Dr. Liesa König

Liesa König is a design researcher and assigned lecturer. She studied communication design (Bachelor of Arts and Master of Arts) at the University of Applied Sciences in Konstanz. After graduating, she first worked as a communication designer. She then completed her doctorate under Prof. Dr. Brigitte Wolf at the University of Wuppertal in the Department of Design Theory: Methodology, Planning, Strategy. During her doctoral studies, she worked as a academic employee at Furtwangen University, then briefly as a user experience consultant and as a marketing & PR assistant and graphic designer at the German Youth for Understanding Committee in Hamburg. She has already gained extensive teaching experience at various universities of applied sciences in Germany and at the German University in Cairo at the GUC Berlin Campus.

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Opportunities for strategic design development to improve the quality of life in old age

Liesa König

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Abstract

This article deals with the topic of "Design for ageing in the context of demographic change in Germany". As ageing always takes place in social contexts, the ageing process is automatically integrated into societal, technical, political and social change processes. To this end, the needs of ageing people in the context of demographic change in Germany were examined using qualitative interviews with men and women aged 65 and older who live alone. The "variety management" approach developed on the basis of the results of this empirical study is presented below and placed in relation to the design.

Keywords

demographic change, diversity management, qualitative interviews, grounded theory

Due to demographic change, one in three people (34%) (cf. Statistisches Bundesamt 2011, p. 11) in Germany will be aged 65 or older by 2060. The ratio of younger generations to older generations will also change. In addition, the proportion of older and younger people living alone in Germany will increase in future (cf. Opaschowski 2008, p. 66 and 529). In order to enable older people to use their living environment independently, even in the context of demographic change, the design of the everyday living environment will play a key role in the future (cf. Lehr 2008, pp. 37-47). The term "design" refers to the creation of industrially manufactured goods and the communication measures for the sale of these products. Design mediates between technology and practical application, between production and use and between manufacturer and user (Wolf 2009, p. 20). Through this mediating role, design shares responsibility for the usability of the everyday environment in old age.
The research presented below was conducted as a dissertation under Prof. Dr. Brigitte Wolf at the Chair of Design Theory: Methodology, Planning, Strategy at the University of Wuppertal and published in 2019. The aim of the research was to close the existing gap in design research described below. To this end, new data was collected and evaluated using the empirical study "Everyday life in old age" presented below. The research result ("variety management") was then tested for using in a practical design process.

Classification of the research work in the design for older age

Within design, there are various approaches that are aimed at senior citizens as well as people with disabilities. These are universal design,

inclusive design, barrier-free design, accessible design, design for all and transgenerational or lifespan design.

All of these approaches pursue the goal of developing products and applications that can be used by all people regardless of their mental and physical abilities or age (cf. Gassmann and Reepmeyer 2011, p. 106). The design approaches mentioned also all deal with the compensation of disabilities or deficits caused by the ageing process. The special needs of older people aged 65 and older living alone with regard to the everyday, designed environment in the context of demographic change in Germany have not yet been investigated. In order to close this research gap, new data on the everyday lives of older people aged 65 and older in Germany was collected by means of an empirical study, as described below.

Older people, the ageing process, functional age and the needs of older people

For the purposes of the research, the term "older people" is defined as the age group of men and women in Germany aged 65 and older. In 2009, a fifth of people in Germany were already over 65 years old (cf. Statistisches Bundesamt 2011, p. 7). The proportion of older people in the population is higher in rural areas than in urban areas (cf. Statistisches Bundesamt 2011, p. 9). The ageing process is determined by various factors that vary greatly from person to person and is part of the individual life course. The individual phases of childhood, youth and adulthood have an impact on later life (Mayer and Baltes 1999). This lifelong process of ageing is heterogeneous. As ageing processes take different courses and show different

developmental trajectories, the physical and mental abilities in old age also vary, as do the individual's state of health and social integration. Although the individual ageing process is influenced by the earlier years of life, it is malleable. It can be supported, optimized and varied through appropriate and suitable interventions. This goes hand in hand with the contexts in which the ageing process takes place. These cultural, individual and social contexts offer opportunities to positively and successfully influence the ageing process (cf. Tesch-Römer 2012, pp. 3-4). These contexts are also shaped by the everyday, designed material and digital living environment. Through the mediating role of design, it has an influence on the social conditions of the ageing process. It therefore offers an opportunity to positively influence this process.
The age group of older people is a heterogeneous, highly diverse group. It differs *"in health and functional states, in ambitions and interests, in capabilities and support systems"* (World Health Organisation 2016, p. 23). This is because various factors and influences result in ageing people being younger or older than their biological age in terms of their physical or mental skills.
The term "functional age" describes although how different mental, emotional, and physical abilities are able to function. These individual abilities are not related to chronological age. Instead, they are influenced by social and biological factors that have an impact throughout a person's entire life (cf. Kaiser und Lehr 2012, p. 14).
In Germany, negative factors were associated with ageing until the 1960s. Until then, the deficit model of aging prevailed. This negative image combines the image of older people, whose deficits come to the fore and who are only uninvolved recipients and persons in need of assistance who receive benefits (cf. Kaiser und Lehr 2012, p. 15).

Research on ageing has now proven that this image does not correspond to reality. Scientific studies have shown that an active lifestyle in particular is associated with a long life (cf. Kaiser and Lehr 2012, p. 15) and that ageing is associated with the acquisition of skills (cf. Lehr 2010, pp. 36-37). The new image of ageing based on these findings is the activity model.

Active aging refers to the process of improving the opportunities available to people as they age, enabling them to maintain their health, participate in social life in their communities, and ensure their own safety. This process then leads to an improvement in individual quality of life (cf. World Health Organization 2002, p. 12).

Presentation of the research: field of research, methods of data collection and analysis, the sample

The empirical study "Everyday life in old age" was conducted to gain new insights. The research field of the study is men and women over the age of 65 who live alone in the district town of Offenburg or in the neighboring community of Ortenberg (Baden) in the Ortenau district of Baden-Württemberg in Germany. The qualitative research method of qualitative interviews in the form of an open survey was used to collect data.

The aim was to gain new, unknown insights into the object of research (cf. Hohl 2000, pp. 143-144) and to generate an independent, new theory (Hermanns, p. 114). The analysis of the collected data and the development of a new theoretical approach (see Hermanns, p. 114; Strauss 1998, p. 19) was carried out according to the methodology of "Grounded Theory" according to STRAUSS (Strauss 1998). The interview form used for the qualitative interview is based on the

understanding interview (Kaufmann 1999) and the qualitative interview (Kvale 2007) in terms of the methodical questioning technique and interview conduct (empathic interviewing). The ethnographic interview (see Friebertshäuser et al. 2013, pp. 445-446), the ero-epic interview (Girtler 2009) and aspects of interaction ethology (cf. Willems 2008, pp. 43-44) form the methodological basis for the design of the qualitative interview setting.
The sample itself consists of 14 participants (n = 14), seven of whom are women and seven of whom are men. The interviewees (m/f) were between 66 and 99 years old at the time of the survey, with an average age of 78.57 years. The female interview participants were between 67 and 85 years old at the time of the survey, making the average age of the female participants 74.43 years. The male interviewees were between 66 and 99 years old, making the average age of the male participants 80.72 years. The interviewees (m/f) all lived alone at the time of the survey, and their living situation varied. Four of the interviewees (m/f) lived in an apartment in an assisted living facility (at various facilities), three of the interviewees (m/f) lived in an apartment, five of the interviewees (m/f) lived in their own home, one of the interviewees (m/f) lived in an apartment with an additional room for a future care professional and one of the interviewees (m/f) lived in a private residential model for living in old age: a residential building for older people.

Methodological approach and implementation of the analysis

The analysis was carried out according to STRAUSS (Strauss 1998), STRÜBING (Strübing 2014a) and BÖHM (Böhm 1994) and was conducted according to the coding paradigm (see Strauss 1998, p. 46;

see Strübing 2014a, p. 25; see Böhm 1994, p. 132). The analysis went through the five steps shown in Figure 1: In the first step, open coding, the data was broken up (cf. Strübing 2014a, p. 16), examined, compared, coded, conceptualized and categorized (cf. Wiedemann 1991, pp. 442-444). The individual interviews were collected one after the other, transcribed directly (see Kuckartz 2010, pp. 38-48) and coded openly.

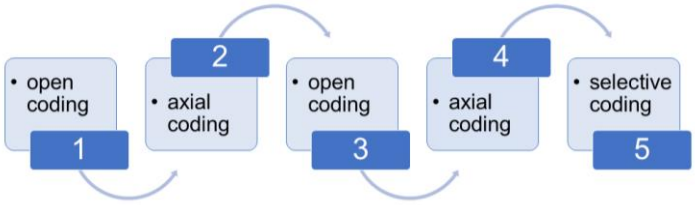

Figure 1: Methodological approach according to grounded theory

The analysis process ran iteratively and cyclically during all five analysis stages according to STRAUSS. The five steps mentioned consisted of many individual analysis cycles, in which not only the newly collected material, but also the already analyzed data were repeatedly included in the analysis process as required by STRAUSS (see Strauss 1998, pp. 46-47). According to STRAUSS (see Strauss 1998, p. 46), the findings from the coding process then flowed directly into the next interview (see Figure 2).

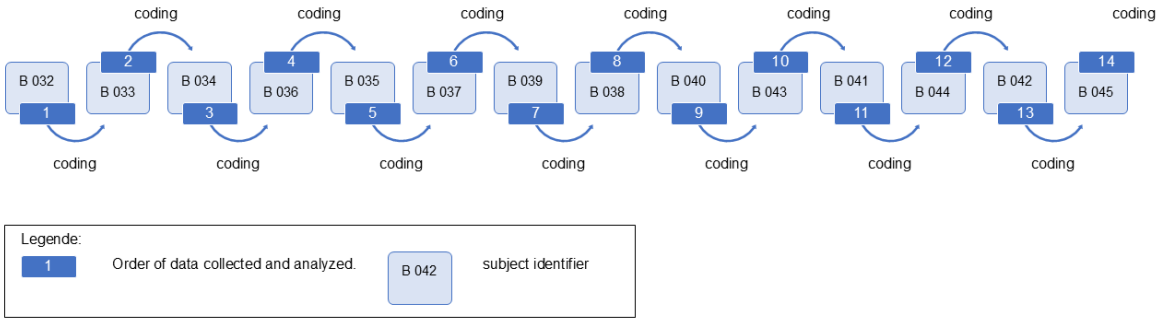

Figure 2: Order of analysis of the collected data

The conceptual process of coding according to grounded theory was, in STRAUSS's sense, a mental process that was closely linked to the collection and examination of new data (cf. Strauss 1998, p. 45). In the first phase of open coding, in STRAUSS's sense, the data were analyzed often, microscopically and in detail (see Strauss 1998, p. 61). To this end, each transcribed interview was, in STRAUSS's sense, coded in detail (see Strauss 1998, p. 61) multiples times and intensively, line by line, and memos were written (see Strauss 1998, pp. 46–47). These initial evaluations resulted in several codes that comprised preliminary content concepts.

In the second step, the data was then coded axially according to the coding paradigm developed by BÖHM (see Böhm 1994, pp. 130–134; see Böhm 2008, p. 479). In the process, the existing concepts were refined and differentiated (see Böhm 1994, p. 130). The axial coding revealed three phenomena : phenomenon variety, phenomenon alone, and phenomenon rest. In addition, approaches for further concepts were found, so that the data material was examined again openly for further concepts. As a result of this second round of open coding, the three phenomena phenomenon variety, phenomenon alone, and phenomenon rest were identified, along with further concepts that were found during the second open coding. The codes found up to that point were then dimen-sionalized. The phenomena found were recoded axially.

In order to formulate a model of the analysed phenomenon area or a theory which is anchored on the objects (cf. Böhm 1994, p. 134), the

data were finally coded selectively. Once the core category and its characteristics and dimensions had been defined, the other relevant categories were placed in relation to the core category. This procedure was carried out schematically and systematically in guideline of the coding paradigm (cf. Böhm 1994, p. 136). The result of the selective coding was the object-anchored theory of "variety management."

For quality assurance purposes, theoretical and analytical memos were written to accompany the research process (cf. Strübing 2014a, p. 88). The approaches and interim results found in the data were also presented for discussion to colleagues not involved in the research (m/f) by means of « Peer debriefing » (Flick 2006, p. 334) at the biannual doctoral colloquia held by Prof. Dr. Brigitte Wolf at the Chair of Design Theory at the University of Wuppertal (cf. Flick 2006, p. 334, see Strübing 2014a, p. 88). Throughout the research process, the data was examined using generative questions (cf. Strauss 1998, p. 50; for the exact wording of the generative questions, see Böhm 1994, p. 127; see Böhm 2008, pp. 477–478). Theoretical sampling was used as a further quality assurance measure. The targeted selection of cases for data collection allowed the theory formation process to be finely controlled in line with STRÜBING's approach (see Strübing 2014a, p. 88). The last two cases collected towards the end of the data collection phase were continuously analyzed in the subsequent phases after the completion of data collection in accordance with theoretical sampling. The data obtained could thus be integrated into the comparison strategies (minimal or maximal) according to the respective state of theory development (cf. Strübing 2014a, p. 30). In the course of the analysis, the mapping procedure in the sense of Adele Clarke was also used. At the beginning of the third analysis

phase (second open coding), additional situation maps were created (see Strübing 2014a, p. 108). The maps were created in accordance with STRÜBING (cf. Strübing 2014a, p. 110) parallel to the analysis process. They were developed in parallel with the creation of analytical memos and coding (cf. Strauss 1998, p. 33) in the ongoing analysis process, becoming increasingly detailed and comprehensive (see Strübing 2014a, p. 108). The mapping process resulted in a large number of different maps. In the course of the research, the maps developed their own character, which only partially corresponds to the situation maps, maps of social worlds, or position maps proposed by CLARKE (see Strübing 2014a, pp. 103–111). The maps created, which in their early version most closely resemble CLARKE's situation maps, represent the relationships between the individual categories and concepts, as well as their points of reference. The chosen mapping process significantly supported the theory-oriented analysis of the data, which generated theory in the course of the analysis process. By combining the essential methods of iterative-cyclical procedures, theoretical sampling until theoretical saturation, constant comparison using generative questions, the writing of analytical memos, and coding (cf. Strübing 2014a, p. 93; see Strübing 2008, p. 30) in combination with the mapping method according to CLARKE, a very dense analysis of the data in the sense of grounded theory was achieved. The analysis of the data was carried out in accordance with STRAUSS until the theory was saturated (cf. Strübing 2014a, pp. 32–33; see Böhm 2008, p. 484). The core category plays a special role in this process. The other categories are mostly related to the core category, which is why they are particularly dependent on modification and qualification (cf. Strauss 1998, p. 66). The theory of

variety management that was developed thus meets the quality criteria and requirements for a good grounded theory.

Results of the data analysis : categories found

The central categories (main categories) are the categories presented below: Variety, Rest, and Alone (see Figure 3).

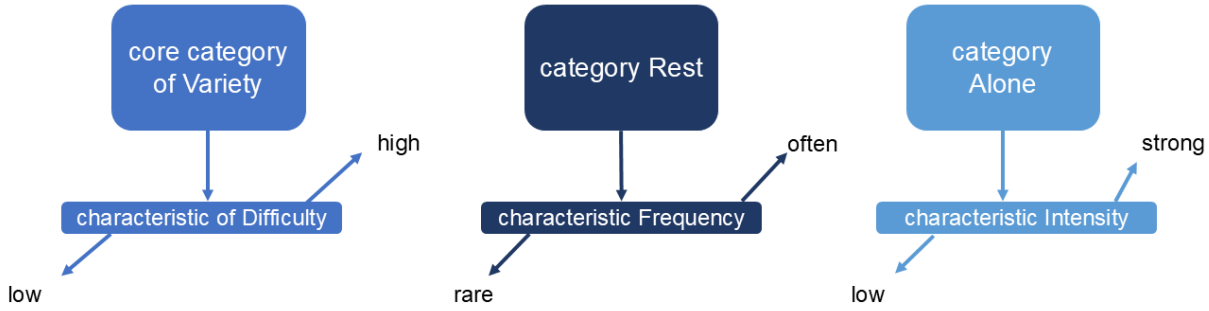

Figure 3: The categories and their characteristics

- **The core category of Variety with the characteristic of Difficulty in the dimensional expression low or high: The core category of Variety is characterized by the fact that the interviewees (m/f) are "thrown off" their everyday rhythm, i.e., their own pace, by external surprising or unpleasant factors. Variety is thus a change in one's own routine state of well-being or comfort zone. This variety represents a challenge of various kinds. It can consist of a temporal, emotional, physical, organizational, etc. change. The central characteristic of the core category Variety is the difficulty of the change : depending on the dimensional characteristic, the difficulty of the change is low or high.**
- **The category Rest with the characteristic Frequency in the dimensional form rare or often: The category Rest stands for moments of varying lengths of physical and/or mental rest in everyday life. These are used to recharge one's batteries. This**

does not refer to extreme, complete, permanent rest. Rather, rest serves the purpose of taking a break. The central characteristic of the category Rest is the frequency of rest: depending on the dimensional value, rest is needed often or rarely.

- **The category Alone with the characteristic Intensity in the dimensional form low or strong: The category Alone stands for being alone in everyday life. All interviewees (m/f) lived alone at the time of data collection. As a result, their everyday starting point was being alone in their daily lives. However, they differed in terms of whether they had a network that supported them in their aloneness or whether they felt alone (or left alone). The category of widowed people cannot be reduced to the loss of a spouse, but is supplemented by other factors such as the loss of friends of the same age and the lack of new contacts (both with people of the same age and with younger people). The central characteristic of the Alone category is the intensity of being alone: depending on the dimensional expression, the intensity is strong or weak.**

Variety management

Within the framework of selective coding, the three categories were in accordance with the coding paradigm according to STRAUSS (Strauss 1998, pp. 56–65; see Strauss 1991, p. 57) systematically and schematically related to the core category (Böhm 1994, p. 136). The result of the analysis according to grounded theory is the theory of variety management (see Figure 4). This describes how older people living alone manage variety in their everyday lives. The three categories already described—core category Variety, category Rest,

and category Alone — are relevant here. Looking at the three categories individually, without considering their relationships (relationships) to each other, the frequency of rest occurs in 9 out of all 14 cases. The low intensity of the category Alone also occurs in 9 out of 14 cases. The difficulty of the core category high Variety was also found in 9 out of 14 cases. When examining the relationships between the categories, relationships were found between all three categories. However, the strongest relationship is between the causal condition of variety and the strategy for coping with variety. The analysis also showed that the theory of variety management is not a closed process, but rather a cyclical model. This is caused by the fact that the strategy (category Alone) indirectly causes the core category Variety as a consequence. Coping with variety management is therefore a variety. This cyclical model is a special feature of the theoretical approach (see Figure 4).

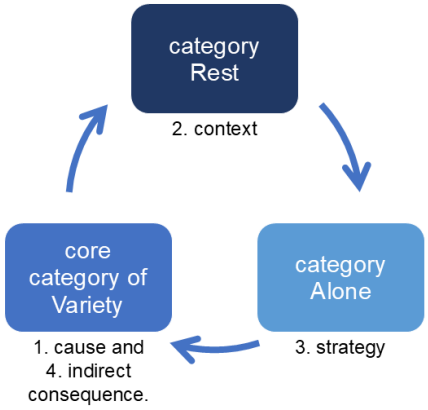

Figure 4: Theory of variety management (cycle model)

All cases examined, with their respective characteristics, could be classified in the detailed cycle model of variety management (see Figure 5). The causal condition for the occurrence of variety management (A) is the core category Variety with the characteristic

difficulty (low or high). The category Rest with the characteristic frequency (rare or frequent) forms the contextual conditions of variety management. The category Alone with the characteristic intensity (low or high) is the strategy for coping (actions for coping) with variety management.

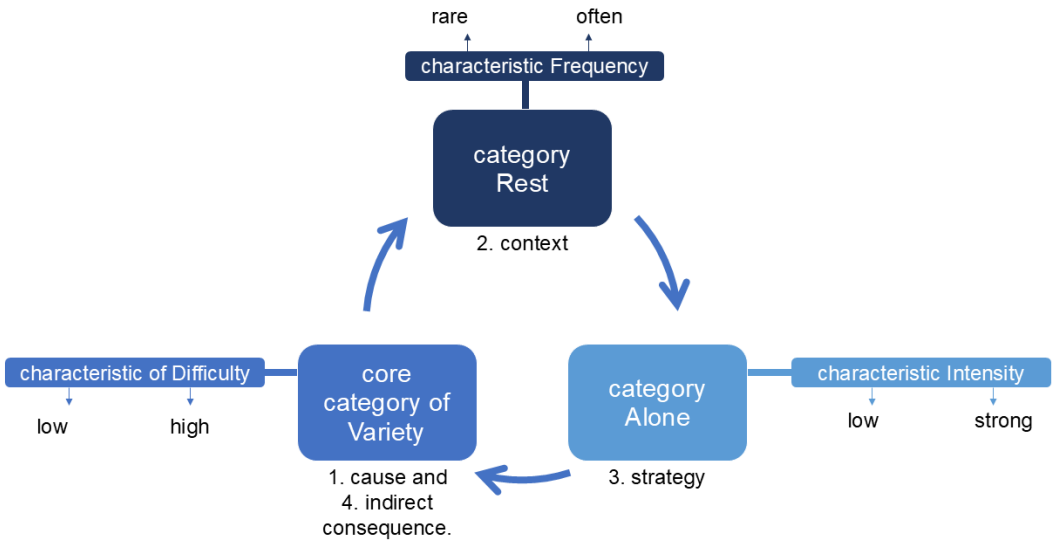

Figure 5: Detailed cycle model of variety management

In the analysis based on grounded theory, no cases were found in which variety management did not occur. The theoretical approach of variety management therefore has a broad scope, as all the case domains surveyed can be integrated into the approach. As the sample was compiled in a rural region in accordance with the expected future living conditions in the demographic change in Germany as described, the theoretical approach of variety management is thus integrated into the associated broader framework conditions. The individual cases in the sample could be assigned to two opposite poles (opposite pole I and opposite pole II) and two gradations (see Figure 6). These represent the changes in variety management associated with the ageing process within the theoretical approach.

The two gradations and the two opposite poles also show how the characteristics of variety management change within this ageing process. While on the one hand the difficulty of variety increases steadily, at the same time the need for rest or breaks increases, i.e. the frequency of the Rest category increases and the intensity of the Alone category also increases. These changes associated with ageing increase the challenge of managing variety in everyday life. The opposite poles and the two gradations also show that the cycle model of variety management is not static. As the characteristic values of the categories show, it can change within the ageing process. The cases that could be assigned to the two opposite poles each have the same characteristic values corresponding to the respective opposite pole. In these cases, the characteristic values of the categories of variety management are therefore identical. The cases that were found as gradations between the two opposite poles show slight differences in the characteristics of variety management. However, they could be assigned to two clusters (referred to as gradations).

Figure 6: Opposite poles and gradations

Opposite pole I. has proven to be the central model of variety management. The high difficulty of the core category of Variety in 5 out of 14 cases is the main causal condition for variety management. The frequency of Rest in 5 out of 14 cases is the essential element in

the context (interaction between the actors) of variety management. The low intensity of the Alone category in 5 out of 14 cases is the central strategy of the interviewees (m/f) for managing variety. Together with others (= low intensity of the Alone category), the high level of variety is therefore managed in the majority of cases. Rest breaks are often taken in the context of variety (= frequency of rest often). As the opposite pole I. shows, the central strategy for coping with variety is to cope with it independently but together with others.

Importance of variety management for the design

Variety (see core category Variety), which can evoke a sense of adventure, curiosity, excitement and joy for younger people, can become a burden of varying degrees in older people. Variety can also be caused by a new product design or a new technological development. In order to cope with this change, it is important to have opportunities to rest (see Rest category) while using the design. In the design context, these can be mental, physical or emotional breaks that are integrated into a service design, an interface design, a game design or even a product design. In the event that a variety cannot be managed alone (see Alone category), the design should already include support options. For example, this could be learning support, advice, personal contacts or even direct service offers. Due to demographic change, the number of men and women aged 65 and older in Germany will increase. This will presumably increase the need for design solutions based on the theoretical approach of variety management in all phases (opposing poles and gradations). In future, a design should therefore already be examined during the development process with regard to the associated variety, the category of Rest in context. For concrete design practice, this means:

- **before introducing a new design, check what variety it will create for the older target group,**
- **to check whether there are enough opportunities for users to take a break or rest while using the design,**
- **ensure that support services for managing variety are integrated into the design. It should be possible to access these services on their own initiative and easily according to their individual needs. Within a strategic design development process, it should be investigated from the outset what support can be provided by the design for managing variety (see Figure 7).**

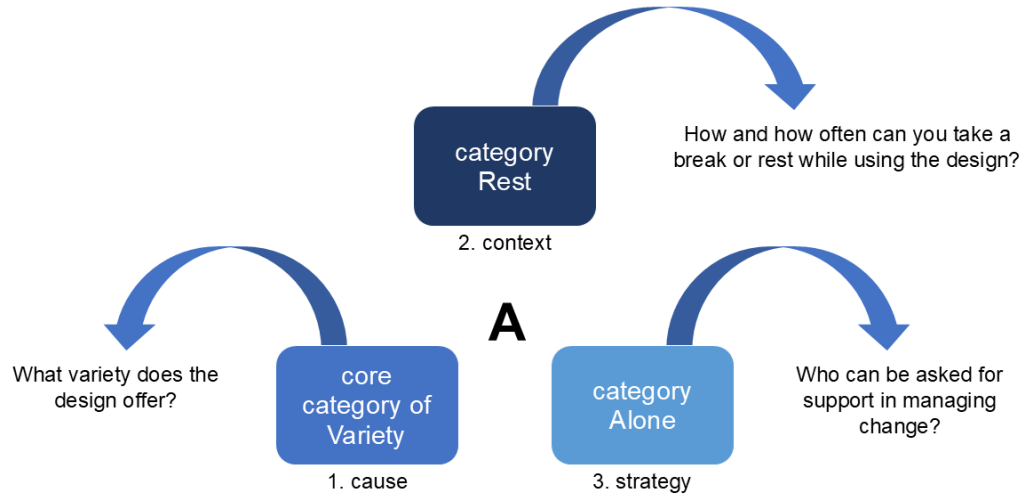

Figure 7: Importance of the core category Variety, the category Rest and the category Alone for the design

The integration of the three categories of the theoretical approach of variety management into the strategic design development process enables the cross-disciplinary development of design solutions that meet the age-specific needs of men and women aged 65 and older who live alone in the context of demographic change in Germany. In this way, they can contribute to independence in old age. The theoretical approach can be integrated into the strategic design

development process in all design disciplines. While previous design approaches have primarily focused on the physical limitations associated with old age, the theoretical approach of variety management is dedicated to the independent lifestyle of older people aged 65 and older who live alone and the associated use of the designed, everyday living environment. On the one hand, design solutions can be created in the future that minimize variety management. On the other hand, practical design solutions can be developed that enable the management of variety in old age. In practice, the approach can be used across design disciplines and industries in at least five different ways:

1. to review and then further develop an existing design (cross-disciplinary),

2. to develop a new design (cross-disciplinary) that is aimed at the mass market and therefore also includes the target group of people over 65 living alone in the context of demographic change,

3. to develop a design that is specifically aimed at the target group of over-65s living alone in the context of demographic change,

4. to introduce new technologies into a niche or mass market,

5. and for the strategic development of all other design components associated with the design (from product design to the associated services and marketing of the products).

Possible applications of variety management in design practice

The practical applicability of the theoretical approach of variety management was tested in practice once after the empirical research was completed. To this end, a service design was developed for an

everyday service for the elderly in the rural region of Ortenau in southern Germany. This is specially adapted to the needs of men and women aged 65 and older living alone and is based on the findings of the qualitative study "Everyday life in old age". The everyday service was developed using the Service Design Thinking strategy and innovation method (Stickdorn and Schneider 2016) and the Business Model Generation innovation method (Osterwalder and Pigneur 2011 and Joyce, A., Paquin, R., & Pigneur, Y. 2015). Four methodological tools were selected from the Service Design Thinking tools according to the four development stages of Service Design Thinking (exploration, creation, reflection and implementation) and implemented one after the other (cf. Stickdorn and Schneider 2016). These are the tools personas, scenarios, desktop walkthrough and triple layered business model canvas shown in Figure 8.

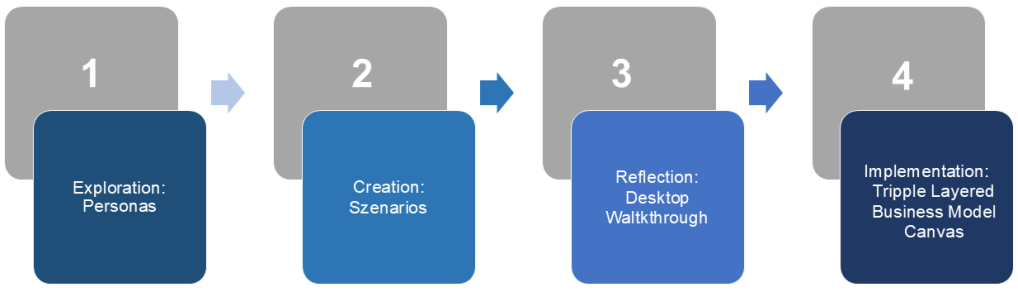

Figure 8: Chronological order of the tools used

The aim of the strategy development was to make the everyday lives of men and women aged 65 and older living alone in the rural region of Ortenaukreis easier through the services of a non-profit company. The theoretical approach of variety management was already used in the first development step - the personas. The personas were created according to COOPER (Noessel et al. 2014, Cooper 1999, cf. Cooper et al. 2010, p. 119). To construct the personas, the behavioral variables were first identified. The number of variables found can vary for

different projects (cf. Cooper et al. 2010, p. 119). Within the persona development for the service in old age, 21 behavioral variables were found for the role of a senior living alone. In contrast to classic personas, the behavioral variables of the personas also include the three categories of variety management: the core category Variety, the category Rest and the category Alone. This simple step enabled the theoretical approach of variety management to be incorporated into the strategy development. The result of the strategy development is the Triple Layered Business Model Canvas for a service for everyday life in old age in Ortenau.

Conclusion

Design (across disciplines) can support the independent lifestyle of ageing people in their own homes in the context of demographic change by building on the theoretical approach of variety management in design development. To achieve this, design development must take place at a strategic level. The involvement of users in strategic design development, for example through co-creation processes, is essential. The theory of variety management can be applied to strategic design development in all design disciplines. The aim of strategic design development based on the theory of variety management must be to ensure that variety can be managed according to an individual need for rest and according to an individual characteristic of the category Alone. It should be emphasized that - as the practical application of the findings has shown - the theory of variety management is particularly suitable for the development of products in the field of service design.

The results of the study also raise the question of the extent to which the theory of variety management can also be used for other older

target groups, such as people in need of care or affected by dementia or Alzheimer's disease. There is a need for further research in this area. Due to the high social relevance of the topic, the question also arises as to how the current and future findings of this field of research could be incorporated in greater depth into academic design training at universities and colleges in Germany.

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