – in line with the idea that design also involves reduction of complexity – they could certainly not incorporate all the suggestions put forward by intermediaries and older people. Juliette explained that not all the information gathered in the interviews, consultations and scenario workshops could be incorporated:

The users can differ so much. And it is very hard to make generic statements about that, about the way something should look. You will notice, well, that you can make very good attempts, during such a project, to involve users or intermediaries. It is of paramount importance that you single out only one or two things that you will take with you in the rest of the project, while they will often really say an awful lot. If you listen to everything, you can't develop anything. You'll get nowhere. So you mustn't listen too well either.

¹³¹ See section 4.5.1 for more details about this particular example. This goes to highlight that some types of aberrant behaviour were seen in a normative light, irrespective of the fact that the knowledge of the existence of this behaviour was gained only by using the system in an unforeseen way (for which the older people had – in all likelihood – not given their consent). This is a clear instance of a very complicated ethical situation. The care workers and the physicians clearly have the best interests of the client or patient in mind. Nevertheless, their actions impinge upon the autonomy of an individual. Dilemmas such as these are common in the ethically complicated field of aged care (Moody, 2005). Technologies such as AIMS are introduced in and subsequently change – and are changed by – these ethically complicated practices.

Thus, the system could not accommodate everything, the care workers did not want it to accommodate everything; thus the process of designing a technology also involves selectively listening for the most salient comments made by intermediaries or prospective users.

Nevertheless, in the case of AIMS, there was substantial attention given to the diversity of older users. While designing AIMS, the designers involved experts and older people and employed three strategies to deal with diversity in design: a lowest-common-denominator design, modularity and adaptability and, if needs be, the “killing” of some technological darlings. The AIMS’ researchers and designers subsequently chose to do a pilot test in which they had to contend with the practices, habits and idiosyncrasies of the older test participants and their living arrangements. In order to make the AIMS system fit in with these practices and habits, the chief designer and the manager of the care organisation tweaked the system and dealt with a puzzling set of false alarms. Although the system was further adapted to make it less likely that settings would have to be changed often in the future, the option of adjusting the settings to the lives of the older people remained available after the designers had left. Finally, the focus on the diversity of older people could also clearly be seen in the way in which the AIMS team members addressed older people, in statements like ‘the users can differ so much’ (Juliette), ‘every person is unique, of course’ (Sophie), and ‘this group of users, it is very broad’ (Tomasz).¹³² Thus there was significant attention given to the diversity of older people, and this attention contributed to the successful functioning of AIMS in the everyday life (care) practices of the older people and their formal and informal carers.

Returning to the theoretical distinction between reproducible and representative technological testing introduced earlier in this chapter, it is clear that the pilot tests performed with the AIMS system were not focused on producing a rather abstract situation that could be readily replicated. Instead the focus was on representing the use practices of older people as realistically as possible. Although there were (academic) evaluation research projects¹³³ being carried out simultaneously, doing reproducible research and gaining valid test results was not of paramount importance in these tests. Indeed, the academic and evaluation research projects had to cope with the ongoing adaptation of AIMS to the practices of the older participants.¹³⁴ This

¹³² Certainly, I asked the AIMS team members explicitly about diversity, but comments as these were also made when diversity was not the topic of the discussion during the interviews.

¹³³ See chapter 4.

¹³⁴ The way in which these tests were organized confronted Mark with some difficulties in doing his research. For instance, the opinions the older people held about AIMS varied considerably as the system, for example, developed some malfunctioning sensors towards the end, the (additional) video communication system malfunctioned, or technological changes were made. Also, interviewing people at the right time was difficult for Mark. All of this shows that the ongoing academic and evaluation

emphasis on representativity extended to a focus on the diversity of older people. The researchers recognized that older people and their practices are diverse. In order to do a test that would be representative of the reality of the lives and practices of older people, the researchers thus had to encompass the diversity of the older test participants in the design of AIMS.

5.4 Conclusion: Comparing Cases

Dealing with diversity is difficult. This chapter has illustrated that for AmI technologies, dealing with diversity is often positioned as an idealistic mission; however, in the practices of testing AmI technologies, diversity is also a source of messy problems that sometimes require painstaking work to solve and that are also sometimes progressively back-grounded and reduced in importance.

In the AmI visions, diversity was presented as a central mission in the development of AmI technologies. However, a more detailed look at the diversity of older people revealed that this idealistic mission did not result in diverse images of older people. Indeed, representing older people as diverse would have been feasible as the structure of guiding and supporting user representations would have easily allowed this. Instead, older people were viewed almost solely in terms of illness, dependence and decrepitude (a view which resonates with the ageing-and-innovation discourse). The mission of being open to and embracing diversity in AmI design thus does not seem to extend much further than simply promising to include many groups in design, as a more detailed view of one of those groups, older people, revealed that they were viewed in rather homogeneous and negative terms. Given the discrepancy between this view and the diversity of older people, it became interesting to observe how diversity would be taken up in actual design practices.

In the iRo case, the meaning of diversity progressively changed from the ideological mission outlined in their vision to a methodological problem at the end. The researchers carried out a particular kind of psychological research which was seen as the best way to gain knowledge about older users. However, this particular view of “good” research led to the backgrounding of the diversity of older users and ultimately, to this diversity being almost completely lost. The results which they generated were neat and tidy – and, more importantly, valid – but the diversity enacted by the older people during the tests was made completely invisible. Thus, dealing with diversity effectively meant negating diversity in the iRo case.¹³⁵

research, itself much more focused on reproducible and valid research, was clearly subservient to the technological tests with AIMS (see chapter 4).

¹³⁵ Of course, this statement derives from the perspective of the (public) results of the research. However, these results are particularly important as different researchers may take them as the starting

In the AIMS case, the designers found ways to incorporate a significant aspect of the diversity of users. Diversity was clearly on the agenda during the development of AIMS as the researchers employed a lowest-common-denominator design strategy, made AIMS modular and adaptable and adapted the technology to the use practices and the views of the older users (ultimately resulting in ditching the high-tech AmI camera that the project was based around at the start). In the test practice, a labour intensive process of tweaking and re-tweaking the software settings allowed the system to accommodate a substantial element of the different and changing behavioural patterns of older people. Nevertheless, some behaviour could not be incorporated and for some behaviour the carers judged that the behaviour was unwanted anyway and other (medical) steps were taken. In the end, the AIMS system was successfully integrated into the lives and care practices of the older participants and their carers. This was achieved in a painstaking research-and-development project that lasted more than a decade. Dealing with diversity may be easy on paper, but it is difficult to achieve in practice.

Comparing the two responses to the diversity of older AmI users found in the two technological testing cases is not completely straightforward. It would be too simplistic to claim that one project found a way of encompassing the diversity of older people, thus becoming a successful project while the other project was unsuccessful in this regard and subsequently failed. Design and innovation processes are contingent, multi-actor activities and success depends on many factors, of which the treatment of the diversity of users is only one. Indeed it is also important to reiterate that these projects had different goals. Notably the iRo project was ambivalent about whether it was a research project or a product design project, whereas the AIMS project was clearly geared towards preparing a technology for introduction on the open market. Nevertheless, a comparison of these two design projects is still insightful.

If we return to the theoretical distinction introduced earlier in this chapter between representative and reproducible research, it is clear that the AIMS tests and the iRo tests present us with two different positions. In the iRo tests, a scientific mode of learning about the user based on certain accepted methods and practices resulted in valid answers to the research questions the researchers set out to answer. From that scientific and methodological perspective, the tests were successful. However, this mode of learning about the user leans heavily on the side of reproducible technological testing. As these researchers valued reproducibility over representativity, complexity was reduced and in the process, their initial emphasis on diversity was lost. The AIMS

point for further development of technologies (like iRo) within the company. It is certainly true that the researchers also learned about older users and their diversity during the research project, but they did not systematically gather this knowledge, thus there emerged a danger that this knowledge would be lost once those researchers were assigned to other projects.

tests provide us with a different take on diversity. The designers of the AIMS system were not carrying out their pilot test to gain valid test results. Their aim was to test whether the system would work in practice and, if necessary, to make any necessary changes. These tests thus present us with an example of the other end of the spectrum of reproducible and representative testing. The emphasis in this case was exclusively on representativity, on achieving a system that would work in the diverse and complicated practices of older people with severe health problems.

The difference between the two projects can be summed up nicely if we consider what was lost along the way. In the iRo project a focus on valid, reproducible testing resulted in the diversity of the older user being progressively lost. In the AIMS case, the focus on representative technological testing resulted in close attention being given to diversity, even to the point of sacrificing a technological darling. Indeed this focus on fitting in with the practices of older people ultimately resulted in the disappearance of the high-tech intelligent cameras that had initially been a focal point of the project.

In line with what could be expected following the discussion in the introduction of the problems and dilemmas posed by diversity in both the laboratory tests and the pilot tests, diversity posed significant problems, which could not be dealt with fully in either case, but were treated very differently in these projects. The differences between these approaches are not arbitrary. It is important to remember that these technological tests differ from scientific tests. One important aspect in which they differ is that these tests produce not only (scientific) “hard” facts but also hard technological *artefacts* (c.f. MacKenzie, 1989: 417). Pinch (1993), who, although in other terms, also recognizes the distinction between reproducibility and representativeness expresses his concern about the black-boxing of the user that occurs in technological tests:

If users (and consumers) are to be black boxed, then technologies must have built within them projections of users' future actions. As we have seen, crucial relationships of similarity and difference are embedded in such tests of the user. The danger is that, unless such relationships can be contested, one particular version of the user will increasingly be incorporated within technoscience systems (Pinch, 1993: 37).

Echoing the work by Woolgar (1991) and Akrich (1992), Pinch thus states that in technological tests, particular representations of the user can be concealed and normalised, and subsequently scripted into technologies. The way in which diversity of (older) users is treated in technological tests is thus not neutral, nor irrelevant. If

homogeneous and negative views of the (older) user are the basis for design, and/or researchers find ways with which to negate the diversity of users in technological testing, such non-diverse views can thus be inscribed and black-boxed in technologies.

On the other hand, it is possible to encompass diversity in technological testing. This is by no means something that is quick and easy to achieve, but it is clearly an important endeavour, particularly in the case of older people as, on the one hand, older people are, in the words of Östlund, ‘so obviously the objects of other people’s preconceptions about their needs and capabilities’ (Östlund, 2004: 46), and, on the other hand, likely to be more readily subjected to pressure – whether “subtle” or not¹³⁶ – to accept (health, care and safety) technologies and systems in their lives, irrespective of whether these technologies fit in with their diverse lives and practices.

¹³⁶ See chapter 4 for the example of “subtle” pressure on older people to accept AIMS.

6. Conclusions

Ageing and technology is a topic that has been gaining interest in STS only relatively recently. This thesis aimed to contribute to this small but growing body of literature by focusing on user representations of older people. The introductory chapter of this thesis indicated that the work that has been done on the topic of ageing and technology in STS has mainly focused on the *use* of (new) technologies by older people and their carers; the “design side” of technologies for older people has received much less attention. Indeed, there are only a few studies of the way in which older people are represented in design processes. To the extent that these studies do exist, they have so far only focused on older people as an ideal type of user in order to gain an in-depth understanding of design processes and the role of user representations therein.¹³⁷ These studies have thus not focused explicitly on how ageing and technology are co-constructed in design. This thesis aimed to address this underexplored but important area of enquiry. It thus set out to analyse the way in which the older user of a new and emerging technology – ambient intelligence – is represented in design processes.

This concluding chapter will first specify four key ways in which the older Aml user was represented by the designers, researchers, engineers and others involved in the projects studied in the empirical chapters of this thesis. These four representations will not follow directly from individual chapters, but will instead comprise “synthetic” representations that cut across all four empirical chapters. These representations will serve to highlight important findings of this thesis, illustrate theoretical connections and critically discuss the way older people are represented in design processes. The importance of the four user representations will subsequently be illustrated further by revisiting the age script concept. Finally, the conclusions will reflect on the consequences of this thesis for design practice and social theory.

6.1 Four overarching user representations of older people

The views of older people held by the designers, researchers and other professionals involved in the design of technologies for older people that were examined in this thesis can be summarised in four overarching user representations of older people. Needless to say, the user representations found in this thesis are more complex and diverse than these four overarching representations. Nevertheless, these four representations embody the four most dominant ways in which older people were represented, and, in turn, serve to highlight the most important findings of this thesis.

¹³⁷ See Hyysalo (2003, 2006, 2011).

The four user representations are:

1. Older people in terms of dependence, illness and decay
2. Older people as reluctant and resistant to (technological) change
3. Older people as people who possess low technological literacy

Although the technologies based on these representations were no doubt well-intentioned, i.e. the designers of these technologies aimed to help or serve the older individual or their carers, these three ways of representing the older user are rather negative ways of viewing older people. There is, however, a fourth clearly distinguishable – and generally more positive – way in which older people were represented by the designers, researchers and engineers:

4. The nuanced exception: the diversity of older individuals

However, despite the exceptions that make up this fourth representation, the first three user representations are very influential, as shall be demonstrated below.

6.1.1 Older people in terms of dependence, illness and decay

A clear and recurring way in which older people were represented by the designers, researchers, engineers and others involved in the projects studied in the empirical chapters of this thesis, was in terms of illness, dependence and decay. For instance, in chapter 2, a distant medicalized way of talking about older people was uncovered. Whereas younger users were discussed in terms of choice, lifestyle and experience, older people were discussed in terms of biorhythms, sleep-wake cycles, melatonin production, visual impairments and risk of depression and were positioned as a “dependent other” in need of the services provided by various AmI technologies. In chapter 3 one sees a distinct way of viewing older people’s health – both physical as well as cognitive and mental health – as subject to deterioration. Robotic technologies like iRo were envisaged as technologies which could serve to maintain (cognitive) health in the face of this decay and as technologies to which additional components could be added as people grow progressively frail, ill or forgetful as they age. In chapter 4, the designers focused specifically on older people with severe health problems like Parkinson’s disease, multiple sclerosis or advanced stages of dementia, and developed a monitoring system that would allow them to remain living at home (relatively) independently. The older participants in the AIMS tests were thus seen as people who wanted to live independently – which was interpreted as living in the own home – but

they were simultaneously also viewed as very dependent on their formal and informal carers. Indeed, the introduction of the monitoring system added further dependencies, in this case on technological instead of human actors (thus the idea of “living independently” could only become a reality by introducing new technological dependencies).¹³⁸ The point here is not that these designers were inaccurate in the sense that there is no category of older users who could benefit from the technologies the designers developed. Rather, the point is that this view of older people as being dependent and having poor and/or decaying health is a dominant representation in the vision and in the iRo and AIMS cases studied in this thesis (moreover, alternate representations of more independent, healthier older people were very hard to come by). Indeed, even in the development of a technology like iRo, which was intended as a game companion; as a source of entertainment, representations of older people in terms of deteriorating health were still strongly foregrounded.¹³⁹ The importance of this way of representing older people lies in the way it is linked to AmI technologies. As a result of the representation of older people in terms of poor or decaying health, these people were seen as *needing* these AmI technologies to deal with their health and safety issues. Instead of a focus on the desire for AmI technology, with an emphasis on lifestyles, choice and enriching experience – which is common for younger AmI users – the older users of AmI are seen as dependent people in poor or deteriorating health who simply need these technologies.

It is clear that this representation is a narrow portrayal of older people, but this way of portraying older people does serve a purpose for the proponents of technologies like AmI. This was made clear in chapter 2, with the use of the distinction between third and fourth age. Originally introduced by Laslett (1987, 1989), this categorisation – widely used in social gerontology – distinguishes four ages that an individual can go through during his or her life. The first two ages are characterised by growing up and (the responsibilities of) adulthood.¹⁴⁰ The third age starts at retirement. It is a period in which the responsibilities which characterise the second age become less prominent or disappear altogether and in which time and energy become available for activity, enjoyment and personal growth. This third age can be brought to an end by a fourth

¹³⁸ In turn, this raises questions about what people become (in)dependent of, as a dependence on people can be replaced by a dependence on a technology. It is thus not simply a question of older people becoming more independent through the introduction of technologies like AIMS. Instead this highlights how dependence and independence are constructed by making use of both human and technological resources. This discussion of dependence and independence in relation to technology was a topic of discussion at the EFORTT conference on ethics and telecare technologies for older people held in Barcelona in September 2010 (See Mort (2011)). Mort and Roberts (2010) also discuss this issue.

¹³⁹ The deficit model of old age is thus invoked here. In this model ageing is predominantly viewed as an illness and as an inevitable process of (physical and mental) decline (Hepworth, 2004; Hugman, 1999; Woodward, 1991).

¹⁴⁰ See section 2.6.1 for a more detailed explanation of the distinction between third and fourth age.

age which is not an age-based category, but is characterised by physical deterioration and increasing dependence. In terms of this categorisation, the older users of the AmI technologies studied in this thesis are represented as people in, or at least nearing, their fourth age. Viewing older people as people in their third age would definitely have been possible, and, as chapter 2 argued, would have fit well with the structure of guiding and supporting user representations. Moreover, viewing older people as people in their third age could have provided opportunities for the design and development of new technologies. However, this view of older people is virtually never used. The reason for this is that the user representation of older people as frail, ill and dependent people who need (AmI) technologies to help them, is an essential requirement for the ageing-and-innovation discourse.

The ageing-and-innovation discourse was shown to be a central element of the way in which older people were discussed by designers, researchers, engineers and others involved in the design of technologies for older people and, indeed, was found to play a role in all three empirical cases.¹⁴¹ The ageing-and-innovation discourse consists of three vital components: the crisis account of ageing, the belief in technological solutions to the (social) problems caused by demographic ageing, and the promise of “triple win”. The crisis account of ageing (Mort & Roberts, 2010; Ney, 2009) often strikes an alarming tone and states that populations are ageing across the world; the cost to care for older people – both in terms of health care and social care (at home) – is increasing and will continue to increase rapidly as populations age; and there will be a dearth of qualified staff to care for older people. In this account, ageing thus leads to huge and unprecedented challenges around the world and these challenges, of course, need to be met. In the ageing-and-innovation discourse, technology is subsequently positioned as an important way of solving or mitigating the challenges posed by ageing. Usually one particular problem, for instance worries about the safety of older people living alone, and one particular solution, for instance a monitoring system, are highlighted. In turn, the benefits of such technical solutions are elaborated on, which is generally done by invoking the triple win rhetoric. The technical solution benefits society as the problems highlighted in the crisis account of ageing are partially solved or mitigated. Older people also benefit as the technology fulfils a particular need or goal they are perceived to have (and these needs and goals are, in turn, often related to health, wellbeing and independence). Finally, there is an economic benefit. The designers, researchers and engineers – and the companies, institutes and universities that employ them – get to produce innovative technologies, which target the “grey market”, viewed as a large market that will grow further in

¹⁴¹ See chapters 1, 2, 3 and 4 for examples of the ageing-and-innovation discourse.

importance. Although this last benefit is sometimes left more or less implicit,¹⁴² there are only winners in the triple win rhetoric. There are societal benefits and economic gains, in addition to benefits for older people. However, as was argued at the end of chapter 2, this ageing-and-innovation discourse relies on a fourth age view of older people. In order for the discourse to work, older people need to be positioned as frail, ill, dependent and, crucially, be positioned as a social problem. They need to be represented as a relatively large and growing group that poses a substantial societal problem. Without the fourth age representation of ageing linked to the view of ageing as a societal problem, the societal benefits disappear and the ageing-and-innovation discourse collapses.

Nevertheless, despite the fact that the ageing-and-innovation discourse relies on a fourth age view of older people – a view that excludes a large number of older people – this discourse is hardly ever questioned (particularly in design circles).¹⁴³ On the one hand, this can be explained by returning to the discussion of narratives of ageing (Johnson, 2005) introduced in the introductory chapter. Johnson shows that the crisis account of ageing is the dominant modern narrative of ageing. The construction of ageing as a social problem – which leads to an undue burden on present and future generations – is widespread and already has a substantial history. The social problem view of ageing is thus a normal and accepted way of talking about older people. On the other hand, the technological solutions to the problems highlighted in the crisis account of ageing are not questioned because the ageing-and-innovation discourse also has strong (idealistic) moral connotations. In chapter 4, the concept of ideograph was used as a means of highlighting these moral connotations. Innovation is strongly related to renewal and creating something out of nothing. Innovation requires people to be “smart”, defiantly determined in the face of detractors, mishaps and teething problems and competent in discovering niches that are yet unidentified. These are values and traits which are generally appreciated and highly valued. In addition, in industrialized societies which like to portray themselves as ‘knowledge societies’, innovation is seen as an important way of attaining economic growth, as a means of

¹⁴² Whether this benefit is left implicit often depends on the intended readership of the document; these economic benefits are highlighted to a greater degree in, for example, policy documents or internal company memos (intended to influence higher management).

¹⁴³ One could of course argue that these designers are focusing specifically on older people with a certain deficiency, risk or health problem. Although this argument is partly valid, it is important to stress that there are virtually no technologies for older people that start from a different image. The question then becomes whether “regular” technologies aimed at younger people are also aimed at 3rd age older people and thus whether technologies for older people are, per definition, for people in their fourth age. The literature on technology generations (Docampo Rama, 2001; Docampo Rama, et al., 2001) does, however, suggest that there is room for innovations “between the iPhone and AIMS”; technology suited to technological generations and technological literacies of older people that does not start from the viewpoint that their older users are ill, dependent and decrepit.

valorisation of research and as a means to distinguish “us” from “them”, referring to mass-producing low-wage countries. Thus innovation is often seen as a nearly undisputable “good” which we need to pursue. Innovating *for older people* contributes to this moral content. In the discourse, and, as demonstrated in the introduction, in wider society as well, older people are often viewed as people who are frail, ill and dependent and in need of (health) care and attention. Taking care of older people is seen as a duty, a duty that will – following the crisis account of ageing – prove difficult and costly. New technology is positioned as a resource with which to mitigate these problems. Attempting to meet these challenges is thus certainly good and *innovating* for this “vulnerable” group is even more noble a task.

The user representation of older people as people who are frail, ill, dependent and whose situation is likely to worsen, is a dominant user representation of older people in design (of AmI technologies). It is embedded in a well-established and morally laden discourse, which makes it hard to dispute.¹⁴⁴ While this user presentation is prominent, there are additional ways in which older people were represented in the empirical chapters of this thesis.

6.1.2 Older people as reluctant and resistant to (technological) change

Apart from the user representation of older people as frail, ill and dependent people, the designers, researchers and engineers involved in the development of the AmI projects studied in this thesis also viewed the older users of their technologies as people who demonstrate an initial reluctance and resistance to technological change, but whose doubts about these new technologies can be removed. Although the designers, engineers and researchers also recognized that some older people are very open to new technologies and welcome it in their lives¹⁴⁵ or are indeed interested in technology for its own sake,¹⁴⁶ they found that many older people were not keen to start using these new technologies.

Chapter 3, for example, provided a description of how the researchers held a need-and-want representation. In their reasoning, older people had a genuine need for a robot like iRo, which could play an assistive role, but also serve as an emotional and intellectual companion.¹⁴⁷ The researchers found that, despite their initial resistance, older people would be able to see the benefits of a robot like iRo quite quickly and

¹⁴⁴ Moreover, as chapter 4 has shown, it also fits in well with a neo-liberal (care) ideology, thus aligning it with a dominant kind of political thinking.

¹⁴⁵ Such as the older couple in chapter 4, see section 4.4.5.

¹⁴⁶ Such as the mining engineer in chapter 4 (also section 4.4.5) and the army radio enthusiast in chapter 3 (see section 3.3.5).

¹⁴⁷ The researchers also linked the development of iRo to societal needs via the ageing-and-innovation discourse.

would eventually grow attached to it. Thus, in their view, older people not only need, but eventually also want a robot like iRo. The participants in the laboratory tests, at least initially, did not share this need-and-want representation. They saw themselves as independent, healthy and socially active individuals and consequently found that they did not need (nor want) an iRo. They felt that the prospective user of iRo was an old, frail and incapacitated person with few social contacts and they clearly did not see themselves as “old.” This positioning of the self as “not old”, irrespective of chronological age, is a well known phenomenon in social gerontology (Hepworth, 2004; Minichiello, et al., 2000; Thompson, 1992, 1993). This insight is important for the design of technologies for older people. If – such as was shown in the iRo-case – a technology intended for older users makes these users feel that they are labelled as “old” by this technology, the chance of these users perceiving this technology as “for somebody else, but not for me” is clearly substantial. Thus an important lesson is that – in the design of technologies for older people – identity matters and perceptions of the self – as not being old – can create non-users. However, the resistance displayed by the test participants during the laboratory tests did not surprise the researchers. They attributed it to media attention to iRo and saw the participants’ resistance as something that could be fixed relatively easily by introducing iRo at a younger age. Their only concerns related to the effect of the responses of the older people on their test results. The need-and-want representation was already firmly in place prior to the tests and was not altered by the responses of the older people. Indeed there was a strong notion on the part of the researchers that any resistance to technologies like iRo would only take the form of “initial resistance”, mainly caused by undue media attention which would gradually ebb away.¹⁴⁸ This response thus provided a way means of negating the reluctant and defiant responses of the older test participants.

The view of older people as reluctant and resistant towards (technological) change also became apparent in chapter 4. The very rationale for developing AIMS was based on a representation of older people as people who want to remain living in their own home despite illnesses and frailties which would make it difficult, unsafe or simply impossible for them to do so. The AIMS team thus wanted to adapt to the (perceived) resistance of many older people to moving into a care facility. However, as was shown in Chapter 4, it is not evident that the wish to remain living at home should automatically be linked to a technological intervention in the home. Some older people may be reluctant to move to a care home, but may also be reluctant to accept a system like AIMS. All of the actors involved in the design and testing of AIMS could link the older-people-want-to-live-at-home user representation to the development of

¹⁴⁸ Indeed the defiant response to iRo was much reduced during the field tests, but this may also have been due to the role of the helpful altruistic test user that the older people devised for themselves.

AIMS, but this link was somewhat tenuous for the older users themselves. Indeed, while some of the older participants were eager to participate in the AIMS pilot tests, other older people were not so sure as to whether they wanted AIMS in their homes. The children of these older people subsequently tried to convince their parents, and some even put some “subtle pressure” on their parents to accept AIMS, saying that accepting AIMS would be for their own good and making some veiled threats that a move to a care home would be necessary otherwise. By accepting AIMS – whether under “subtle” pressure or not – into their homes, the homes of the older people were reconfigured and a technology with a passive compliance script was introduced. Thus, despite the initial resistance of some participants, the AIMS system was introduced into, and did change, the lives of these older people, who, apart from voicing complaints about the system, had very few means available to them to resist using the system.

The researchers, designers and engineers in both the iRo and the AIMS case viewed older people as people who might be reluctant or hesitant to start using their technologies. However, the researchers also saw these older people as people who could be convinced that the technologies in question could benefit them, that they needed them and indeed that they would grow accustomed or even attached to them. This user representation of older people as people who are sceptical about new technologies resembles – and is perhaps partly built on – a commonly held (ageist) view of older people as people whose beliefs and manners are rigid and as people who are reluctant to change (Butler, 1975; Bytheway, 1995, 2005). When not wanting change – whether technical or otherwise – is interpreted as a trait of older people, there is apparently nothing intrinsic to the technology that causes this resistance, but it is seen as an attribute of older people. The view that older people initially will not want change, but can, in time, be convinced, provides a rationale for negating both the will of older people to refuse a new technology, in addition to a rationale for negating the input of older people in design processes. Such a way of representing the older user harbours a clear danger of paternalism, as it puts designers, not older people, in a position to distinguish between “initial” and “real” resistance. In this constellation, favouring the own interpretation over the hesitant or defiant responses of older people becomes easier for designers.

Moreover, even if the findings of a test or introduction of a technology (seem to) vindicate a pattern of initial resistance that subsequently ebbs away, it should not be forgotten that older people, particularly those who are targeted for such care related technologies, may have to contend with complicated power relations in their everyday lives. Decisions about whether or not to use a technology are often made in the triangle of care (Colombo, et al., 1998), in which the formal and informal carers/children also

have a say. Older people may use a technology because ‘it makes the children so happy’¹⁴⁹ or, people may be afraid to speak their mind about a technology for fear of some kind of retribution.¹⁵⁰ The acceptance of such technologies for older people may thus be a reluctant acceptance and may be made for reasons that are only indirectly related to the technology (and not to the benefits a technology is said to have). Indeed there is a risk that this acceptance may have a distinct element of, to paraphrase Shaw, being “forced to like what you get.”¹⁵¹

In any case, a pertinent question in this context is whether there is a way back, that is, can older people return to being non-users (rejecters (Wyatt, 2003)) of these technologies without facing serious ramifications? If not, then a representation of older people as “initial resisters” can be particularly damaging. While it should not be forgotten that older people, just like people in other age categories, may devise creative ways of becoming or remaining a selective user or non-user (for instance, by employing the well-known strategy of wearing a technology like a pendant alarm when their children or carers are around, only to put it in a drawer once they are gone), there are also technologies, like AIMS, that do not afford many options for resistance, which may result in a passive compliance script. The only way to refuse to use such a technology is likely complete removal, but, as was shown in the AIMS case, this may be a risky strategy as it may, for instance, result in a reappraisal in the triangle of care of the question as to whether it is still safe to live at home. Viewing older people as people who may initially resist a technological innovation, but who will change their mind later is thus a paternalistic and potentially pernicious representation of older people as it may result in, more or less, forced use of (care) technologies in a situation where there may be few options to resist.

6.1.3 The low technological literacy of older people

The third overarching way in which the older user was represented by the designers, researchers and engineers in the empirical chapters was as people with a low level of technological literacy.¹⁵² Fourez explains technological literacy as the ‘familiarity with (...) technology needed by individuals to become full participants in our present world,

¹⁴⁹ Interview with Mark, see section 4.4.5.

¹⁵⁰ Such a fear was described in chapter 4, when a researcher got the distinct impression that older people were not critical about the AIMS system as they feared that they would no longer receive the right type of care (interview with Mark).

¹⁵¹ The original quote, by George Bernard Shaw, is: ‘Take care to get what you like, otherwise you are forced to like what you get’.

¹⁵² For definitions and critical discussions of the concept of technological literacy, see Fourez (1997) and Petrina (2000).

without becoming overwhelmed by technoscience' (Fourez, 1997: 903).¹⁵³

Technological literacy thus involves having an understanding of technologies, in addition to a sufficient level of skills to interact with them. The older people in the AIMS and iRo cases were, barring some exceptions, judged to have relatively low technological literacy.

This became apparent in the AIMS case in several ways. There was, for instance, the idea that introducing a new interface, even if it had only one new button, would be enough for older people to operate it incorrectly. Instead the designers decided to make use of an interface which the older people were already familiar with; their home phone. This decision is already indicative of a view of these older people as having low technological literacy. Furthermore, the system was designed in such a way that it did not necessitate the older people having to take any new actions, to learn new skills or to change their ways. The system was designed to function completely autonomously, which led to a passive compliance script: the control of the technology was taken away from the older people, leaving the older user – it is questionable if “user” is still an apt description for this – to passively undergo the operation of the system. Although the researchers and designers developing AIMS recognized that some older users were capable of more, these people were seen as an exception. The researchers and designers adopted a lowest-common-denominator design strategy which implicitly assumed a representation of older people as having low technological literacy; this particular representation was subsequently scripted into AIMS.

In the iRo chapter, the representation of older people as people with low technological literacy came to the fore in the craft representations. These were not representations of what the older prospective user would be like, but were rather representations of what older people are like as test users, and the resulting special skills and crafts necessary to work with them. As already mentioned in chapter 3, Johan, one of the researchers, clearly subscribed to the low technological literacy view of older people: ‘These are just people who interact less easily with technology than younger generations. You’ve got to take that into account’. In turn, the fact that older test participants were seen as less technologically competent became apparent in the way they were viewed as test users. The researchers, for instance, said they had to provide additional instructions on how to use iRo, explain it more slowly, use more examples and account for older people possibly forgetting the instructions. In addition, they mentioned that it was hard to find older people to participate in the tests, that older participants felt insecure or intimidated by the tests and the venue and that younger people were more open to technological tests like those with iRo and were

¹⁵³ To be sure, at a further point in his article Fourez substantially broadens the definition of scientific and technological literacy (which he treats in tandem) but for our purposes here this initial definition suffices.

much easier to work with. Like the users of AIMS, the older test participants were thus also seen as less competent technology users than other, younger, categories.

To be sure, in both the iRo case and the AIMS case, the researchers, designers and engineers did remark that some older users displayed playful, testing, probing behaviour in trying to find out what the robot or system could or could not do or to find out whether the system actually works and under what conditions. This, then, is behaviour that is not usually associated with older users, but with more technologically savvy, competent and confident younger users. However, despite such exceptions – which will receive more attention in the next section – the designers, researchers and engineers involved in the development of iRo and AIMS by and large saw older people as people with low technological literacy. This perception could imply that the responses in tests would be taken less seriously or that it would be in the best interest of the older people to take control of the technology away from them.

It is important to state that not learning to use a new technology can also be an active and wilful stance towards technology (Kline, 2003; Wyatt, 2003). In addition, Melenhorst (2002) and Melenhorst et al. (2006) have shown that older people can be very critical about new technologies and only decide to learn how to use a new technology if they see a significant benefit in the relative short term. Such a response, then, also has an effect on technological literacy. This “lack” of literacy may thus also be a choice, a wilful decision not to adopt a new technology any more. To use the taxonomy provided by Wyatt and colleagues (Wyatt, 2003; Wyatt, Thomas, & Terranova, 2002), older people are often seen as ‘excluded’ or ‘expelled’, for instance, in discussions about the dangers of a digital divide¹⁵⁴, however older people may thus also be ‘resisters’, or ‘rejecters’, who wilfully decide not to adopt a new technology or decide to cease using it.¹⁵⁵ Viewing “low” technological literacy solely as a problem is thus flawed as older people may possess a different kind of technological literacy, a literacy that allows them to fully participate in their present worlds; indeed older people may wilfully choose this type of literacy.

Nevertheless, the representation of older users as technologically less competent is very common. Like McCreadie (2010) and Joyce and Mamo (2006), Joyce, Williamson and Mamo (2008) rightly question this representation and state that older users are often intimately involved in technoscientific practices:

As users of technologies, elderly persons intimately interact with technoscientific practices such as blood sugar monitors, walkers, pharmaceuticals, and pill

¹⁵⁴ See Jæger (2004, 2005) for discussion of the idea and potential dangers of the digital divide and whether the digital divide actually presents a danger to older people.

¹⁵⁵ As already argued in section 6.2.2, it is, however, important to remember that the choice of older people, particularly those who receive care, may not be entirely free, but may be constrained.

dispensers yet there is little research that studies how raced, classed, and gendered aging bodies actually use and give meaning to these technologies. The opportunity to theorize aging people as technologically creative and literate is missed when we ignore this topic. New complex technologies can be extremely helpful in the everyday life of older people, and old men and women routinely use technologies and scientific interventions in their daily life. Despite their experience as technocitizens, older people in general and older women in particular are commonly represented as lacking the skills and comprehension needed to use and assess the risks and benefits of new technologies (Joyce, et al., 2008: 18-9).

Following Joyce, Williamson and Mamo, I argue that the representation of the older person as a technologically incompetent and illiterate person can be countered by examining older people as being *hyper-technological*. Viewing older people as hyper-technological emphasises their regular interaction with many technologies, along with the point that, although they may have different technological skills and competencies, their technological literacy is not necessarily inferior. For instance, and as indicated in the quote above, older people are more likely to be actual cyborgs in the sense that they may be more dependent on and make more intimate use of (health care) technologies such as pacemakers or hearing aids, which may be in or on the ageing body. In addition, older people have used a greater number – as well as different kinds – of technologies over the span of their lives (and may, as a result of having used a greater number (types of) technologies, take a more reflexive stance towards new technologies and technological change). They may, for instance, have extensive knowledge of technologies that are now considered obsolete, but which are still used by them.¹⁵⁶ It is thus not the case that older people are technologically illiterate; rather they do not possess “the right kind” of literacy and the technological literacy which they do possess is undervalued or ignored. Featherstone and Hepworth (1993), referring to the work of Dowd (1980) note that ‘processes of industrialisation and technological innovation which provide the dynamic thrust of modernisation (...) render the skills and knowledge of the older generation redundant. As a consequence old people become devalued and irrelevant to the productive process’ (Featherstone & Hepworth, 1993). As the notion of what counts as a valuable form of technological literacy changes, older people who cannot or do not want to keep up are seen as incompetent and technologically illiterate.

¹⁵⁶ Kline and Pinch (1996), for instance, describe the technological skills of rural Americans in fixing and substantially modifying Model T Fords for various uses. This involved technical know-how that is currently only possessed by a few; although it may be less relevant in current times, this is a form of technical literacy nonetheless.

We can take two important lessons from this. First, older people's technological literacy, competence and stance towards technology should not be seen *a priori* as low and reluctant. Instead this should be an empirical question which should *allow* for – and should perhaps even *start* from – the representation of older people as hyper-technological. Second, we should ask what *counts* as technology. The positioning of older people as technologically illiterate, passive and incompetent is in no small part due to a myopic emphasis on new – mostly digital – technologies and the skills required to operate those particular technologies. Instead of focusing on the skills and competencies that older people *may not* have, an empirical analysis of the technological literacy and competencies would shed light on the literacy and competence that older people *do* have, which could in turn be used as input for design.¹⁵⁷

6.1.4 The nuanced exception: the diversity of older individuals

Social gerontological research (see e.g. Thompson, 1992, 1993; Wilkinson & Ferraro, 2002) has repeatedly shown that a common social and cultural image of older people is that they are all the same, while, in fact, older people are a group which is characterized by great diversity. A similar tension became apparent in the empirical chapters of this thesis. Underlying the first three user representations discussed in these conclusions are homogeneous generalized representations of older people. It is important to note that the view of older people as frail, dependent and ill, as rigid and reluctant to change and as unable to keep up with current (technological) developments, strongly resonates with the social and cultural images of ageing and stereotypical ageist images. Social gerontological studies – as discussed in the introductory chapter (see section 1.3.2) – have shown that social and cultural images of ageing often depict older people as frail, forgetful, shabby, outdated, senile, in biological decline, nearing death, rigid in thought and manner, old-fashioned in morality and skills and as people who are different from “us”; older people are “the other.” If we compare the first three overarching user representations with these social and cultural images of ageing, it becomes clear that these first three overarching user representations thus tap into, and in turn reinforce, common repertoires used to address ageing and ageing individuals.

However, despite these generalized homogeneous views of older people, the researchers, designers and others involved in the design of these AmI technologies for older people also readily acknowledged that older individuals can be diverse in nature.

¹⁵⁷ Indeed, given the existence of technology generations (Docampo Rama, 2001; Docampo Rama, et al., 2001; Sackmann & Weymann, 1994) one can ask to what extent it is fair to ask older people to have the same prowess in dealing with new technologies as young people. In a somewhat ironic turn, this thus seems to be a paternalistic stance of the young towards the old. See also section 7.2.3 for a discussion of technological literacy in relation to technology generations.

When making this point, they often referred to the behaviour and characteristics of certain older individuals they encountered while working on their projects. These stories about the exceptional older individual were also part of the way in which older people were represented by the designers, researchers and engineers. For instance, in chapter 3, a few of the older test participants deliberately ignored the researchers' instructions and started probing to find out what iRo could or could not do, which, as the researchers pointed out, contradicted the more generally held view that older people are intimidated by such tests, difficult to recruit, require more instruction, etc. Another example came from the AIMS case. The designers and researchers commented that some people could not handle technology very well, while others clearly could. They recalled the story of a technologically savvy retired mining engineer who was very keen to talk about the system with people with a technical background. A final example, also from the AIMS case, was that despite the view of older people as reluctant to accept a system like AIMS in their homes, one of the researchers also recalled an older couple who were very enthusiastic about AIMS and were very keen to participate in the tests. It is thus clear that generalised homogeneous statements about older people exist side by side with views of particular older individuals who are the (diverse) exception to the rule. For the designers, researchers and engineers, these two, apparently conflicting, ways of representing the older user co-exist unproblematically.

However, this tension between relatively simple generalised homogeneous images (which provide easy guidelines for design and reduce complexity), and the complex reality of the diversity of individuals and their practices is a key tension that has to be dealt with in design. Whereas in the AmI visions, the authors did not really have to contend with this tension, but could instead position dealing with diversity as an idealistic mission for AmI, the diversity of older people was definitely an element in the design practices of iRo and AIMS that the involved designers, researchers and engineers had to deal with (which could indeed prove to be a difficult task). For instance, in the iRo case, dealing with the diversity of users, while clearly an idealistic task at the start, turned into a methodological problem. In order to obtain results which could be deemed relevant and reliable, the diversity of older people was progressively lost. In the AIMS case, diversity was treated quite differently. Although diversity of users led to many difficulties and a lot of extra work for the researchers, their focus was on matching the technology to the practices of the older people. The tinkering work involved in doing this proved vital in matching the technology to the practices of the older people, as did the choice to swap the high-tech cameras for more low-tech motion sensors which concerned far fewer older users. The researchers and designers thus held both homogeneous generalized views of older people, as well as diverse views. The comparison made in chapter 5 has shown that taking this diversity

into account is by no means easy and while more factors are at play in determining the success of a technology, the way in which the diversity of (older) users is treated can indeed be vital.

6.2 A call for explicit reflexivity

Taking the diversity of older people into account is thus not easy or straightforward. Moreover, despite the attention that the designers, researchers and engineers paid to diversity, the three other dominant user representations of older people, which provide more general homogeneous images, had a very substantial impact on the way in which older people are represented in design contexts, an impact which easily exceeds the view of older individuals as diverse people. The dominant user representations found to underlie the designs of the AmI technologies studied in this thesis are closely related to the social and cultural images of ageing which are studied in social gerontology. This section argues that these potentially stereotypical and ageist images inform design and that their effect may be far reaching but simultaneously hidden from view; this will be elaborated upon by arguing that there is a risk of a double naturalization of age scripts. In order to counter this risk of double naturalization, this section calls for explicit and informed reflection on the way in which older people are represented in design processes.

It has been a theoretical premise of this thesis that user representations can be scripted into technologies. In chapter 3, the notion of “age script” was introduced to underline the point that particular – and potentially stereotypical or ageist – views of older people or the ageing process can be inscribed into designs of technologies. It is important to analyse these user representations and age scripts as, on the one hand, they structure the way people age, but on the other hand these user representations and inscriptions can easily become obscured, or, in Akrich’s words, naturalized. Akrich explains this as follows: ‘[T]echnical objects have political strength. They may change social relations, but they also stabilize, naturalize, depoliticize, and translate these into other media. After the event, the processes involved in building up technical objects are concealed. The causal links they established are naturalized. There was, or so it seems, never any possibility that it could have been otherwise’ (Akrich, 1992: 222). It is important to realize that this “naturalization” effect is particularly strong in the context of age scripts as the naturalization that is inherent to the design processes is accompanied by a second source of naturalization. In order to elucidate this “double naturalization”, a return to studies of ageism is necessary. Wilkinson and Ferraro (2002) state that, compared to racist or sexist notions, ageist ideas are more likely to be accepted as normal ways of speaking and even be internalized by older people. They

state that: ‘many aspects of our culture support ageism. Yet as individuals and as a society, we have become so conditioned by the prejudice and discrimination against age that we often fail to recognize its existence. Ageism permeates our culture through a variety of ways, such as language, physical appearance, mass media, and values’ (Wilkinson & Ferraro, 2002: 341). Older people may thus be the victims of ageism, while this may not even be recognized as discriminatory, but seen as normal, even by older people themselves. Thus ageist thinking is already subject to naturalization and the naturalization of potentially stereotypical and ageist notions in design processes adds a further dimension to this. Indeed the common social and cultural representations of ageing, which do have a distinct stereotypical and sometimes ageist tone, inform designers’ user representations as well as design practices. Double naturalization thus has a reciprocal, mutually reinforcing structure; accepted social and cultural images of ageing and stereotypical or ageist ways of talking about and treating older people may underlie designs of technologies for older people and, in turn, these technologies engrain these views into different (obdurate) media and thus subtly and obscurely, but potentially very forcefully, reinforce these views of older people. In addition, it is important to note that this double naturalization takes place in a moral context. As a result of the double naturalization, it is difficult to question the way in which user representations and age scripts affect the lives of older individuals; however it is even more difficult to call this into question as innovating for older people is considered obviously the right thing to do and often begins with the best intentions.¹⁵⁸

Thus naturalization is doubly engrained in society, in the way we talk about older people and portray them, but also – in a potentially very durable, but also very inconspicuous way – in the age-scripts we build into technologies and these forms of naturalization mutually reinforce one another. Although – as the reactions of the older participants in chapter 3 has shown – older people are not powerless against the user representations and scripts written into a technology, the double naturalization does make it much more difficult to act in defiance of them, particularly in situations where older people do not decide autonomously about, for example, accepting a new (care) technology in their lives.

Given this context, it is thus important for designers, researchers, engineers and others involved in the design of technologies for older people to make an explicit and

¹⁵⁸In addition, it should be noted here that there is a gender dimension to this double naturalization. As women tend to live longer than men (but do so in relatively poorer health) (Austad, 2006; Blue, 2008; May, 2007), more women will live to ages in which they will be seen as “old” and may thus be more likely to come into contact with ageism and become a “target group” for gerontechnologies. Thus the double naturalization of ageism and technology may have its most profound effects on a group which may already be more disadvantaged (Zaidi (2010a, 2010b) has shown that older women tend to be poorer than older men) or less likely to be the intended user of a technology (Oudshoorn, 1996a; Rommes, 2002; Sontag, 1978).

informed reflection of the way in which they represent older users in their design processes.¹⁵⁹ The analysis given above of the double naturalization of stereotypical or even ageist views of ageing indicates that it is, on the one hand, relatively easy to contribute to such common representations of ageing without perceiving that anything problematic is going on, while on the other hand, these representations may have profound effects on the lives of older people. Such a call for explicit and informed reflection on the way in which older users are represented is a call that can easily be made rather gratuitously, i.e. one can argue that it is important to take up such a call, while not providing any means of doing so. In order to facilitate the type of reflection that this conclusion and this thesis call for, a set of design suggestions will be offered in the next chapter.

6.3 User representations and design

With that, our attention thus shifts from the way in which older users are represented to the way in which designers, researchers and engineers are represented. Many analyses of user representations have implicitly or explicitly viewed designers, engineers and researchers in “hero and villain” terms, lauding them when they get it right, but also – and more frequently – blaming them for having user representations that lead to products that are “mismatches.” The idea of the mismatch, which refers to an ill fit between the user representation written into a technology and the actual user and her or his characteristics, implies that there could be and indeed, should be, a match, and, in turn, that the designers, researchers and engineers who developed the technology are responsible for achieving this match. This flies in the face of the fact that it is well-known that users are diverse and that no single technological design could ever encompass that diversity. While there is certainly room for improving the way in which (older) users are represented in design processes, the (implicit) request to designers to come up with an all-encompassing “holy grail” type of user representation should nevertheless be avoided. The emphasis should instead be on finding ways to help designers improve their thinking about (older) users, i.e. assisting designers, engineers and researchers in the creation of more reflexive, more inclusive user representations which are better suited to the practices of more (older) people.

¹⁵⁹ It must be noted that the researchers, designers and engineers involved in the iRo and AIMS projects were already relatively reflexive about the way in which they viewed older people. If anything this was evident in their willingness to talk to me, while being fully aware of what my research was about. One can easily imagine that there are designers, engineers and researchers who lack this level of reflexivity. In any case, for those who wish to heighten their reflection in relation to the way in which they represent older people in their design processes the following two chapters offer a set of suggestions designed to aid such a reflective effort.

In addition to this, it is important to remember that designers, researchers and engineers do not have free reign over the development of a technology and the user representations that are scripted into them. Mackay et al. (2000) have already shown that designers are also configured, for instance, by the organizations in which they work. Jelsma (2003), Stewart and Williams (2005) and Hyysalo (2011) underline this point and add various other constraints, such as the constraints inherent in the computer programs used in design or the technical components and designs from previous projects which designers have to use again. This thesis supports this claim and has shown other ways in which designers are configured.

Chapter 3 has shown that designers are not just representing or configuring the user, but are also configured by their test users and the user representations they make. While the assumption is that only designers, researchers, engineers and other professionals involved in the design and innovation process create user representations, the test users were also shown to create user representations. The researchers had to modify their test practices to deal with the user representations devised by the older test participants and generate the preferred results. Thus designers are not only configured by the constraints of the organisations they work for, but can also be configured by their test participants. However, the response of the test participants was in itself at least partly the result of the way in which the older user of iRo was represented in the media prior to the tests. This media exposure had a substantial effect on the test participants and in turn, on the designers of iRo. The designers remarked that they were unhappy with the way in which iRo had been portrayed – in a documentary and in newspapers – as a technology for “really old people” in retirement homes as the test participant rebelled against these representations. This then is a clear instance of how a cultural representation of older people in the media and the reaction to that representation, influenced the perceptions of a technology and, in turn, configured the context in which the designers were working.

Following this idea that designers are also configured, and in line with what was argued at the end of chapter 3, responsibility for representing the user should not be put solely on the designers; others who contribute to these representations should also share this responsibility. Indeed this also means there is a role for social scientists analysing user representations. Instead of playing a passive blame-game from the sidelines, this thesis aims to take a more cooperative, pragmatic stance towards design and designers. This thesis will thus conclude with seven suggestions for the representation (and cooperation) of older people in design. Before providing these suggestions a final reflection remains to be made in this chapter – a reflection on the theoretical combinations this thesis has set out to make.

6.4 Upon opening the grey box and finding it... rather full¹⁶⁰

At the beginning of chapter 3, a quote by Oscar Wilde was provided ('The tragedy of old age is not that one is old, but that one is young'). This quote contains a vital truth about ageing, that older people may very well not perceive themselves as old, a point that has also been made by various authors in social gerontology (Hepworth, 2004; Minichiello, et al., 2000; Thompson, 1992, 1993). As was shown in chapter 3, this perception of the self also has serious implications for the design of technologies for older people. However, I refer to this quote here in order to make another point. Readers who have a background in social gerontology will no doubt have seen this quote before; however the chance that a reader with a background in science and technology studies has seen this quote before is much smaller. This observation draws attention to the disciplinary rift between social gerontology and STS. There are, of course, many disciplinary lines and the fact that they exist does not by itself mean that they should be crossed. However, an interest has been expressed from both sides in crossing the border between STS and social gerontology. In the field of STS, ageing is generating ever more interest. Until a few years ago, there were very few studies of the way in which science, technology and ageing are co-constructed. Interest in ageing is currently growing, which, for instance, becomes visible in the increase in the number of publications and conferences on science, technology and ageing. As was shown in the introductory chapter, several authors in social gerontology have in turn flagged technology as an important but understudied topic in social gerontology and have called for conceptual and theoretical work which addresses the ways in which ageing and technology are co-constructed (Cutler, 2006; Joyce & Loe, 2010a; Joyce & Mamo, 2006; Joyce, et al., 2008; McCreadie, 2010).

In line with these authors, this thesis has called for the opening of the "grey" box of ageing, which implies a shift from the treatment of ageing as a given backdrop against which to make analyses of, for instance, user-producer relations, to *opening* this black – or grey – box of ageing by employing insights from social gerontology, as these insights have a distinct impact on those relations. This thesis has claimed (in Chapter 1) that the combination of the conceptual and theoretical insights developed in STS with those developed in social gerontology could provide a fruitful basis for understanding the way in which ageing and technologies – or for that matter ageing and science – are co-constructed. Subsequently, this thesis sought to combine insights, concepts and theories from STS with those from social gerontology in its analyses of the way in which the older user of AmI was represented.¹⁶¹ This thesis has made use of

¹⁶⁰ Although the allusion to Langdon Winner's famous article 'Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology' (Winner, 1993), will strike a chord with STS audiences, those from other audiences may not recognise it.

¹⁶¹ And to a lesser extent gerontechnology.

social gerontological work on, for instance, ageism; cultural and social images of ageing and narratives of old age; the distinction between third age and fourth age and the treatment of old age as a medical problem (versus notions of successful ageing); diversity of older people and the life course perspective; and analyses of the perception of the self in relation to the ageing body and how it is perceived by other, younger people. The theories, concepts, sensitivities and insights provided by social gerontology have enabled an analysis of the way in which the older user is represented by designers, researchers and others involved in design, along with the way in which these representations are scripted into technologies, in a way that not only provides insight into the way in which users are represented, but, more importantly, in the way *older* users are represented and the ways in which these representations differ from other, younger age categories and the impact of these differences on technological design and, eventually, use practices. Without the theoretical and conceptual insights acquired from social gerontology, many of the conclusions drawn in the previous sections could simply not have been drawn. In conclusion, it is thus possible to say that, upon opening the grey box, it was found to be rather full. This thesis has focused specifically on user representations and scripts. Accordingly, this thesis has utilised a specific set of social gerontological concepts and theories which were relevant in the context of user representations of older users of new ICT applications. However, there is little doubt that other projects focusing on the co-construction of science, technology and ageing could also benefit substantially from venturing into social gerontology. The grey box of ageing is far from empty.

7. Seven Suggestions for Design

In this chapter, I intend to make a selection of the insights of this thesis, and the literature it builds on, accessible for other audiences than social scientists. Specifically, this chapter intends to inform designers and engineers who are interested in developing technologies for older people. If you are reading this chapter after having read the previous six chapters, you will recognize much of what you will read, as this chapter is intended to be a “stand-alone” chapter which can be read as such.

7.1 Introduction

Before elaborating on the seven suggestions, it is prudent to explain, first, what this chapter is *not* and does *not* aim to do, second, what this chapter *is* and *does* aim to do, and, third, how this chapter came to be what it is.

The seven suggestions that comprise the main body of this chapter are not intended to be a new design methodology, nor a set of design guidelines in the classical sense. The proverb “every man to his trade” applies here. These suggestions are written by a social scientist who recognizes that he is not a designer nor a design methodologist. Accordingly, a modest stance is appropriate: these suggestions apply solely to the images and ideas that people – designers and engineers in particular, but others just as well – often have about older people, as this is the focus of this thesis. Nevertheless, this focus on these representations of the older user is a very important one. The intention of this chapter is to take insights from social science – particularly science and technology studies and social gerontology – and this thesis in particular and bring them together in a way – and in a language – that is hopefully meaningful for designers, researchers, engineers and others interested in the design of technologies for older people. The overall goal is to improve the thinking in relation to what older people are like as users of (new) technologies, with the ultimate aim of helping to make better technologies; better technologies being those that fit in better with the practices of (more) older people.¹⁶²

A final point that needs to be addressed before explaining the seven suggestions for design concerns how these suggestions came to be what they are. It is important to mention that while these suggestions were initially developed by the author, they were subsequently tried out in workshops and presentations for both scholars in science and technology studies as well as design audiences.¹⁶³ The seven suggestions are thus a co-

¹⁶² This aim is thus closely related to the Constructive Technology Assessment (CTA) approach; see e.g. Rip et al. (1995).

¹⁶³ I would specifically like to thank ir. Lenneke Kuijer from the Delft University of Technology, who kindly organized a workshop with four designers working on technologies for older people. Together

operative effort, and they should still be seen as such, meaning that any comments, criticism, questions for clarification, comments with regard to language, jargon et cetera are still very welcome.¹⁶⁴

7.2 The Seven Suggestions

Throughout these chapters you will find references to relevant literature, but also to the respective chapters of this thesis, on which the particular statements are based. As it is my aim to build some bridges across the chasm between design and social science, I invite you to follow-up on these references to literature and chapters, as they may provide you with greater insight than my list of seven suggestions could ever do.

7.2.1 Reflect on cultural representations of older people

What are older people like? This is a question that is implicitly answered in many ways in everyday life. In the media or in advertising, but also elsewhere, older people are often portrayed in particular (and often negative) ways as people who are for instance, grey, frail, ill, lonely, vulnerable, slow, who cost a lot of money, don't contribute to society and have a plethora of health problems – particularly cognitive health problems (Featherstone & Hepworth, 1993, 2005; World Health Organization, 1999).

Although more positive ways of representing older people are becoming increasingly prominent (Katz, 2001), this more pejorative form of representing older people is still a very dominant one. The problem with this way of representing older people is that it portrays them in one single way, whereas older people are in fact not all the same, but very diverse.

In fact, older people are, one can argue, even more diverse than other age groups (Thompson, 1992, 1993; Wilkinson & Ferraro, 2002; see chapter five), as the differences between people tend to grow larger over the life course (Dannefer & Settersten, 2010). There are, for instance, differences between people in terms of age, health (physical, mental or cognitive), social-economic status (one of the current myths about older people is that they are all quite well off; it is important to realize that a substantial portion of older people are not rich, but, in fact, live in poverty (Townsend, 1979; Zaidi, 2010a, 2010b)), social networks, and obviously ethnicity and gender (while the difference between men and women is slowly getting smaller, women, on average, still live three years or more longer than men (Austad, 2006; Blue, 2008; May, 2007; Perls, 2005; Rijksinstituut voor Volksgezondheid en Milieu, 2010)).

they reflected on the seven suggestions and gave encouraging and helpful comments, which helped me to develop these suggestions further. Thanks to all of you.

¹⁶⁴ My e-mail address is: mail @ louisneven . net

Nevertheless, despite this diversity, older people are often seen and treated as one homogeneous category.

Treating older people in such a way may lead to ageism. Ageism is a term coined by the psychiatrist Robert Butler (Butler, 1969). Bytheway (2005) states that Butler (1975) provides us with a widely quoted definition of ageism:

Ageism can be seen as a process of systematic stereotyping of and discrimination against people because they are old, just as racism and sexism accomplish this for skin colour and gender. Old people are categorized as senile, rigid in thought and manner, old-fashioned in morality and skills... Ageism allows the younger generations to see older people as different from themselves, thus they subtly cease to identify with their elders as human beings (Butler, 1975: 35, quoted in Bytheway (2005): 338).¹⁶⁵

Why is this important for design? You might say: “I’m not racist nor sexist, nor an ageist person. Actually, I want to develop technology to *help* older people”. Well, if you intend to devise technologies that improve the lives of older people, then these should obviously be technologies that fit in with the lives and viewpoints of older people. Developing such technologies requires knowledge of what older people are like, how they live, how they differ in terms of preferences and needs and so on. If a design is based solely on simple or stereotypical views of older people, even those views which stem from the best intentions, the design may run into trouble. The example in the next paragraph provides an excellent illustration of this particular form of unintended ageism.

This “ageism of good intentions” is based on an image of older people as vulnerable, frail, and in need of care or protection. A clear example of this kind of ageism, and of the responses it can provoke, is provided by a measure that was suggested by the Belgian ING bank. On the 3rd of August 2010, a story was leaked that the Belgian branch of the ING bank were going to decrease the maximum sum that people over 60 years old could withdraw from their accounts via ATMs (Automated Teller Machines; cash machines) from 2500 to 1000 euro per week.¹⁶⁶ It was a measure to protect older people against criminals who were stealing bank cards and scamming older people into disclosing their PIN codes. According to the bank, lowering the maximum amount per week would reduce the damage of such a crime and make it less attractive for criminals.

¹⁶⁵ To be sure, Bytheway does not accept Butler’s definition uncritically (see Bytheway, 1995; Bytheway, 2005).

¹⁶⁶ <http://nos.nl/artikel/176145-pinlimiet-voor-ouderen-bij-ing-belgie.html>, consulted August 3rd 2010.

Almost instantly, a storm of protest rose. Unions for older people, politicians and even the Belgian Centre for Equal Opportunity and Opposition to Racism¹⁶⁷ universally condemned the measure, stating that it was patronizing, arrogant, and discriminatory. A former editor of a major Belgian magazine, *Knack*, Tessa Vermeiren, even called for a boycott. She stated: 'You [the ING bank] clearly suspect us of being incapable of caring for ourselves and our money. Should I feel grateful for your concern? On the contrary, I feel incredibly offended, and I feel that apologies on your part to my age group would be very appropriate'.¹⁶⁸ Luc Coppens, editor at *De Standaard*, a major Belgian newspaper, wrote that 'This matter deserves a nomination for the marketing blunder of the year'.¹⁶⁹ Within 12 hours of the news leak, criticism reached such a level of frenzy that the bank decided to withdraw the measure. Nine days later, Eric Dralans, the chairman of the Belgian ING bank, offered his 'sincere apologies' in a letter to all ING clients over 60 years old, stating that the bank had been concerned for the safety of its older clients and wanted to protect them against fraud, but that 'this measure has provoked many and fierce responses'¹⁷⁰ and was thus withdrawn.

The ING bank thought that it had a strong case for lowering the maximum amount per week that could be withdrawn from an ATM. They knew that 98% of their clients never took out more than 1000 euro a week. Moreover, they knew that the maximum amount per week had been raised from 1250 to 2500 euro only two years earlier, and they knew that older people are far more likely to be systematically targeted for this kind of crime.¹⁷¹ Indeed, as Luc Coppens remarks, 'competing banks admit, off the record, that such a measure would be very sensible'.¹⁷² Thus the bank thought that their reasoning was sound. However – and this is the important point in this context – despite the best interests of the ING bank, their measure discriminated between people on the basis of a – seemingly rather randomly chosen – age category. Moreover, this measure positioned older people as vulnerable and incapable of taking care of themselves and their money. Many older people did not see themselves as such; this measure was highly patronizing to them and they revolted accordingly. Thus this measure, devised with the best intentions, relied on a simplistic and ageist image of older people. One can easily imagine a technology, devised with such an image of an

¹⁶⁷ <http://www.diversiteit.be/?setLanguage=3>, consulted December 8th 2010.

¹⁶⁸ Tessa Vermeiren, 'Boycot ING!', *De Standaard Online*, August 4th 2010 (retrieved on the same day).

¹⁶⁹ Luc Coppens, 'Senioren doen ING bakzeil halen', *De Standaard Online*, August 4th 2010 (retrieved on the same day).

¹⁷⁰ Luc Coppens, 'ING biedt oudere klant excuses aan', *De Standaard Online*, August 12th 2010 (retrieved on the same day).

¹⁷¹ Luc Coppens, 'Senioren pikken 'betutteling' door ING niet – Cashlimiet voor ZESTIGplussers zou worden gehalveerd', *De Standaard Online*, August 4th 2010 (retrieved on the same day).

¹⁷² Luc Coppens, 'ING biedt oudere klant excuses aan', *De Standaard Online*, August 12th 2010 (retrieved on the same day).

older user in mind, provoking a similar response. Designing with the best intentions in mind can thus prove insufficient. If these noble intentions are coupled with critical reflection on how older people are generally thought of and with learning about what older people are actually like, what they actually want and what differences exist between them, chances of a successful design will be very likely improved.

Although it may not appear immediately obvious, the way in which older people are viewed by other people in society – and for example, in the media – is of significant importance for design for two main reasons. First, if such representations of older people are also held by a designer and are not reflected upon critically, simplified, stereotypical or even ageist views may lie at the heart of a design, which in turn may generate resistance to the technology at hand. In particular, when designing something that is considered “obviously a good thing” – like the bankers from ING were thinking – you may want to reflect on how your technology positions older people. Second, the media’s representations of ageing – along with wider social and cultural representations of ageing (see e.g. Featherstone & Hepworth, 1993, 2005; Hepworth, 2004) – can also influence the ideas prospective users have about new technologies (see chapter 3). These societal and cultural representations are out of your control and it is very difficult to change these ideas and images. Nonetheless, they may still influence the acceptance of your technology, as, for instance, older people may see your design as a technology for “really old” people, only to state subsequently that they are not *that* old or *that* dependent (yet) (Minichiello, et al., 2000; Thompson, 1992; 1993; see chapter three).

7.2.2 Reflect on the effects of the ageing-and-innovation discourse

Publications addressing the subject of technology for older people often begin with a particular set of statements. In an often strikingly alarming tone, these publications state that people are getting older all over the world, and that Western societies in particular are ageing rapidly. The increase in the number of older people is then linked to several problems. For instance, the need for – and also costs of – various types of (health) care will increase dramatically. In addition, such publications often state there will a dearth of care workers and a shortage of facilities to enable adequate care for older people. The gist of this reasoning, which is also referred to as the “crisis account of ageing” (Mort & Roberts, 2010; Ney, 2009), is that ageing presents our societies with huge financial and social challenges (for examples of such reasoning see chapters 1, 2 and 4. This reasoning has not remained uncontested (Van Dam, 2009; Kinnear, 2001; Sanderson & Sherbov, 2010; World Health Organization, 1999)).

The next step in this type of discourse is to identify one particular ageing-related problem and to provide a technological solution to that problem. In turn, a

rhetoric of “triple win” is invoked (see chapters 1, 2 and 4). The older people win, as a particular problem they are perceived to have is solved or ameliorated or a particular goal that they are perceived to be striving for – such as living independently at home for longer – is achieved. Society also wins, as labour and/or costs will be saved and in turn a major societal, financial and thus political problem will be ameliorated. Finally, and mostly implicitly, the designers and engineers and the companies, universities and research institutes they work for, also win as they are able to develop such technologies and – potentially – sell them for a profit, thus contributing to goals of innovation and economic growth. Taken together, the crisis account and the triple-win answer to it, can be termed the “ageing-and-innovation discourse” (see chapter 2 and 4).

At this point, I should probably make a few things clear. I am not claiming that these demographic changes are not real, nor that these changes will not present Western societies with major challenges.¹⁷³ I am also not claiming that these proposed technologies cannot help (at least some) older people, or alleviate some of the problems our societies face. However, I would like to draw your attention to the fact that this is a narrow way of framing both older people and the problems caused by ageing, and, in turn, that the solutions provided by the authors of such statements are a very particular kind of solution, which (implicitly) comes from and reinforces a neo-liberal political stance.

As it might seem strange for some to talk about the design of technology in political terms, I will address this last part first. It is long known in Science and Technology Studies (STS) that technologies can be imbued with politics. In his famous article entitled *Do artefacts have politics?*, Langdon Winner gave a classic exemplar of how the design of overpasses over the park ways of Long Island, prevented poor black people from reaching the beaches of Long Island (Winner, 1980). In Winner’s account, Robert Moses, an influential urban planner and “master builder” of New York City, deliberately designed overpasses that were so low that busses could not use the parkways. The affluent – and white – population could afford cars and unhindered by the low bridges, their cars could take them to the beaches. However, the black and poor population was dependent on public bus services to reach the beaches, but the low overpasses prevented these busses from using these highways, thus restricting the access of black people to the beaches and effectively segregating white and black people. Winner makes the point that such segregation was not achieved by legal rules and police force, but this racist political stance could be built into brick and

¹⁷³ Some caution is nevertheless warranted with regard to how these demographic figures are explained and the (policy) implications that are related to them (see e.g. Van Dam, 2009; Kinnear, 2001; Sanderson & Sherbo, 2010; World Health Organization, 1999).

mortar, i.e. politics could be built into highway overpasses. Thus Winner demonstrated that the realms of the political and of the technical are not necessarily separate.¹⁷⁴

The politics involved in the design of technologies for older people are often more implicit – and obviously less malicious – than the politics Winner ascribes to Moses’ bridges, but there is politics nonetheless. As mentioned, many technologies for older people – particularly those that make use of the ageing-and-innovation discourse – implicitly rely on and reinforce a neo-liberal political stance (see chapter 4). Solutions to political and societal problems involving a minimum of state interventions are favoured in neo-liberalism (Harvey, 2005). For instance, care technologies – monitoring systems, walkers, alarm systems etc. – that allow older people to live independently at home for longer are looked upon favourably from a neo-liberal perspective, as this independence also means that the state has a smaller role as fewer places are necessary in care homes and more care work is done by non-professional carers. Moreover, many innovations for older people are intended to support care workers and informal carers (“mantelzorgers”). This is fully in line with neo-liberal care ideologies, which emphasise that care should preferably take place in the home, provided by both paid care workers and unpaid informal carers (Esping-Andersen, 1990; Milligan, 2009; Oudshoorn, 2011). Finally, neo-liberalism generally looks favourably upon innovation, as innovation is often linked to discourses about knowledge societies and economic growth (Harvey, 2005). If an innovation can contribute to solving a societal problem which would otherwise have required the intervention of the state, this is the preferred solution, as it not only takes tasks and expenditure away from the state, but also results in economic activity, i.e. companies developing, selling and maintaining health care technologies which could perhaps also be exported elsewhere, thereby tapping into various economic discourses. That is not to say that neo-liberal politics are wrong (nor for that matter, right). The important point here is that these politics are implicit. Innovations for older people are imbued with political discourse. Accordingly, this may mean that the technology is not necessarily designed with the best interests of the older person in mind, as many additional interests, for example, of politicians, care home managers, care workers, informal carers and designers and engineers, are also taken into account (see chapter 4). Explicit reflection on the implicit politics underlying designs and the impact of such politics on views of and positioning of older people is thus called for.

¹⁷⁴ In actual fact, the situation is not as clear-cut as Winner would have us believe. About twenty years after Winner’s landmark article, a debate arose about whether the low overpasses on Long Island actually made it impossible for buses to pass under them (with people claiming that they travelled on busses on those parkways), or whether Robert Moses designed low overpasses with a deliberate racial politics in mind (Joerges, 1999; Woolgar & Cooper, 1999). However, as an example of the potential of doing politics by technological means, this story is still often retold.

Second, and equally important, is that the ageing-and-innovation discourse presupposes that older people are in their fourth age (see chapter 2). Peter Laslett (1987, 1989, 1997) introduced this categorisation of life into four distinct categories. In a nutshell, the first age is characterised by growing, learning and dependence (mostly on parents). In the second age, people become independent, but they also take on responsibilities, e.g. related to work and/or raising children. The third age begins with retirement. This age is characterised by independence and fewer responsibilities and can be a time for personal growth and activities like travelling. Finally, the fourth age is a category based on health rather than on chronological age. As people get older they can develop certain illnesses which require care and e.g. restrict mobility or other faculties; this, in turn, implies that older people grow progressively dependent on others again. The importance of these age categories lies in the difference between the third and the fourth age. In the context of innovating for older people, and particularly in the ageing-and-innovation discourse, older people are often viewed solely as people in their fourth age. Based on Laslett's age categories, I argue that this is not only actually wrong, but it also represents a missed opportunity.

Tapping into repertoires which position older people as people in their third age offers opportunities (see chapter 2). Instead of seeing older people as ill and dependent, they could also be seen as people who are (still) active and independent, with a zest for life. Promoting ageing in such a way has been called "successful ageing" (Baltes & Smith, 2003; Calasanti & King, 2005; Rowe & Kahn, 1997) or "positive ageing" (by companies trying to market products to older people, see Katz, 2001). The opportunity here centres on the positioning of older people; instead of positioning older people as *a priori* ill and dependent, one could also design a technology that positions people as healthy and active, thus making it considerably more attractive. The ageing-and-innovation discourse, however, does not fit with such a view. In order to create the rhetoric of "triple win", a view of older people as ill and dependent, and thus as a societal problem, is necessary. The point here is that there is an alternative rhetoric that could lead to other, potentially successful technologies. It should be noted, however, that the idea of successful ageing itself is certainly not unproblematic (Katz, 2001; Twigg, 2004). Indeed Calasanti and King (2005) have called it ageist, because successful ageing introduces new norms of youthfulness and activity that older people should adhere to. Thus, while we should not go too far in positioning successful ageing in a normative, prescriptive way, adopting a third age view of older people would reduce the dominance of fourth age views.

Importantly, and in complete contradiction to the ageing-and-innovation discourse, it can even be sensible to position the prospective older user of a technology as a person in their third age, *even if* it is a technology intended for people in their

fourth age. As shown in chapter 3, by Minichiello and colleagues (2000), by Thompson (1992, 1993), and by Hepworth (2004) in his discussion of “the mask of ageing”, older people often do *not* feel old. They often still feel the same as they did in their younger days, even though their age has changed in a chronological sense, their bodies have changed, and they are positioned by others as being old. This feeling has ramifications for design. If a design starts from a fourth age view of older people, positioning them as old, dependent and ill, it may be a mismatch to the way people feel. Even if “objectively”, from the outside, it may seem that a person is “actually” or “really” old and dependent, these people may still reject the technology by stating that they “are not that old yet” (see chapter 3). On the other hand, if design starts from a third age perspective and positions people as active and (relatively) healthy, even if they are “objectively” not very active and healthy, the chances of aligning with how a person perceives her or himself could be improved.

Nordic walking poles are an example of a technology that can position older people in such a way. Over the past couple of years, Nordic walking has become quite fashionable, especially with middle-aged – and third aged – people. Nordic walkers walk with long sticks – originally ski poles which had been modified – that allow them to walk faster and further and give them a work-out of the upper body.¹⁷⁵ In many countries, Nordic walking has become something of a trend; it is ‘cool’. What is not so cool, and a clear sign of old age, is walking with a cane. However, as an older person, you may ditch your cane and use Nordic walking poles, or similarly styled apparel. You may need a stick of some kind to walk, but with a Nordic walking pole you look like – and perhaps feel like – you are participating in the hype. You are not old, you are being cool.¹⁷⁶

7.2.3 Older people are not technologically illiterate

One very common view of older people is that they are technologically illiterate, meaning that, in such a view, older people have few technological skills and competencies. I argue that this is not only caused by a narrow view of older people, but also by a narrow view of technology. The fact that some older people are very proficient at using facebook, twitter, blogs, mobile phones, iPods etc. should not come

¹⁷⁵ <http://www.nordicwalking.nl/>, http://nl.wikipedia.org/wiki/Nordic_walking both accessed December 16th 2010.

¹⁷⁶ Here is a challenge: if you see an older person walking with a stick, have a look at the type of stick they are using. Is it a “classic” cane, a medical style crutch, or a more sporty styled walking stick / Nordic walking pole? At least in the Netherlands and Scandinavia, I have personally seen many (shortened) Nordic walking poles, or at least walking sticks that have the same sporty look as the Nordic walking poles. The difference between the image of these sticks vis-à-vis classical or medical style canes, can be very important.

as a surprise. However, what is surprising – at least to me – is that when the (lack of) technological literacy of older people is discussed, the vast majority of technologies are conveniently forgotten in favour of a very narrow view of current *digital* technologies. This generates an image of older people as incapable of using technologies, whereas the reality is that – just like everybody else – older people often use a great number of technologies.

To counter this image of technological illiteracy, I argue, first, that older people have a *different* technological literacy, and, second, that older people are in fact *hypertechnological* (although you might have to change your view as to what counts as technology). To start with this last point, older people use more technologies and have more expertise in using technologies than they are often perceived to have (Joyce & Mamo, 2006; Joyce, et al., 2008; McCreadie, 2010). Although it is important to remember that some older people live into deep old age with very few aids, older people can be potentially more dependent on technologies than other groups, and can thus be seen as a “heavier” type of technology user than others. To illustrate: you may feel – like me – that you cannot do without your Blackberry or iPhone, but it is far more difficult to do without a pacemaker, hip replacement, or even a hearing aid. In turn, older people are more likely to be actual cyborgs, human-technology hybrids, as they have a higher chance of needing and having various sorts of implants or aids inserted in or attached to their bodies. Moreover, older people, like nearly all of us, use many of the everyday technologies like cars, televisions, cookers, computers, etc. on a regular basis. Thus older people may actually use *more* and make *more intense* use of technologies than others.

This leads us to another point: older people may also be more reflexive about technologies. They have seen and used more technologies and *different types* of technologies during their lives than others, and may thus reflect in greater depth on whether a technology is useful for them. ‘Different types of technologies’ was italicized in the last sentence for good reason, as it highlights both differences in application (i.e. entertainment, mobility, food preparation, medical purposes etc.), but also, and importantly, differences in technology generations. Technology generation (Docampo Rama, 2001; Docampo Rama, et al., 2001; Sackmann & Weymann, 1994) is a concept conceived to explain differences between generations with respect to how accustomed they are to different styles of interfaces. The theory is that the style of user interface that is dominant during a person’s “formative years” – between 10 and 25 years old (Docampo Rama, et al., 2001: 27) – will remain the style of user interface that he or she is most accustomed to and can work most easily with. Docampo Rama and colleagues distinguish three different generations, the mechanical generation (birth cohorts before 1930), electro-mechanical generation (birth cohorts before 1960) and

the software-generation (birth cohorts after 1960).¹⁷⁷ For instance, for me, born in 1978, technologies with displays and menus are – generally – no problem. During my formative years, I quickly learned to use software style interfaces (admittedly, mostly by playing computer games). However, for my parents, both born around 1950, the dominant interfaces in their formative years were electro-mechanical interfaces, based on switches, push buttons, dials etc. They have both learned, at least to some extent, to use a PC later in life. However their use lacks the ease and fluency of the software generation. These generational differences can thus lead to a profound difference between a (younger) designer and an (older) user. A design may thus appear to be very simple *from the perspective of a particular technology generation*, but if it is, for instance, a menu based technology, it might still prove difficult to handle for some older people. The key is thus to attempt to think from the perspective of a different technology generation (which may require enlisting older participants and/or older designers).

Although they may not be as proficient in using *current* (digital, software based) technologies, older people are far from technologically illiterate. Instead of dismissing their technological skills beforehand, you may instead want to analyse and tap into the kind of literacy that they *do* have. Potentially, this may require killing a few darlings. What is a successful technology? A technology that has all the latest high-tech in it? A technology that poses a technical challenge to design? Or a technology that fits in with and fulfils a useful role in the practices of (older) people? In chapter 5, the researchers involved in the design of the AIMS system found out that the task envisioned for a high-tech AmI camera could also be achieved with a low-tech motion sensor.¹⁷⁸ This change turned out to be crucial for the acceptance of that particular monitoring system by the older people, as these older people – and many (older) people like them – were hesitant about cameras being placed in their homes, but they were, by and large, not bothered by motion sensors. Thus, acceptance of a technology by older people may sometimes require tapping into older interface styles and may perhaps also require using some low-tech instead of high-tech components. In my view, stating outright that older people are technologically illiterate deprives oneself of opportunities for designing a fitting technology.

¹⁷⁷ In her thesis, Docampo Rama splits the software generation into a display and menu generation (Docampo Rama, 2001). However, for the purposes of this chapter, such a categorisation is not very relevant as the focus is mainly on the mechanical and electro-mechanical generations.

¹⁷⁸ To be fair, while the motion sensor might have been relatively low-tech, it did make use of wireless communication and the software which was used to analyse the input from all the sensors was also anything but low-tech.

7.2.4 Some older people can participate in design processes

Until now, I have discussed ideas and views about older people as potential users of new technologies. While reflection upon how older people as prospective users are represented is clearly important, there is a second important way in which older people are represented in design processes. These secondary representations relate to how older people are seen as participants in design processes (see chapter 3). While designers often want to involve older people in design, this is also often considered a difficult thing to do. Older people are often considered for instance to be ‘quickly overburdened’, lacking the ability to ‘think conceptually’ and as giving ‘please-me answers’ to please the researcher rather than giving their real opinion. In addition, it has been said that older people ‘don’t know what’s possible technically’, and that they ‘discard options beforehand’ (see chapters 3 and 4). The view of older people that emerges from such statements is, amongst other things, a homogeneous image; however, as argued before in this chapter, older people are in fact very diverse. While it is indeed true that some older people – much like other people – are not capable of acting as valuable participants in design processes, other older people are very capable of participating in design.

I once had the opportunity to go to a sheltered housing facility in Morecambe and a community centre in Preston. I was there to help researchers working on the EFORTT project on ethics of telecare systems.¹⁷⁹ I interviewed older people, some of whom were well into their eighties. It was remarkable – given the views of some of the designers I had interviewed – how well these older people were able to articulate their views on (their) telecare systems, what they were willing to put up with, and what they were not willing to put up with. Crucially, they had very clear ideas about how to improve the system to make it suit their everyday life practices and circumstances (for instance making certain sensors of the systems they used wireless so that they could be moved around to accommodate specific furniture and room layouts). For me, this was a very clear example that the view of older people as people who cannot actively participate in design is too simplistic: some people cannot participate while other people definitely can. My suggestion would thus be to invest in trying to find those people who can. While virtually all older people are potential candidates, regardless of their background, whether male or female, I would like to point to one specific category of older people: older engineers and designers. In chapters 3 and 4, I encountered examples of older engineers and/or technology enthusiasts, for instance, a man who collected and restored old army radios and a former mining engineer. They

¹⁷⁹ I would like to thank Maggie, Celia, Christine, Elham and Josephine for allowing me to join them while they were doing their fieldwork in Morecambe and Preston. More information about the EFORTT project can be found on: <http://www.lancs.ac.uk/efortt/index.html>

were drawn into these technological projects more or less by accident, but they still had a passion for technology. A break-down of his AmI monitoring system was a treat for the mining engineer, as it meant that engineers would come to his home with whom he could talk about technology. This was something he could not do with the care workers who came to his home, but it was something he really loved to do.

If you do find older people – perhaps older engineers – willing and able to engage (critically) in design and test processes, cherish them. For instance, Juliette, a researcher whom I interviewed for my study of AIMS, the Ambient intelligent Monitoring System (see chapters 4 and 5), remarked that there were profound differences in the way in which older people participated in design processes and that you had to treasure the ‘good participants,’ by which she meant the few critical participants who were not afraid to speak their mind. You might even want to go one step further than finding and cherishing your older participants. You may even want to see older people as experts and pay them accordingly. Older people – certainly the engineers, but others as well – have a wealth of expertise regarding the use of technologies, about their everyday life practices and about what is important to them. This type of information is – to my mind – crucial if you want a design to fit in with the practices of its (older) users.¹⁸⁰

Finally, I would like to point to the PR-aspect of working with older people in design processes. If you have older people working as advisors or consultants to improve the fit between design and use practice, you can use this fact in your public relations management as a means of showing that you are listening to older people and developing technology with them, rather than designing something for them without consulting them. You could thus present an image of older people as active and competent, which goes against the grain of common images of older people (Featherstone & Hepworth, 1993, 2005; Hepworth, 2004), and emphasises the self-perception of older people as (still) competent and not (yet) really old. Thus you could have a nordic-walking-pole-effect on a PR-level.¹⁸¹

To sum up: if you are doing user tests with older people, an important question is: how do you view older people as test users and how do these images influence the design process? For instance, do older people get a real say in design? Are there implicit ideas like ‘older people can’t think conceptually’ that prevent you from taking advantage of the diversity of older people, i.e. of finding that person who *can* think conceptually? Also, it may be prudent to consider how much room remains to change a

¹⁸⁰ And in particular as the “un-thinking” of the background provided by your technology generation is a difficult task.

¹⁸¹ Of course, marketing and public relations management with regard to the “grey market” is a whole new topic in itself, which I will not venture into any further (see Koopman (2008) for a review of 91 articles which deal with marketing and older people).

design at the moment you bring in older people to the process? If it is too late, and, effectively, their input is only for validation purposes, you might also be running a risk. In any case, *some* older people *can* participate in design. Find them, cherish them and consider paying them, to improve the fit between design and everyday life use practice, and potentially also for pr-purposes.

7.2.5 Reflexive scripting

Perhaps you are still wondering: ‘All this talk of images – but do these images *really* matter? I mean, do such images of older people *really* influence designs and use practices?’ Good question. The short answer is yes. The long answer involves a concept called “script.” Script was first introduced by Madeleine Akrich and Bruno Latour¹⁸² (Akrich, 1992; Akrich & Latour, 1992). Drawing a parallel with film scripts, Akrich and Latour state that designers “write” into an object certain scripts or scenarios for its use. These scripts make it easier or more obvious to use the technology in a certain way, for a specific purpose, or by a specific person. Simultaneously, other users or forms of use – often those deemed less desirable – are discouraged by the design of a technology. Script thus shares some characteristics with Norman’s concept of “affordance” (Norman, 1988, 1998). While Norman’s focus is on designing for usability by guiding the user towards the intended behaviour, Akrich and Latour’s focus is more analytical and political. Akrich and Latour are interested in how the design of a technology promotes or inhibits certain uses, and, thus, how the ideas about the user, his or her competencies and what “proper” use is, are transferred from the designer to the user (and in turn whether the user decides to comply or is forced to comply with the script). Via the scripts built into a technology, the ideas and images a designer has of a user can be transferred from the designer to the technology and finally, to the use practice.

These scripts are important for two reasons: first, they may result in positioning users in particular ways or forcing certain actions that users do not necessarily approve of. Second, and importantly, such scripts often go unnoticed, and quickly become part of “the way things simply are.” Akrich (1992) states that social relations, political decisions and, for that matter, views of older people can be stabilized, naturalized, and depoliticized as they are scripted into technologies. Once this has been done, such views and decisions and the way in which they were made are concealed. The technological object or system becomes part of our life world and it seems as if it could not have been any other way. Via scripts, the images and ideas underlying a design can

¹⁸² The work by Bruno Latour is a great entry point for designers into the world of science and technology studies and philosophy of science and technology (see e.g. Latour, 1997).

thus have profound effects on the older user and his or her use practices, but simultaneously remain rather inconspicuous.

Three types of scripts are particularly important in the context of design for older people. The first type is “age script,” which summarises much of what has been said above (see also chapter 3). When simplified, stereotypical or even ageist ideas or images of older people – who an older user is, what they want or need, what he or she is assumed to be able to do (safely) etc. – are the basis for design, they may be scripted into designs and thus result in *age scripts*. Accordingly, they may influence use practices of aging people, and may in turn, invoke fierce responses, as was shown by the example of the ING bank. As straightforward as the ING bank example may seem, it is nevertheless important to remember that ageism and stereotypical thinking about older people are very common and accepted in society (Wilkinson & Ferraro, 2002). This thus adds to the naturalization of scripts, and there thus is a definite risk of designing technologies with age(ist) scripts.

The second type of script – gender script – is perhaps less obvious, but certainly pertinent. Gender script was introduced by Dutch and Scandinavian scholars in the 1990s (Berg & Lie, 1995; Van Oost, 1995, 2003; Oudshoorn, 1996a). Like ideas about ageing, ideas about what men and women are like, what their relative competencies are, etc. can be scripted into technology. Gender scripts are relevant in the context of older people because, first of all, women tend to live longer than men. Thus women will be confronted more often with technologies for older people than men, and – as the majority of designers are still men – the chances are relatively large that young men are designing technologies for older women. Furthermore, although women tend to live longer than men, they often have more health problems while they do so (Austad, 2006; Perls, 2005). Thus they are more likely to become dependent on health care technologies. Finally, older women tend to be poorer than older men (Zaidi, 2010a), thus options to circumvent the use of certain technologies (for instance by hiring someone to manually do a particular task or buying a more expensive technology with a different script) are more limited. Thus technologies for older people may contain gender scripts and older women may be affected to a greater degree by the scripts written into technologies for older people. Careful reflection on the gender aspect of technologies for older people is thus warranted.

A final type of script – the passive compliance script – that warrants attention was addressed in chapter 4. The monitoring system which was studied in chapter 4 was designed in such a way that the user did not have to learn to work with the system, rather the system could operate completely autonomously. The designers recognized that some older people were very proficient in using technologies, while also recognizing that others were not. The designers felt that the inclusion of one button

might lead to the incorrect operation, as even one button could be operated wrongly or not at all in case of an emergency.¹⁸³ Thus a system that worked autonomously was seen as the best option. In turn, this meant that the only option for the older participants in that particular test was to passively undergo the “use” of the technology.¹⁸⁴ They had very few options to influence or resist the system, but had to put up with the changes in their lives caused by the installation (the alternative being complete removal of the system, but this could lead to a move to a care home, something that these older people did not want). In the end, the system presupposed and positioned its “users” as passive and the older people had very few options to do anything about this.

In sum, if stereotypical and ageist ideas about older people form the basis for the design of technologies for older people, these technologies may carry scripts that further reinforce and naturalise these stereotypical and ageist ideas. Thus reflexivity with regard to the way in which older users are represented in design processes and the way in which these images are inscribed – and the way they are read (also non-intentionally) – is called for.

7.2.6 Older people also change: adaptability as a pre-requisite

By now you are probably no longer surprised to read that singular, homogeneous images of older people are simplifications, and such simplifications can have serious ramifications for the acceptance and (non) use of a technology by older people. In addition to the diverse nature of older people and their practices, it is important to recognise that, again contrary to commonly held beliefs, older people and their practices also change (Thompson, 1992; 1993; see chapter four).

First, living conditions and arrangements may change. For instance, the number of people in the home may change, as people move in or out, or, for instance, as a partner dies. In addition, the number of pets may change, and pets can be particularly troublesome for technologies (see chapter 5 for the example of Willem the cat, who, managed to create a rather mysterious malfunction). Another example of changing living conditions is moving house, e.g. moving to sheltered housing, a care home, a hospice, or simply a new home. If the technology is brought along, it might be necessary to adapt it to meet the requirements of the new environment.

Second, practices of older people may change. In chapter 5, an example was given of an older lady who had a habit of napping on the sofa in her living room. This

¹⁸³ There was a version of the system that included an interface – the home telephone – but this had no other functionality than cancelling a false alarm. The interface afforded no means of entry into the system.

¹⁸⁴ Indeed it is questionable whether this can even still be termed as use.

habit caused a problem for a monitoring system designed to check whether she had fallen. The designer of the system, in conjunction with a manager of the care home, went to considerable lengths to adjust the settings of the system to accommodate this behaviour. A few weeks later, the older lady started sleeping in her bed in the afternoon. By installing sensors in both the bed and the sofa, the designers eventually adapted the system to this changing behaviour.

Third, there are also changes in the technologies older people have and use. While some older people age in good health, others may progressively develop some illnesses and deficiencies that may necessitate new health and care technologies, thus adding to the already highly technological bodies and environments of older people. In addition, older people may also decide to learn and use a new technology. Although this is contrary to common beliefs about older people, older people are often willing to accept and to learn to use new technologies, provided they have the right benefits. Anne-Sofie Melenhorst and colleagues (Melenhorst, 2002; Melenhorst, et al., 2006) have convincingly shown that it is not the costs nor the difficulty of learning to use a (communication) technology that is the major barrier when older people decide whether they want to start using a technology; rather their concern is whether the technology offers a significant benefit. A nice example of this was provided by Juliette, a researcher involved in the AIMS project who is an expert on the subject of ICT and older people. She recalled how a lady in a care home became a computer user:

Her “click” was that you could convert photos, with some free software tool, into embroidery patterns (...) or into “painting by numbers” patterns. Thus they could simply, by using a photo that they had, a holiday picture or a picture of a grand child or something, have the computer translate it into an embroidery instruction. That colour yarn, that brand, you know, a stitch like this, a stitch like that. Or into a painting by numbers pattern. Those are activities that are being done a lot in care homes. So she really thought ‘oh, this is it, I’ve really got to... I have to have this, because then I can make really nice pictures’ (...). Nobody is going to come up with that. No designer imagined that this would be the “killer app” for ICT in care homes.

Thus, if a technology has a clear benefit for older people, then they might not be so reluctant to change and adopt a technology, as is often thought.

Thus the suggestion would be to dispense with the view of older people and their everyday life practices as being unchanging. In turn, this means that in some way or form, technologies for older people should be able to cope with changes that are relevant to its use; this may have minor implications for some technologies, while for

other technologies the ability to cope with change will have more serious implications. With respect to this, it is important to take differences in technological literacies into account; not only the technological literacies of older people, but also those held by care workers or informal carers, as they might also be key users of such a technology.

7.2.7 Selective use, modification and resistance as design input

What options are there to “modify,” “resist,” “subvert,” “abuse,” “misuse,” “sabotage,” “hack,” or not use your technology at all? Strange as it might seem, leaving some room for the user to use the system in unforeseen ways may go some way towards acceptance of a technology.

The fact that design is completed in use also means that not all salient elements of a use practice can be predicted. However sophisticated our thinking about (older) users and use practices, the everyday life reality of people is nearly always more complex and will present us with many surprises. Selective use and modification of technologies can be essential to adapt technologies to the idiosyncrasies of the everyday lives of people. Older people are no exception to this. Older people are neither passive nor technologically illiterate. They may choose to use a technology in different ways than intended by a designer and develop alternate uses and workarounds to make a technology suit their needs and preferences. In this respect, older people are no different from other people.

Resisting the actions intended by the designer, i.e. resisting the script, may be the result of the way in which a user perceives the implied user or of an (unforeseeable) ill fit with existing use practices. As one design often needs to cater to many and very different types of users, such reactions are inevitable. Resistance or non use may also be the result of perceived forced use (for instance of health care and care technologies)¹⁸⁵. It can be worthwhile to consider resistance in the context of the four phases of domestication: appropriation, objectification, incorporation and conversion (Silverstone, et al., 1992). Take for instance, the case of iRo (chapter 3), a robot with which, in that specific configuration, older people could play cognitively challenging games. When the older participants initially interacted with iRo, they said that they liked iRo, and thought it worked very well, however almost none of the participants wanted to have an iRo. To the older participants in the tests, iRo was a signifier of old age and decrepitude. This perception was partly due to the way in which iRo and robots like it, had been presented in the media prior to the tests. It may also have been due to the fact that the older people knew that they were selected on the basis of their

¹⁸⁵ On the other hand, older people can also be coaxed or forced into use of (health) technologies “for their own good.” See chapter 4 for an example of the way in which “subtle pressure” was used to get some older people to accept a monitoring system in their homes.

age and the fact that they lived alone. They thus assumed that iRo was a robot for older people who were not very active and needed to be kept company, and they did not associate themselves with such a person. The image that the older people had of the user of iRo thus impeded the appropriation of the robot.

Interestingly, when asked after the initial tests whether the older people would like to participate in a more extensive field test, nearly all the older participants agreed. They did this because they thought it was fun and interesting, and – importantly – because they thought they were helping other people, people older and more frail than they were. Thus, the robot did find its way into the homes of the older people, through the backdoor of being a helpful participant. Once in the home, something interesting happened; nearly all the participants in the field test successfully domesticated iRo. iRo was given a physical place in their homes (objectification) and was taken up in their routines (incorporation). When the researchers came to collect iRo when the field test was done, the participants readily admitted that they had grown attached to iRo and that they were going to miss it. iRo was fully taken up in their lives, up to the point that they were not afraid of showing themselves to others as users of iRo (conversion). The point here is thus, that even though iRo was a technology that could work well in the lives of the older people, who thought it was fun and became attached to it, it would have never been able to achieve this, if it had not passed the appropriation stage. This illustrates that a careful analysis of the reasons why (older) people resist technologies can be worthwhile.

Allowing for some alternate use, selective use and resistance can be a good strategy. If a system does not afford any options for resistance, modification or non-use, acceptance quickly becomes too much of a black-or-white, yes-or-no decision. Leaving options for resistance, modification, and selective use can thus be essential for the acceptance of a system, also for older people. In turn, it may be worthwhile not only to allow, but also to study forms of resistance, as they are instances of reflective learning on the part of the user. When a technology is introduced to people, they learn about the technology, but they also learn about themselves in relation to the technology, i.e. they learn about who they are, what they want, need, prefer, dislike and so on. Studying the ways in which people domesticate technologies and make them fit in with their everyday lives can thus provide a designer with information which can be vital for the design and re-design of a technology.

7.3 Conclusions

It is well known that design involves reduction of complexity. Indeed, also in the design of technologies for older people, some of the complexity, diversity,

idiosyncrasies, paradoxes and contradictions cannot be taken into account, and thus choices need to be made. However, some designs of technologies for older people have in the past reduced this complexity too much, making use of oversimplified, stereotypical views of older people, which – sadly – abound in our societies. Nevertheless, that does not mean that such images are a decent basis for design. In this chapter, I have tried to give some input that provides a different, more reflexive view of older people. Thus, if there is one suggestion that I feel sums up this chapter, and thus my advice for design, it would be to adopt a reflexive stance towards the explicit and implicit images of older people that underlie designs. I believe that such reflection can lead to designs that fit in better with the lives of older people and thus provide better chances of success.

7.3.1 Seven Suggested Readings

Finally, I offer seven suggested readings. Throughout this chapter, I have provided references to literature and chapters of this thesis, which you can follow-up on if you are interested in one particular subject. These seven suggestions are more general (hand)books and reports which provide insight into research about older people and/or user-technology relations.

1. World Health Organization (1999) *Ageing: Exploding the Myths*, Geneva, WHO: Ageing and Health Programme.
2. Oudshoorn, N. & Pinch, T. (eds.) (2003b) *How Users Matter; The Co-construction of Users and Technologies*, Cambridge (MA), MIT Press.
3. Jæger, B. (ed.) (2005) *Young Technologies in Old Hands: An International View on Senior Citizen's Utilization of ICT*, Copenhagen, Djøf Publishing
4. Calasanti, T., & Slevin, K. (Eds.) (2006b) *Age Matters; Realigning Feminist Thinking*. New York, London: Taylor & Francis Group; Routledge.
5. Mort, M., Milligan, C., Roberts, C., & Moser, I. (2008) *Ageing, Technology and Home Care: New Actors, New Responsibilities*. Paris: Presses de l'École des Mines de Paris.
6. Joyce, K. & Loe, M. (eds.) (2010b) *Technogenarians: Studying Health and Illness Through an Ageing, Science, and Technology Lens (Sociology of Health and Illness Monographs)*, Chichester, Wiley-Blackwell.
7. Mort, M. (2011) Project final report of EFORTT - Ethical Frameworks for Telecare Technologies for older people at home project. Grant Agreement number: 217787, FP7-Science-in-Society 2007-1.

8. Seven Suggestions – a Super Short Summary

Time is a limiting factor for social scientists and designers alike. If you can only spare five minutes, this super short summary is for you.¹⁸⁶

These seven suggestions do not provide a comprehensive set of design guidelines for designing technologies for older people. Rather, these are suggestions on how and how not to view older people if you intend to design a technology for them. These suggestions start from the premise that the views, images and ideas about older people that designers and engineers have, have a significant effect on the design, acceptance and use of a technology (if you disagree with that, I suggest chapter 1).

1. Reflect on cultural representations of older people

Viewing older people solely as lonely, sick or frail is a major simplification. Older people often reject this kind of positioning. Even if a design stems from the best intentions, i.e. to help the frail and needy aged, older people may still reject these as ageist images. Recognise that there is no standard / average older person. Reflect on common images of older people and try to learn about their actual lives.

2. Reflect on the effects of the ageing-and-innovation discourse

It is often said that ageing populations lead to huge social, financial and (health) care problems. Innovation is often positioned as an “everybody wins” answer to these problems. However, such answers often implicitly reinforce a neo-liberal political view and assume a fourth age (frail and dependent) view of older people. A third age (still active and healthy) view might offer opportunities for design.

3. Older people are not technologically illiterate

Older people are often said to have few technological skills. This is frequently due to a myopic focus on current digital technologies. I argue that older people have a different technological literacy and are of a different technology generation. They have used, and possess skills in using, more technologies than you might think. Try to analyse and tap into the technological literacy that they *do* have.

4. Some older people can participate in design processes

An important image of older people that influences design is the idea that they cannot participate in design because they ‘don’t know what’s possible’ ‘are quickly

¹⁸⁶ For the sake of space, I have omitted references in this chapter. I certainly do not claim that all the ideas in this chapter are my own, and I point the reader to chapter 7 for the relevant references.

overburdened', 'cannot think conceptually', and so on. Some older people indeed cannot participate, but others – e.g. older engineers and designers – certainly can provide essential information. Find them, cherish them and consider paying them.

5. Reflexive scripting

Designers “write” into an object certain scripts or scenarios for its use. These scripts make it easier or more difficult to use the technology in a certain way, for a specific purpose, or by a specific person. Scripts may position an older person in a negative way or force specific actions, but they often go unnoticed. Reflect on your images of older people, how they are inscribed in design, and the kinds of effects they may have.

6. Older people also change: adaptability as a pre-requisite

Although older people are often seen as reluctant to change, older people and their practices do change. Living arrangements, technologies and everyday life practices of older people are subject to change. Some designs may thus need to be adaptable or self-adapting. The technological literacies of older people, but also of care workers and of informal carers should be taken into account in such adaptable designs.

7. Selective use, modification and resistance as input for design

(Older) people may choose to use a technology in different ways than intended by a designer in order to satisfy their particular needs and preferences. Instead of designing “closed” technologies, leaving some room for users to use the system in their own ways may be essential for the acceptance of a technology. Study forms of resistance and modification, as they are instances of learning on the part of the (older) user.

More than any other category of people, older people are likely to be the object of others' preconceptions about their capabilities, needs and preferences. These are often simplified homogeneous images, while older people are in fact diverse. It is thus not easy to predict or speculate about what older people are like, what they want, need, prefer, etc. Those who take this complexity seriously are – in my mind – better equipped to design technologies that successfully fit in the lives of older people. If you take anything from this thesis, or this summary, it is to be aware of (the dangers of) simplified images, be sensitive to complexity, be reflexive about your own images and ideas of older people and be open to learning *about*, and preferably *with*, older people.

Samenvatting¹⁸⁷

Representaties van ouderen en vergrijzing in het ontwerp van nieuwe en emergente technologie. Een assessment van het ontwerp van Ambient Intelligence technologieën voor oudere mensen.

We leven in een tijd waarin het gebruikelijk is geworden om over ouderen te praten in termen van een maatschappelijk probleem. Er wordt vaak gesteld dat de vergrijzing ertoe zal leiden dat de kosten van de AOW, de pensioenen, en de zorg sterk zullen oplopen terwijl er steeds minder ‘jonge’ mensen zijn om die kosten te betalen. Daarnaast wordt vaak gesteld dat de veranderende verhouding tussen het aantal jongeren en ouderen onder meer zal leiden tot tekorten aan personeel om te zorgen voor ouderen. Verschillende technologieën worden in toenemende mate gezien als een gedeeltelijke oplossingen voor deze ‘crisis’. De ontwikkeling van dergelijke technologieën wordt vaak gelegitimeerd door te stellen dat het alleen maar ‘winnaars’ oplevert. De ouderen profiteren van de nieuwe technologieën omdat ze bijvoorbeeld langer onafhankelijk kunnen blijven wonen (hoofdstuk 4), of hun cognitieve vaardigheden kunnen trainen (hoofdstuk 3). De samenleving profiteert omdat diverse (zorg)kosten voor ouderen uitgesteld, verminderd of vermeden kunnen worden. En de ontwerpers en hun bedrijven profiteren; zij kunnen innovatieve technologieën ontwikkelen, verkopen en misschien wel exporteren naar het buitenland, wat zelfs nog geld op zou kunnen leveren. Dergelijke ‘gerontechnologieën’, technologieën voor ouderen, bieden derhalve een prachtige oplossing voor een groot maatschappelijk probleem, nietwaar?

Deze retoriek en de daaraan verbonden beeldvorming van ouderen (in termen van ziekte en gebrek) wordt vaak gebezigd in technische, wetenschappelijke en populaire publicaties over gerontechnologieën. Maar is dat alleen voor de Bühne? Hoe denken ontwerpers, ingenieurs, onderzoekers, managers en anderen die betrokken zijn bij het ontwerp van gerontechnologieën, over ouderen? Zien zij ouderen als een fundamenteel ander type gebruiker? En leiden die beelden tot andere technologieën? Dit proefschrift analyseert de derhalve de ‘gebruikersrepresentaties’, de beelden, ideeën, stereotypen van ouderen, die ten grondslag liggen aan het ontwerp van technologieën voor ouderen. Om deze analyse te maken, maakt dit proefschrift enerzijds gebruik van een semiotische theorieën om de relatie tussen mensen en techniek te analyseren (met name de concepten ‘gebruikersrepresentatie’ en ‘script’) en anderzijds van sociale gerontologische concepten en analyses (bijvoorbeeld analyses met betrekking tot

¹⁸⁷ Deze samenvatting poogt een laagdrempelige ingang in dit proefschrift te bieden. De ideeën genoemd in deze samenvatting komen logischerwijze voor een substantieel deel uit de literatuur. Ik verwijs naar de betreffende hoofdstukken voor de referenties naar deze literatuur.

ageism, sociale en culturele beelden van ouderen, en diversiteit van ouderen). Hoewel er zowel van STS (Science and Technology Studies) als sociaal gerontologische zijde steeds meer interesse is voor de analyse van de relatie tussen ouderen en techniek, is de combinatie van deze perspectieven, zeker met betrekking tot gebruikersrepresentaties, nog vrijwel onontgonnen gebied. Dit proefschrift zal laten zien dat de verknoping van deze perspectieven waardevolle inzichten oplevert ten aanzien van de co-constructie van techniek en veroudering. Gebruikmakend van deze perspectieven stelt dit proefschrift de volgende hoofdvraag: wat voor gebruikersrepresentaties van oudere gebruikers worden er gecreëerd in ontwerpprocessen en vervolgens ingeschreven in het ontwerp van gerontechnologieën en hoe wordt daarbij omgegaan met de diversiteit van ouderen? Om die vraag te beantwoorden zal dit proefschrift zich richten op Ambient Intelligence (AmI) technologieën voor ouderen. Veel technologieën voor ouderen zijn informatie- en communicatietechnologieën. Een dominant paradigma in de ontwikkeling van deze technologieën is AmI. AmI technologieën zijn informatie- en communicatietechnologieën die veelal geïntegreerd zijn in de omgeving en gevoelig zijn voor, en zich kunnen aanpassen aan, de aanwezigheid van mensen, teneinde een natuurlijke en intuïtieve relatie tussen mens en techniek te bereiken. Ouderen worden gezien als een type gebruiker die in het bijzonder van AmI technologieën zou kunnen profiteren en als een potentiële groeimarkt. De gebruikersrepresentaties van ouderen zullen bestudeert worden in drie casussen (en vier hoofdstukken). Deze casussen bestrijken verschillende fases van het ontwikkelingstraject van een technologie als AmI, te weten: 1. vroege visies en verwachtingen, 2. laboratorium tests en 3. het ‘pre-market’ tests van een prototype in de gebruikspraktijken van ouderen. De eerste drie empirische hoofdstukken bestrijken deze drie fases. Het vierde empirische hoofdstuk gaat na hoe in deze drie fases omgegaan wordt met een bijzonder belangrijk onderwerp: diversiteit van ouderen.

Hoofdstuk 2 behandelt de manier waarop ouderen worden gerepresenteerd in AmI visies en doet dit door een vergelijking te trekken met representaties van ‘jongere’ gebruikers. Dit hoofdstuk laat zien dat ouderen in deze visies vooral gezien worden in termen van ziekte, afhankelijkheid en gebrekkigheid en op een afstandelijke, gemedicaliseerde manier besproken worden. Het sociaal gerontologische onderscheid tussen ‘third age’ en ‘fourth age’ komt van pas om deze representaties te analyseren. Het beeld van ouderen dat gebruikt wordt in de AmI visies is een beeld van de ‘vierde leeftijd’, waarmee een laatste levensfase bedoeld wordt die in het teken staat van ziekte, verval en afhankelijkheid. Echter, voorafgaand aan deze fase is er ook een ‘derde leeftijd’, een levensfase die begint bij de pensionering en gekarakteriseerd wordt door vrijheid, onafhankelijkheid en tijd voor ontplooiing. Het was voor de auteurs van de AmI visies zeker mogelijk, en misschien wel nuttig, geweest om een dergelijk ‘derde

leeftijd' beeld van veroudering te hanteren, maar dat hebben ze niet gedaan. Een verklaring hiervoor is dat het vergrijzing-en-innovatie discours, waarin, zoals reeds besproken, vergrijzing sterk wordt gepositioneerd als een maatschappelijke crisis en het technische antwoord daarop alleen maar winnaars oplevert, een 'vierde leeftijd' representatie van ouderen vereist. Immers, alleen door ouderen als ziek, afhankelijk en gebrekkig neer te zetten, kunnen ze gezien worden als een maatschappelijk probleem. Zonder het beeld van ouderen als maatschappelijk probleem hebben dergelijke technologieën geen maatschappelijke opbrengst en is er in feite slechts sprake van een gewoon product.

Hoofdstuk 3 benadrukt het belang van identiteit van ouderen in relatie tot nieuwe techniek. Het hoofdstuk behandelt de gebruikersrepresentaties die naar voren kwamen in een laboratoriumtest met een 'human-interaction' robot en oudere testgebruikers. Deze robot, voornamelijk gepositioneerd als een onderzoeksproject, was bedoeld als gemakkelijk te gebruiken interface waar verschillende applicaties op geprogrammeerd konden worden. Voor deze tests fungeerde de robot als een 'spel maatje'. Het idee was dat ouderen spelletjes zouden spelen die hun cognitieve vaardigheden op peil zouden houden. In lijn met het vergrijzing-en-innovatie discours, zagen de ontwerpers ouderen als mensen die een dergelijke robot nodig zouden krijgen, maar daarnaast ook als mensen die graag zo'n robot zouden willen hebben. De oudere testgebruikers zagen dat anders. Ondanks dat de oudere testgebruikers vonden dat de robot goed werkte, gaven ze vrijwel allemaal nadrukkelijk aan dat ze zichzelf niet zagen als de veronderstelde eindgebruiker van deze robot. Die eindgebruiker was iemand die oud, ziek en afhankelijk was, en zo zagen zij zichzelf niet. In tegendeel, de oudere testgebruikers zagen zichzelf als nog jong, onafhankelijk en actief. Ze waren best bereid om aan de tests deel te nemen, maar alleen in de rol van een altruïstische testgebruiker die mee deed met het onderzoek om andere, oudere en meer afhankelijke mensen te helpen. Hierdoor wisten de ouderen zich enerzijds verder te distantiëren van de veronderstelde oude, zieke en afhankelijke eindgebruiker. Anderzijds konden ze zo toch deelnemen aan de veldtest en de robot enkele weken in huis hebben, wat de meeste participanten erg leuk bleken te vinden. De reacties van de ouderen hadden echter weinig invloed op de ontwerpers. De initiële reactie werd afgedaan als een incident dat werd veroorzaakt door de manier waarop de robot in de media werd geportretteerd. De onderzoekers richtten zich op het beantwoorden van hun onderzoeksvragen en probeerden zowel de opstandige als behulpzame reacties van de oudere participanten zoveel mogelijk uit de onderzoeksresultaten te houden. Het is echter van belang om dergelijke reacties toch serieus te nemen om 'ageist scripts' en verzet tegen en non-gebruik van technologieën te voorkomen.

Hoofdstuk 4 behandelt een ‘pre-market’ pilot test met een Ambient Intelligent monitoringssysteem (AIMS). Dit systeem kan door middel van sensor- en netwerktechnologie vaststellen of iemand thuis gevallen is of, voor mensen met dementie, of iemand het huis heeft verlaten. Het systeem stelt daarmee (oudere) mensen die ernstig ziek zijn in staat om langer veilig thuis te blijven wonen. Het hoofdstuk laat zien dat de verschillende partijen die betrokken zijn bij de ontwikkeling en het testgebruik van AIMS, allemaal een andere betekenis hechtten aan AIMS, maar dat men ondanks dat verschil zich toch achter de technologie kon scharen omdat iedereen zich kon vinden in de representatie van ouderen als mensen-die-thuis-willen-blijven-wonen. Dit beeld van ouderen fungeert daarmee als een ‘boundary object’ en het zorgt voor de ‘alignment’, het op een lijn brengen van alle actoren. Er is echter nog een ander essentieel onderdeel dat bijdraagt aan deze alignment: het morele discours rond het beeld van ouderen als mensen-die-thuis-willen-blijven-wonen. Ouderen thuis laten wonen wordt gauw herkend als goed. Innovatie kent eveneens veel positieve connotaties. Middels innovatie ouderen thuis laten wonen en zo maatschappelijke problemen oplossen wordt gauw gezien als ontegenzeggelijk het juiste om te doen. Het lijkt dan ook nauwelijks meer mogelijk om een dergelijke ontwikkeling te bevragen. Echter, laat de introductie van AIMS de levens van de oudere testgebruikers wel onveranderd zoals de ontwerpers beloven? Een script analyse laat zien dat ouderen weliswaar geen nieuwe techniek hoeven te leren gebruiken, maar dat AIMS wel degelijk het opgeven en accepteren van bepaalde zaken vereist. Zo zijn bepaalde ruimtes niet meer toegankelijk, wordt er nieuwe informatie over de (nachtelijke) levens van ouderen ingewonnen en zijn er weinig mogelijkheden om het systeem te gebruiken om creatief verzet te leveren. Een ander belangrijk aspect met betrekking tot de effecten van de introductie van AIMS, richt zich op het thuis. Het thuis wordt in de retoriek van AIMS gezien als een goede plaats om te leven en als een plaats die in essentie niet veranderd door de introductie van nieuwe techniek. Echter, als we kijken naar hoe het huis gereconfigureerd wordt door de introductie van AIMS dan zien we een reconfiguratie op drie niveaus: een fysieke, virtueel en emotioneel niveau. De literatuur laat zien dat dergelijke reconfiguraties een grote impact kunnen hebben; ze kunnen een huis veranderen tot op het punt dat het niet meer als thuis herkend wordt. Deze scripts en reconfiguraties krijgen echter geen aandacht omdat het zo overduidelijk juist lijkt om ouderen, met technologische middelen, thuis te laten wonen. Het is echter alleen het juiste om te doen vanuit een bepaald perspectief (in dit geval is dat een neoliberale perspectief). Het is dan ook belangrijk om de gevolgen van de introductie van AIMS en de sociale en politieke keuzes die daaraan ten grondslag liggen expliciet te maken, zodat ouderen en hun familie een betere keuze kunnen maken.

In hoofdstuk 5 staat de spanning tussen de diversiteit van ouderen en de ontwerppraktijk centraal. Uit sociaal gerontologisch onderzoek is gebleken dat, in tegenstelling tot het vrijwel algemeen geaccepteerde idee dat ouderen allemaal hetzelfde zijn, ouderen in feite zeer divers zijn. Een dergelijke diversiteit is problematisch voor de ontwerppraktijk. Een bepaalde reductie van complexiteit, zeker ook met betrekking tot de kenmerken van de gebruiker, is essentieel in het ontwerpproces. Tegelijkertijd moet een dergelijke techniek wel passen in de levens en praktijken van ouderen, en die kunnen onderling dus zeer verschillen. Hoe gaan de schrijvers van de AmI visies en de ontwerpers, ingenieurs en onderzoekers uit de AIMS en robot casus om met de diversiteit van ouderen? In de AmI visies wordt diversiteit gepresenteerd als een centrale en idealistische missie. Echter, een gedetailleerde blik op hoe ouderen gerepresenteerd worden laat weinig van die missie over. In de AmI visies wordt er uiteindelijk vooral een homogeen beeld van ouderen gegeven in termen van ziekte, afhankelijkheid en gebrekkigheid. In de robot casus verandert de betekenis van diversiteit van een idealistische missie aan het begin naar een methodologisch probleem aan het eind. De onderzoekers deden een bepaald soort psychologisch onderzoek dat volgens hen de beste manier was om kennis over ouderen te generen. Echter, gedurende hun onderzoek schoof de nadruk op diversiteit naar de achtergrond en hoewel de testresultaten valide en reproduceerbaar waren, verdween de focus op diversiteit uiteindelijk vrijwel compleet. De AIMS casus liet daarentegen een andere aanpak zien. In deze testpraktijken lag de nadruk op het aanpassen van het systeem aan de praktijken van de oudere participanten. In plaats van de nadruk op diversiteit waren het de hightech camera's, oorspronkelijk een kerntechnologie waar het project rond opgezet was, die uit het project verdwenen. De AIMS onderzoekers konden ook niet met alle diversiteit omgaan en voor zover dat wel kon betekende het veel werk. Hun tests waren echter niet gericht op reproduceerbare valide resultaten, maar op representativiteit (vergelijkbaarheid) ten aanzien van de praktijken van ouderen. Deze casus laat zien dat, enerzijds, er in technologisch testen wegen gevonden kunnen worden om om te gaan met diversiteit, maar anderzijds ook wegen gevonden kunnen worden om de diversiteit van ouderen te marginaliseren. Dit is belangrijk aangezien beide vormen van testen, met een nadruk op reproduceerbaarheid of representativiteit, legitiem zijn binnen hun context, maar tegelijkertijd kunnen leiden tot of bijdragen aan zeer verschillende inscripties.

In het concluderende hoofdstuk (hoofdstuk 6) worden de belangrijkste bevindingen van het proefschrift samengebracht in vier dominante representaties van oudere gebruikers. Deze vier beelden zijn:

1. ouderen in termen van afhankelijkheid, ziekte en verval. Ondanks dat het vergrijzing-en-innovatie discours een 'vierde leeftijd' beeld van veroudering vereist, een

beeld dat de kenmerken van een kleine groep ouderen sterk benadrukt en een zeer grote groep ouderen uitsluit, wordt dit discours nauwelijks bevraagd in ontwerpkringen. Dit komt omdat praten over ouderen als een maatschappelijk probleem een normale en geaccepteerde manier van praten over ouderen is en omdat innoveren voor ouderen een sterke morele inhoud heeft.

2. Ouderen als terughoudend en zich verzettend tegen technologische verandering. Het beeld van ouderen als mensen die zich in eerste instantie verzetten tegen nieuwe technologie, maar die gaandeweg de voordelen ervan wel gaan zien is een veelgebruikt, maar ook gevaarlijk beeld van ouderen. Het bouwt voort op stereotype beelden van ouderen als conservatief, rigide en weerbarstig. Als ‘niet-willen-veranderen’ gezien wordt als een attribuut van ouderdom, dan is er niets intrinsieks aan de technologie dat dit veroorzaakt. Dit biedt de ontwerper een reden om de negatieve reacties van ouderen te negeren en plaatst de ontwerper in de positie om onderscheid te maken tussen ‘initieel’ en ‘echt’ verzet. Temeer daar keuzevrijheid geen eenvoudige zaak is in zorgpraktijken en het maar de vraag is of ouderen daadwerkelijk mogelijkheden hebben tot verzet nadat een technologie geïnstalleerd is, is de representatie van ouderen als mensen die zich in eerste instantie altijd tegen een nieuwe technologie zullen verzetten, een potentieel bijzonder gevaarlijk beeld.

3. Ouderen als mensen met een lage technologische geletterdheid. In het empirische deel van dit proefschrift kwam dit beeld herhaaldelijk terug. Een laag niveau van technologische geletterdheid wordt gauw gezien als een probleem of tekortkoming. Het kan echter ook een bewuste houding zijn. Daarbij maken ouderen in hun dagelijkse praktijken veel gebruik van allerlei technologieën. Ouderen zijn niet technologisch ongeletterd, maar bezitten een andere geletterdheid die genegeerd of ondergewaardeerd wordt. Dit komt deels doordat vaak alleen nieuwe ICT telt als relevante techniek. In plaats van een *a priori* beeld van ouderen als technologisch ongeletterd, zou de geletterdheid van ouderen een empirische vraag moeten zijn.

4. de genuanceerde uitzondering: ouderen als individuen gekenmerkt door diversiteit. Naast de sterke homogene beelden van ouderen die erop nagehouden worden, erkenden de onderzoekers, ingenieurs en anderen die betrokken waren bij de projecten die bestudeerd zijn in dit proefschrift, ook dat ouderen divers zijn. Dit werd vaak ondersteunt met verhalen over uitzonderlijke oudere individuen. Deze twee manieren van representeren bestaan naast elkaar en zijn voor de ontwerpers en ingenieurs onproblematisch. Tegelijkertijd moet de spanning tussen heldere homogene beelden van ouderen – die duidelijke ontwerpcriteria bieden – en de complexe realiteit van de diversiteit van oudere individuen wel opgelost worden in ontwerp praktijken. De vergelijking in hoofdstuk 5 laat zien dat het niet makkelijk is om om te gaan met

diversiteit in ontwerp, maar dat het wel een belangrijke factor is voor het succes van een ontwerp.

Ondanks dat er wel enige aandacht was voor diversiteit, worden ouderen in hoofdzaak dus toch voornamelijk gerepresenteerd middels de drie genoemde homogene beelden. Deze beelden sluiten nauw aan bij normale en geaccepteerde – maar voornamelijk zeer negatieve – sociale en culturele beelden van veroudering (zoals ouderen als zwak, ziek, langzaam, conservatief etc.). Er bestaat een serieus risico dat dergelijke ‘normale’ beelden worden ‘ingeschreven’ in het ontwerp van gerontechnologieën en zo enerzijds verborgen raken, maar anderzijds een sterk effect op de levens van ouderen kunnen hebben. Homogene en stereotype representaties van ouderen die ingeschreven worden in techniek kunnen zo ‘genaturaliseerd’ worden, wat wil zeggen dat het lijkt alsof een techniek nooit anders had kunnen zijn. In het geval van gerontechnologieën is er sprake van een risico op ‘dubbele naturalisatie’.

Geaccepteerde stereotype representaties van ouderen kunnen aan de basis liggen van technologieën voor ouderen, en kunnen dus op hun beurt ‘ingeschreven’ worden in dit soort technologieën en zo, via een technisch medium, op subtiële, maar potentieel zeer dwingende wijze, deze beelden van ouderen versterken. Vanwege dit risico is het belangrijk dat ontwerpers, onderzoekers, ingenieurs en anderen die betrokken zijn bij het ontwerp van gerontechnologieën, expliciet en geïnformeerd reflecteren op de gebruikersrepresentaties die zij hanteren in hun ontwerp processen. Het is echter niet de bedoeling om op nogal gratuite wijze een dergelijke oproep te doen. In plaats daarvan is het van belang om te proberen om manieren te vinden om een dergelijke reflectie te faciliteren. Het feit dat ontwerpers, ingenieurs en onderzoekers ook geconfigureerd worden door de context waarin zij werken leidt tot het inzicht dat de verantwoordelijkheid voor de gebruikersrepresentaties van ouderen ook gedistribueerd zou moeten worden over verschillende actoren en dat daar, onder andere, ook een rol voor sociaal wetenschappers weggelegd is.

In hoofdstuk 7 worden derhalve een zevental suggesties voor ontwerp gegeven die gebaseerd zijn op inzichten uit de literatuur en op inzichten die gegenereerd zijn in dit proefschrift (hoofdstuk 8 bevat een korte samenvatting van deze suggesties, bedoeld als een snelle inleiding). Deze zeven suggesties zijn opgenomen omdat het niet alleen belangrijk is om gebruikersrepresentaties kritisch te analyseren, maar juist daarna ook gepoogd moet worden om een constructieve bijdrage te leveren aan de ontwerp wereld.

Suggestie 1: reflecteer op culturele representaties van ouderen.

Suggestie 2: reflecteer op de effecten van het vergrijzing-en-innovatie discours.

Suggestie 3: zie ouderen niet als technologisch ongeletterd, maar als technologisch anders geletterd.

Suggestie 4: sommige ouderen kunnen *wel* deelnemen aan ontwerpprocessen.

Suggestie 5: reflexieve inscripties: reflecteer op de achterliggende gebruikersrepresentaties en hoe deze 'ingeschreven' raken in het ontwerp van technologieën voor ouderen en wat voor effecten dat heeft op gebruikspraktijken.

Suggestie 6: ouderen veranderen ook, aanpasbaarheid is een vereiste.

Suggestie 7: selectief gebruik, modificaties en weerstand als input voor ontwerp.

Ouderen zijn vaak het object van de vooroordelen en preconcepties van anderen met betrekking tot hun capaciteiten, noden en voorkeuren. Dit staat op gespannen voet met de diversiteit van ouderen. Ontwerpers die niet uitgaan van stereotypen, maar reflexief tegenover deze beelden staan, de complexiteiten van het ontwerpen voor ouderen serieus nemen en bereid zijn om te leren van en met ouderen, zijn, mijns inziens, beter toegerust om tot succesvolle ontwerpen te komen.

References

- Aarts, E. (2003). Technical Issues in Ambient Intelligence. In E. Aarts & S. Marzano (Eds.), *The New Everyday; views on Ambient Intelligence*. Rotterdam, Eindhoven: 010 publishers; Koninklijke Philips Electronics n.v.
- Aarts, E. (2004). Ambient Intelligence: A Multimedia Perspective. *IEEE multimedia*, 11(1), 12-19.
- Aarts, E. (2009, June 16th 2009). *AmI 2.0 Towards Synergetic Prosperity*. Paper presented at the Keynote at the 2009 CTIT symposium University of Twente, Enschede.
- Aarts, E., & Appelo, L. (1999). Ambient Intelligence Thuis. *IT-monitor*.
- Aarts, E., & Diederiks, E. (2006). *Ambient Lifestyle, from concept to experience*. Amsterdam: BIS Publishers.
- Aarts, E., & Eggen, B. (2002). *Ambient Intelligence in HomeLab*. Eindhoven: Philips Research (Neroc Eindhoven).
- Aarts, E., & Encarnação, J. (2006). Into Ambient Intelligence. In E. Aarts & J. Encarnação (Eds.), *True Visions: The Emergence of Ambient Intelligence*. Berlin Springer.
- Aarts, E., & Grotenhuis, F. (2009, November 18-21, 2009). *Ambient Intelligence 2.0: Towards Synergetic Prosperity*. Paper presented at the Ambient Intelligence European Conference, AmI 2009, Salzburg.
- Aarts, E., Harwig, R., & Schuurmans, M. (2001). Ambient Intelligence. In P. Denning (Ed.), *The Invisible Future*. New York: McGraw Hill.
- Aarts, E., & Marzano, S. (2003). *The New Everyday; views on Ambient Intelligence*. Rotterdam, Eindhoven: 010 publishers; Koninklijke Philips Electronics n.v.
- Aarts, E., & De Ruyter, B. (2009). New research perspectives on Ambient Intelligence. *Journal of Ambient Intelligence and Smart Environments*, 1(1), 5-14.
- Akrich, M. (1992). The De-Description of Technical Objects. In W. Bijker & J. Law (Eds.), *Shaping technology/building society : studies in sociotechnical change* (pp. 205-224). Cambridge, MA MIT Press.
- Akrich, M. (1995). User representations: Practices, Methods and Sociology. In A. Rip, T. Misa & J. Schot (Eds.), *Managing Technology in Society; the approach of Constructive Technology Assessment*. London: Pinter Publishers.
- Akrich, M., & Latour, B. (1992). A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies. In W. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change*. Cambridge, MA: MIT Press.
- Anonymous. (2004a). Philips wordt eenvoudig en zinvol. September 14th. *Algemeen Dagblad*.
- Anonymous. (2004b). Philips zoekt het voortaan in 'zin en eenvoud' ; 'Een menselijk merk met groot bedieningsgemak'. September 14th. *Trouw*.
- Anonymous. (2007). Technische snufjes helpen oude Japanners, October 5th. *Trouw*.
- Anonymous. (2008). Een robot in elk huis, October 21st. *Volkskrant*.
- Anonymous. (2011). Deense regering wil pensioenleeftijd naar 71. January 26th. *Trouw (online)*. Retrieved from

- http://www.trouw.nl/nieuws/economie/article3395165.ece/Deense_regering_wil_pensioenleeftijd_naar_71.html, accessed January 26th.
- Austad, S. (2006). Why Women Live Longer Than Men: Sex Differences in Longevity. *Gender Medicine*, 3(2).
- Baltes, P., & Smith, J. (2003). New Frontiers in the Future of Aging: From Successful Aging of the Young Old to the Dilemmas of the Fourth Age. *Gerontology*, 49, 123-135.
- Bengtson, V., Rosenthal, C., & Burton, L. (1996). Paradoxes of Families and Aging. In R. Binstock & L. George (Eds.), *Handbook of Aging and the Social Sciences*. San Diego: Academic Press Inc.
- Berg, A.-J., & Lie, M. (1995). Feminism and constructivism: Do artifacts have gender? *Science, Technology and Human Values* 20(3), 332-351.
- Binstock, R., & George, L. (Eds.). (1996). *Handbook of Aging and the Social Sciences*; 4th edition. San Diego: Academic Press.
- Binstock, R., & George, L. (Eds.). (2006). *Handbook of Aging and the Social Sciences*, 6th edition. Amsterdam etc.: Academic Press.
- Blue, L. (2008). Why Do Women Live Longer Than Men? August 6th. *Time*
- Borup, M., Brown, N., Konrad, K., & van Lente, H. (2006). The Sociology of Expectations in Science and Technology *Technology Analysis & Strategic Management*, 18, 285-298.
- Butler, R. (1969). Age-ism: Another Form of Bigotry. *The Gerontologist*, 9, 143-146.
- Butler, R. (1975). *Why Survive? Being old in America*. New York: Harper and Row.
- Bytheway, B. (1995). *Ageism*. Buckingham, Philadelphia: Open University Press.
- Bytheway, B. (2005). Ageism. In M. Johnson, V. Bengtson, G. Coleman & T. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing*. Cambridge: Cambridge university press.
- Bytheway, B., & Johnson, J. (1990). On Defining Ageism. *Critical Social Policy*, 27, 27-39.
- Calasanti, T. (2004). New directions in feminist gerontology: An introduction. *Journal of Aging Studies*, 18(1), 1-8.
- Calasanti, T., & King, N. (2005). Firming the Floppy Penis: Age, Class, and Gender Relations in the Lives of Old Men. *Men and Masculinities*, 8(1).
- Calasanti, T., & Slevin, K. (2006a). Introduction; Age Matters. In T. Calasanti & K. Slevin (Eds.), *Age Matters; Realigning Feminist Thinking*. New York; London: Taylor & Francis Group; Routledge.
- Calasanti, T., & Slevin, K. (Eds.). (2006b). *Age Matters; Realigning Feminist Thinking*. New York, London: Taylor & Francis Group; Routledge.
- Charness, N., & Czaja, S. (2005). Adaptation to New Technologies. In M. Johnson, V. Bengtson, G. Coleman & T. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing*. Cambridge: Cambridge university press.
- Clark, M., & Anderson, B. (1967). *Culture and Ageing: An Anthropological Study of Old Americans*. California: Langley Porter Institute.
- Cockburn, C., & Ormrod, S. (1993). *Gender and technology in the making* London: Sage.
- Colombo, M., Vitali, S., Molla, G., Gioia, P., & Milani, M. (1998). The home environment modification program in the care of demented elderly: Some examples. *Archives of Gerontology and Geriatrics*, 26(1), 83-90.

- Coppens, L. (2010a, August 12th). ING biedt oudere klant excuses aan. *De Standaard Online*. Retrieved from <http://www.standaard.be/artikel/detail.aspx?artikelid=OG2TTTAD>
- Coppens, L. (2010b, August 4th). Senioren doen ING bakzeil halen. *De Standaard Online* Retrieved from <http://www.standaard.be/artikel/detail.aspx?artikelid=MJ2TJNVN>
- Coppens, L. (2010c, August 4th). Senioren pikken 'betutteling' door ING niet - Cashlimiet voor ZESTIGplussers zou worden gehalveerd. *De Standaard Online*. Retrieved from <http://www.standaard.be/artikel/detail.aspx?artikelid=AK2TJMI1>
- Cowan, R. S. (1987). The Consumption Junction: A proposal for Research Strategies in the Sociology of Technology. In W. E. H. Bijker, Thomas P. Pinch Trevor (Ed.), *The Social Construction of Technological Systems; New Directions in the Sociology and History of Technology* (pp. 261-280). Cambridge, Massachusetts; London, England: MIT Press.
- Cutler, S. (2006). Technological Change and Aging. In R. Binstock & L. George (Eds.), *Handbook of Aging and the Social Sciences*, 6th edition. Amsterdam etc.: Academic Press.
- Cutler, S., & Hendricks, J. (2001). Emerging Social Trends. In R. Binstock & L. George (Eds.), *Handbook of Aging and the Social Sciences*. San Diego etc.: Academic Press.
- Van Dam, M. (2009). *Niemandland: biografie van een ideaal*. Amsterdam: Bezige Bij.
- Dannefer, D., & Daub, A. (2009). Extending the interrogation: life span, life course, and the constitution of human aging. *Advances in Life Course Research*, 14(1-2), 5-27.
- Dannefer, D., & Phillipson, C. (2010a). Preface. In D. Dannefer & C. Phillipson (Eds.), *The Sage Handbook of Social Gerontology*. London etc.: Sage Publications Ltd.
- Dannefer, D., & Phillipson, C. (2010b). *The Sage Handbook of Social Gerontology*. London etc.: Sage Publications Ltd.
- Dannefer, D., & Settersten, R. (2010). The Study of the Life Course: Implications for Social Gerontology. In D. Dannefer & C. Phillipson (Eds.), *The Sage Handbook of Social Gerontology*. London: Sage publications ltd.
- Van der Kloor, R. (2011). Deense regering: Pensioenleeftijd naar 71 jaar, January 26th. *Elsevier Online*. Retrieved from <http://www.elsevier.nl/web/Nieuws/Economie/287578/Deense-regering-Pensioenleeftijd-naar-71-jaar.htm?print=true>, accessed January 26th 2011
- Van der Kwartel, A., Paardekoper, P., Van der Velde, F., & Van der Windt, W. (2007). *Arbeid in Zorg en Welzijn 2007; Stand van zaken en vooruitblik voor de sector Zorg en de sector Welzijn en Maatschappelijke Dienstverlening, Jeugdzorg en Kinderopvang*. Utrecht: Prismant.
- Docampo Rama, M. (2001). *Technology generations handling complex user interfaces*. PhD thesis, Technische Universiteit Eindhoven, Eindhoven.
- Docampo Rama, M., De Ridder, H., & Bouma, H. (2001). Technology generation and age in using layered user interfaces. *Gerontechnology*, 1(1), 25-40.
- Dowd, J. (1980). *Stratification Among the Aged*. Monterey, CA.: Brooks/Cole Publishing co. .

- Downer, J. (2007). When the Chick Hits the Fan: Representativeness and Reproducibility in Technological Tests. *Social Studies of Science*, 37(1), 7-26.
- Ducatel, K., Bogdanowicz, F., Leijten, J., Burgelman, J-C. (2001). *ISTAG Scenario's for Ambient Intelligence in 2010; final report*: ISTAG.
- Eliot, T. S. (1934,1963). Choruses from 'The Rock'. In T. S. Eliot (Ed.), *Collected Poems 1909 - 1962*. London: Faber and Faber.
- Elzen, B., Enserink, B., & Smit, W. (1990). Weapon Innovation: Networks and Guiding Principles. *Science and Public Policy*, 17(3), 171-193.
- Epstein, S. (1995). The Construction of Lay Expertise: AIDS Activism and the forging of Credibility in the Reform of Clinical Trials. *Science Technology & Human Values*, 20(4), 408-437.
- Epstein, S. (1996). *Impure Science, AIDS, Activism and the Politics of Knowledge*. Berkeley: University of California Press.
- Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Cambridge, UK: Cambridge Polity Press.
- Ewijk, C., Draper, N., Ter Rele, H., & Westerhout, E. (2006). *Ageing and the Sustainability of Dutch Public Finances*.
- Featherstone, M., & Hepworth, M. (1993). Images of Ageing. In J. Bond, P. Coleman & S. Peace (Eds.), *Ageing in Society; an introduction to social gerontology*. London, Thousand Oaks, New Delhi: Sage Publications.
- Featherstone, M., & Hepworth, M. (2005). Images of Ageing. In M. Johnson, V. Bengtson, G. Coleman & T. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing*. Cambridge: Cambridge University Press.
- Featherstone, M., & Wernick, A. (Eds.). (1995). *Images of Aging; cultural representations of later life*. London and New York: Routledge.
- Feenberg, A. (1995). *Alternative Modernity, The Technical Turn in Philosophy and Social Theory*. Berkeley CA: University of California Press.
- Foner, N. (1994). *The Caregiving Dilemma*. Berkeley, CA: University of California Press.
- Fourez, G. (1997). Scientific and Technological Literacy as a Social Practice. *Social Studies of Science*, 27(6), 903-936.
- Ganzevles, J. (2007). *Technologie voor mens en milieu : een actor-netwerk analyse van de ontwikkeling van energietechnologie voor woningen*. Twente, Enschede.
- Harvey, D. (2005). *A Brief History of Neoliberalism*. Oxford: Oxford University Press.
- Heerink, M., Kröse, B., Evers, V., & Wielinga, B. (2008). The Influence of Social Presence on Acceptance of a Companion Robot by Older People. *Journal of physical agents*, 2(2).
- Hepworth, M. (2004). Images of Old Age. In J. Nussbaum & J. Coupland (Eds.), *Handbook of communication and aging research*. Mahwah, New Jersey, London: Lawrence Erlbaum Associates Publishers.
- Van den Heuvel, W., & Olaroiu, M. (2010). De ouderenzorg is hard aan verjonging toe, August 31st. . *Trouw*.
- Hugman, R. (1999). Ageing, Occupation and Social Engagement: Towards a Lively Later Life. *Journal of Occupational Science*, 6(2), 1-7.
- Hyysalo, S. (2003). *Uses of Innovation: wristcare in the practices of engineers and elderly*. PhD thesis, University of Helsinki, Helsinki.
- Hyysalo, S. (2004). Technology Nurtured - Collectives in Maintaining and Implementing Technology for Elderly Care. *Science Studies*, 17(2).

- Hyysalo, S. (2006). Representations of Use and Practice-Bound Imaginaries in Automating Safety of the Elderly. *Social Studies of Science*, 36(4), 599-626.
- Hyysalo, S. (2011). *Health Technology Development and Use*. New York, London: Routledge - Taylor & Francis Group.
- Jaeger, B. (2004). Trapped in the Digital Divide? Old People in the Information Society. *Science Studies*, 17(2), 5-22.
- Jaeger, B. (Ed.). (2005). *Young Technologies in Old Hands: An International View on Senior Citizen's Utilization of ICT*. Copenhagen: Djøf Publishing.
- Jelsma, J. (1999). *Huishoudelijk energieverbruik: Beter gedrag door beter ontwerpen, een aanzet tot een integrale benadering*. Enschede: Novem, Centrum voor Studies van Wetenschap, Technologie & Samenleving.
- Jelsma, J. (2003). Innovating for Sustainability: Involving Users, Politics and Technology. *Innovation: The European Journal of Social Sciences*, 16(2), 103-116.
- Jelsma, J. (2005). Bridging Gaps Between Technology and Behaviour: A Heuristic Exercise in the Field of Energy Efficiency in Households. In H. Rohracher (Ed.), *User Involvement in Innovation Processes: Strategies and Limitations from a Socio-Technical Perspective* (pp. 73-106). Munich, Vienna: Profil Verlag GmbH.
- Joerges, B. (1999). Do Politics Have Artifacts? *Social Studies of Science*, 29(3), 411-431.
- Johnson, M. (1976). That was your life: a biographical approach to later life. In J. Munichs & W. Van den Heuvel (Eds.), *Dependency or Interdependency in Old Age*. The Hague: Martinus Nijhoff.
- Johnson, M. (2005). The Social Construction of Old Age as a Problem. In M. Johnson, V. Bengtson, G. Coleman & T. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing*. Cambridge: Cambridge University Press.
- Johnson, M., Bengtson, V., Coleman, G., & Kirkwood, T. (Eds.). (2005). *The Cambridge Handbook of Age and Ageing*. Cambridge: Cambridge University Press.
- Joyce, K., & Loe, M. (2010a). A sociological approach to ageing, technology and health. *Sociology of Health and Illness*, 32(2), 171-180.
- Joyce, K., & Loe, M. (Eds.). (2010b). *Technogenarians: Studying Health and Illness Through an Ageing, Science, and Technology Lens (Sociology of Health and Illness Monographs)*. Chichester: Wiley-Blackwell.
- Joyce, K., & Mamo, L. (2006). Graying the Cyborg; New Directions in Feminist Analyses of Aging, Science, and Technology. In T. Calasanti & K. Slevin (Eds.), *Age Matters; Realizing Feminist Thinking*. New York, London: Taylor & Francis Group; Routledge.
- Joyce, K., Williamson, J., & Mamo, L. (2007). Technology, Science, and Ageism: An Examination of Three Patterns of Discrimination. *Indian Journal of Gerontology*, 21(2), 110 - 127.
- Joyce, K., Williamson, J., & Mamo, L. (2008). *Studying Aging through a Science and Technology Lens*. Paper presented at the American Sociological Association Annual Meeting. Retrieved from http://www.allacademic.com/meta/p242366_index.html
- Van Kammen, J. (2000). *Conceiving Contraceptives, the Involvement of Users in Anti-Fertility Vaccines Development*. University of Amsterdam, Amsterdam.

- Katz, S. (2001). Growing older without aging? Positive aging, anti-ageism, and anti-aging. *Generations*, 25(4), 27-32.
- Kinnear, P. (2001). *Population Ageing; Crisis or Transition?*: The Australia Institute, Discussion Paper No. 45.
- Kline, R. (2003). Resisting Consumer Technology in Rural America: The Telephone and Electrification. In N. Oudshoorn & T. Pinch (Eds.), *How Users Matter; The Co-construction of Users and Technologies* (pp. 51-66). Cambridge, Massachusetts; London: MIT Press.
- Kline, R., & Pinch, T. (1996). Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States. *Technology and Culture*, 37(4), 763-795.
- Knowledge Institute. (2009). *Evaluatieonderzoek van het [AIMS] project van [Care Organization], zorg aan huis. Eindrapportage*. Utrecht: Knowledge Institute.
- Konrad, K. (2008). Dynamics of Type-based Scenarios of Use: Opening Processes in Early Phases of Interactive Television and Electronic Marketplaces *Science Studies*, 22(2), 3-26.
- Koopman, B. (2008). *Zo oud als je je voelt... Onderzoek naar succesfactoren in de seniorenmarketingcommunicatie*. Master thesis Toegepaste Communicatie Wetenschap - Faculteit Gedragswetenschappen - Universiteit Twente, Enschede.
- Kranenburg, M. (2005). Hightech houdt Japanse bejaarden zelfstandig. February 11th. *Trouw*.
- Laslett, P. (1987). The Emergence of the Third Age. *Ageing and Society*, 7(2), 133-160.
- Laslett, P. (1989). *A fresh map of life : the emergence of the Third Age*. London: Weidenfeld and Nicolson.
- Laslett, P. (1995). Necessary Knowledge: Age and Aging in the Societies of the Past. In D. Kertzer & P. Laslett (Eds.), *Ageing in the Past : demography, society and old age* Berkeley: University of California Press.
- Laslett, P. (1997). Interpreting the Demographic Changes. *Philosophical Transactions: Biological Sciences*, 352(1363, Ageing: Science, Medicine and Society), 1805-1809.
- Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. In W. Bijker & J. Law (Eds.), *Shaping technology / building society: studies in sociotechnical change*. Cambridge, MA: MIT Press.
- Latour, B. (1997). *De Berlijnse sleutel en andere lessen van een liefhebber van wetenschap en techniek* (H. e. V. d. Kooy, Trans.). Amsterdam: Van Gennep.
- Latour, B. (1999). *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.
- Laws, G. (1995). Understanding Ageism: Lessons From Feminism and Postmodernism. *The Gerontologist*, 35(1), 112-118.
- Lawton, M. P. (1998). Future Society and Technology. In J. Graafmans, V. Taipale & N. Charness (Eds.), *Gerontechnology - A Sustainable Investment in the Future* (pp. 12-22). Amsterdam et al.: IOS Press.
- Lawton, M. P., & Nahemow, L. (1973). Ecology and the aging process. In C. Eisdorfer & M. P. Lawton (Eds.), *The psychology of adult development and aging* (pp. 619-674). Washington D.C.: American Psychological Association.

- Van Lente, H. (1993). *Promising Technology, the Dynamics of Expectations in Technological Developments*. University of Twente, Enschede.
- Van Lente, H., & Rip, A. (1998). Expectations in Technological Developments: an example of prospective structures to be filled in. In C. Disco & B. Van der Meulen (Eds.), *Getting New Technologies Together: studies in making sociotechnical order* (pp. 203-231). Berlin: Walter de Gruyter.
- Lie, M., & Sorensen, K. (1996). Making Technology our Own? Domesticating technology into everyday life. In M. Lie & K. Sorensen (Eds.), *Making Technology our Own? Domesticating technology into everyday life*. Oslo: Scandinavian University Press.
- Lindsay, C. (2003). From the Shadows: Users as Designers, Producers, Marketers, Distributors, and Technical Support. In N. Oudshoorn & T. Pinch (Eds.), *How Users Matter: The Co-Construction of Users and Technology* (pp. 29-50). Cambridge, Massachusetts; London: MIT Press.
- López, D., & Tirado, F. (2004). La norma digital y la extitución. El caso de la Tele-Asistencia Domiciliaria Digital norms and extitution: the case of telehome care. *. Athenea Digital*, 5(135-149).
- Lorenz, C. (1998). *De Constructie van het Verleden; een inleiding in de theorie van de geschiedenis*. Amsterdam: Boom.
- Mackay, H., Carne, C., Beynon-Davies, P., & Tudhope, D. (2000). Reconfiguring the user: Using Rapid Application Development. *Social Studies of Science*, 30(5), 737-757.
- MacKenzie, D. (1989). From Kwajalein to Armageddon? Testing and the Social Construction of Missile Accuracy. In D. Gooding, T. Pinch & S. Schaffer (Eds.), *The uses of experiment*. Cambridge: Cambridge University Press.
- Markson, E. (2003). *Social Gerontology Today; An Introduction*. Los Angeles, CA: Roxbury Publishing Company.
- Marzano, S. (2003). Cultural Issues in Ambient Intelligence. In E. Aarts & S. Marzano (Eds.), *The New Everyday; views on Ambient Intelligence*. Rotterdam, Eindhoven: 010 publishers; Koninklijke Philips Electronics n.v.
- May, R. (2007). Gender, immunity and the regulation of longevity. *BioEssays*, 29, 795-802.
- McCreadie, C. (2010). Technology and Older People. In D. Dannefer & C. Phillipson (Eds.), *The Sage Handbook of Social Gerontology*. London etc.: Sage Publications Ltd.
- McGarry, J., & Simpson, C. (2008). Identifying, reporting and preventing elder abuse in the practice setting. *Nursing Standard* 22(46), 49-55.
- McGee, M. (1980). The "ideograph": A link between rhetoric and ideology. *Quarterly Journal of Speech*, 66(1), 1-16.
- Melenhorst, A. (2002). *Adopting Communication Technology in later life; the decisive role of benefits*. Technische Universiteit Eindhoven, Eindhoven.
- Melenhorst, A., Rogers, W., & Bouwhuis, D. (2006). Older Adults' Motivated Choice for Technological Innovation: Evidence for Benefit-Driven Selectivity. *Psychology and Aging*, 21(1), 190-195.
- Milligan, C. (2009). *There's No Place Like Home: Place and Care in an Ageing Society*. Farnham: Ashgate.
- Minichiello, V., Browne, J., & Kendig, H. (2000). Perceptions and consequences of ageism: views of older people. *Ageing and Society*, 20, 253-278.

- Mol, A. (2008). *The Logic of Care: Health and the Problem of Patient Choice*. London, New York: Routledge.
- Montemerlo, M., Pineau, J., Roy, N., Thrun, S., & Verma, V. (2002). *Experiments with a mobile robotic guide for the elderly*. Paper presented at the AAAI '02.
- Moody, H. (2005). Ethical Dimensions in Old Age Care. In M. Johnson, V. Bengtson, G. Coleman & T. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing*. Cambridge: Cambridge university press.
- Mort, M. (2011). *Project final report of EFORTT - Ethical Frameworks for Telecare Technologies for older people at home project*: Grant agreement number 217787, FP7-Science-in-Society 2007-1.
- Mort, M., Milligan, C., Roberts, C., & Moser, I. (2008). *Ageing, Technology and Home Care: New Actors, New Responsibilities*. Paris: Presses de l'École des Mines de Paris.
- Mort, M., & Roberts, C. (2010). *At Home with Machines: technology in/dependence and ageing*. Paper presented at the EASST 2010 conference: practising science and technology; performing the social, september 2-4 2010.
- Mort, M., Roberts, C., & Milligan, C. (2009). Ageing, Technology and the Home: Researching new care configurations (special issue). *ALTER - European Journal of Disability Research*, 3(2).
- Neven, L. (2010). 'But obviously not for me': robots, laboratories and the defiant identity of elder test users. *Sociology of Health and Illness*, 32(2), 335-347.
- Ney, S. (2009). *Resolving Messy Policy Problems: Handling conflict in environmental, transport, health and ageing policy*. London: Earthscan.
- Norman, D. (1988). *The Psychology of Everyday Things*. New York: Basic Books.
- Norman, D. (1998). *The design of everyday things*. Cambridge Ma: MIT press.
- Van Oost, E. (1995). 'Male' and 'female' things. In M. Brouns, M. Verloo & M. Grunell (Eds.), *Women's Studies in the 1990s. An introduction to the different disciplines* (pp. 287- 310). Bussum Couthinho.
- Van Oost, E. (2003). Materializes Gender: How Shavers Configure the Users' Femininity and Masculinity. In N. Oudshoorn & T. Pinch (Eds.), *How Users Matter; The Co-construction of Users and Technologies*. Cambridge MA: MIT Press.
- Östlund, B. (2004). Social Science Research on Technology and the Elderly – Does it Exist? *Science Studies*, 17(2), 44-62.
- Den Ouden, E. (2006). *Development of a Design Analysis Model: Revealing a new class of quality failures*. PhD Thesis at the Technical University of Eindhoven, Eindhoven.
- Oudshoorn, N. (1996a). Genderscripts in technnologie. Noodlot of uitdaging? [bewerking van de oratie van Nelly Oudshoorn van 12 september 1996 aan de Universiteit Twente]. *Tijdschrift voor Vrouwenstudies*, 17(4), 350-367.
- Oudshoorn, N. (1996b). A Natural Order of Things? Reproductive Sciences and the Politics of Othering. In G. Robertson, M. Mash, L. Tickner, J. Bird, B. Curtis & T. Putnam (Eds.), *FutureNatural; Nature, Science, Culture*. London, New York: Routledge.
- Oudshoorn, N. (2003). *The Male Pill, A Biography of a Technology in the Making*. Durham NC, London: Duke University Press.
- Oudshoorn, N. (2011). *Telecare Technologies and the Transformation of Healthcare*. Houndmills, Basingstoke, Hampshire, New York: Palgrave Macmillan.

- Oudshoorn, N., & Pinch, T. (2003a). Introduction: How Users and Non-Users Matter. In N. Oudshoorn & T. Pinch (Eds.), *How Users Matter; The Co-construction of Users and Technologies*. Cambridge Ma: MIT Press.
- Oudshoorn, N., & Pinch, T. (2008). User-Technology Relationships: Some Recent Developments. In E. J. Hackett, O. Amsterdamska, M. Lynch & J. Wajcman (Eds.), *The Handbook of Science and Technology Studies, Third Edition*. Cambridge, Ma: MIT Press.
- Oudshoorn, N., & Pinch, T. (Eds.). (2003b). *How Users Matter; The Co-construction of Users and Technologies*. Cambridge, MA: MIT press.
- Oudshoorn, N., Rommes, E., & Stienstra, M. (2004). Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technology. *Science Technology & Human Values*, 29(1), 30-63.
- Peine, A., & Neven, L. (forthc.). social-structural lag revisited. *Submitted to Gerontechnology*.
- Perls, T. (2005). *The Different Paths to Age One Hundred*. Paper presented at the Longevity Health Sciences: The Phoenix Conference, Scottsdale (published in the Annals of the New York Academy of Sciences, 1055, 13-25).
- Petrina, S. (2000). The Politics of Technological Literacy. *International Journal of Technology and Design Education*, 10, 181-206.
- Philips. (2007). *Driving Change, Delivering Value: Annual Report 2006*. Eindhoven: Koninklijke Philips Electronics n.v.
- Pinch, T. (1993). "Testing - One, Two, Three... Testing!": Toward a Sociology of Testing. *Science, Technology & Human Values*, 18(1), 25-41.
- Pinch, T., & Bijker, W. (1987). The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other. In W. Bijker, T. Hughes & T. Pinch (Eds.), *The Social Construction of Technological Systems*. Cambridge MA, London: MIT Press.
- Pine, J., & Gilmore, J. (1999). *The Experience Economy : Work is theater and every business a stage*. Boston: Harvard Business School Press.
- Pollack, M. E., Brown, L., Colbry, D., Orosz, C., Peintner, B., Ramakrishnan, S., et al. (2002). *Pearl: A Mobile Robotic Assistant for the Elderly*: AAAI Technical Report WS-02-02.
- Pollock, N., & Williams, R. (2008). *Software and Organisations: The Biography of the Packaged Enterprise-Wide System, or, How SAP Conquered the World*. London: Routledge.
- Rapoport, R., & Rapoport, R. (1975). *Leisure and the Family Life Cycle*. London: Routledge and Kegan Paul.
- Reeves, B., & Nass, C. (1996). *The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places*. Stanford, CA: CSLI Publications.
- Rijksinstituut voor Volksgezondheid en Milieu. (2010). *RIVM Factsheet: De gezondheid van ouderen in Nederland*. Bilthoven: RIVM.
- Rip, A., Misa, T., & Schot, J. (Eds.). (1995). *Managing Technology in Society; the approach of Constructive Technology Assessment*. London: Pinter Publishers.
- Roberts, C., & Mort, M. (2009). Reshaping what counts as care: Older people, work and new technologies. *ALTER - European Journal of Disability Research*, 3(2), 138-158.

- Rommers, E. W. M. (2002). *Gender Scripts and the Internet; the design and use of Amsterdam's digital city*. Enschede: Twente University Press.
- Rowe, J. W., & Kahn, R. L. (1997). Successful Aging. *Gerontologist*, 37(4), 433-440.
- Roy, N., Baltus, G., Fox, D., Gemperle, F., Goetz, J., Hirsch, T., et al. (2000). *Towards personal service robots for the elderly*. Paper presented at the Proceedings of the Workshop on Interactive Robotics and Entertainment (WIRE), Pittsburgh, PA.
- Sackmann, R., & Weymann, A. (1994). *Die Technisierung des Alltags: Generationen und Technische Innovationen*. Bremen: BMFT.
- Sanders, M. (2001). Robot verovert steeds meer terrein. December 14th. *Volkskrant*.
- Sanderson, W., & Sherbov, S. (2010). Remeasuring Aging. *Science*, 329, 1287-1288.
- Schillmeier, M., & Domènech, M. (Eds.). (2010). *New Technologies and Emerging Space of Care*. Farnham: Ashgate.
- Scholtens, B. (2004). Simpelheid van Philips is stilte en veel wit *De Volkskrant*.
- Silverstone, R., Hirsch, E., & Morley, D. (1992). Information and communication technologies and the moral economy of the household. In R. Silverstone & E. Hirsch (Eds.), *Consuming Technologies; Media and information in domestic spaces*. London: Routledge.
- Smit, W. (1989). Defence technology assessment and the control of emerging technologies. In M. Ter Borg & W. Smit (Eds.), *Non-Provocative Defence as a Principle of Arms Reduction* (pp. 61-76). Amsterdam: Free University Press.
- Smit, W., Elzen, B., & Enserink, B. (1998). Coordination in Military Socio-technical Networks: Military Needs, Requirements and Guiding Principles. In C. Disco & B. Van der Meulen (Eds.), *Getting New Technology Together : Studies in Making Sociotechnical Order* (pp. 71-105). Berlin: Walter de Gruyter.
- Snoeijs, M. (2005). De robot wordt huisvriend, maatje, partner; maar hoever gaat die liefde? May 21st. *NRC Handelsblad*.
- Sontag, S. (1978). The Double Standard of Ageing. In V. Carver & P. Liddiard (Eds.), *An Ageing Population*. Sevenoaks: Hodder and Stoughton Educational / The Open University Press.
- Sparrow, R., & Sparrow, L. (2006). In the hands of machines? The future of aged care. *Mind and Machines*, 16(2), 141-161.
- Star, S. L., & Griesemer, J. R. (1989). Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, 19(3), 387-420.
- Stewart, J., & Williams, R. (2005). The Wrong Trousers? Beyond the Design Fallacy: Social Learning and the User. In H. Rohrer (Ed.), *User Involvement in Innovation Processes Strategies and Limitations from a Socio-Technical Perspective* (Vol. Volume 44, pp. 39-72). München Wien: Profil Verlag.
- Stienstra, M. (2003). Gender in the design of electronic entertainment technologies. In M. Stienstra (Ed.), *Is Every Kid Having Fun? A gender approach to interactive toy design* (pp. 33-61). Enschede: Twente University press.
- Stil, H. (2004). Miljard omzet uit gezondheidszorg. *Het Parool*.
- Suchman, L. (2007). *Human-Machine Reconfigurations*. Cambridge: Cambridge University Press.
- Taylor, D. K., Bachuwa, G., Evans, J., & Jackson-Johnson, V. (2006). Assessing barriers to the identification of elder abuse and neglect: A community-wide

- survey of primary care physicians. *Journal of the National Medical Association* 98(3), 403-404.
- Taylor, R., & Ford, G. (1981). Lifestyle and Ageing. *Ageing and Society*, 1, 329-345.
- Thane, P. (2000). *Old Age in English History: past experience, present issues*. Oxford: Oxford University Press.
- Thompson, P. (1992). 'I Don't Feel Old': Subjective Ageing and the Search for Meaning in Later Life. *Ageing and Society*, 12, 23-47.
- Thompson, P. (1993). 'I Don't Feel Old': The Significance of the Search for Meaning in Later Life. *International Journal of Geriatric Psychiatry*, 8, 685-692.
- Townsend, P. (1979). *Poverty in the United Kingdom: a survey of household resources and standards of living*. Berkeley and Los Angeles: University of California Press.
- Twigg, J. (2004). The body, gender, and age: Feminist insights in social gerontology. *Journal of Aging Studies*, 18, 59-73.
- Vermeiren, T. (2010, August 4th). Boycot ING! *De Standaard Online*. Retrieved from <http://www.standaard.be/artikel/detail.aspx?artikelid=K62TJVL7>, accessed August 4th
- Wada, K., Shibata, T., Saito, T., & Tanie, K. (2002). *Analysis of Factors that Bring Mental Effects to Elderly People in Robot Assisted Activity*. Paper presented at the IEEE/RSJ intl. Conference on Intelligent Robots and Systems, Lausanne, Switzerland.
- Weber, J. (2008). Human-Robot Interaction. In S. Kelsey & K. St. Amant (Eds.), *Handbook of Research on Computer Mediated Communication* (Vol. II). Hershey, PA: Information Science Reference.
- Van Weert, H. (2004). Ziekenhuizen in Amerika 'verphilipsen'. *Het Parool*.
- Van de Weijer, B. (2009). Reorganisatie Philips kost 6000 banen. *Volkskrant*, 26th of January.
- Weiser, M. (1991, september 1991). *The Computer for the 21st Century, Specialized elements of hardware and software connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence.* . *Scientific American*, 265, 66-75.
- Wilde, O. (1891, 1994). *The Picture of Dorian Gray*. Groningen: Wolters-Noordhoff.
- De Wilde, R. (2000). *De Voorspellers, een kritiek op de toekomstindustrie*. Amsterdam: De Balie.
- Wilkinson, J. A., & Ferraro, K. F. (2002). Thirty year of ageism research. In T. D. Nelson (Ed.), *Ageism: Stereotyping and Prejudice against Older Persons*. Cambridge MA, London: MIT Press.
- Winner, L. (1980). Do artifacts have politics? *Daedalus*, 109(1), 121-136.
- Winner, L. (1993). Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology. *Science Technology & Human Values*, 18(3), 362-378.
- Woodward, K. (1991). *Aging and its discontents*. Bloomington: Indiana University Press.
- Woolgar, S. (1991). Configuring the user: the case of usability trials. In J. Law (Ed.), *A Sociology of Monsters*. London: Routledge.
- Woolgar, S., & Cooper, G. (1999). Do Artifacts Have Ambivalences? Moses' Bridges, Winner's Bridges and other Urban Legends in S&TS. *Social Studies of Science*, 29(3), 433-449.

- World Health Organization. (1999). *Ageing: Exploding the myths*.
- Wyatt, S. (2003). Non-Users Also Matter: The Construction of Users and Non-Users of the internet. In N. Oudshoorn & T. Pinch (Eds.), *How Users Matter; The Co-construction of Users and Technologies*. Cambridge Massachusetts, London: MIT Press.
- Wyatt, S., Thomas, G., & Terranova, T. (2002). They came, they surfed, they went back to the beach: conceptualising use and non-use of the Internet. In S. Woolgar (Ed.), *Virtual Society?* Oxford: Oxford University Press.
- Yin, R. K. (2003). *Case Study Research, Design and Methods (third edition)*. Thousand Oaks, London, New Delhi: sage publications.
- Zaidi, A. (2010a). *Poverty and incomes of older people in OECD countries*. Paper presented at the 31st General Conference of The International Association for Research in Income and Wealth, 22-28 August 2010, st-Gallen.
- Zaidi, A. (2010b). *Poverty Risks for Older People in EU Countries – An Update*. Vienna: European Centre for Social Welfare Policy and Research.
- Zeeman, R. (2002). De opmars van de zorg- en dweilbots. April 6th. *Trouw*.