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The limits of participatory technology development: The case of service robots in care facilities for older people

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ABSTRACT

The paper examines how participatory technology development (pTD) in the field of ambient assisted living (AAL) is marked by several weaknesses. We will discuss these from a theoretical point of view as well as based on empirical findings of a three-year project dedicated to the achievement of pTD within a representative AAL domain, adopting the scenario-based design (SBD) method. The case study – dealing with the introduction of care robots in a care facility for the elderly – will be examined by an ethnographical qualitative analysis as well as by three theoretical approaches often used in the field of Science and Technology Studies (STS). We combine these three approaches with an ethnographical analysis to achieve a deeper understanding of several difficulties with pTD that are typical in the realization within the AAL field, especially when a mediating method, such as SBD, is adopted. In this respect the theoretical contribution consists of outlining the importance of a strictly bottom-up view on pTD. Finally, we conclude with two general recommendations on how the inclusion of care workers and older people as target groups of pTD within the AAL field can be accomplished more successfully.

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1. Introduction

Today, aging and shrinking populations can be seen in almost all industrial nations, and are understood as one of the most challenging global trends (Drucker, 2002; Kohlbacher and Herstatt, 2011; Peine et al., 2014).¹ This demographic shift gives rise to new needs and wants in terms of products and services that correspond to the expectations of older customers, and thus requires new technological solutions (Peine et al., 2014; Kohlbacher and Hang, 2011; Kohlbacher et al., 2014). Medical technologies are a case in point here, whose advancements are largely driven by demand from aging populations (Phillips,

2011). According to Peine and Herrmann (2012), demographic aging carries a number of threats for social and healthcare systems that can be addressed through new technical solutions, while at the same time providing a chance for knowledge-intensive economies to define and corner new markets by timely responses to associated changes in consumption patterns (see also Peine et al., 2014; Kohlbacher and Hang, 2011). However, developing products and technologies for older users is not an easy task (Fisk et al., 2009; Neven, 2010; Bechtold and Sotoudeh, 2013; Kohlbacher et al., 2011), especially with regard to the process of user integration or participation (Fisk et al., 2009; Diemel et al., 2004; Östlund, 2011a; Schmidt-Ruhland and Knigge, 2011). Indeed, recent research has shown that current design practices for older persons tend to be overly paternalistic and imply various risks that should be avoided (Peine et al., 2014: 207).

In this paper, we build on this literature and complement and extend its findings by providing an analysis of an empirical

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¹ As a matter of interest, the earliest article to deal with this topic in *Technological Forecasting & Social Change* – with a focus on longevity – was published 35 years ago (Ebel et al., 1979).

study of participatory technology development (pTD) for older people in the area of care robotics.² The case under study used scenario-based design (SDB) as the main method in the participatory development approach. We consider our paper to be a contribution to some uprising new tendencies in typical research framework settings dedicated to the “socio-material constitution of later life” insofar as we will try to show how pTD approaches in the field of ambient assisted living (AAL) are marked by several weaknesses that we will delineate in the following paragraphs. We thus follow [Peine et al.'s \(2014\)](#) call for further STS research on innovation and aging and for the need for new methodological tools. The SDB that was employed in the extensive case study we use to illustrate our case is an under-research method, especially in its application to pTD for older users. It is a very promising method for involving user groups in the development process of innovative technology. However, as we will show, it could also be the source for misleading assumptions. In this regard we provide a contribution concerning the range of this methodological tool for participation.

Overall, we will discuss the critical aspects of pTD mainly from the perspective of how robotic engineers and industrial user–interface–designers are capable of twisting the whole process of user integration in a rather non-intentional manner and how these deviations are leading to an outcome that is missing the main purpose of participation. pTD can serve as the basis for cost-efficient and user-centric product development and can be expected to further gain in importance, especially in light of the above-mentioned way it can help to target new market segments. The empirical findings are based on a three-year project dedicated to the achievement of pTD within a representative AAL domain. We will build our argumentation upon three main assumptions and will present two guidelines to conquering the stated problems.

In a nutshell, the main assumptions for the failure of pTD are as follows:

- 1) As a finding of the discussed empirical case study we will point out that in typical AAL research and development settings or projects regarding a technological system, a development line can quite often be traced back 10 or more years. The present further developments often still include the early orientations which were usually a long way off meeting AAL criteria.
- 2) The second very important finding is the assessment of older people as a weak and deficient user group (i.e. as a non-user or merely trial-user group and as such are first and foremost relevant to acquiring funding) and the quite fixed orientations of engineers towards “younger” (i.e. “real”) user groups. This goes hand in hand with a stereotypical and prejudiced view of older people that leads to a distorted way of including them in the development process. Developers may therefore not be able to grasp and appreciate the real meaning and value of older users’

assessments of the new technologies and thus lead to non-desirable results.

- 3) Finally, we claim that using participatory methods that try to mediate between the involved, heterogeneous user groups – as was done in the case study, which on the other hand is typical for this type of participation – is leading to potentiate problems 1) and 2).

From our point of view, we suggest that more suitable strategies to achieve the goal of a successful pTD – which will be of use for the demands and societal challenges caused by the demographic shift – are:

- 1) To diminish the degree of participation in the first stages of the innovation process and dramatically increase usability trials in the middle stages, combined with a distinctive use of rapid prototyping.
- 2) To decrease, or even refuse intermediary/mediating methods. Instead, the aim should be for the most direct interaction possible between the user and the developer.

To develop this line of argument we will first relate the demographic shift to the need for participatory methods. After that we will present a case study that will serve as a showcase for how the flaws of participation that includes the (very) old as a user group could be revealed by combining three theoretical approaches – well known within Science and Technology Studies (STS) research designs – with an analysis conducted at a deep micro, ethnographical level. By quoting several exemplary short extracts of interviews and/or recorded discussions between the involved groups it is possible to frame even more crucial characteristics following the guidelines of grounded theory (GT), rather than simply framing characteristics using preconceptions of specific theories. In the final section, we will outline the conclusions deriving from the findings of the analysis of the case study, and explicate further the above-stated strategies for overcoming the identified flaws.

2. Demographic shift, technology development, and the demand for participation

As mentioned above, the demographic shift is functioning as an amplifier for some specific development methods in technology ([Kohlbacher and Herstatt, 2011](#); [Peine et al., 2014](#); [Kohlbacher and Hang, 2011](#)). However, developing products and technologies for older users is not an easy task ([Fisk et al., 2009](#); [Neven, 2010](#); [Bechtold and Sotoudeh, 2013](#); [Kohlbacher et al., 2011](#)). This is especially true for the process of user integration or participation, even though participatory approaches are now widely demanded ([Peine et al., 2014](#); [Clarkson et al., 2003](#); [Dienel et al., 2004](#); [Östlund, 2011a](#); [Schmidt-Ruhland and Knigge, 2011](#)).

On the one hand this is undoubtedly the effect of research agendas of government-funded projects – both on a national and a transnational (EU) level. On the other hand the link to a particular high degree of participation lies in the source itself, insofar as both older people and the “typical” care worker are seen as remote from technology rather than the opposite of having an affinity with technological innovations ([Blackman, 2013](#)). The irony of this increasing linkage is double-sided as we are going to show in this article: First it has its cause in stereotypical judgments of the involved, and second it leads for

² The development of care robotics is a very interesting case because it fulfills as an open-ended system all the main characteristics of a configurational technology ([Fleck, 1994](#); [Peine, 2009](#)), which, according to [Peine et al. \(2014: 200, 206\)](#) will have the most powerful impact on the socio-materially induced change of later life. At the same time, interest in research on care robotics is also increasing (see [Stahl et al., 2014](#); [Blackman, 2013](#)).

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