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Design for Resourceful Ageing: Intervening in the Ethics of Gerontechnology

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Abstract: This paper discusses an innovative approach to the design of technologies for older people. The approach contains a critique of "gerontechnology" as taking decisions out of the hands of older people and materializing what it means to live healthily and well into "foolproof" designs that easily become inappropriate in the variety of situations in which older people end up using them. The proposed design approach focuses on re-delegating such ethical decisions to the point at which technology is used. It does so by considering technologies as *resources* that can complement the ageing competences of older people and adapt in a variety of ways. To gain design knowledge of the way existing technologies as well as prototypes function as resources across webs of practices, and the dimensions of 'openness' along which they may adapt within such practices, the approach enlists networks of everyday things as co-ethnographers.

Keywords: ethics; gerontechnology; resourcefulness; thing-ethnographies

1. Introduction

The demographic trend of an ageing society has triggered a range of new products and services. The EU Ambient Assisted Living program alone (2008-2013) had a budget of €600 million, half of which was public funding. A number of areas spanning the fields of engineering, information technology and human-computer interaction (HCI) have developed various assisted living technologies and care systems targeted at "older adults". This type of technology is also referred to as gerontechnology (e.g., Bouma, Fozard & Van Bronswijk, 2009).

Research by social gerontologists, who focus on social aspects of gerontechnology, indicates that a widespread problem with the growing number of technological innovations for the

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elderly is a mismatch between their designed properties and the variety of situations in which they are used (Neven, 2015a,b; Peine, Rollwagen & Neven, 2014; Gomez, 2015; Aceros, Pols & Domènech, 2014). Such mismatches lead, on the one hand to frictions in the everyday lives of users in the form of irritations, disruptions or even safety risks, and on the other hand to partial or complete rejection of these technologies (Hyysalo, 2006; Neven, 2010). These researchers identify two main problems underlying these mismatches. The first is misconceptions about ageing among technology developers; and the second a tendency of designers to design for single, fixed-use scenarios. Each will be discussed in more detail below followed by a discussion of the ethical implications of such problems.

1.1. Misconceptions about ageing

Reflecting mainstream public discourse, ageing and in particular the 'greying society' tend to be viewed as a problem amongst developers of technology for older people (Neven, 2015b). Related to this idea about ageing as a problem, the stereotype image of older people is that of frail, vulnerable, immobile and passive (Harvey & Thurnwald, 2009; Kendig & Browning, 2011), which resonates with the so-called "fourth age", final life stage category (Laslett, 1989). However, the much larger group of healthy, active, independent "young old" or "third age" older people neither match nor identify with this image. An example described in Neven (2010), where older people are asked to interact with a care robot, indicates that they like the robot and think it is a good product, but when asked if they want to have one themselves, give a clear no. These people saw the care robot as a technology that was suitable for others – old people in poor health – a group that they did not consider themselves part of. Moreover, this group is far from being homogeneous (Peine & Neven, 2011). Not only is there great variety in the everyday lives, needs and motivations of ageing people, these needs and motivations are also continuously changing with the changing capabilities and routines of an ageing body (Thompson, 1992). Therefore, mismatches between the stereotype image and actual lives of elderly people also exist on very practical levels. Examples are telecare systems designed for indoor use only, while many older people spend some or even most of their active time out (Gomez, 2014) – and even feel they should in order to adhere to images of "active ageing" (Aceros et al., 2015), and pill dispensers that (implicitly) assume that their users get up at the same time every day and never get to spend a night away from home.

1.2. Limits of designing for single, fixed-use scenarios

With the image of ageing as a problem and older people as frail and passive comes the view of older people as technologically illiterate (Durick et al., 2013). In line with this image, designers tend to make things that are "foolproof" (Hyysalo, 2006). The statement of a designer of devices for older people that "one button is enough for them to operate it wrong" (Neven 2015a, p. 40) illustrates this tendency. Such "foolproof" designs currently developed for older people – or better their stereotypes – do not match their everyday lives, creative capital and identities (Neven, 2010, 2015). A device with little or no ways of

controlling or adjusting it can only act according to the assumptions and related scenarios that it was designed for. This results in a "passive script" in which the user has little other option than to passively undergo the operation of the technology – and indeed the question rises whether that is actually still use (Neven, 2015a). Such products limit or negate possibilities for innovation "in use" and adjustment to the varied and changing situations of use in which people may end up (Fischer & Giaccardi, 2006). As we will argue below, this tendency to develop narrow-scripted designs, which easily become inappropriate in the variety of use situations that older people encounter as they age, invokes ethical concerns.

1.3. Ethical decisions in design practice

It has long been acknowledged in design research that technology design practice is a type of activity that contains implicit and explicit ideas about right and wrong conduct and in particular, the conduct of those who use its designs (Akrich, 1992; Friedman, 1996; Sengers et al., 2005; Verbeek, 2005). These ideas enter the world materialized in designed artefacts where they play a part in shaping actual conduct in these use practices – and beyond. As such, technologies "give material answers to the ethical question of how to act" (Verbeek 2006, p. 361) and ethical ideas that exist in design practices enter use practices.

Gerontechnology often underlies the assumption that without a technological intervention, users are somehow incapable of engaging in cognitive or physical activity (Östlund, 2005; Rogers & Marsden, 2013). Needs that are addressed by the technologies are virtually always biomedical needs or, more rarely, psycho-social needs related to loneliness, but in any case assume some sort of disfunctioning (Peine & Neven, 2011). Gerontechnology can therefore be argued to over-emphasize the need for "compensation" (of declining cognitive and physical abilities) and "prevention" (of the consequences of such declining abilities) (Peine & Neven, 2011). While existing technological solutions informed by these principles offer value in certain situations, they are unlikely to apply to all users, or to remain appropriate in the long term.

Building on this idea, Fozard (2002) acknowledges the transitional quality of old age and suggests that designing for an ageing body means that designing cannot stop with the use of a designed solution. It must continue through its use:

> "gerontechnology significantly expands the philosophy of human factors engineering and consumer oriented product design because the interaction between individual ageing and secular changes in the environment over time is not static" (Fozard, 2002, p. 139).

This position is echoed in engineering by McBryan, McGee-Lennon and Grey (2008) with a proposition for how to design complex and dynamic home care systems, and by Durick et al. (2013) in HCI with their demystification of ageing myths in technology design. Similarly in ICT, Winthereik and Bansler (2007) advocate for the need of developing ICT infrastructures in support of integrated care that acknowledge that organizational practices, roles and identities are mutually transformed and entirely new practices are created simultaneously.

However, the idea of "care technologies" still implies a technology taking over part of the responsibility for the health of people and thus contains judgments of what is healthy to do. While some older people do indeed require care (i.e. for someone or some-thing to take over part of the responsibility for their health and wellbeing), the general tendency of taking ethical decisions out of the hands of virtually all older people is in our view unethical design practice. In this paper, we present a design approach that aims to shift ethical decisions about how to live healthily and well to situations of use. We do so by focusing on the concept of resourceful ageing. The following sections will first explain what we mean by resourceful ageing, what our view on ageing means for the role of design and finally, how we propose to tackle its challenges by using things as co-ethnographers. The final section of the paper will reflect on the proposed approach and its ethical implications.

2. Designing for resourceful ageing

Fundamental to our approach is a different view on ageing. Rather than as a problem, the fact that people are reaching an older age can also be viewed as an achievement. Countering stereotypes of older people and addressing the problem of inflexible technologies designed on the basis of these we promote a research and design disposition that views ageing as something positive and places emphasis on empowering older people to deal with the effects of an ageing body in a wide variety of ways. A novel angle that the approach takes in this respect is that it does not focus on the fourth age, the "old old", as the vast majority of design projects has done in the past (Peine & Neven, 2011). Instead, it focuses on the understudied group of the third age, the so called "young old" that lead active, independent lives, but are noticing first signs of older age in the form of changing physical and mental capabilities.

In line with this view, it considers older people not as technologically illiterate, but technologically differently skilled (Neven, 2015b), incorporating the idea of technology generations (Docampo, Ridder & Bouma, 2001). In this idea, older people are certainly very well capable of creatively finding solutions to the challenges that they encounter as they age (such as changing skills and self-images), by using the everyday things that surround them as resources. A nice example is described by Brereton (2013), who relates the story of 82-year-old Maria who has found creative ways of negotiating her limited mobility and eyesight with a range of objects and routines, such as four fixed phones in strategic spaces of her home, strategically placed magnifying glasses and a key on a string that she can throw down from a window after checking who is at the door. Another story is that of an old woman using her walking stick as a phone by knocking on the ceiling whenever she wants to contact her neighbour and receive help with shopping in exchange for a cup of coffee (Forchhammer, 2006).

Therefore, rather than aiming to develop "innovative technologies that serve well-defined purposes" such as "optimal health and independence" (Bouma et al. 2009; p. 68), the approach focuses on empowering older people to age resourcefully. In our view, resourceful

ageing is about continuously reinventing the practical arrangements of everyday life as the body ages, but also as preferences and desires of older people develop. The role of technology design then lies in allowing for resilient, independent lives that people remain in control of.

2.1. A focus on resourcefulness

Resources are technologies that are appropriate for a wide range of use situations because they place judgments about ways of use and purpose in the situation at hand. To illustrate this point, an example on toys. As a child grows up, it stops playing with its jigsaw because it isn't challenging enough anymore. But its balls, blocks, crayons and cardboard boxes remain interesting toys, arguably into adulthood, because they allow for a variety of ways of playing. While the jigsaw contains a clear idea of its right way of use – all the pieces in the right place – the ball, blocks, crayons and cardboard box do not. Rather, they function as resources for play and obtain their purpose in the situation of use. This example resonates with the aforementioned case of 82-year-old Maria, who has found creative ways of negotiating her limited mobility and eyesight by using the everyday things that surround her routines as resources.

Resourcefulness is not a property of a person or a technology alone. Rather, it is something that emerges from the way they work together (Desjardins & Wakkary, 2013; Wakkary & Maestri, 2008). Using technologies as resources includes skills of achieving purposes in creative, new ways, but also of adjusting purposes to means. Besides offering resources to creatively deal with their everyday life challenges, design for resourceful ageing aims to enable and empower older people to adjust purposes to means according to their own judgment of the situation, while taking into account their varied and changing skills and capabilities.

Therefore, resourcefulness requires technologies that offer a range of competences that are accessible with the varied and changing skills available to their users, and make sense in their lives. While resources aim to be open in terms of their intended purpose, a completely open design does not exist. If there is a design, decisions have been made about what it is, and therefore what it isn't. Any design has openness on certain dimensions, and "closedness" on others. In terms of technologies that support resourcefulness, a main challenge is therefore to identify appropriate dimensions of variety across use practices. To tackle this challenge, we argue that a view on technologies and people as co-performers of practices is helpful.

2.2. Considering technologies as co-performers of practices

In their study into vacuum cleaners and the discrepancy between their expected and actual lifespans, Salvia et al. (2015) find that while vacuum cleaners, in particular the fully automatic type, take responsibility for cleaning floors, they are not (yet) capable of maintaining themselves. Therefore, people have responsibility for this part of the "hybrid

system" of vacuuming (which they do not always take). Viewing the tasks and responsibilities of vacuum cleaning as *distributed* between people and machines helps these researchers explain the early disposal of vacuum cleaners in new ways.

Similarly, Kuijer and Giaccardi (2015) reflect on historic change in laundry care by viewing technologies and people as co-performers of practices. This view reveals that over time, tasks in laundering have been delegated – a term used in this context by Latour (1992) – to increasingly "competent" washing machines. While early versions were only capable of turning round a ladle at a steady speed, washing machines today are able to wash and dry garments practically autonomously. It also highlights is that while people have characteristics that make them particularly suitable for certain tasks, such as handling garments and judging whether a garment needs washing, technologies have others, such as turning round a tub at high and steady speeds or measuring the exact weight of a load. By viewing competences as distributed between people and technologies, the idea that technologies have certain unique qualities, characteristics and capabilities that people do not have means that technologies can complement people in areas where they excel.

Moreover, when looking at a distribution of tasks and responsibilities between people and technologies, it becomes clear that people are particularly capable of making situated judgments in *non-standard situations.* For example, a garment that comes out of the washing machine but still has stains on it can nonetheless be judged, in the situation, as appropriately clean for its intended use. Reckwitz (2002) refers to these non-standard situations as "*everyday* crises of routine" (p. 255, emphasis added) indicating that they are in fact a common occurrence. Besides variety in the ways in which older people live their lives, and the variety of practices in which technologies-as-resources are envisioned to be used, such crises form another type of variety in use situations. In these non-standard situations in particular, technologies should allow people to make decisions about appropriate ways to act.

So to recap, the idea that technologies as resources have distinct competencies that can complement people in the performance of everyday practices, and that dimensions of variety include variety (1) in ways of living among older people, (2) variety between the different practices in which technologies as resources could be deployed, and (3) the occurrence of non-standard situations calls for a particular type of insight into use practices.

2.3. Enlisting everyday things as co-ethnographers

In aiming to design resources and looking for dimensions of variety across use practices, we argue that enlisting the perspectives of mundane things on the lives of older people is helpful. Such a perspective can offer novel insights about the unique relationships among the technologies that surround people, and about people's everyday use practices with such technologies. Particularly when it comes to how humans are entangled with material objects, insights can be discovered only through observation and engagement with the "things" that are there (Ingold, 2012). The conceptual framework of theories of practice – as

interpreted and worked out by Shove, Pantzar and Watson (2012) works well here to integrate a thing perspective in the design process, because it does not prioritize the role of people in everyday life over the role of objects, and allows for a view on technologies as co-performers of practice next to people (Kuijer & Giaccardi, 2015).

A thing perspective, as defined in Giaccardi et al. (2016a), does not just expose and describe forms of practice that are difficult to express in terms of just design or use; it also presents new ways of framing and solving problems collaboratively with objects, which have access to fields, data and trajectories that we as human do not. While technologies cannot be interviewed about their lives, new technologies in the form of sensors, data transfer and memory now allow us to obtain insight into their point of view. As co-ethnographers, things can contribute a different perspective and unique insights (thing-ethnographies, see Giaccardi et al. 2016b) on the everyday use practices of older people that enhance, complicate, and perhaps even challenge those of human observers. Patterns of use can be identified within the data that is streamed through the interaction between people and things and between things and things, which would otherwise go unnoticed (Cila et al., 2015).

The opportunity of enlisting things as co-ethnographers was developed in the context of a study on everyday home practices from the perspective of material objects (Giaccardi et al., 2016a). This study has revealed that objects have the ability to support a variety of different practices according to their movements, temporalities and relationships with other objects. For example, sensor data from a cup, kettle and fridge revealed additional objects that were related to participants' practices of drinking tea, beyond those initially identified by human ethnographers: other dishes, silverware, towels, papers, and pet food, among many other things. These illuminated unexpected and otherwise invisible relationships among objects – that is, the networks or ecosystems inhabited by objects that would have been difficult to elicit through traditional observations and interviews alone. The study also showed that thing-ethnographies might reveal how, in moving through networks of spaces, times and relationships, things can not only "occupy" multiple practices but also be the connector among these practices. Over the course of an ordinary day, for example, cups traveled with participants from their kitchens into dining rooms and bedrooms, and then out of their homes into cars and on to work. These travels brought them into contact with other things – cars, radios, telephones, computers, books, papers, and cigarettes among others – and even into other settings such as kitchens in workplaces. This will assist in the identification of opportunities to where and how the same technologies can be of use across multiple practices and leave space for people to step in when improvisation is required.

The idea of enlisting everyday things as co-ethnographers acknowledges that things have a life beyond their envisioned moments of use, where they relate with humans in relationships other than product-user ones, and where they also horizontally connect to and relate with other things for which they have "uses": the surface holds the keys, the cane waits at the door, the phone upholds its connection to other phones. Objects are dynamic

and emergent entities that contain their own life forces, energies and histories (e.g., Appadurai, 1986). Therefore, a thing perspective moves away from a focus on technologies in their intended user-centred role and functionality, and helps designers and other stakeholders to see them as *resources* with a range of skills and competences of their own.

Furthermore, the study indicated that because technologies do not make judgments about what situations are relevant, memorable or representative and thus what they report to the researchers, their view on daily practices is more likely to reveal variety, "misuse" and *deviations from norms*. As such, objects as co-ethnographers provide practice-specific data on dimensions of variety in everyday crises of routine. We believe these data can provide designers with unique insights on how to design for resourcefulness. Importantly, because resourcefulness is not a property of technologies alone, the approach implies a view on design as an ongoing process rather than as something that ends at market introduction.

2.4. Design as an ongoing process

In designing for resourcefulness, improvisation and adaptation are more than a luxury: they are a necessity (Giaccardi & Fisher, 2008). The challenge of design is not a matter of reducing to the lowest common denominator, but rather of making the emergent an opportunity for better solutions. In established design practices the role of things and prototypes is usually to support people to imagine, discuss and shape future practices at "design time" (Donovan & Gunn, 2012). By extension, design becomes a kind of stabilizing process through which future practice(s) are imagined and realized. In our approach to resourceful ageing instead, we take an orientation according to which we consider every situation at "use time" as a potential design situation (Giaccardi, 2005; Binder et al., 2011; Redström, 2012). This view extends the traditional notion of "design time" to include co-adaptive processes between older people and their technologies that enable older people to act as designers in personally meaningful activities and be resourceful and resilient. This is done by using things (both existing and proposed) as co-ethnographers, and by supporting ways of understanding and designing that take place *after*, *with* and *beyond* the design work at project time (Giaccardi et al. 2016a).

As such, the proposed approach also acknowledges that innovations do not enter a vacuum; they need to be integrated into the existing living arrangements of their users (Scott, Bakker & Quist, 2012). Considering resourcefulness as something that emerges in and forms part of mundane everyday practices – such as cooking, cleaning, getting around, receiving guests and so on – requires sensitivity to the interactions between design proposals, existing technologies, competencies and purposes that make up these practices from an early stage in the design process. Rather than focusing on technology development alone, our approach works with the notion that new competencies can be learned and new purposes and meanings are likely to emerge from interacting with technological innovations (Kuijer, De Jong and Van Eijk, 2013).

The approach therefore assumes to "spend time" with things (familiar and novel) and "work together with" them in order to exorcise and manifest forms of practice in which they partake, which emerge "after design" and do not necessarily adhere to the anticipated forms of practice in the (initial) design process. As argued by Gunn and Donovan (2012), this engagement requires developing capacities to offer people different ways of understanding what they know and do. These different ways of understanding are inherently performative and transformative. By "listening" to things for an extended period of time, and reflecting on what we usually take for granted, we may begin to articulate unique opportunities for the everyday resourcefulness of older people.

Returning to our objective of shifting ethical decisions about how to live healthily and well to situations of use, the proposed approach aims to do so by focusing on resourceful ageing. This focus implies viewing competences as distributed between people and technologies, developing technologies that remain appropriate in a wide variety of use situations, enlisting things as co-ethnographers and viewing design as an ongoing process. There are, however, other dimensions to the ways in which it intervenes in the ethics of gerontechnology.

3. Intervening in the ethics of gerontechnology

When ethics is about the question of how to act, then the approach we propose is taking up the challenge of developing designs that redistribute ownership of the problem and control over appropriate responses to older people. It acknowledges that skills and meanings change over time – partly in response to new technologies and changing circumstances, and it allows for a wider variety of uses and interpretations than the "foolproof", single scenario technologies that are currently available in the market for older people.

From an ethical perspective, old age care is a challenging and interesting area, in which, for instance, issues arise around dependency, autonomy, agency and judgements about good care, around the sharing and shifting of responsibilities, around acting and deciding in situations where people may (or may not) have diminishing mental capacities or other trajectories of decline (Moody, 2005). As such, this is an ethically complex area, fraught with dilemmas and characterised by great diversity. It is hard to find a single ethical perspective that is useful or valid all the time and cannot be countered by a different legitimate perspective.

Designing technology to fit into such an ethically complicated situation is obviously difficult. Nevertheless, gerontechnologists deliberately intervene in use practices with their designs in the hope of improving care practices, making care cheaper or more efficient, or enhancing safety or social communication. They are therefore heavily involved in ethics. However, because gerontechnological design tends to be positioned as an unquestionably "good" thing, such issues remain hidden. Neven (2015a,b) shows how in the rhetoric surrounding gerontechnological innovations, ageing is positioned as a looming demographic disaster and thus a big societal problem (e.g., by relating ageing to the rising costs of care). In turn, this rhetoric states that this impending disaster can be resolved with gerontechnological

innovation. In this discourse, gerontechnology presents a triple-win scenario in which societal problems are mitigated, older people are better cared for, and technological innovations generate economic revenues. Gerontechnological innovation is thus positioned as the "right" thing and implicitly, the ethical thing to do. This rhetoric provides gerontechnologists with an ethical legitimation on gerontechnology as a whole. Ethical aspects of the individual designs tend to remain under the radar.

A main intervention in matters of ethics that our approach embodies is therefore its critique on existing practices of technology development for older people. But our position is not just a critique. In the "designerly" tradition (Cross, 2007), we aim to offer a possible, arguably more desirable alternative form of technology development *with* and *for* older people that nurtures a fundamentally different idea about the relations between technology developers and the users of those technologies. In particular, it harbours different ideas about expertise and skills (i.e., where they reside and how they are involved in practice), and it redistributes ideation, design and control between professional design and everyday use practices.

With our approach, we intend to illustrate the complex relationships between objects, competencies and purposes (Donovan & Gunn, 2012; Kjærsgaard & Otto, 2012), and initiate critical inquiries into issues of routine patterns and deviations from norms. In the approach, deviations from norms are explicitly not approached in terms of right or wrong behaviour, but assumed as routine parts of daily life. Older people, for whom such situations can be argued to be particularly common, are considered as those best capable of making judgments about the personal and social life they would like to live. What it is to live healthily and well is something that varies greatly between people, for the same people in varying situations, and changes over time.

As a consequence, rather than being intended to affect and assess change (Horvath, 2008), or to "change existing situations to preferred ones" (Simon, 1996, p. 111), our approach suggests to turn the role of design on its head. By explicitly engaging with the changes that accompany the human ageing process, the designs may even have the intention to *absorb* change. In other instances they may be designed to facilitate, celebrate or highlight change, but in any case there is a fundamental acknowledgement that gerontechnologies enter a world that is already changing, and continuously reinventing itself, through them, with them, but also in spite of them.

Finally, the approach itself calls up ethical issues. Focusing on resourcefulness is in itself a major ethical decision. One complicating factor is the fact that openness isn't always better. In some designs for older people (e.g. telephones for people with mild forms of dementia), some constraints in the design actually enable people to make use of the technology. Moreover, using things as co-ethnographers means that we are delegating part of our research work to things. What are the implications of equipping things with sensors and collecting their view on the lives of the people they live with? For example, when do technologies with their sensors capture episodes or insights on older people's lives that they did not notice, remember or find significant, and when are these aspects instead

deliberately not mentioned because they did not want to share them with the researchers (whether human or non-human)? How to give participants in the study control over what data is collected and shared and how it is interpreted and used? As we progress in developing and applying the approach, these are questions we will engage with.

4. Conclusions

By problematizing existing approaches to the design of gerontechnology, this paper proposes an approach to design for resourceful ageing. By reformulating the question of "how to deal with the problem of ageing" into a question of "how to celebrate getting older as an achievement", the approach sees older people not just as "old old" but as a broader category of people that are differently skilled, but certainly resourceful, and very much capable of creatively finding solutions to the wide variety of challenges they encounter as they age.

With our approach, we critique the unreflective materialization of ethical decisions into "foolproof" technologies and propose a design approach that focuses on re-delegating such ethical decisions to use situations. To design technologies as resources that offer complementary competences that are appropriate in a variety of use practices (and can therefore help older people adapt and improvise in everyday crises of routine), this positioning requires rich insight in the ways in which technologies function and can function as resources in varied and changing everyday routines. To gain holistic insight into these opportunities, the approach enlists things, both existing and proposed, as co-ethnographers.

The impact of this approach can be significant, as it has the potential to empower a larger, growing group of ageing population and support them to negotiate their changing bodily and mental skills, while remaining in control of their own lives, and make their own decisions on how to age well. It also introduces new ways of using technology for design and innovation that enable to avoid the waste of investment and lack of adoption of existing products and services for ageing people conceived for single-use scenarios and single functionalities and possibly generate ideas and innovations for resourceful living that can be rewarding and fulfilling for all ages.

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