Focusing on the Human: Interdisciplinary Reflections on Ageing and Technology

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Technology and society co-construct each other. Practices and perceptions of others and the self as well as the world outlook are highly mediated by technology; in turn, society – i.e. in the form of concepts and perceptions of age and ageing – is inscribed in technologies. Technologies can support specific ways of living together, but they can also be appropriated in varied ways. The choices concerning desired and avoided concepts of society that are made in technology development processes highlight the need for ethical reflections on technology.

The basic insight of that co-construction, derived from technology studies, not only sketches out a highly complex field for critical research, but also points to the ethical dimensions of technological development. Ethical questions, though, are only one reason for taking the human being as a starting point in the following reflections on ageing and technology. A limited understanding and consideration of the human factor in technological research risks to miss out some crucial aspects necessary for a rich understanding and a responsible shaping of a technologized ageing society.

How are older people and how is ageing imagined, conceptualized, inscribed and involved in current technological research? Looking into the field of technology development in Germany, technologies are explicitly developed for older people and/or the demographically changing society. Conceptualizations of age and ageing in this field are often shaped primarily by market research: we find these in the form of "human factors" and imagined "users" of these technological innovations. Recently technological development focuses on so-called interactive technologies, following the aim to bring forward technologies that are well adapted to the needs and preferences of

the users. Thereby specific conditions of old age – quite often conceptualized as age-group-specific inabilities or disabilities – are taken into account in the technological design of the product. A recent trend is to increasingly involve the targeted age group in research and development since "user participation" promises two things at once: better adapted products and market success.

Our interdisciplinary perspective on ageing and technology aims to include a rich(er) understanding of older people as users of technologies and an ethical orientation within and for this field of research. We therefore take the older human being as a starting point.

We will first discuss concepts from the social sciences: These are a complex understanding of age and ageing developed in social gerontology, the analysis of the inscription of users, the appropriation of technologies by actual users developed in the user-script approach, and the analysis of interaction in socio-technical ensembles. The second part focuses on ethical questions linked to ageing and technology: We will reconsider the *conditio humana* from an ethical stance in order to introduce an ethically based concept of enabling/disabling technologies in a first step; in a second step, we propose that theories of the "good life" and concepts of "good care" and autonomy can provide orientation not only for technologies' implementation, use and evaluation, but also for research processes and research funding structures. In the third part, we ask how old people can participate in research. We discuss approaches such as the democratization of technology and meaningful participation as a basis for the analysis and evaluation of forms of involvement of older people in technological research.

In the conclusion we point out the implications for further research and discuss potentials for cooperation within the sciences as well as between the sciences and civil society in the field of ageing and technology.

1. Perspectives from the Social Sciences on Human-technology Interaction in Old Age

A Differentiated Understanding of Age and Ageing

When taking human beings as the starting point of reflections on ageing and technology, one of the first questions is: What exactly characterizes older human beings? Images of ageing are quite influential in the development and use

of technologies for older people. When a technology shall tackle "problems of ageing", there must be a notion involved of what age and ageing actually are.

In the 1990s, social gerontologists began to study images of ageing (Featherstone/Wernick 1995; BMFSFJ 2010: 35). They showed that stereotyped, reductionist, negative and therefore ageist images of ageing have until now been very popular in our culture. Countering these negative images with extra positive images of healthy, wealthy and always active seniors has, however, also proven to be a problematic strategy. Since both do not do justice to the complexity of age and ageing, it is still necessary to reflect on and differentiate images of ageing.

Against this backdrop many social gerontologists today share a certain discomfort about the way age and ageing are imagined in the context of technology (Oswald et al. 2008: 104). Especially in the field of assistive technologies, the ageing body is often seen as an increasingly malfunctioning machine, which itself needs technical support or surveillance. Furthermore, older people are frequently depicted as incapable of adapting to new technologies or even resistant to technology (Cutler 2005, Charness/Czaja 2005).

Here social gerontology can contribute to a differentiated understanding of age and age-ing. We argue that five essentials are important when taking older human beings as a starting point of reflections on ageing and technology: The fact that ageing is first a heterogeneous and second a multidimensional process; ageing is thirdly not linear decline but is located between strength and weaknesses; life courses (of older people) are fourthly deeply social and interconnected and fifth, that ageing is the subject of powerful discourses (Kruse/Wahl 2010: 77; Wahl/Heyl 2004: 41).

First, older people are not a homogeneous group, but a very diverse population. Their living conditions differ significantly according to, for example, income, education, gender, ethnicity, social networks, the housing situation, chronological age, the cohort a person belongs to and other categories of social stratification (Backes 1997; Heusinger et al. 2013). It is therefore difficult to generalize about "the needs of older people". Taking into account the heterogeneity of ageing rather reveals that usual patterns of social inequality continue across the life course: when technologies are assessed, the heterogeneity of ageing raises questions of inclusion and justice. Who does benefit from technological developments, who does not? Do older people have equal access to new technologies?

Ageing is, secondly, not only a biomedical bodily phenomenon. It has psychological, social, political, and economical as well as other dimensions

(Kruse/Wahl 2010: 336). The emphasis on the multidimensionality of ageing is based on a holistic view of human beings, according to which older people should not be reduced to a biomedical dimension of bodily decline. This raises anthropological questions for the assessment of technology: Which images of humanity and of older people underlie and foster a technology? It also points to the importance of including different disciplines in the development process, which can capture the multidimensionality of ageing.

Thirdly, ageing was long seen as a determined linear decline. Today, on the contrary, new medical approaches promise to prevent, stop or even reverse ageing. However, social gerontologists stress that ageing processes do not only go along with weaknesses, but also with strength and potentials (BMFSFJ 2006). Ageing is also not determined but – within limits – malleable. When technologies are assessed, this procedural view of ageing raises the question if a specific technology addresses only weaknesses or also strengths of ageing.

A fourth gerontological essential is that ageing should not be regarded as an isolated phase of an individual life. It rather is part of the life course, meaning a "sequence of age-linked transitions that are embedded in social institutions and history" (Bengtson et al. 2005: 493). The life course perspective reveals aspects of ageing which are often missing in popular images (ibid: 494): The individual life course is strongly interconnected with other people's life courses. Ageing processes can hardly be understood without their social and historical contexts and they need keen attention to biographical transitions. Older people do not "naturally" pass through "natural" stages of life but are active agents of their life courses.

From a critical gerontological perspective it is also important to, fifthly, take into account that our understanding of and dealing with ageing is shaped by powerful biomedical, economical and welfare state discourses: Since the beginning of modernity, a biomedicalization of ageing has taken place (Kaufman et al. 2004), which is problematic e.g. if the biomedical model leads to a situation where other dimensions of ageing are neglected. It is also well known that ageism is strongly linked to capitalism (Walker 2005), since potentially less "productive" older people become a problem only if productivity is the measure of all things. The strong political emphasis on encouraging older people to keep active, healthy and productive is part of a neoliberal welfare policy (van Dyk/Lessenich 2009), which tends to prefer individual responsibilities over societal concepts of solidarity. For the assessment of technology this raises the question whether a specific technology supports a problematic biomedicalization of ageing, a primarily economic view on age-

ing or emphasizes an activation of ageing without at the same time stressing the need for the improvement of the care system.

These gerontological essentials stress the need to think age and ageing as a much more complex process than negative or extra positive images of ageing suggest. Having sharpened our understanding of older human beings, we can now turn to the question of how they interrelate with technology.

Older People in Technology Development Processes: User Script Analyses

A social science perspective which analyses technology development as social process can highlight the contingent character of technical developments and power relations which shape them. An important strand of this work is the analysis of the co-construction of technology and society developed in the field of Science and Technology Studies (Hackett et al. 2007; Bijker et al. 2012). Together with the contribution in terms of a better understanding of technology in society, this can also be taken as a starting point for a combination of an integrated social science and ethics approach for studying ageing and technology. Such an integrated approach can use this analysis as a foundation for drafting future alternatives in terms of technology and the "good life" in old age (see section 2 of this chapter for a discussion of the "good life"). The analysis of technology development as social process begins with questions such as which technologies are developed, by whom, for whom and under which conditions.

This approach, which can be extended beyond the examination of the development of a particular technology and scrutinize the wider context in which it takes place, can be used to carve out existing trends in the broader field of "ageing and technology". An example for this is the analysis of discourses which underpin specific funding policies and decisions by private companies to invest in the development of specific products, such as a neoliberal discourse on individual self-responsibility combined with the promotion of active ageing (van Dyk 2009). Technologies are developed for diverse identified needs in old age (support for people with age-related illnesses, adaptations of information and communication technologies for older people, etc.) (BMBF/VDE Innovationspartnerschaft AAL 2011), but what opportunities are there to focus on human beings in analyses of technology development as social process?

There are multiple ways of focusing on older people in this approach. For example, older people and their experiences can be taken as key measure for the analysis and evaluation of technology development which aims for

an improvement of life in old age. This can also be combined with an ethics and social science perspective which investigates trends in the field of "ageing and technology", comparing existing and envisioned technology against questions of the "good life in old age" (see section 2). Another approach is the inclusion of older people in research teams, for example as co-researchers (Walker 2007). We will now briefly discuss a third perspective for making older people central in the study of technology development as social process, namely to investigate inscribed and actual users of technologies.

This approach is based on Akrich's (1992, 1995) investigation of user scripts in technologies. She argued that designers merge various, explicit (e.g. market research) and implicit (e.g. personal experiences) user representations in the development process. Simultaneously, designers have to link technical options and potential markets for a technology. However, Akrich emphasizes that technologies emerge from the confrontation of user scripts with actual users, since the latter can appropriate technologies in unforeseen ways. For example, users can adapt technologies to solve different problems than those that the designers wanted to address. It is therefore important to study both inscribed and actual users to understand technology development. As Neven (2011) has demonstrated, the user script approach can be utilized to analyse dominant themes – such as the assumption that older people are always less competent technology users – in the inscription of older users in technology.

The advantage of the user script approach is that technology development is not studied in isolation from use; instead, a focus on user scripts suggests that, in order to understand technology, we have to equally study its appropriation. The inscription of users in technology goes beyond the identification of target user groups and considers that users are inscribed in technology in various ways, e.g. as individuals with relationships, specific capabilities and experiences and diverse characteristics (ergonomic, experiential, economic etc.). The analysis of inscribed and actual users can be taken as a base for a discussion of current trends in the field of "ageing and technology" and compared to a differentiated understanding of ageing from an integrated ethics and social sciences perspective.

Thinking Older People in Interaction with Technology

A social scientific perspective also brings the interaction of older people with technology into focus. Human-technology interaction is a tricky notion, par-

ticularly in interdisciplinary research. Since very different notions of that interaction exist, a careful explication of the concept is necessary:

In technology development, the term human-technology interaction usually refers to how humans operate technologies. Its notion of interaction was borrowed from computer sciences (Heesen 2014: 7); accordingly, the focus is put on the design of the technical interface, which – in this perspective – is the main site of interaction. A similar concept of human-technology interaction is often to be found in the development of AAL technologies for older people. Building on the assumption that older people are not used to inter-act with technology, the focus is put on adapting the technology to the reduced competences of older people. Simple or even invisible interfaces are one solution. Furthermore, increasingly intelligent and interactive technologies are developed, which are supposed to support individual older persons in everyday life by suggesting or by taking decisions (BMBF/VDE Innovationspartnerschaft AAL 2011: 12).

Here, a sociologically enriched notion of human-technology interaction allows for a more comprehensive understanding of that interplay. With regard to recent conceptual developments in technology studies for capturing the complex human-technology relations (Oudshoorn/Pinch 2007), we suggest to put four aspects into focus, namely: first, taking all actors into account, second, acknowledging the reciprocity, openness and contextuality of human-technology interaction, third, granting full agency to older users and fourth, understanding technology as a part of older people's lives.

First, human-technology interaction does not only take place between a single user and one technical device. The site of interaction rather is a socio-technical ensemble of multiple interrelated actors (Bijker 1995). Besides the individual user, his or her wider social environment is part of the interaction as well. Institutions can play an important role, too, which is hardly recognized so far (Oudshoorn/Pinch 2007: 556). Finally, technology does not only function but is itself regarded as a social actor in some recent sociological research (Rammert/Schulz-Schaeffer 2002; Latour 2007). This is because it shapes social practices and interactions and impacts on the perception of the self as well as the world. Human-technology interaction is therefore distributed between a complex network of humans, institutions and technologies. Understanding older people's interaction with technology therefore also includes how their relatives and friends, their neighbours and care givers, maybe also care homes or municipalities as well as the technology itself contribute to the interaction.

Understanding human-technology interaction sociologically means, secondly, that this interaction is no one way process but consists of mutually adaptive performances (Meister 2011): actors tend to anticipate each other's actions and adapt their actions accordingly. Thereby humans, societies and technology mutually constitute each other. Human-technology interaction therefore potentially changes all actors involved: The preferences of people can change as well as their role in a socio-technical ensemble. Technological artefacts can change, particularly the roles and values ascribed to them. The (power) relations between human, institutional and technical actors can in turn be altered. Human-technology interaction is therefore an open process and not determined, but conditioned by societal, political and cultural contexts.

Despite recent conceptual efforts to put the cultural appropriation of technology into focus (Hahn 2011), older people are still often not viewed as active actors in the human-technology interaction (Krummheuer 2010). The focus is rather put on their "unability" to adapt to new technologies (Charness/Czaja 2005: 662). With keen attention on different forms of interaction – verbal, bodily, intentional as well as unintentional interactions – we have to bring their diverse, potentially creative and subversive ways of technology appropriation into sight. It is therefore, thirdly, a matter of granting full agency to older people – without putting a case for an idealized notion of autonomy.

A fourth aspect is that particularly in the development of technologies for older people one finds the assumption that older people so far were isolated from technology, which now has to be introduced into their lives as a new factor. Philosophy and sociology of technology, however, have disproved this narrow understanding of technology (Hubig 2006): from their perspectives, human life is always mediated by technology, as we do not perceive the world independently from technology. For older people, human-technology interaction is a normal part of their lives, too (Peliz̈aus-Hoffmeister 2013, see also article in this volume). However, there are new technologies which – so far – hardly play a role in older people's lives.

These four aspects of a more differentiated, sociological understanding of human-technology interaction show that this complex interplay cannot be reduced to an individual person operating a technological device. Nor should the perspective be reduced to a triadic relation consisting of a technology, a care-taker and an old person. Rather the whole socio-technical ensemble has to come into sight. Human-technology interaction not least shapes relations between humans, between technologies, the relations of humans to themselves as well as between individuals and their social surroundings re-

spectively the society. A critical analysis of technologies that are developed *for* older people should comprise all these different levels. Such perspective thereby also facilitates an in-depth analysis of power relations within human-technology ensembles i.e. how power is distributed within an interactive system, which role the technology design plays in ascribing certain roles and setting responsibilities, in creating meanings and confining spaces and scopes for agency.

The discussions around currently developed and introduced (interactive) technologies claim that through their potential to adapt to older users, these technologies meet the specific needs of people of old age and/or are appropriate means to meet the challenges of an ageing society. In the development of an approach for a human centred research we drew not only to social sciences but also to ethics. The human focused approach is both, a result and a quest of an intense transdisciplinary collaboration. Ethical perspectives can provide orientation for human centred technology development and use, as approaches of good life in old age and reflections on care urge to take the older person into account. When talking about technologies *for* older people, we refer to technologies that are able to enable good life and good care in old age. But how can the good life in old age be outlined? How to think technologies in ensembles of good care?

2. Ethical Perspectives on Good Life in Old Age

Taking the human being as a starting point of ethical reflections in the field of ageing and technology, we want to reconsider two things: firstly, the *conditio humana*, thus that what from a philosophical-anthropological perspective is defined to be the human nature or the basic human condition, and secondly, ethical approaches of the good life. By raising the basic question how we *want* to live as individuals and as societies we aim to ethically orientate the reflection on ageing and technology. Further we want to discuss the potentials of the good life in old age for the evaluation, development and practical use of (interactive) technologies.

The common narration of technology is that it is enabling: Innovation is often thought in technical terms and technical innovation stands, if not anymore for "progress" of societies, then still often for "improvement". In the following, we want to move away from the common understanding of "enabling technologies" characterized by aiming for the restoration of cer-

tain (dwindling) basic bodily functions or means that seem necessary for social participation, or focusing on an improvement of subjective life quality. Instead we pick up a conceptualization of "enabling/disabling technologies" developed in disability studies (Apelmo 2012), proposing two things: an anthropological-ethical grounding and an ethical orientation of the conception. The crucial questions we want to develop are: (How) Can technologies enable/disable the good life – for us as individuals and as a society? (How) Can technologies contribute to "good care" and a self-determined life in old age?

In the following, we argue that the stance of the good life offers a possible orientation and therefore reference point not only for an ethical impact assessment of technologies, but also for technological research and practical use of technologies. Looking to theories of the good life, we have to diagnose that they have long been blind to the fact of ageing. The good life, as it is framed in Western philosophical traditions, generally requires a healthy, rational, autonomous and highly reflected subject. What does that mean for (thinking) the good life in old age? Instead of developing a specific or reduced concept of the good life in old age(s), we need to rethink those theories from their essence. Our starting point is instead the vulnerable, dependent and related human being and the knowledge that ageing is by no means a unified, simple or linear process. Such an ethical approach towards the good life further needs to critically (re)consider questions of good care, concepts of autonomy and not least the role of technologies as they not only shape imaginations of ageing in society, but also practically enable/disable the good life. In the following, we want to give some orientation and continue the work that has to be done. Therefore we will first introduce Martha Nussbaum's capability approach and her ten dimensions of the good life, arguing that they could provide ethical orientation for the evaluation of technologies. In the second part, we consider questions of "good care" and introduce some (re) formulations of the concept of autonomy.

Enabling Technologies? Reconsidering the Approach of Capabilities

In Martha Nussbaum`s influential capability approach, individual ethics and social ethics are strongly interlinked as her approach of a life in dignity is strongly connected to her concept of a good society (Nussbaum 2006, 2011). In the context of her reflections on human capacities in general, she formulates ten core capabilities which she further claims to be social entitlements.

Meeting these capabilities is not only a precondition for a dignified life for the individual but at the same time characterizes a good society.

We here refer to these core capabilities as they offer to outline a universal but culturally sensitive concept of (dignified) human life and good society. As the formulated capabilities are operationalizable, the list – that is considered as open – is a useful tool to ethically evaluate technologies and their use in terms of the good life. Instead of asking technical questions like if a certain technology restores or compensates dwindling physical, mental or communicative abilities, if it enables social participation – e.g. by improving mobility –, or if it improves subjective life quality, we can ask if it enables the development of human core capabilities. The approach thereby urges us to consider the specific societal and cultural conditions as they moderate capabilities e.g. are definitions of bodily integrity influenced by different religious regulations, societal discourses and cultural practices? Let us demonstrate this by operationalizing just a few of the ten dimensions for the evaluation of technologies, their development and use: Does certain (use of a) technology enable *bodily integrity*? Does it enable or rather disable *social affiliation,* e.g. good relations of care? Does a technology enable the older user's *practical reason* or, in other words, does it allow him/her to reflect on his/her own situation and enable him/her to develop an idea and plan of the own life? Does it enable the user to take *control over his or her environment*? Does a technology enable *play*? Answering such questions is no doubt a complex task and it requires careful consideration as it depends on social, institutional and cultural contexts, on practical use of technologies and not least on the cultural appropriations of a technology. To define the disabling and enabling potentials of technologies, ethics relies on a close collaboration with empirical social sciences. For the research of interactions in concrete ensembles of humans and technologies qualitative and especially ethnographic approaches seem to have most potential.

Questions of Good Care and Reconsidering Autonomy

To develop an ethically grounded concept of "good care" it is worth looking to the broad field of discourses on "care ethics". This predominantly feminist approach has not only strongly criticized the subject of classical philosophy and reformulated the *conditio humana,* the common conception of the human nature/condition, by claiming dependency, relatedness and vulnerability to be aspects of all human lives, but has also pointed to the political dimen-

sions and ethical pitfalls of care (Brückner 2010). It is argued that one crucial problem of care – related to patriarchal societal order – is that although care is essential for human life, not only care-receiving is stigmatized, but also the different works of care-giving are dramatically devaluated. Another central problem is that care-relations are at risk of being shaped by paternalism, and ending up in domination and abuse. Dependence on care can endanger a life in dignity as it complicates self-respect and good affiliation. The need though is to conceptualize and experiment "good authority", which fosters and does not diminish self-respect. We have to develop an ethics of asymmetric (power) relations instead of generally considering such constellations as hindering for the good life and as disabling autonomy.

Empirical findings are thereby of crucial importance for ethical reflections. Lately, Andreas Kruse (Kruse, 2014) has published the results of two broad surveys, pointing out the importance of attention and social affiliation but also shared responsibility and caring for others as subjective dimensions of quality of life in old age. Considering on the one hand the enduring importance of *Weltgestaltung* and *Selbstgestaltung* in old age and on the other hand older people not only as care-receivers but also their wish to be care-givers asks us to redesign common ensembles of care and to rethink the political agenda of social participation as well as the orientation of care. Besides, the precarious conditions of institutionalized care, characterized by employee shortage, further economization and precarious work conditions demand to consider the human beings first – old people but also those who take care of them. To refer to terms of Hannah Arendt, it seems necessary to call for an orientation of care towards the human being as a person. Such an orientation towards the *who* instead of the *what* (Arendt 1998) asks if technology enables relations of care in which the individual is able to express him or herself and to find acceptance, as the preconditions for a life in dignity are mutual respect, social recognition and the ability to shape one`s own life and participate meaningfully in society.

Starting from the vulnerable, related self, questions of good care also lead us to scrutinize our concept of autonomy. Focusing on age and ageing, we are urged to consider situations of dependency and conditions characterized by limited or unsteady mental and bodily capacities. "Classical" conceptions of autonomy, presupposing the freedom of will and the ability to reflect upon one's own person, thoughts and decisions appear somehow quixotic. Instead, we want to point to two approaches that basically reformulate autonomy as relational and gradual. Looking toward life in old and very old age helps to

recognize two things: firstly that it is often rather a collective of people – in the named case the old person, relatives, doctors and other care-receivers – who take both essential and daily decisions and secondly that cognitive conditions are generally plural, dynamic and in certain phases of life (potentially) limited. Feminist scholars have argued that autonomy in practice is always relational and that the self is constituted in and through social relations (Holstein et al. 2011; Mackenzie/Stoljar 2000). In different fields – e.g. regarding medical decisions – autonomy has been reconceptualized as relational and gradual (Kipke/Rothhaar 2009; Downie/Llewellyn 2012).

Taking an approach to the good life that is based on rich concepts of ageing human beings as orientation for technology, we can formulate concrete questions towards technologies and the socio-technical ensembles and their funding and development practices: Does a certain (use of a) technology enable or rather disable us to live a good life – as individuals and as a society? Does it enable or rather disable relations and socio-technical ensembles of good care, characterized by a life in dignity with mutual respect, social recognition and participation? Does a technology support or is it rather hindering for a self-determined life in old age?

3. Participatory Perspectives on Ageing and Technology

A third perspective of focussing on the human in the field of ageing and technology lies across and beyond the traditional academic disciplines: it consists in the participation of older people in the research on and in the development of technologies. Funding agencies, technicians as well as seniors call for a better integration of users in the development of technology for older adults. And indeed, older people are increasingly involved in development processes, for instance in the evaluation of products, in selected decisions or via empirical surveys on users' preferences (e.g. Glende et al. 2011). The rationale is that user integration leads to technical devices which are better adapted to the users and therefore to market success.

We share the call for more participatory designs in the field of ageing and technology. However, in order to sharpen our focus on the human, we have to rethink participation as currently applied in the field in three regards: Why is participation important? Who should participate? And how should participation be implemented?

First, we have to rethink the aims of participation. Why is it important that (older) people participate? The answer to this question reveals normative presuppositions which are crucial for the orientation of participation processes and the way participants are addressed: as users, as consumers, as experts or as citizens. Participation approaches developed in the context of direct democracy and action research (Bergold/Thomas 2010) show that participation can serve more than the goals of technology acceptance and market success. It is about the involvement of citizens; participation from this perspective is a civil right of people to shape areas and practices which are particularly relevant for their lives. The involvement of stakeholders is a political act to practice and to enforce the social participation, particularly of social groups that dispose of weak interest representation. In this sense, participation is not primarily about the optimisation of products. It is about democratization – in our case of the research on and the development of technology for older people. It aims at social change (Götsch et al. 2012: 43) and at fostering empowerment (Bergold/Thomas 2010: 49).

What does that mean with regard to involving older people? Since the 1980s, senior organisations along with social gerontologists have called for more participation in different fields. In the past decades, opportunities for older people to participate have indeed expanded (Barnes 1999), particularly at municipal level e.g. in the planning of health care services or housing policy but also in gerontological research. One reason for that expansion is that the relation between individual and state has changed in a way that older people are increasingly perceived as consumers of welfare services (Walker 2007). However, the original point of reference in seniors' and gerontologists' calls for more participation is also the ideal of a deliberative democracy and emancipation (Heslop 2002; Barnes 1999).

Furthermore, there are research ethical reasons why older people should be involved (Walker 2007: 482). The general right of people to be consulted about research that is conducted on them is particularly important for older adults, due to their experiences of ageism. Researchers, politicians and developers have to be careful not to reproduce such forms of discrimination and exclusion. Especially when research aims at improving the quality of life of older people, it is a matter of justice to consult them. Alan Walker takes assistive technologies as an example for "the inadequacy of attempts to involve older people in identifying needs and appropriate solutions." (ibid:482).

Who should participate? A second highly political question relates to the criteria according to which participants are chosen (Wright 2011) which is

in turn linked to the aims of participation processes. If the aim is to take the diversity of older people's lives into account, it is necessary to recruit participants who can represent this diversity. To achieve this, it is useful to ask which groups of older people are affected by the development of a technology in different ways. If the aim is a more inclusive debate informed by the concept of a deliberative democracy, it is necessary to critically think about the conditions for participation, and to create a space which is receptive to various ways of engaging in a debate, rather than privileging only one (Barnes 1999). If the focus of participation is empowerment of older people, the acquisition of competences, such as training as a researcher or co-researcher (Walker 2007), can be an integral part of participatory designs. As Barnes (1999) suggests, it might also be useful to rethink the focus on participatory approaches which are based on institutionalized representation of older people. Many potential participants will bring with them experiences of other forms of involvement in decision making e.g. on a local political level. She argues that the formation of a collective identity of older people might be a result rather than a precondition for participation processes.

The third question is how participation should be implemented. Since participation has become a catchword in different contexts, there is a growing opinion among advocates of participation calling for full, for systematic or for meaningful participation. What makes participation in practise meaningful? Many of the arguments put forward in this context go back to questions of power. Usually the resources and the power to define and to decide is distributed unequally between those who participate (e.g. older people) and those who grant them the opportunity to get involved (e.g. engineers). A constant reflection on the distribution of power in the transdisciplinary team is essential (Götsch et al. 2012: 34; Bergold/Thomas 2010: 340, see also the contribution in this volume (Domínguez-Rué and Nierling 2015). We also have to ask how much influence is actually granted to the participants. When implementing participation, several aspects are crucial to deal responsibly with the asymmetric power relations characteristic for the involvement of stakeholders:

The participants should not be regarded and addressed as lay persons, but as experts in their lifeworld (*Lebenswelt*). Their competences and experiences should be acknowledged equally. This helps participants/experts to contribute and exchange their visions, skills and expertise more at eye level, which requires equal access to information and keen attention on the integration of limited or non-verbal forms of communication. It is also important to

disclose the (different) expectations in the transdisciplinary team throughout the participation process. The gains of the project should not be one-sided but a win-win situation.

Another crucial point is the financial side of participation. If older people are involved in technology development, they usually do not receive a salary as their counterparts in the transdisciplinary team do. As salary is the common and socially most accepted form of acknowledgement, everyone who is working on the process of development – participatory personnel as well as classical developers – should be remunerated (Bergold/Thomas 2012: 37).

The question about the moment in a development process in which participation should take place is often also a question of power. When people are involved from the beginning through the whole process of technology development, they have more opportunities to negotiate even aims, research questions and structures which are decisive for the development process. If participation takes place for the evaluation of an already developed technical device, there are less opportunities to influence the process.

The accomplishment and the dealing with results is another important point. Participation can only be effective if research and development are adaptive processes which are open to really include results of participation in the final outcome. A difficult question here is how to negotiate conflicting ideas and opinions. An issue that is also largely unresolved is how different forms of knowledge – particularly experience-based knowledge of people affected and academic knowledge of researchers – should be integrated during participation processes. However, it is crucial to make transparent how the final results were accomplished and to ensure equal access to them.

In the practical implementation of participation, there is often the need to balance the far-reaching claims of a meaningful involvement with practical limits. It is important to ask under which conditions it is tolerable or necessary to limit participation e.g. by restraining participation to selected decisions during the development process (e.g. Lindsay et. al. 2012).

Why should who participate how? As transparency is a precondition for good participation (Bergold/Thomas 2010: 340); it is important to consider these basic questions before the starting point of policy making, research or technology development. They should be negotiated and communicated within the transdisciplinary team but also externally in order to reveal what exactly is meant by letting older people participate.

4. Doing Transdisciplinary Research on Technology in an Ageing Society

We have combined different research approaches, theories and methods to outline the potentials of cooperation of different disciplines and civil society that leads to both a rich and critical understanding of ageing and technology and an ethically as well as democratically orientated research and development of technology. Our point of reference are societies that are facing an unprecedented demographic change and that have decided to explicitly invest in technological innovations to manage, shape and control this societal change.

Integrating these various perspectives and actors into a framework of inter- or transdisciplinary research is costly and experimental. It is costly not only in terms of time and money, but also in that it requires a critical reflection of (disciplinary) concepts and rationalities of all actors involved. It is experimental in the sense that new research designs and new forms of participation in decision making – of other disciplines and/or civil society – will change accustomed paths of technological development and common distributions of power and authority. Sciences and humanities are asked to collaborate closely in the same way that science and civil society need to learn how different forms of knowledge can come together in a productive way. The success of such kinds of research projects relies on interdisciplinary competences, interdisciplinary spaces and the establishment of transdisciplinary structures and competences as well. This requires willingness to engage with other perspectives.

We started our reflections on age and ageing by pointing to the need for a more complex understanding of age and ageing in technology research and technological development. By outlining conceptions and research approaches that focus on older people as both imagined and real users of technologies, we underlined the need for a critical reflection on user scripts (within technological development processes) but also called for a broader research on the actual use and cultural appropriations of (new) technologies, considering that the impact of technologies highly depends on contexts and user practices. As these practices are (potentially) diverse and (can) change over time, ethical evaluations that only focus on the development process and the initial implication phase do not close the case. We urged to understand older people as active parts of socio-technical ensembles and therefore propose to consequently integrate a socio-scientific empirical approach, as it

promises to be productive for the evaluation and design of interactive technologies and user specific interfaces.

The second part showed the starting point for our reflection and analysis: It is a concept of the good life that *includes* old age instead of isolating it as an (exceptional) stage of life. Our anthropological core statement is an understanding of human beings as fundamentally vulnerable and dependent on others in every phase of life – not just in childhood or old age. Enabling technologies thus relates to reflections of the good life and of good care, thus also rethinking classical concepts of autonomy.

As we see the need for broader ethical reflection in the context of technological development for older people, interdisciplinary approaches have to be further established. Ethical theories of the good life can thereby inform and advise democratic discussions and political processes but never substitute them.

In the third part we analyzed questions of participation of older people in technological development, reflecting on the potentials and pitfalls of established or intended practices. Which approach and method to follow is highly dependent on aims and resources. What is necessary, however, is a systematic reflection of the goals of participation, the transparency of these goals and processes and the reflection of research conditions that allow a meaningful involvement of older people. The current increase in participatory designs has great potentials but still needs conceptual work. Only then can technologies do justice to the wants and needs of older users through a better understanding of ageing which can derive from close contact on the one side and the democratization of technology on the other.

Society and technology co-construct each other. But (how) can technological research contribute to good life and good society? To develop a conception of the good life that embraces questions of good care, neither the horror scenario depicting a wave of incompetent old people needing (too) costly care, nor a reconfiguration of old people as active, healthy, and useful – and therefore not needing costly care – seems helpful. Instead we propose starting from an anthropological core statement: human beings are vulnerable and dependent on others in every stage of life. Old age is then not an exceptional stage but is rather to be understood as a radicalization of a human fundamental situation. Taking a glimpse at current innovations, we come across a lot of promises that suggest that technologies are enabling. They enable mobility, social participation, long life at home, security, health etc. But do they enable the older person and society to lead the good life?

Do they support and create good care? Especially so-called interactive technical innovations suggest that care relations will change through the use of new technologies. Created and supported by interactive technologies, highly engineered and cross-linked care ensembles are about to emerge. These "care platforms" link different human and technical care receivers, and collect, save, and organize information with different information technologies. Emotional intelligent technologies suggest that soon care will also embrace new forms of social relatedness between technologies and old people.

Facing the common imaginations of age and ageing and the accelerated technological development that allegedly is aimed at meeting the needs of the elderly and an ageing society, inter- and transdisciplinary approaches call those who research and develop technology to reflect on the ethical dimensions of their own action and acknowledge their responsibilities for shaping and organizing the future society – one in which vulnerability, dependence and relatedness will neither disappear nor be technically "solved", but rather needs to be acknowledged as the fundamental human condition.

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