

# Architecture

for People With Dementia

Planning Principles, Practices and  
Future Challenges

Gesine Marquardt and Axel Viehweger (Eds.)



Gesine Marquardt und Axel Viehweger (Eds.)

**Architecture for People With Dementia:  
Planning Principles, Practices and Future Challenges**

ISBN 978-3-86780-390-8

May 2014

# Index

---

Introduction   Gesine Marquardt & Axel Viehweger	5
People with Dementia in an Aging Society   Tom Motzek	6
Research, Needs of Users and Practice—A Contradiction? An Introduction to Evidence-Based Design   Tom Motzek	10
Dementia Friendly Environments: The Physical Dimension in Support of Psychosocial Wellbeing   Patrick Verhaest	16
Impact of the Design of the Built Environment on People With Dementia - An Evidence-based Review   Gesine Marquardt, Kathrin Büter & Tom Motzek	30
The Virtual Care Home   June Andrews	58
Designing Architecture in Dialogue with User Expertise   Iris Van Steenwinkel & Ann Heylighen	60
The Power of Nature and Outdoors: Architecture, Nature and People   Garuth Chalfont	62
The Design of a Demonstration Dwelling for Older Persons with Dementia   Joost van Hoof	70

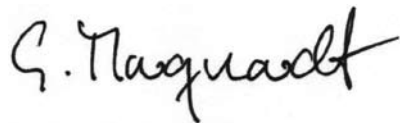
---

Housing for People with Dementia   Alexandra Brylok	76
Dementia-Friendly Hospital Architecture - What Lessons can be learnt from Long-Term Care Facilities?   Kathrin Büter	84
Multi-Sensory Rooms –Dwellings for the Elderly   Christoph Metzger	92
Additional Construction of a Quality led Care Oasis of KDA—a Pilot Project of the State of Saxony at ASB Senior Care Institution Willy Stabenau in Zwickau/Saxony: The Care Oasis in Zwickau   Matthias Sachse	100
Project of a Multi-Generation House “Goldene Sonne” (“Golden Sun”) in Oelsnitz/Vogtland-Saxony   Susann Martin	108
“Cura Maria” - Supported Housing Units for People with Dementia or with other Need of Assistance, Leipzig-Marienbrunn   Gilbert Then	110
Authors and Editors	112
Imprint	120

Providing care for people with dementia is an increasing societal challenge. In Nursing Homes, Assisted Living Facilities and Housing alike, dementia-friendly concepts are needed.

Whether it is possible to live well with dementia is determined by many factors, among which the architectural design of the living environment plays a major role. Dementia-friendly architectural concepts support the everyday activities, independence, and quality of life not only of people with dementia, but also their care givers. The following issues need to be addressed: Which living and care arrangements support best the needs of people with dementia? How can architectural and technological concepts support family care givers, professional care providers, and volunteers?

We hope you enjoy reading this book.



Dr. Gesine Marquardt  
Technische Universität Dresden



Dr. Axel Viehweger  
Dean VSWG

Only a holistic approach to the provision of care for people with dementia will allow the generation of economically sustainable concepts. These are especially in demand in light of the demographic changes our society encounters and will become a key issue for the future development of shrinking regions.

This book is a collection of the contributions to the symposium "Architecture for People With Dementia" which took place in Dresden, Germany, in May of 2014. It provides an overview on this important topic and includes new insights from research and care practice on the architectural design of various living and care arrangements of people with dementia.

## People with Dementia in an Aging Society

Tom Motzek, M.Sc.

Europe, especially Germany, is facing a rapidly aging society, caused by the increasing life expectancy and a constantly low birth rate; the percentage of elderly will grow even at a higher rate in the future.

With an increasing age, the risk of care necessity and the need for healing of illness is more evident in an aging population. For the society as a whole, dementia will become a growing challenge. Dementia is characterized by decreasing cognitive, social, and emotional capacities. Consequently, people with dementia are in need of an increasing

support for their daily life. Finally, they will become completely dependent on care services.

There are various forms of dementia. Nearly two thirds of all dementia cases are caused by Alzheimer disease, followed by vascular dementia and mixed forms of both types.

### In Europe, 9.2 Million People are Affected by Dementia

At present, there are 9.2 million people in Europe and 35.6 million people with dementia worldwide (Price et al., 2013). In Germany, approximately 1 million people are affected by this disease (Alzheimer Europe 2013, Ziegler & Doblhammer, 2009). The number of new German cases is estimated to be 256,000 people per year (Ziegler & Doblhammer, 2009).

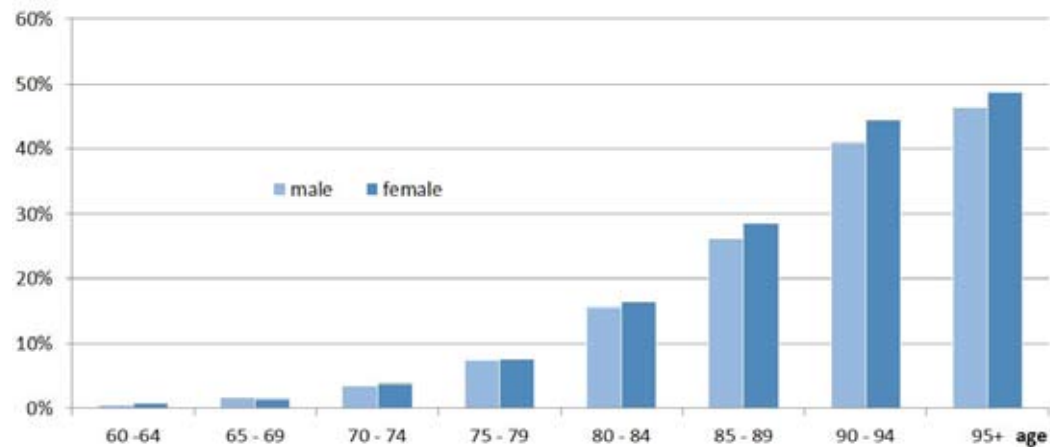


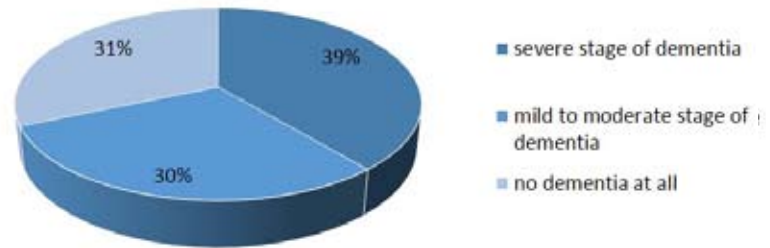
Figure 1: Rates of Prevalence by Age and Sex in Europe (facts from Alzheimer Europe, 2013).

As illustrated by figure 1, the frequency of dementia is increasing by age. Although the rate of people, aged 60 – 64 years, is still below 1% of the whole population, the percentage of people, aged older than 90 years, is increasing above 40% (Alzheimer Europe, 2013). In Germany, more men, aged between 60 and 70 years, are observed to be slightly more affected than women of the same age group. In total, the frequency of women's dementia is higher and more severe with an increasing age. Two thirds of all people with dementia are women.

In the future it is expected that the relation between men and women will be balanced, as life expectancy of men is increasing at a higher rate so that a male cohort is growing, which had not been affected anymore by the two world wars. Looking at the regional distribution, the rates of prevalence for an age group of older than 85 years in Eastern Germany are slightly higher than those in the western part. The reason might be more unhealthy lifestyle factors in Eastern Germany. These factors increase the risk for dementia and associated illness (Ziegler & Doblhammer, 2009).

### **68% of all Residents in Nursing Homes are People with Dementia**

Frequently, dementia is the main reason for the entry into a care home for elderly. A recent study shows that nearly 30% of all newly affected elderly, aged older than 75 years, are going into



*Figure 2: Prevalence of People with Dementia in German Nursing Homes (Data from Schäufele et al., 2013).*

a nursing home for the elderly. The period between the outbreak of dementia and the entry into a care institution is 4.1 years on average (Luppe et al., 2012). In care institutions, people with dementia generally are in the majority. As illustrated in figure 2, nearly two thirds of all residents in care homes are affected by dementia. Fifty-six percent of them have a serious stage of dementia (Schäufele et al, 2013). Also in private households, the percentage of people with dementia is significant. Nearly half of the people with private care in their households are affected by this mental illness (Schneekloth & Wahl, 2005).

### **High Increasing Rates of People in Need of Care in Nursing Homes**

The number of people with dementia will increase in the future. In Europe, this number will increase from 9.2 million in 2009 to 14 million in the year 2030 (Alzheimer Europe, 2009). For

Germany, it is estimated that the number of cases will be doubled and reach 2.3 million people in the year 2050 (Wancata et al., 2003).

Which consequences have to be considered for Germany in the future? In the study, "Pflege, 2013" ("Care 2013") it is estimated that there will be an increase of people in need of care from 2.3 million in 2003 to 3.4 million in 2030, which means an increase of 47.4%.

In a status quo scenario, it is illustrated (figure 3) that the highest increase (59.6%) is expected for inpatient care, followed by the professionally outpatient care (54.2%) and informal care by family members (35.7%). Regarding the necessity of care, the study concludes that care level 2 (middle level, according to German long-term care ins-

urance) will increase at the highest rate (51.2%), followed by care level 1 (lowest level) with a percentage of 45.6% and level 3 (highest level) with 45% (Rothgang, Müller & Unger, 2012).

### New Concepts and Chances of Services

Today, people with dementia are regarded as the most frequent and severe psychological cases of mental disease within the age group of elderly. Facing the increase of these affected people and, at the same time, the decrease of qualified care staff (Rothgang, Müller & Unger, 2012), new concepts and ways of services have to be found and tested. The wish of most elderly to remain in their own dwelling has to be respected as far as possible. Therefore, it is important to optimize the individual life and housing quality according to the residents' needs. This requires an improvement of local care provision close to their residential location, an improved mobility, the support of family members as well as volunteers of the civil society.

It is necessary to develop various and alternative forms of housing to correspond to the pluralistic needs of elderly.

In the field of care institutions and hospitals, there is an urgent need of conceptual and building modifications to cope with the needs of people with dementia in a better way.

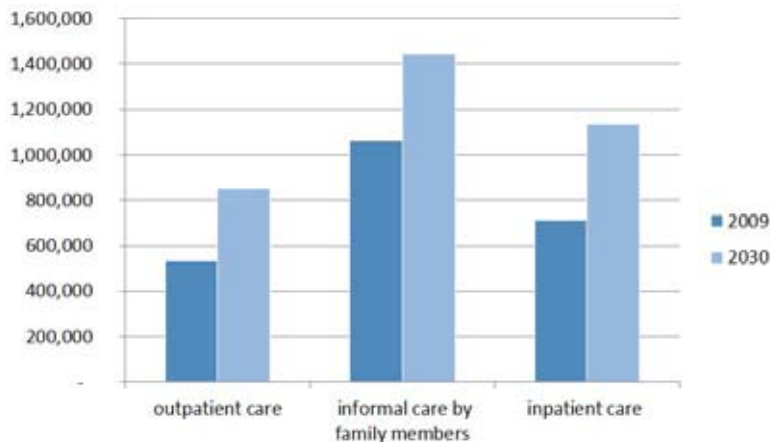


Figure 3: Projection of the Number of People in Need of Care from 2009 up to 2030 in Germany, Differentiated by Type of Care Service (Source: Rothgang, Müller & Unger, 2012).



## Literatur

- Alzheimer Europe. (2009). Cost of illness and burden of dementia in Europe - Prognosis to 2030. Retrieved from <http://www.alzheimer-europe.org/Research/European-Collaboration-on-Dementia/Cost-of-dementia/Prognosis-to-2030>.
- Alzheimer Europe. (2013). Prevalence of dementia in Europe. Retrieved from <http://www.alzheimer-europe.org/Research/European-Collaboration-on-Dementia/Prevalence-of-dementia/Prevalence-of-dementia-in-Europe>
- Luppa, M., Riedel-Heller, S. G., Stein, J., Leicht, H., König, H.-H., van den Bussche, H., ... (2012). Predictors of Institutionalisation in Incident Dementia □ Results of the German Study on Ageing, Cognition and Dementia in Primary Care Patients (AgeCoDe Study). *Dementia and Geriatric Cognitive Disorders*, 33(4), 282–288. doi:10.1159/000339729
- Prince, M., Bryce, R., Albanese, E., Wimo, A., Ribeiro, W., & Ferri, C. P. (2013). The global prevalence of dementia: A systematic review and metaanalysis. *Alzheimer's & Dementia*, 9(1), 63–75.e2. doi:10.1016/j.jalz.2012.11.007
- Rothgang, H., Müller, R., & Unger, R. Themenreport „Pfleger 2030“: Was ist zu erwarten—was ist zu tun. Retrieved from [http://www.zes.uni-bremen.de/uploads/GAZESse/201301/2012\\_Themenreport\\_Pfleger-2030.pdf](http://www.zes.uni-bremen.de/uploads/GAZESse/201301/2012_Themenreport_Pfleger-2030.pdf)
- Schäufele, M., Köhler, L., Hendlmeier, I., Hoell, A., & Weyerer, S. (2013). Prävalenz von Demenzen und ärztliche Versorgung in deutschen Pflegeheimen: eine bundesweite repräsentative Studie. *Psychiatrische Praxis*, 40(04), 200–206. doi:10.1055/s-0033-1343141
- Schneekloth, U. & Wahl, H. W. (2005). Möglichkeiten und Grenzen selbständiger Lebensführung in privaten Haushalten (MuG III): *Repräsentativbefunde und Vertiefungsstudien zu häuslichen Pflegearrangements, Demenz und professionellen Versorgungsangeboten*. Retrieved from <http://www.bmfsfj.de/doku/Publikationen/mug/01-Redaktion/PDF-Anlagen/gesamtdokument,property=pdf,bereich=mug,sprache=de,rwb=true.pdf>
- Wancata, J., Musalek, M., Alexandrowicz, R., & Krautgartner, M. (2003). Number of dementia sufferers in Europe between the years 2000 and 2050. *European psychiatry: the journal of the Association of European Psychiatrists*, 18(6), 306–313.
- Ziegler, U., & Doblhammer, G. (2009). Prävalenz und Inzidenz von Demenz in Deutschland – Eine Studie auf Basis von Daten der gesetzlichen Krankenversicherungen von 2002. *Das Gesundheitswesen*, 71(05), 281–290. doi:10.1055/s-0028-1119384

---

## Research, Needs of Users and Practice—A Contradiction? An Introduction to Evidence-Based Design

Tom Motzek, M.Sc.

Facing the background of demographic change, architecture is confronted with the challenge of developing new ways for supporting an increasing number of elderly. This question has to be raised: which building and design components of architecture are able to support an independent life and an optimal provision of care for the elderly? There are already quite many research results about this topic, concluded by different scientific disciplines. However, no adequate procedure has been developed so far, where the insights of empirical research could sufficiently be considered and integrated (Hamilton, 2011; Pati, 2011; Büter & Motzek, 2013).

Apart from the challenge of the transfer of scientific experience to practice, the essential question—how user needs and expectations can be fulfilled—is getting more and more important. This is especially true for building matters for people with dementia. Because of the symptoms of their illness, people with a severe level of dementia are not in a position or not able to communicate their needs for a residential environment. Therefore, there is a frequent danger in practice, that housing environment is just designed by

functional ideas of care staff or family members, so that the real needs of people with dementia are not always sufficiently considered.

The evidence-based design (EBD) is an approach to integrate research results and final users' needs into practice. EBD aims to transfer the best results from research and practice into architectural implementation (Rashid, 2013). This can be realized through a process, as illustrated in figure 1. According to the essential questions, and for the implementation of this process, it is necessary to take scientific studies into consideration. In a methodological way, the results of these studies are concluded and evaluated in systematic reviews. These reviews represent the research results at present. They show the extent of the efficacy of a certain intervention. However, the integration of these best insights of research work at present does not mean that only highly valued studies, so called "randomized and controlled studies," are considered. In most cases and especially in architecture, implementing these highly valued studies is not always possible (Marquardt & Motzek, 2013). For example, the evaluation of a building intervention in a nursing home is not possible, because experimental conditions cannot be created. For example, it is not possible to allocate the participants randomized in an experimental or control group. Therefore, interventions in architecture are frequently evaluated in the form of a before-

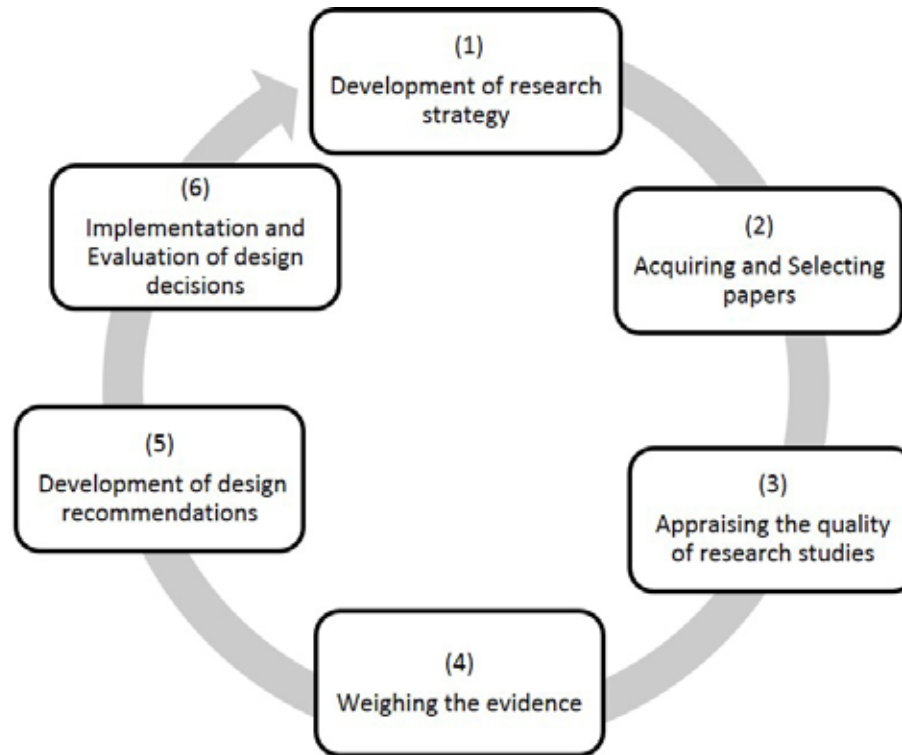


Figure 1: The Evidence-Based Design Process (adapted by Rosswurm & Larrabee (1999) and Brown & Ecoff (2011)).

and-after design. In reviewing these studies, it plays an increasing role in knowing how far the study succeeds in minimizing the distortions of the study design, implementation and evaluation. If this can be achieved, then it can be assured that the result can be considered as a reliable one. Furthermore, it is also important to determine how often and how definite an inter-

vention could be tested to be an effective one in various studies. This can offer important information about the credibility of study results. Another important role of EBD is presented by qualitative studies. These are frequently used when a new research topic has been described or has to be interpreted. Used methods are observation, interviews (often made with a small

group of persons) or group discussions. Based on the interpretative and explorative character, qualitative studies can offer important information about the conditions—how certain building solutions are evaluated and considered by individual groups. Especially in the field of building for people with dementia, qualitative studies with a good level of qualitative methodology are helpful to consider the needs of people with dementia.

Through the conclusion of systematic reviews, the effectiveness of individual interventions can be illustrated. But these reviews often do not offer concrete recommendations for the implementation of building interventions. For the transfer into practice, a further step is necessary. It is weighing evidence. Here, it is important to decide which result of systematic reviews can be implemented and how can it work. In this decision-making process, further questions have to be answered, such as the following: Which consequences—if they are wished or not—are caused by the intervention? How is the acceptance of the people with dementia? What implication on resources are expected? (Andrews et al., 2013). As far as possible, all concerned persons should be involved: people with dementia, residents, family members, professional representatives, and experts. With this consultation as basis, concrete planning and design recommendations can be elaborated. Then, these recommendations can be made available

for a wider public: through guidelines, handbooks for planning, and catalogues of criteria.

Through the integration of user groups into the process of evidence weighing, it is possible to involve the needs of all actors and especially the needs of future users (Büter & Motzek, 2013). Once implemented building decisions are evaluated and the results are published, the EBD process can be enriched by new expertise.

The process of EBD, as presented in this article, describes a scientific procedure. Certainly, an enlarged methodological and interdisciplinary know-how in the field of research methods will be necessary. The question has to be answered: how can the EBD process be integrated into the practical work of architects to solve a concrete building task? To solve a building related task, it is recommended to take the EBD process as an orientation, as illustrated in figure 1.

After formulating key scientific questions, secured insights, being up to date, should be looked for. For this purpose, systematic reviews should be used. They offer real good overview about the research area and are also able to answer questions about the effectiveness of individual building interventions. Studies of van Hoof, Kort, van Waarde, & Blom (2010) or Tilly & Reed (2008) are offering good information about building for people with dementia. Additionally, the general research work of Fleming & Purandare (2010) as well as Marquardt, Büter & Motzek (2014) are evaluating the methodological quality

of studies, thus giving information about the evidence, which means the effectiveness of building measures for people with dementia.

Taking the results of evidence weighing, which means the use of evidence-based guidelines, handbooks for planning or catalogues of criteria is more application orientated. However, at present, there are few evidence-based guidelines and catalogues of criteria for building in favor of people with dementia in German-speaking countries. Therefore, stronger efforts for interdisciplinary development of evidence-based guidelines are needed in the future. Until then, the use of general scientific research work has to be taken.

## Conclusion

The evidence-based design is an important methodology to combine user needs with secured research results. It is the declared aim of EBD processing to transfer secured and up-to-date research results into planning for practice and, thus, enable best decisions for the benefit of final users. To cover the needs of people with dementia, more adequate solutions are needed, which means further development of the procedure toward an evidence-based planning. Especially for the elaboration of guidelines and catalogues of criteria, it will be necessary to open architecture for a more interdisciplinary approach, for example, to integrate results from medical science, psychology, and gerontology.

## Literatur

- Andrews, J., Guyatt, G., Oxman, A. D., Alderson, P., Dahm, P., Falck-Ytter, Y., ... (2013). GRADE guidelines: 14. Going from evidence to recommendations: the significance and presentation of recommendations. *Journal of Clinical Epidemiology*, 66(7), 719–725. doi:10.1016/j.jclinepi.2012.03.013
- Büter, K., Motzek, T. (2013). Architektur in einer alternden Gesellschaft – ein methodischer Ansatz für eine nutzergerechte bauliche Umwelt. In von Hülsen-Esch, A., Seidler, M., & Tagsold, C. (Hg.), *Methoden der Alter(n)sforschung – Disziplinäre Positionen und transdisziplinäre Perspektiven* (pp.209-223). Bielefeld: transcript Verlag.
- Brown, C. E., & Ecoff, L. (2011). A systematic approach to the inclusion of evidence in healthcare design. *Health Environments Research and Design Journal*, 4(2), 7–16.
- Fleming, R., & Purandare, N. (2010). Long-term care for people with dementia: environmental design guidelines. *International Psychogeriatrics*, 22(07), 1084–1096. doi:10.1017/S1041610210000438
- Hamilton, D. K. (2011). Evolving roles for practice-based researchers. *Health Environments Research and Design Journal*, 5(1), 116–119.
- Marquardt, G., Büter, K., & Motzek, T. (2014). Impact of the Design of the Built Environment on People With Dementia - An Evidence-based Review. *Health Environments Research & Design Journal* (Accepted 28 Apr 2014).

- Marquardt, G., & Motzek, T. (2013). How to rate the quality of a research paper: introducing a helpful algorithm for architects and designers. *Health Environments Research and Design Journal*, 6(2), 119–127.
- Pati, D. (2011). A framework for evaluating evidence in evidence-based design. *Health Environments Research and Design Journal*, 4(3), 50–71.
- Rashid, M. (2013). The question of knowledge in evidence-based design for healthcare facilities: limitations and suggestions. *Health Environments Research and Design Journal*, 6(4), 101–126.
- Rosswurm, M. A., & Larrabee, J. H. (1999). A model for change to evidence-based practice. *Image—the journal of nursing scholarship*, 31(4), 317–322.
- Tilly, J., & Reed, P. (2008). Literature Review: Intervention Research on Caring for People With Dementia in Assisted Living and Nursing Home. *Alzheimer's Care Today*, 9(1), 24–32.
- van Hoof, J., Kort, H. S. M., van Waarde, H., & Blom, M. M. (2010). Environmental Interventions and the Design of Homes for Older Adults With Dementia: An Overview. *American Journal of Alzheimer's Disease and Other Dementias*, 25(3), 202–232. doi:10.1177/15333317509358885



---

## **Dementia Friendly Environments: The Physical Dimension in Support of Psychosocial Wellbeing**

**Patrick Verhaest**

### **Introduction**

People working in dementia care mostly don't worry that much about bricks and mortar, nor about furniture and curtains. They usually experience this physical side as a given edge and focus on their real job: making the best of life in relationship with the person with dementia. And of course, the quality of that care relationship is paramount. But the fact that the quality of the physical environment can also collide with the needs of people with dementia and thus the quality of life and the quality of the care relationship is underestimated. How to shape that environment is the subject of this article.

In a first section, we attempt to understand the mechanisms that are playing in the interaction between the person and his physical and social environment. Then we will discuss research findings in the field of dementia care that concretize these insights and make them manageable. Attention to sensory comfort increases the legibility because it puts into focus that what is significant for the person with dementia (section 2). Free moving space is obviously important, but it must be perceived as save by the carer and the

person with dementia, without frustrating barriers. Various measures can support this (section 3). Finally, caring for the physical environment sometimes provides some surprising powerful approaches for sustaining personhood (section 4). We end with a brief outline of the Flemish landscape, as explored by Stroobants and Verhaest (2012) (Section 5).

### **The person in relationship to his environment**

"We shape our buildings. Thereafter they shape us." This quote from Winston Churchill appeals the professional carer of people with dementia directly, as loss of identity is a central element in our phenomenological understanding of dementia. If buildings have indeed the power to create who we are, how big is then the impact for those people who become uncertain of their identity? Elderly usually have put their souls into their home through many decades. Their house and its interior are an expression of who they are or at least of how they want to be seen. They identify themselves with this house and all it contains. On the other hand, they also derive identity from the significance they attach to the house as it is. And at the same time they shape their lives within the possibilities and limitations offered by the house in its context. This in turn feeds the identity. But it goes beyond the 'content' of identity. Living creates a strong emotional attachment



through the many personal events, each adding a new layer of meaning to the environment. In addition, throughout the prolonged use of the rooms, a profound familiarity is created at a corporal level. No sound nor light is strange anymore and one moves through the building on autopilot. The space became embodied.

Therefore, the house, our house, is not simply the sum of spaces in which we can uphold ourselves. By inhabiting them and the experiences we gained there, these spaces got a significant meaning and therefore became places. Spaces have no meaning in themselves, but so do places. By inhabiting spaces they increasingly give us a sense of familiarity, security, ownership, control, comfort and identity. They are the safe haven where we come back to again and again. We belong to it. Our house became our home. (Rowles and Bernard, 2013) And isn't it, at the end, not just that what we have in mind in the care for people with dementia? Consequently, the question we have to deal with is therefore how spaces can become places for the person with dementia, taking into account his cognitive problems.

According to Rowles and Bernard (2013), gaining a sense of being at home in an unfamiliar place and therefore turning spaces into places, is a skill that we acquire in the course of our lifetime to a greater or lesser degree. However, the cognitive impairments caused by dementia are complicating this, reinforcing the importance of

our guidance herein and the care with which we create spaces. Therefore, it is important to understand what exactly constitutes the vulnerability of persons with dementia. Some models can help us in this.

The Competence Press Model of Lawton and Nahemow (1973) (figure 1) shows how behaviour and affect stand in relation to environmental press and competence. Environmental press is to be understood as the totality of both physical aspects (noise, light, visual stimuli, ...) and social aspects (behavior and expectations of others,

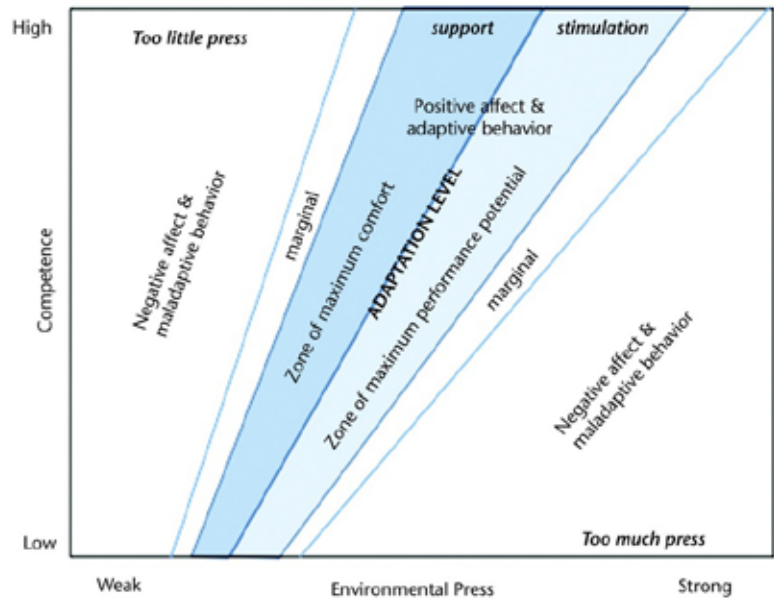


Figure 1: Competence Press Model according to Lawton und Nahemow (1973).

tasks one faces, ...) of the environment. When the environmental press is optimal, we see a positive affect and adapted behavior. But what is optimal, depends on the competence level of the person. Remark that the environmental press can both be too weak and too strong, which is then associated with inappropriate behavior and a corresponding negative affect.

The difference between people with high and low competence is only quantitative. So, the model applies for each of us. Therefore, we can empathize to what it means to have to live in an environment that stimulates too much or too little. Having to be too long in silence alone at home can be just as stressful as a busy birthday party with lots of kids. Reading a complex text succeeds much better in a quiet environment than in an environment full of stimuli. If the undesirable environmental press persists, it may become difficult to stay calm. But the level of press where the person has difficulty to maintain himself, is lower for the person with low competence. Remark, however, the narrow base of the zone where the person shows positive affect and adaptive behavior in Figure 1. It expresses that the range of situations someone with low competence can handle is much smaller. It is a very concrete way of understanding vulnerability.

It is understood that the cognitive deficits are an important factor in the increased vulnera-

bility. The increasing difficulties in orientation, the difficulty in experiencing the space as the own home, the clashing on boundaries people do not understand, ... Moreover, it is difficult to estimate how long a situation will last, or to understand how to control the situation or how to get rid of it. But on a more basic level, it concerns also about the increasing burden of misunderstood stimuli. Selecting and giving meaning to even simple visual or acoustic stimuli becomes less evident. So also irrelevant stimuli are demanding.

Moreover, the Progressively Lowered Stress Threshold Model of Hall and Buckwalter (in Finch & Ekkerink, 2007) teaches us that the tolerance for stress decreases. In fact, all environmental stimuli call somehow arousal or alertness. The body finds strength in this arousal to handle the situation. This is good, because it motivates. But when the arousal is too high, people can't handle it anymore. In dementia, that threshold is exceeded earlier, leading to inappropriate behavior.

Notice that not only the amount of stimuli is creating arousal, but also the misunderstanding of them and the anxiety and frustration as a consequence of not being able to handle a situation. So this makes clear that an important part of the measures that are discussed later on, are aimed to reduce these sources of stress and to prevent that people reach the stress tolerance threshold.

---

The competence press model of Lawton and Nahemow further makes a distinction between comfort and stimulation zone. In the comfort zone, the person feels relaxed, slightly under stimulated without leading to significant boredom. However, when the environment offers some stimuli that are inviting to do something or to explore, people are put into motion. They are challenged to use their potential and come in the stimulation zone. They feel interested and when the amount is not too big, they feel competent. This supports self-esteem. It is clear that the distinction between comfort and stimulation zone is hugely interesting and relevant to how to give shape at the way of living with the person with dementia and consequently to the design and features of the physical environment.

The above insights relate to very different aspects of the relationship between the person and his environment. Wahl and Oswald (2010) made a creditable attempt to integrate these and other models known from psychogerontological literature to get a more profound insight in the relationship between the elderly person and environment (Figure 2).

According to them, there are two core processes: belonging and agency. Processes of belonging entail mainly the cognitive and emotional evaluation and representation of physical environments. It concerns the feeling of being

connected to the place and the meaning the place has for the person. Here we recognize the process by which a space becomes a place, in terms of Rowles and Bernard.

Agency refers to the experience of being able to act purposefully, and the degree to which one experiences the environment as controllable. It also refers to the degree to which the environment compensates for needs and impairments of the person. Here we may situate the model of Lawton and Nahemow with his focus on level of competence.

According to Wahl and Oswald these two processes are in line with two major developmental tasks in old age: maintaining a sense of integrity in terms of identity and remain independent as long as possible. Experiencing control and sense of identity are also known as key factors for well-being.

The above frameworks relate to the living of the elderly in general. Recently, Radzey (2012) focused in her literature study and research on people with dementia. She found three dimensions of design criteria: autonomy, identity and stimulation. Autonomy and identity are very near to the two dimensions of the model of Wahl and Oswald, but specifically for people with dementia, Radzey found it was necessary to adjust a dimension that has to do with sensory stimulation (figure 3). Additionally, her model also shows how certain features ad to different dimensions.

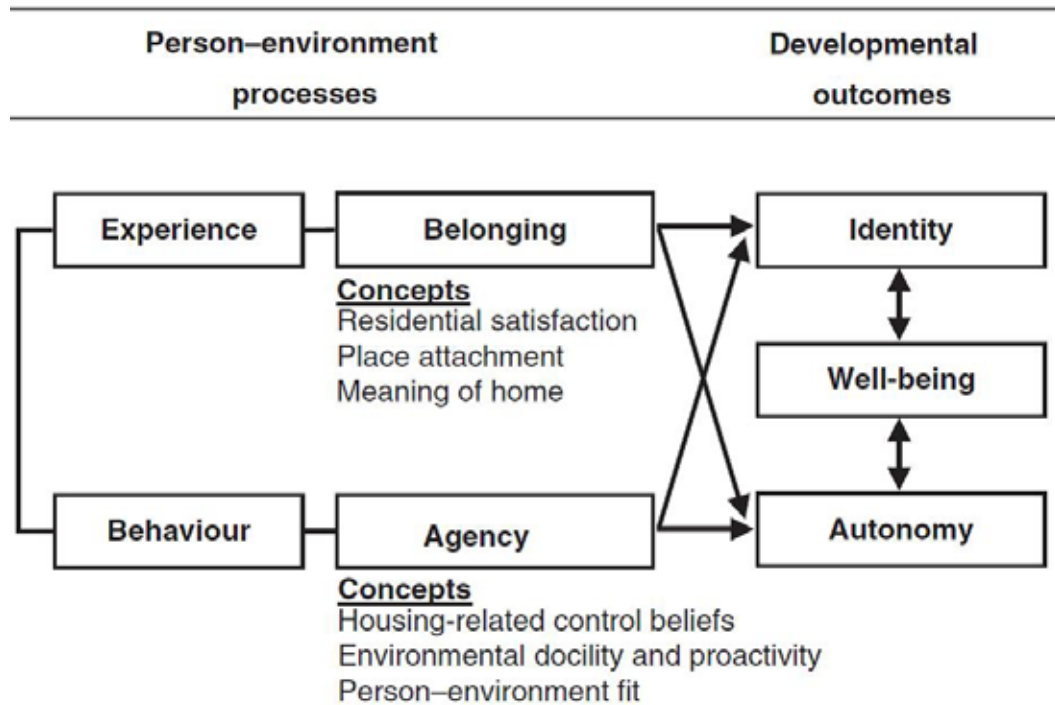


Figure 2: Overarching conceptual framework on person–environment relationships in later life (Wahl & Oswald, 2013).

In what follows we will have a closer look at a selection of concrete important findings of research in people with dementia. The overview is based on Stroobants and Verhaest (2012), where we made a distinction between sensory comfort, freedom of movement in an environment that supports orientation and a person enhancing environment. We believe that sensory comfort (section 2) and the extent to which the environment sustains orientation (section

3) contribute to the experience of agency. Freedom of movement (section 3) and an environment that supports personhood (section 4) will mainly promote the experience of belonging. In terms of the Competence Press Model: Sensory comfort and the orientation-supporting nature of the environment will contribute to bringing people in their comfort zone, the person enhancing character is the way in which we can give form to a stimulating environment.

---

## Sensory comfort

Pallasmaa (2005) explains in an interesting essay, that in the past architecture focused too much exclusively on the visual qualities of buildings, neglecting the potential of auditory and even olfactory and tactile characteristics for the quality of life in the house. Knowing that people with dementia are much more sense-oriented than an average user of buildings, architecture has a lot to win if it can enhance the sensory quality of buildings. One can think on the impact of the quality of materials on how the room is sensed or at the impact of positioning of spaces to sounds. Also attention to climate or creating opportunities to integrate natural fragrances are crucial. However, also in creating a dementia friendly architecture, the importance of visual aspects cannot be underestimated. Also control of acoustic stimuli is of paramount importance.

A key principle in creating a dementia friendly environment is to bring into light everything that's relevant for the inhabitant and to let disappear everything else to the background. So we can use all the principles of the psychology on perception to create clear 'figures' against background.

On the visual level, there has to be compensated for the (underestimated) perception problems that Alzheimer's disease entails: the increasing difficulties with color differentiation (especially in

cold colors), contrast and depth perception (Jones & Van der Eerden , 2008). It involves the deployment of sufficient contrast on the one hand and a simplification of the environment on the other hand. Furniture should contrast with the surrounding wall and floor, so white bathroom furniture on a white tile and pale floor is to prevent. It can seem surprising, but sufficiently contrasting furniture reduces shock incidents and thus decreases the risk of falling and increases the autonomic use of furniture. Figurative elements or complex patterns in wallpaper, floor coverings and curtains are to be avoided because they complicate the background. Shiny surfaces create unnecessary visual ballast and can sometimes frighten the person, such as a shiny floor that is perceived as wet or the reflection of himself in the window when it's dark outside.

A good overall light level supports these measures. It also involves fewer falls. De Lepeleire et al (2007), who found that only a small minority of Flemish residential care centers meet the light levels needed for people with dementia, make obvious that there is a world to win by increasing light levels.

Caring for the auditory quality of the building is at least as relevant for people with dementia. As the filtering of noise and habituation decreases, sounds increasingly intrude into the attention. If people with dementia can't handle the large amount of stimuli anymore, they become

severely impaired in any purposeful activity. Agitation increases. Limiting sounds, working with sound-absorbing materials and (very selectively) adding meaningful noises (for example music) to camouflage background noises are three strategies to apply. In the context of working on acoustic comfort, it can be very instructive to sit down for a certain time, being receptive for all the noises that are produced in the environment. Only then we remark the noises we don't remark anymore thanks to habituation. We become more aware of all sources of noise and of disturbing reverberation.

### Freedom of movement in an environment that sustains orientation

Feeling oriented is not evident anymore for most people with dementia and, in the course of the disease, people become extremely impaired in the possibility to find their way in even familiar areas. That does not mean that there aren't possibilities to learn to find the way. So planning a living environment for people with dementia demands to take account of this and to shape an environment that sustains orientation strategies and learning. The aim is to reduce both feelings of insecurity and aimless wandering behavior as a result of not



Figure 3: Zusammenfassung der nutzerorientierten Gestaltungskriterien (Radzey, 2012).

---

finding the target and preventing the crash on uncontrollable barriers such as closed doors.

Paying attention to this stems from the importance of freedom of movement. It sustains the physical exercise that people with dementia need, but more fundamentally it adds to the sense of control that is of overall importance in wellbeing. But with freedom of movement, also safety is a concern. Often, the balance between autonomy and safety is biased towards an over-attention to safety, aiming to avoid all risks of falling and getting lost. More and more however we understand how that undermines quality of life, both via a fast and dramatical increase of physical dependence and a sense of losing the sense of having control over one's life.

Obviously the question is how to reconcile safety and autonomy. An important key to this lies in creating environments where people are confronted with boundaries as less as possible. So, there should be as less boundaries as possible and the necessary boundaries should be unobtrusive. If we want to prevent frustration because of closed exit- and service doors, we can make them discrete among others by situating them out of side and continuing color and texture of the surrounding wall. In the garden, we can think of a natural looking fence, so that people don't feel being locked up. These measures add to the feeling of control over the environment.

Such limitation presupposes that we create attractive anchor points that are easy to find in the inner area, including the outside area (preferably a garden and at least a big balcony) that is situated in line with the living area. What makes them worthwhile is the subject of the next section, but good traceability implies good visibility and easy to recognize. It implies a maximum of open sight lines. If all important places are visible from the other places, a drastic reduction in the number of burdensome decision points can be realized. Complex ground plans are to be avoided, including continuous paths in a tour. It seems perhaps counterintuitive, but research shows that also in continuous paths, people with dementia have difficulties to find their way (Marquardt , 2007). If there are reasons to choose for a continuous tour, it is important to ensure differentiated meaningful goals at the end of each corridor.

On the other hand, each area or any part of an area should be well characterized so that the function of it can be understood intuitively. This excludes multifunctional spaces: they are difficult to understand for someone with dementia. A clear function of the spaces, such as the kitchen, dining or sitting area, facilitates the autonomous use of them (Charras et al , 2011). Moreover, such a differentiated environment leads to a differentiated use of it, which makes it possible to recognize the person as unique by

his unique pattern of space use. It helps to prevent that the individual disappears in the group, a risk in highly institutionalized environments. Therefore, Radzey (2012) underlines the importance of having choice in how to make use of the environment.

### **Personhood sustaining character of the environment**

With the importance of making choices, we touch to the perhaps most important aspect of a dementia friendly environment: It helps the person with dementia to maintain personhood. Providing a sensory comfortable and orientation-supporting environment is necessary, but it is not sufficient. Just as for a transit hall in a modern airport, it is still an empty environment that doesn't appeal. It can be very comfortably and even enjoyable to stay there for a couple of hours, but as it lacks possibilities to really engage, it becomes boring very soon. So, if people with dementia have to live in an environment that doesn't stimulate nor attracts, they risk to either completely withdraw or to be agitated by boredom. In fact, we then have to deal with an excess of disability: the dementia symptoms are bigger than may be expected on basis of the brain damage itself.

Dementia confronts us with our basic relational dependency. We can only be who we are because our social environment gives us that

chance. With the loss of possibilities and the loss of memory, people with dementia become insecure about themselves and who they are. It becomes difficult, for example, to hold on the roles from which one derives his identity. Good dementia care tries to remedy this, first of all by working on quality of relationships. More concrete, they guide towards meaningful use of time, facilitate reminiscence that restores contact with one's identity, pay attention to comfort during care. Well, all this will be reflected in the physical environment. But conversely a thoughtful design of this environment will also enable this kind of care and support.

Consequently, a dementia friendly environment invites to encounter, reminiscence, exploration and activity. A major focus here is the balance between opportunities for contact and opportunities for privacy. In an environment that does not provide sufficient privacy, people seem to avoid each other. It is a general human phenomenon which is also seen in public spaces. The common area in the nursing home needs therefore to afford sufficient opportunities to withdraw, for example in a somewhat secluded seating area (but that in one way or another still has visual contact with the living room). In line with that, also the free movement between the personal private room and the living room is an important issue. In conjunction with the importance of direct sight lines, more and more we



see that (part of) the private rooms are adjacent to the living room or can at least be seen from within the living room.

Within this safe social environment, well-chosen elements may encourage activity. It concerns very common objects, such as a kitchen towel, a sweeping brush or a basket for journals; and clearly profiled corners, such as a desk or a laundry and ironing area. It is essential however that they are integrated in a normal and thus recognizable manner in the living environment. If it is added in a too artificial way, the chance that it will be used autonomously is much smaller.

What initiates activity, often is also a catalyst for contacts. Consider what happens when you visit an animal in the house or the interest that can arise when someone shows captivated by a picture in a magazine. Recent research also revealed the importance of space around windows in that (Chalfont, 2008). Apparently the ever changing outside world triggers enough to stimulate interactions between people. It means that in addition to the traditional sitting area, which is often inwardly oriented, preferably there should also be foreseen in a number of seats at the window!

A dementia friendly environment provides people with dementia the necessary anchor space where they can develop the feeling to belong there. It is an environment that feels as right,

where one can have the feeling that it could be right if people say that they live there, even though they have difficulty to believe. The home-like character is the absolute prerequisite for this, without which the above measures lose much of their meaning.

### Exploring the Flemish landscape

With these insights in mind, we looked for good examples in Flemish nursing homes. It resulted in a book (Stroobants and Verhaest, 2012) with on the one hand reportages from 20 Flemish facilities and on the other hand an exploration of the above findings for which the good practices we found served as an example. The aim of the book was to sensitize to take the perspective of the person into account when planning the build environment or its rearrangement for people with dementia.

It is no coincidence that almost half of these twenty facilities are member of the Flemish network group on small scale living. Out of a strong motivation to understand and join needs of the residents with dementia and a strong care philosophy, they often managed intuitively to create an environment that meets the key points that emerge in scientific research on physical environment today!

Actually, they speak of "small scale and normalized living". In the definition by Van Audenhove et al (2003), not only the small scale (6 to 16

people with dementia) but also the normalized character of the environment is stressed. They speak of a recognizable living and care environment that approaches their home situation as much as possible. The people form a household together and the living environment is architectural and socially integrated in the surrounding neighborhood or municipality.

Currently, many facilities in Flanders have chosen to create groups of about 15 residents (instead of 30 or even 45 in the past). Smaller groups require a very big creativity within the current regulations. However, organization of care often remains on a higher scale (with for example big teams and thus ever changing staff members in the perspective of the resident) and also the principle of normalization is not always consistently put into practice.

Although “small scale and normalized living” should not be seen as the only desirable model, as stresses also the network group (Spruytte et al, 2009), the above sections will have made clear that small scale and normalization do have a major contribution to the dementia friendliness of the area. But what the projects of the network taught us above all is the power of a strong philosophy of care. If this is taken as a starting point for both the planning of the building and the organization of care, then they reinforce each other. Philosophy of care is a necessary starting point before you can plan a house. To mention

just one example: residents will use the garden autonomously more often when there is enough catalyzing action in the care itself. Or to put it on another way: if you plan to use the garden in a certain way, you will shape it along.

We didn't find a best or perfect practice in Flanders. This was perhaps to be expected, given the many other interests that must be reconciled with dementia friendliness (fire safety, budget, characteristics of the site, ... ). But we found of course good practices, or in every facility at least examples of good applications. It is difficult to summarize, but let's look at some remarkable findings.

The first small-scale living facilities in Flanders date from the 80s: De Bijster in Essen (1978), De Wingerd in Leuven (1982), Huis Perrekes in Geel (1986). They pioneered on world scale. What is striking is that all of them emphasized on the living in community. Use of the private room was therefore discouraged, by keeping it small and poorly accustomed as is a normal sleeping room. In De Wingerd and in Huis Perrekes, personal rooms were located on the top floor, in line with the prototypical Flemish house. Today, supported by research, and without doubt influenced by the fact that a new more individualized generation has arrived, we see clearly that the free movement between living room and the (upgraded) personal room

---

is more validated. The new facility of De Wingerd and plans for new parts of Huis Perrekes go along with that evolution.

Some facilities illustrate well the findings from research in their testimony about their views and experiences. Their testimony is inspiring and provides important practical evidence. De Maretak in Bruges, for example, learns us the importance of an open view and the irrelevance of continuous paths. The service block they have in the middle of the house was planned to create a walking circuit, based on the insights on that moment, but until now, no resident has used it in that sense. People prefer to stay seated together in a well situated (lots of light and view at the street), well-structured and homelike space.

Or De Wingerd, who decided to divide there groups of 16 residents into two groups of eight. They saw that these houses had a much more institutional character, with much more overall stimuli, than their houses of eight residents they had from the beginning.

The project of the association Menos is the latest development. The first house opened in April 2014. It serves as a pilot house before the other houses will be build. With a very unique floor plan, they possibly will add a new chapter to the development of dementia friendly architecture. So, the Flemish residential care facilities are waiting with great curiosity to know

their experiences and what can be learned from them. The main feature is that the eight private rooms and four well-differentiated common areas are mixed throughout the house. Every personal room is situated directly adjacent to one of the common spaces. In this way an optimal connection between personal private rooms and communal places is made. Moreover, corridors could be suppressed by which more square meters could be invested in common areas.

## Conclusion

In this article, we gave an overview of the major concerns in the design of a living environment for people with dementia. Sensory comfort and visibility play a major role in ensuring that the person continues to experience control. The environmental press is more in line with his competence. This prevents unnecessary frustration and arousal. So contributes to the experience of agency, one of the two pillars in the model of Wahl and Oswald.

The other pillar in this model, belonging, is fed by maximizing freedom of movement in an environment that is secured with unobtrusive boundaries and that, thanks to his overview and good legibility, the resident can be appealed in a meaningful way. Optimizing opportunities for exploration, meeting and activity offer opportunities to be able to gradually feel at home. And isn't that not just one of the most important indicators of quality of life?

## Literature

- Charras, K., Demory, M., Eynard, C., & Viatour, G. (2011). Principes théoriques et modalités d'application pour l'aménagement des lieux de vie accueillant des personnes atteintes de la maladie d'Alzheimer. *La revue francophone de gériatrie et de gérontologie*, 18(177), pp. 205-210.
- Chalfont, G. (2008). The living edge: Connection to nature for people with dementia in residential care. In: K.A. Froggatt, S. Davies & J. Meyer (red.): *Understanding care homes: A research and development perspective* (pp. 109-131). London: Jessica Kingsley Publishers.
- De Lepeleire, J., Bouwen, A., De Coninck, L., & Buntinx, F. (2007). Insufficient lighting in nursing homes. *Journal of the American Medical Directors Association*, 8(6), pp. 314-317.
- Jones, G.M.M., & Van der Eerden, W.J. (2008). Designing care environments for persons with Alzheimer's disease: visuoperceptual considerations. *Reviews in Clinical Gerontology*, 18, pp. 13-37.
- Lawton, M.P. & Nahemow, L. (1973). Ecology and the aging process. In: C. Eisdorfer and M.P. Lawton (eds). *The Psychology of Adult Development and Aging*. Washington, DC: American Psychological Association.
- Marquardt, G. (2007). *Kriterienkatalog Demenzfreundliche Architektur. Möglichkeiten zur Unterstützung der räumlichen Orientierung in stationären Altenpflegeeinrichtungen*. Berlin: Logos Verlag.
- Marshall, M. (1998). How it helps to see dementia as a disability. *Journal of Dementia Care*, 6(1), pp. 15-17.
- Pallasmaa, J. (2005). *The eyes of the skin. Architecture of the senses*. West Sussex: John Wiley & Sons. 80pp.
- Radzey, B.S. (2012). Eine nutzerorientierte Bewertung von Pflegeheimbauten für Menschen mit Demenz. Dissertation zur Erlangung des Doktorgrades Dr. oec. Troph., Giessen: Justus-Liebig-Universität. 333p.
- Rowles, G.D. & Bernard, M. (2013). The meaning and significance of place in old age. In: G.D. Rowles & M. Bernard (red.) *Environmental Gerontology. Making meaningful places in old age* (pp. 3-24). New York: Springer Publishing Company.
- Spruytte, N., Declercq, A., Herbots, B., Holvoet, M., Elst, R., Van der Flaas, J., Molenberghs, C., Kuylen, L., Lecoutere, J., Van den Heuvel, B. & Van Audenhove, C. (2009). *Kleinschalig genormaliseerd wonen voor mensen met dementie. Het antwoord op 101 vragen*. Antwerpen: Garant. 234 pp.
- Stroobants, E., & Verhaest, P. (2012). *Architectonica. Een thuis voor mensen met dementie*. Antwerpen: Epo en Expertisecentrum Dementie Vlaanderen vzw. 301 pp.
- Van Audenhove, C., Declercq, A., De Coster, I., Spruytte, N., Molenberghs, C. & Van den Heuvel, B. (2003). *Kleinschalig genormaliseerd wonen voor personen met dementie*. Antwerpen: Garant, 120pp.
- Vink, M., & Ekkerink, J. (2007). Gedrag. In: A.M. Pot, Y. Kuin, & M. Vink (red.). *Handboek ouderenpsychologie* (pp. 151-171). Utrecht: De Tijdstroom.

---

Wahl, H.-W., & Oswald, F. (2010). Environmental perspectives on ageing. In: D. Dannefer & C. Phillipson (Red). *The Sage Handbook of Social Gerontology* (pp. 111-124). London: Sage Publishers.

## **Impact of the Design of the Built Environment on People With Dementia - An Evidence-based Review**

**Dr. Gesine Marquardt, Kathrin Büter, M.A. & Tom Motzek, M.Sc.**

### **INTRODUCTION**

The number of people with dementia is increasing. In 2010 it was estimated, that 35.6 million people were living with dementia worldwide. This number is expected to double every 20 years, to 65.7 million in 2030 and 115.4 million in 2050 (Prince et al., 2013). Dementia is a syndrome due to the disease of the brain, which is characterized by a progressive decline in cognitive, social and emotional abilities. The deterioration in cognitive abilities includes impairments in memory, language and orientation. As a result, people with dementia need assistance with numerous daily tasks and they are, as the disease progresses, in increased need of care. Therefore, dementia is associated with a high individual burden for both people affected by the disease and their caregivers (van der Linde, Stephan, Savva, Denning, & Brayne, 2012). In light of these developments, strategies to create appropriate living environments for people with dementia are required.

An important strategy is the adaptation of the built environment to meet the needs of persons

with dementia. For already more than two decades, a great number of studies examining and reviewing the relationship between people with dementia and their environment has been published. They have shown that the physical environment can have a therapeutic effect on people with dementia, helping them to improve and preserve their well-being, behavior, independence, and functionality (Day & Carreon, 2000; Fleming & Purandare, 2010; Tilly & Reed, 2008). This development was accompanied by the rising of the evidence-based design (EBD) concept. The aim of the EBD is to systematically translate research findings into design practice and to expose the best available evidence in order to help architects and designers to make the right design decisions on users' behalf (Pati, 2011; Stichler, 2010a).

The aim of this paper is to not only review but also to rate the available evidence on environments for people with dementia in long term-care facilities using an evidence-based approach. It will provide architects and designers with credible evidence on which they can confidently base their design decisions. For researchers, this evidence-based approach will provide information on which environmental aspects have been well investigated and where there are gaps in the current state of the research.

## METHODS

### **Search strategy**

A systematic literature search was implemented according to literature review guidelines (Centre for Reviews and Dissemination, 2009). Retrieved were empirical studies published from 1980 until February 2013, written in English or German, and available on the databases MEDLINE, web of science, PSYINDEX, psycINFO, academic search, EMBASE, CINAHL and TOC Premier. The search was carried out using the keywords *dementia or alzheimer and architecture or interior design or environment design or facility design or "built environment" or „therapeutic design" or "environmental intervention" or "design intervention" or "physical environment"*. If applicable, MeSH terms were used. In addition, reference lists of review articles were hand searched for further empirical literature.

### **Study selection**

For inclusion in this review studies had to meet the following criteria:

- a quantitative or qualitative research was conducted,
- the influence of the physical environment on people with dementia was measured,
- study participants were people with dementia, and
- the participants were living in a long-term care facility.

On the basis of these inclusion criteria, titles and abstracts of articles were screened for relevance. If a clear decision on relevance could not be made, full texts were requested for a detailed analysis. Thereupon, full-text articles were screened for final inclusion by two researchers. Disagreements were discussed with a third researcher until a consensus was reached.

### **Data extraction**

Data on study objectives, study methods, dementia diagnostic criteria, outcomes, interventions, and results were extracted from all included studies using a standardized data sheet.

### **Appraisal of the methodical quality**

To compare the great number of studies with their diverse methodical frameworks a classification system is necessary. Assigning evidence levels on the basis of the study designs has been established in the field of medicine (i.e., Balshem et al., 2011) and expanded to evidence-based design (Hamilton, 2011; Pati, 2011; Stichter, 2010b). For this paper, an algorithm which guides the user through assigning hierarchical levels to research studies was used (Marquardt & Motzek, 2013).

Based on their methodological design, the studies included in this review were assigned to a level of evidence, ranging from 1 (high) to 6 (low). Excluded from this review were studies

arriving at level 1, which are systematic reviews or meta-analyses themselves. Further, professional or organizational standards and guidelines which are covered by level 4, and recommendations from manufacturers or consultants which arrive at level 6 were excluded from this review since they do not meet the inclusion criterion (1). Studies that were assigned to levels 2, 3a and 3b and 5 were included in this review. Level 2 encompasses experimental and quasi-experimental studies fulfilling certain requirements, such as a low attrition rate, intention to treat analysis, blinding, masked randomization, and consistent results. Studies which did not fulfill these criteria, as well as studies with a cohort design were assigned to level 3a. Studies at level 3b include qualitative research which is based on a literature review and a theoretical framework, reports a clear method and considers a diversity of views. Cross-sectional studies and case-control studies were also assigned to level 3b. Other qualitative research which did not meet the criteria of level 3b was included in the review and assigned to level 5. Disagreements in appraising the study quality were discussed by the study authors to reach a consensus. However, we would like to caution that a study which arrived at a lower level of evidence is not of lesser value. Not all research objectives in care environments allow for rigorous methods, such as randomized controlled trials, or large samples of participants.

### ***Data synthesis***

To summarize the results of this review, matrices were used. Listed in the columns, interventions/exposures were summarized into thematic groups and arrayed by evidence level. In the rows, all outcome variables were assigned to one of the following seven groups:

- behavior (e.g., agitation, eating behavior, psychiatric symptoms, violence, wandering),
- cognition (e.g., attention, cognitive performance),
- function (e.g., activities of daily living, falls, mobility),
- well-being (e.g., depressive symptoms, mood, quality of life),
- social abilities (e.g., engagement, social interaction),
- orientation (e.g., wayfinding), and
- care outcomes (e.g., medication, oral intake, physical restraint use, sleep).

In each field of the table, the number of icons shows the number of studies investigating the relationship, while the position and the color of the icon indicates whether an impact was found. For example, a black square placed on the top left side of a field means that a study with evidence level 2 established a relationship between the intervention and the outcome. This can be either a positive or a



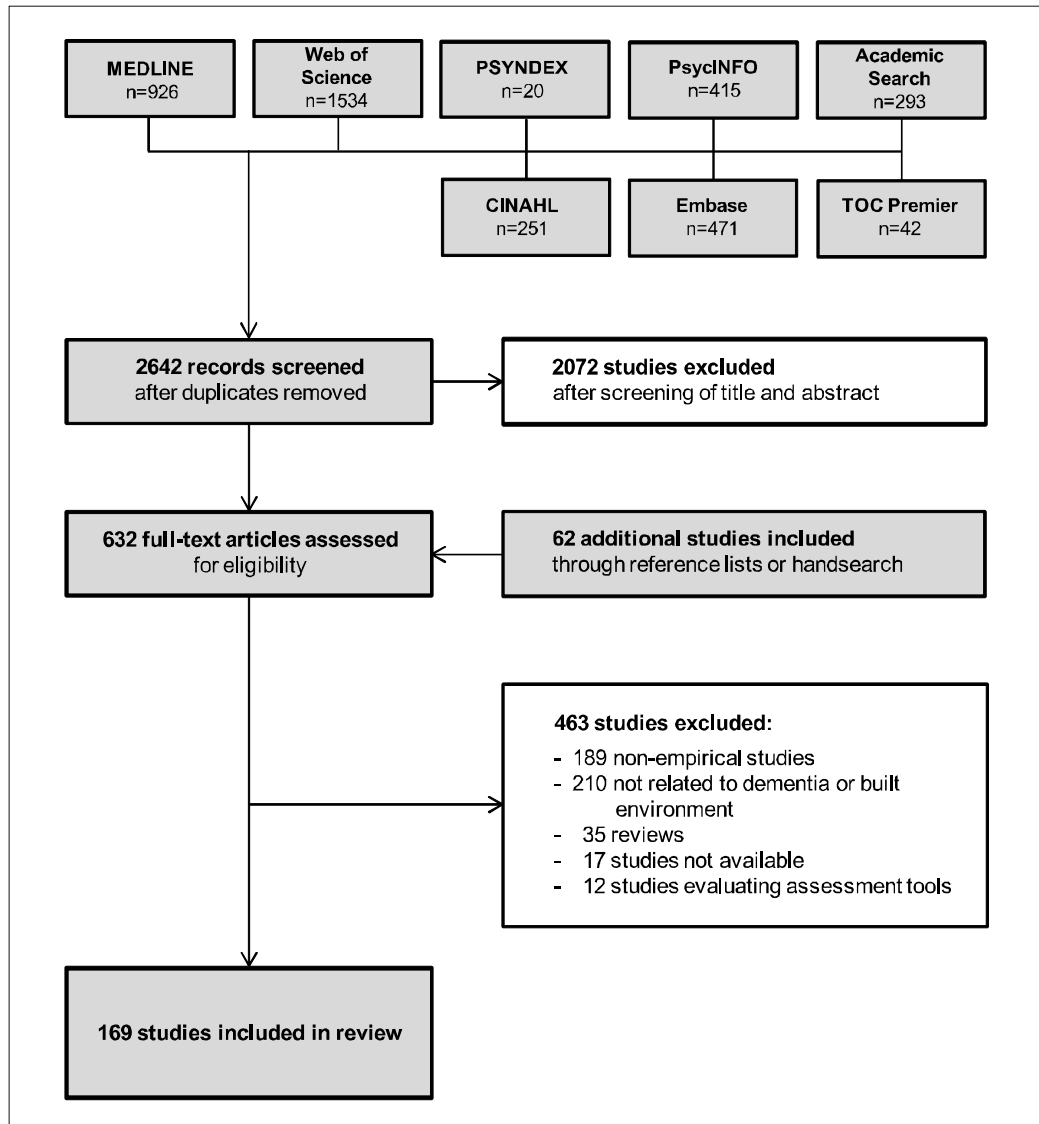


Figure 1: Search strategy and results of the systematic literature.

negative correlation. A white triangle aligned to the right, however, indicates that no effect was found.

## RESULTS

### ***Search results and study characteristics***

The search results of the systematic literature review are shown in figure 1. After eliminating duplicate articles 2.642 records were identified. 632 papers were found to fit the inclusion criteria. 62 of these were hand searched or taken from reference lists of identified articles. After scanning full texts, 169 studies were included for further detailed analysis. The majority of these studies were conducted in the United States (n=88). 19 studies were conducted in Canada, 18 in the UK, 33 in other European countries, 5 in Australia, and 6 studies in Asia. Regarding the evidence levels, 49 studies were considered to be level 2, 62 studies were categorized into level 3a, 40 studies reached level 3b and 18 articles were evidence level 5.

The identified studies were summarized into four main categories:

- basic design decisions,
- environmental attributes,
- ambiance, and
- environmental information.

Studies which aimed to assess the general influence of the environment on people with de-

mentia are not reported since it was impossible to derive precise design information. These studies either used environmental assessment tools (n=12; such as TESS-NH, Bicket et al., 2010); changed many or unclear characteristics of the interior design (n=2) or were qualitative studies, which asked nursing home staff about general environmental requirements (n=2). In addition, five studies which compared different facilities types without a clear objective are not reported.

### ***Basic design decisions***

This category covers the basic decisions that need to be made when designing long-term care facilities. Findings regarding special care units, small-scale environments, social density and the building layout will be presented.



### **Special Care Units**

Special care units (SCUs) within nursing homes offer specialized, segregated care for cognitively impaired residents. The features of SCUs are not standardized. Besides a dementia-sensitive social and physical environment they could include dementia-trained staff, special activities, and family involvement. Nineteen studies investigating SCUs were identified.

The outcome variable behavior was taken into account by eleven studies. Six studies rated as evidence levels 2 and 3a found a reduction on

		behavior	cognition	function	well-being	social abilities	orientation	care outcomes
special care units	2	■ ■ ■    △ △ △ △	■            △ △ △ △	△ △		△ ■		■ ■ ■ ■
	3a	■ ■ ■ ■ ■    △	△ △	■ ■            △ △ △ △		■		■ ■
	3b		△		△ ■	■		■ ■
	5							
small-scale environments	2	■ ■            △ △ △ △	■ ■ ■ ■    △ △ △ △ △ △	■ ■ ■ ■    △ △	■ ■ ■ ■    △	■ ■ ■ ■    △		△ ■ ■ ■
	3a	■            △	■            △	■ ■ ■ ■	■ ■            △ △ △ △	■ ■ ■ ■    △		■
	3b	■ ■	■ ■	■	■	■ ■	■	■
	5	■				■ ■		
low social density	2	■            △						△
	3a	■				■		■
	3b	■ ■            △				■ ■ ■ ■		■
	5	■ ■			■	■ ■ ■ ■		■
building layout	2	■					■	
	3a							
	3b	■					■ ■ ■ ■	
	5					■		

Table 1: Basic design decisions.

overall behavioral disturbances (Bellelli et al., 1998; Bianchetti, Benvenuti, Ghisla, Frisoni, & Trabucchi, 1997; Kovach & Stearns, 1994; Nobili et al., 2008), a reduction of catastrophic reactions, such as weeping, blushing, anger, agitation, or stubbornness (Swanson, Maas, & Buckwalter, 1993). Further, less verbally agitated behavior was found in SCUs (Wilkes, Fleming, Wilkes, Cioffi, & Le Miere, 2005). Five studies mostly at level 2 found no effect on aggressive behavior (Leon & Ory, 1999) and overall behavioral scores (Chafetz, 1991; Holmes et al., 1990; Mathew, Sloan, Kilby, & Flood, 1988; Wells & Jorm, 1987).

Six studies were identified dealing with the outcome cognition. Only one study at level 2 observed a moderate positive impact of living in a SCU on cognition in residents (Webber, Breuer, & Lindeman, 1995) while five studies at level 2 and 3a found no effect (Bianchetti et al., 1997; Chafetz, 1991; Holmes et al., 1990; Nobili et al., 2008; Wells & Jorm, 1987).

Function was an outcome investigated by eight studies. Results of three studies at level 2 and 3a show positive effects on basic function (Benson, Cameron, Humbach, Servino, & Gambert, 1987) and some improvements or preservation

of physical capacity (Rovner, Lucas-Blaustein, Folstein, & Smith, 1990). However, no changes in functional abilities were observed by six other studies at similar levels of evidence (Bianchetti et al., 1997; Holmes et al., 1990; Mathew et al., 1988; Nobili et al., 2008; Phillips et al., 1997; Webber et al., 1995).

The relationship between SCUs and well-being was investigated by two studies meeting evidence level 2 and 3b. The latter found higher quality of life in residents living in a SCU compared with those in traditional care (Abrahamson, Clark, Perkins, & Arling, 2012), the other did not (Wells & Jorm, 1987).

Three studies compared residents' social abilities in SCUs with those who lived in other care homes. One study at level 3b found more social contacts (Weyerer, Schaeufele, & Hendlmeier, 2010), and two studies which arrived at evidence levels 2 and 3a observed increased interaction among residents in SCUs (Kovach, Weisman, Chaudhury, & Calkins, 1997; Swanson et al., 1993).

In the context of SCUs seven studies investigated care outcomes. Stemming from evidence levels 2, 3a and 3b, six studies reported a positive impact on care outcomes such as less psychotropic drug use (Bellelli et al., 1998; Bianchetti et al., 1997; Nobili et al., 2008), a decrease in physical restraint use (Bellelli et al., 1998; Nobili et al., 2008; Webber et al., 1995; Weyerer et al., 2010), and less tube feeding (Cadigan, Grabowski, Givens, & Mitchell, 2012). However, one stu-

dy at level 3b found an increase in psychotropic drug use in SCUs (Mathew et al., 1988).



### Small-scale Environments

These environments offer care for a small number of residents, which varies between 5 and 15 people. Depending on their country of origin, these care concepts may be called group living, group houses, greenhouses or domus homes (Verbeek, van Rossum, Zwakhalen, Kempen, & Hamers, 2009). Often they were described as "homelike." This term usually characterizes an environment that includes a living room, kitchen, dining room, and homelike furnishing. Involving residents in daily activities or providing individually tailored care may further complete this concept. Thirty studies investigating small-scale environments were identified.

The outcome variable behavior was taken into account by ten studies. Five studies from all evidence levels reported that residents in small-scale and homelike environments were less behaviorally disturbed (Cutler & Kane, 2009; Malmberg & Zarit, 1993; Proctor, Brook, Blandford, & Billington, 1985) and less aggressive (Annerstedt, 1997). Another study at level 3b observed, that a large size unit was associated with an increased level of agitation (Sloane et al., 1998). However, four other studies at levels 2 and 3a did not find any changes in behavior in small-scale units (Dean, Briggs, & Lindesay,

---

1993; Suzuki, Kanamori, Yasuda, & Oshiro, 2008; te Boekhorst, Depla, Lange, Pot, & Eefsting, 2009; Verbeek et al., 2010a). One study at evidence level 2 even reported more behavioral disturbances in residents living in a small-scale environment compared with those in a traditional nursing home (Kihlgren et al., 1992).

Eleven studies investigated the relationship between small-scale environments and residents' cognition. Six of the studies, encompassing the levels 2, 3a and 3b, showed either an improvement or maintenance of cognitive function in small-scale units (Annerstedt, 1993; Dean et al., 1993; Kihlgren et al., 1992; Suzuki et al., 2008; Verbeek et al., 2010b) or that residents were more confused in larger units (Proctor et al., 1985). However, five studies, four of them at level 2, show conflicting results. They did not find a significant effect of small-scale environments on cognition (Dettbarn-Reggentin, 2005; Reimer, Slaughter, Donaldson, Currie, & Eliasziw, 2004; Saxton, Silverman, Ricci, Keane, & Deeley, 1998; Skea & Lindesay, 1996; te Boekhorst et al., 2009).

Eleven studies investigated the outcome variable function. Nine studies, mostly at evidence levels 2 and 3 a showed a beneficial impact of small-scale environments on the performance of the activities of daily life (Annerstedt, 1997; Reimer et al., 2004; te Boekhorst et al., 2009; Thistleton, Warmuth, & Joseph, 2012), functional status (Dean et al., 1993; Malmberg & Zarit, 1993; Suzuki et al., 2008; Verbeek et al., 2010b),

and motor function (Annerstedt, 1993) in residents. By contrast, only two studies observed no effect regarding functionality (Dettbarn-Reggentin, 2005; Saxton et al., 1998).

Well-being was investigated by twelve studies. Eight of them, predominately rated evidence level 2, showed a positive impact of small-size units on mood (Dettbarn-Reggentin, 2005; Rooij et al., 2012), quality of life (Funaki, Kaneko, & Okamura, 2005; Kane, Lum, Cutler, Degenholtz, & Yu, 2007; Nakanishi, Nakashima, & Sawamura, 2012; Reimer et al., 2004), and a decline in depressive symptoms (Dean et al., 1993; Kihlgren et al., 1992). Conversely, four studies, mostly at level 3a, did not find a correlation between the small-scale environment and symptoms of depression (Skea & Lindesay, 1996; Thistleton et al., 2012) or quality of life (Samus et al., 2005; Verbeek et al., 2010a).

Fourteen studies looked at the outcome variable social abilities. Twelve studies at all evidence levels observed a positive effect and showed that small-scale units improved residents' social abilities (Dettbarn-Reggentin, 2005; Kihlgren et al., 1992; Rooij et al., 2012) and communication skills (Campo & Chaudhury, 2012; Dean et al., 1993; Skea & Lindesay, 1996; Zimmerman et al., 2007). Furthermore, residents were more engaged in activities (Campo & Chaudhury, 2012; Morgan-Brown, Newton, & Ormerod, 2013; Smit, Lange, Willemse, & Pot, 2012; Smith, Mathews, & Gresham, 2010; te Boekhorst et al.,

2009). Only two studies did not observe an impact on interaction behavior (McFadden & Lunsman, 2010) or social withdrawal (Reimer et al., 2004).

In a study at level 3b small-scale units were found to provide residents with better orientation than larger units (Marquardt & Schmiege, 2009), whereas another study at level 2 did not establish this association (Reimer et al., 2004). Care outcomes were taken into account by four studies. Two studies at level 2 found that residents in small-scale units had lower drug use than residents in traditional nursing homes (Annerstedt, 1993, Annerstedt, 1997). Another study at level 3a showed a decline in blood pressure after residents moved to smaller sized units (Thistleton et al., 2012). Furthermore, a study at level 3b found that small-size units can create opportunities for individualized care and attention to residents' personal needs (van Zadelhoff, Verbeek, Widdershoven, van Rossum, & Abma, 2011).



### Social Density

Social density is a term describing the number of people per surface area, or, respectively, the number of people per room. The impact of social density on people with dementia has been investigated by thirteen studies.

Eight studies looked at the outcome variable behavior. Four studies distributed over all le-

vels of evidence found a decrease in disruptive behavior in residents who were relocated from a high to a low density unit (Morgan & Stewart, 1999; Morgan & Stewart, 1998a), a reduction of aggression (Morgan & Stewart, 1998b), and a more active and engaged behavior in residents in double versus in multi-occupancy bedrooms (Hsieh, 2010). These findings are supported by two studies which found more violent behavior in units with a higher number of residents (Isaksson, Astrom, Sandman, & Karlsson, 2009; Nelson, 1995). Two studies at level 2 and 3b could not find any impact on neuropsychiatric symptoms (Zuidema, Jonghe, Verhey, & Koopmans, 2010) or confused reaction behavior (Elmstahl, Annerstedt, & Ahlund, 1997).

One study at evidence level 5 found higher well-being in residents having moved from shared to private bedrooms (Morgan & Stewart, 1999).

Social abilities were investigated by seven studies. One study at level 3a observed residents to be more engaged in small groups of people (Cohen-Mansfield, Thein, Dakheel-Ali, & Marx, 2010). Further it was found in a study at level 5 that residents had fewer conflicts among each other (Morgan & Stewart, 1999) and, in a study at level 3b, that they were more engaged in social interaction in double versus in multi-occupancy bedrooms (Hsieh, 2010). In shared bedrooms that provided more privacy, fewer conflicts were observed in a study at level 5 (Cutler & Kane, 2002). However, three studies

report disadvantages. Two studies at level 3b and 5 found that fewer opportunities for social interaction were provided and that the stimulation of residents was reduced (Hsieh, 2010), even causing boredom (Morgan & Stewart, 1999). Another study at level 3b states, that social withdrawal scores tend to be lower in larger facilities with more residents (Zeisel et al., 2003).

No association between social density and residents' orientation was found in a study rated evidence level 2 (Elmstahl et al., 1997).

Three studies found a relationship between social density and care outcomes. In a study at level 3a it was found that private bedrooms led to improved sleep (Morgan & Stewart, 1998b). In a qualitative study at level 5 crowding was avoided by increasing the number and size of bathrooms which made it easier for staff to assist with toileting (Hutchinson, Leger-Krall, & Skodol Wilson, 1996). Units with a higher number of residents and a low staff – resident ratio had higher drug prescriptions than units with a lower number of residents, as it was found in the study at level 3b (Zuidema, Jonghe, Verhey, & Koopmans, 2011).



### **Building layout**

Decisions on the buildings spatial layout are among the first steps when designing care environments. This process involves choosing the size

and shape of hallways and distributing resident's rooms as well as common spaces. Six studies investigated the impact of the building layout on people with dementia.

A negative impact from long corridors on residents' behavior was found in two studies. The one at evidence level 2 found that in this layout residents displayed higher restlessness and anxiety (Elmstahl et al., 1997), while the study at level 3b additionally found more violence among residents (Isaksson et al., 2009). A central location of the nursing station and sightlines between relevant places were identified as influential for prompting or supporting informal social interactions, as one study at level 5 found (Campo & Chaudhury, 2012).

Four studies established a relationship between the building's layout and the residents' orientation. Direct visual access to relevant places, the integration of reference points, and the implementation of several zones with a unique character were identified as helpful for resident's wayfinding abilities by all four studies mostly at level 3b (Elmstahl et al., 1997; Marquardt & Schmieg, 2009; Netten, 1989; Passini, Pigot, Rainvillee, & Tétrault, 32). In a study at level 3 b it was found that a straight circulation system supports residents to better find their way (Marquardt & Schmieg, 2009). Further supportive design features are a small number of doors and exit points (Netten, 1989), as well as the spatial proximity of communal spaces, as the study at level 2 pointed out (Elmstahl et al., 1997).

		behavior	cognition	function	well-being	social abilities	orientation	care outcomes
lighting	light therapy	2	■ ■ ■ ■ △ △ △ △ △	■ ■ ■	■	■ ■ △ △		■ ■ ■ ■ ■ △ △ △ △ △
		3a	■ ■			△ △		■ ■ ■ ■
		3b		■	■	■		
		5						
	daylight control	2	■	△	△	△		△
		3a						
		3b						
		5						
	overall light level	2			■			■
		3a	■					■
		3b	■			■		
		5						■
noise level	2		△			△	△ △	
	3a	■				■	■	
	3b	■ ■ ■ ■ ■			■	■		
	5	■					■	
room temperature	2							
	3a							
	3b	■	△		■			
	5	■						
use of color, contrast, patterns	2			■			■ ■	
	3a	■		■		■	■	
	3b					■		
	5	■					△	

Table 2: Environmental attributes.



### ***Environmental attributes***

This section encompasses all interventions and design decisions which concern the issues of lighting, noise levels, temperature, and the use of color, contrasts and patterns in care home settings.



#### **Light Therapy**

Exposure to bright light has been studied as a non-pharmacological treatment of people with dementia.

Light therapy is provided through a high-intensity light source, such as light boxes or ceiling-mounted luminaires. Overall twenty-one studies were identified dealing with light therapy.

Nine studies investigated the relationship between light therapy and behavior. Five studies, assigned to evidence levels 2 and 3a, found a positive correlation between bright light and negative behavioral outcomes, such as agitation, restlessness or aggression (Dowling, Graf, Hubbard, & Luxenberg, 2007; Lovell, Ancoli-Israel, & Gevirtz, 1995; Riemersma-van der Lek et al., 2008; Thorpe, Middleton, Russell, & Stewart, 2000; van Hoof, Aarts, Rense, & Schoutens, 2009a). However, four studies, all of them at level 2, observed that behavior was not affected by light therapy (Barrick et al., 2010; Lyketsos, Lindell Veiel, Baker, & Steele, 1999; Ouslander et al., 2006; van Hoof, Schoutens, & Aarts, 2009b). A positive impact of light therapy on cognition was observed by three studies, two at level 2

and one at level 3b (Graf et al., 2001; Nowak & Davis, 2011; Riemersma-van der Lek et al., 2008). They found residents being exposed to bright light, to be, for example, more awake, verbally competent, or, to even display an increase in MMSE total scores. Two studies on cognition, one at level 3b and another at level 2, showed improvements in functional performance (Nowak & Davis, 2011; Riemersma-van der Lek et al., 2008).

The outcome well-being was measured by seven studies. Two studies, one at level 2 and another at 3b, found out that the exposure to bright light improves mood (Nowak & Davis, 2011; Riemersma-van der Lek et al., 2008). Further, a reduction of depressive symptoms was found in a study at level 2 (Dowling et al., 2007). However, three other studies at level 2 and 3a showed no results on residents' well-being (Hickman et al., 2007; Lyketsos et al., 1999; Ouslander et al., 2006). Another study stated that there were no side effects of a bright light intervention (Sloane et al., 2005). Care outcomes were investigated by thirteen studies. Positive care outcomes such as improvements of sleep or of the circadian rhythm were observed by eight studies at levels 2, 3a and 3b (Ancoli-Israel et al., 2003; Lyketsos et al., 1999; Mishima, Hishikawa, & Okawa, 1998; Mishima et al., 1994; Satlin, Volicer, Ross, Herz, & Campbell, 1992; Sloane et al., 2007; van Hoof et al., 2009a; van Someren, Kessler, Mirmiran, & Swaab, 1997). One study at level 2 found a

positive impact of bright light on the reduction of sleep disturbances in combination with melatonin intake (Riemersma-van der Lek et al., 2008). Nevertheless, four studies at level 2 did not find any effects of bright light on sleep (Dowling et al., 2005; Dowling et al., 2008; Ouslander et al., 2006; van Hoof et al., 2009b).



### Daylight Control

Light interventions were used to imitate or to control naturalistic forms of light. This domain is covered by two studies at evidence level 2.

In one study, specific lighting was used to maintain a constant level of light intensity and to control the effects of natural daylight changes across the afternoon. This intervention led to improved behavior (La Garce, 2004). No effects on behavior, cognition, depression, or sleep were found in a study investigating the impact of a dawn-dusk light therapy, which simulates outdoor twilight transitions (Fontana et al., 2003).



### Overall Light Level

Another lighting intervention is to increase the overall light level, which was investigated by five studies.

Two studies investigated the outcome behavior. One study at evidence level 3a found that increasing the lighting level at the dining table

and enhancing the visual contrast of tableware resulted in decreased disruptive behavior (Koss & Gilmore, 1998). However, another study at level 3b found that brighter lighting caused more wandering (Algase, Beattie, Antonakos, Beel-Bates, & Yao, 2010).

That a higher overall light level leads to improved function was found in one study at evidence level 2. (Brush, Meehan, & Calkins, 2002).

Lower lighting conditions were associated with more signs of negative affected mood, and thus lower well-being, as a study at level 3b found (Garre-Olmo et al., 2012).

Three studies investigated the impact of the overall light level on care outcomes. An increased light level and table setting contrast (using navy blue tray liners and white plates) was found to improve oral intake, as a study at level 2 and another at level 3a found (Brush et al., 2002; Koss & Gilmore, 1998). By contrast, a study of evidence level 5 associated improvements in oral intake with lower lighting and higher noise conditions (McDaniel, Hunt, Hackes, & Pope, 2001).



### Noise Level

The impact of ambient noise on people with dementia was investigated by twelve studies.

Seven studies examined the relationship between noise levels and behavior. Five studies at evidence levels 3b and 5 found that high le-

vels of noise were associated with increased wandering, aggressive and disruptive behavior (Algase et al., 2010; Cohen-Mansfield & Werner, 1995; Garcia et al., 2012; Nelson, 1995) as well as agitation (Joosse, 2009). However, one of these studies pointed out, that a total absence of sound might not have the desired effect either, because a pleasant level of noise might be beneficial to stimulate residents and to help them to avoid boredom (Cohen-Mansfield & Werner, 1995). Still, behavioral disturbances and violence declined when noise was avoided by a reduced volume of electronic devices, the distribution of earphones, reduced staff talking and less fast movements, as a study at level 3a found (Meyer et al., 1992). Only one study at level 2 did not find a relationship between noise levels and behavior (Ouslander et al., 2006).

The effect of noise levels on well-being was investigated by two studies. The one at level 3b did observe a positive correlation between reduced noise and quality of life (Garcia et al., 2012), whereas the other at level 2 did not find a relationship (Ouslander et al., 2006).

Regarding social abilities, a study at evidence level 3a found residents to be more engaged with moderate levels of sound (Cohen-Mansfield et al., 2010), while another at level 3b observed less signs of social interaction in residents when sound levels were high (Garre-Olmo et al., 2012).

One study at evidence level 3a observed worse orientation in noisy environments (Netten, 1993).

A qualitative study at level 5 found that care outcomes, such as food and fluid intake were higher in noisier units (McDaniel et al., 2001). No effect of reduced nighttime noise on sleep in people with dementia was found in two studies at evidence level 2. This was explained with, among others, the inability to reduce noise levels sufficiently (Ouslander et al., 2006; Schnelle, Alessi, Al-Samarrai, Fricker, & Ouslander, 1999).



### Room Temperature

The impact of room temperature on residents was investigated by four studies, aiming at thermal comfort for residents.

Two studies, assigned to level 3b and level 5, found that a comfortable room temperature was associated with less unwanted, such as agitated or disruptive, behavior (Cohen-Mansfield & Werner, 1995; Cohen-Mansfield & Parpura-Gill, 2007). However, another study at level 3b did not observe an impact of a room's temperature or humidity on wandering behavior (Algase et al., 2010).

Uncomfortable room climate was associated with lower well-being, here measured as quality of life (Garre-Olmo et al., 2012).



### **Use of Color, Contrast, and Patterns**

Seven studies evaluated the use of color, contrast or patterns in environments for people with dementia.

Painting walls and woodwork to highlight, respectively camouflage, doors led to less undesired behavior, as a study at evidence level 5 stated (Cooper, Mohide, & Gilbert, 1989). Further, less disruptive behavior was found to be the result of increased light intensity and enhanced visual contrast at dining tables in a study at evidence level 3a (Koss & Gilmore, 1998). A study at level 2 observed improvements in function by enhancing lighting and table setting contrast (Brush et al., 2002). Whereas people with dementia seem to profit from enhanced color contrast for tableware, lower contrast and small motifs on carpets were found to be beneficial for their walking performance, found a study at level 3a (Perrit, McCune, & McCune). Furthermore, floor patterns and dark lines or surfaces can disorient people with dementia, as a study at level 3b observed (Passini et al., 32). In another study at level 3a, color was reported by residents as a cue for locating their room (Gibson, MacLean, Borrie, & Geiger, 2004). Though, a study at level 5 did not find a relationship between color and orientation in people with dementia (Cooper et al., 1989). Three studies at evidence level 2 and 3a found that an increased table setting contrast, also

combined with lighting changes, improves residents' oral intake which is a care outcome. (Brush et al., 2002; Dunne T.E., Nearing, Cipolloni, & Cronin Golomb, 2004; Koss & Gilmore, 1998).

### ***Ambiance***

The term *ambiance* summarizes interventions which aim at creating a pleasant and stimulating environment. In order to improve the behavior and well-being of residents, a non-institutional character, personalized and sensory environment, and the use of the multi-sensory environment approach are implemented.



### **Non-institutional Character and Personalization**

The literature suggests that a non-institutional, homelike character of long-term care facilities has positive effects on residents. Unfortunately, there is no general definition of these terms. The concept of "homelikeness" has been introduced in an earlier paragraph (see Basic Design Decisions). Further, providing space for residents to individualize and personalize their surroundings was taken as an indicator for non-institutional and personalized environments. 17 studies on this topic were found.

Nine studies explored the correlation between non-institutional, personalized environments and behavior. One study at level 3b found that

		behavior	cognition	function	well-being	social abilities	orientation	care outcomes
non-institutional character and personalization	2	■ ■ ■ ■			■	■ ■		
	3a	■ ■						
	3b	■ ■ ■ ■			■	△		■ ■
	5	■			■ ■	■ ■ ■ ■		
sensory environment	2	■						
	3a	■ ■	■					■
	3b	■ ■ ■ ■ ■						
	5	■						
multisensory approach	2	■ ■	■	■	■			
	3a	■			△ ■ ■			
	3b	■						
	5							

Table 3: Ambiance.

both staff and families identified the homelike character to be a central influencing factor on behavior in people with dementia and they appreciated the ability to respond to residents' individual needs in these environments (Garcia et al., 2012). These findings are supported by three other studies at levels 2, 3a and 5, which found that residents in facilities with more individualized rooms and increased personalization (such as decorating each resident's room with wall decorations, ornaments, pictures, and towels) expressed less behavioral problems (Charras et al., 2010; Morgan & Stewart, 1999; Zeisel et al., 2003). Changing seating arrangements and meal-time routines in dining rooms to be less institutional and more conducive to conversation resulted in improved eating behavior, as it was found in

two studies assigned to level 2 (Götestam & Melin, 1987; Melin & Gotestam, 1981). Moving the dining room from a central area in the facility to the living unit even led to a reduction in assaultive behavior (Negley & Manley, 1990). Another study at level 3b showed, in contrast, that a non-familiar atmosphere in the bathing area can cause problematic behavior in people with dementia (Namazi & Johnson, 1996) and, therefore, also stresses the importance of the non-institutional character of long-term care facilities. In addition, one study found out, that an unlocked door to a safe garden area is beneficial to reduce residents' agitation (Namazi & Johnson, 1992a).

Five studies investigated the effect of homelike environments on well-being. Four studies, assigned to evidence levels 2, 3b and 5, stated

that a homelike environment and increased personalization were positively linked to improved quality of life (Charras et al., 2010; Garcia et al., 2012; Gnaedinger, Robinson, Sudbury, & Dutchak, 2007; Minde, Haynes, & Rodenburg, 1990). However, another study at level 3b did not find this association (Samus et al., 2005).

The effect of homelikeness on social abilities was examined by six studies. Four of them were conducted in the dining room setting. Two studies at evidence level 2 showed that changing seating arrangements resulted in increased communication (Götestam & Melin, 1987; Melin & Götestam, 1981). The two studies at level 5 found that a homelike dining atmosphere with a small number of people eating together led to more resident-directed conversations (Roberts, 2011), and that a homelike therapeutic kitchen can become the center of activity (Marsden, Meehan, & Calkins, 2001). Two further studies at level 5 suggest that a non-institutional, but homelike environment supports residents' engagement in daily activities and informal social interactions (Campo & Chaudhury, 2012; Milke, Beck, Danes, & Leask, 2009).

In the category of care outcomes, two studies at evidence level 3b found a relationship between a homelike environment and higher food and fluid intake (Reed, Zimmerman, Sloane, Williams, & Boustani, 2005), as well as less tube feeding (Lopez, Amella, Strumpf, Teno, & Mitchell, 2010).



### **Sensory environments**

Most design guidance states that the sensory enhancement of the physical environment through visual, auditory, tactile and olfactory stimuli has a positive effect on mood and behavior in people with dementia. 10 studies on this topic were identified.

The impact on behavior has been investigated by nine studies. Two studies at level 3b found that a sensory enhancement of the environment has positive effects on agitation and wandering frequency in residents (Cohen-Mansfield & Werner, 1998; Yao & Algase, 2006). These studies also suggest that residents seemed to prefer the enhanced environments and spend more time in them. Another study at the same evidence level found that a soothing atmosphere reduces wandering behavior (Algase et al., 2010). However, the authors also cautioned that too much stimulation through, for example, high variations in sound levels or a high engaging quality of the environment, can even result in increased wandering behavior. Two studies, one at level 2 and the other at level 5 used sensory stimuli during the bathing process to create a relaxing atmosphere. They found that increased room temperature, music (such as recorded songs of birds, sounds of babbling brooks, the sounds of other small animals) pictures, and offering food, are effective to reduce agitated behavior in bathrooms

(Cohen-Mansfield & Parpura-Gill, 2007; Whall et al., 1997). Two other studies at levels 3a and 3b support the use of music as an intervention to reduce agitation (Cohen-Mansfield & Werner, 1995; Dunn & Riley-Doucet, 2013). Also, minimizing distraction led to reduced agitation, as a study at level 3a found (Cleary, Clamon, Price, & Shullaw, 1988). However, some studies suggest that the degree and type of sensory stimulation provided might be an important factor in regard to the positive effect of such interventions. One study at level 3b showed that playing unwanted or interrupting pleasurable music can lead to more agitation in people with dementia (Ragneskog, Gerdner, Josefsson, & Kihlgren, 1998).

The positive effect of controlling sensory stimulation on cognition is supported by one study at level 3a (Namazi & Johnson, 1992b). Here, the researchers used interior partitions to reduce distractions and found residents to be more attentive under this condition.

Reducing stimulation by minimizing distractions from televisions and phones, as well as camouflaging exit doors, led to improved care outcomes, measured by less residents' weight loss and fewer cases of physical restraint use, as one study at level 3a found (Cleary et al., 1988). In conclusion, it can be stated that there is sufficient evidence available to come to a consensus on the positive effect of appropriate sensory environments on agitation in people with demen-

tia. However, study findings indicate that there is a need to control the sensory stimulation in order not to evoke the reverse effect.



### **Multi-sensory environment approach**

The multi-sensory environment approach, also known as Snoezelen, aims at stimulating the primary senses. It allows the recipient to enjoy a wide range of sensory experiences without the need for intellectual activity. It is often offered in a specifically designed room that typically is equipped with bubble tubes, fiber optics, revolving color wheel projectors, soft relaxing background music, and an oil burner for aromatic smells. The effect of multi-sensory environments on people with dementia has been investigated by seven studies.

A positive impact of multi-sensory environment sessions on behavior was found in four studies which were assigned evidence levels 2, 3a and 3b (Baker et al., 2001; Hope, Keene, Gedling, Fairburn, & Jacoby, 1998; Milev et al., 2008; Ward-Smith, Llanque, & Curran, 2009).

One of these studies, assigned level 2, also found that residents receiving Snoezelen sessions were more attentive to their environments afterwards, thus improved their cognition (Baker et al., 2001).

Further, regarding function, a study at level 2 revealed improvement in motor and process

scores (Collier, McPherson, Ellis-Hill, Staal, & Bucks, 2010). However, another study at level 3a could not find an effect on balance and number of falls (Klages, Zecevic, Orange, & Hobson, 2011).

Better well-being, including improvements in mood, was found in three studies at evidence levels 2 and 3a (Baker et al., 2001; Cox, Burns, & Savage, 2004; Hope et al., 1998).

### ***Environmental information***

Environmental information mostly comprises visual cues or barriers. They can support people with dementias' orientation and wayfinding abilities. Further, wandering behavior and exit attempts can be managed.



#### **Environmental cues**

Signs, labels and color-coding are environmental cues that can be used to communicate information to people with dementia. Thirteen studies examining their efficacy were found.

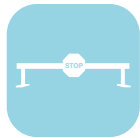
Two studies assessed the impact of environmental cues on function. Residents' ability to perform activities of daily living improved when labels were placed on drawers and closet doors, objects were visible and distracting items removed from their workspaces, as it was found in a study at level 3a (Chard, Liu, & Mulholland, 2009). Another study at evidence level 5 found improvements in oral care when the bathroom

environment was modified through pictures and colors (Connell, McConnell, & Francis, 2002).

Eleven studies found positive effects of environmental cues on residents' orientation. Signposting seems to be an effective intervention to help residents to find their way around, as a study at level 3b found (Passini et al., 32). However, older adults with cognitive impairments have poorer sign comprehension and experience difficulties with wayfinding signs that have icons only whereas text seems to be better understood, as a study at level 2 and another at level 3a found (Namazi & Johnson, 1991a; Scialfa et al., 2008). Also room numbers, nameplates and color might help residents locate their bedrooms (Gibson et al., 2004). Though, one study at level 3a investigated signposting combined with verbal cueing and found that signposting alone was less effective (Hanley, 1981). In four studies, three at level 3a and one at level 2, personal cues, such as written names, portrait-type photographs of residents as young adults, and personal memorabilia, were positively correlated with the residents' ability to locate their room or identify belongings (Gross et al., 2004; Namazi, Rosner, & Rechlin, 1991; Nolan, Mathews, & Harrison, 2001; Nolan, Mathews, Truesdell-Todd, & VanDorp, 2002). Furthermore, the relationship between visual access and orientation was investigated by one study at level 3a. The authors found that the frequency of toilet use increased under high visual access conditions (Namazi &



Johnson, 1991b). Providing a clock and signs in a dining room led to a decrease of residents' repetitive questions for food and mealtimes in a study assigned level 3a (Nolan & Mathews, 2004).



### Visual barriers

Managing the wandering behavior of people with dementia is a challenge in long-term care facilities.

Residents' attempts to leave the facility or walking into unsecure areas are a safety concern for caregivers. Visual barriers to reduce exit attempts were investigated in eleven studies.

Visual barriers tested were, for example, exit doors camouflaged through cloth barriers or wall murals manipulated views through window panels in exit doors, and grid patterns or mirrors placed in front of doors. In nine studies at levels 3a and 5 exiting behavior was reduced (Dickinson & McLain-Kark, 1998; Dickinson,

McLain-Kark, & Marshall-Baker, 1995; Feliciano, Vore, LeBlanc, & Baker, 2004; Namazi, Rosner, & Calkins, 1989; Roberts, 1999) and less door testing was found in four studies at level 3a (Hewawasam, 1996; Hussian & Brown, 1987; Kincaid & Peacock, 2003; Mayer & Darby, 1991). Only one study at level 3a did not find any effect (Chafetz, 1990).

Positive effects of unobtrusive safety features on well-being of people with dementia were found in one study at a level 3b. Here, facilities which provided camouflaged and silent electronic door locks tended to have less depressed residents (Zeisel et al., 2003).

## DISCUSSION

The results of this review indicate that specific design interventions are associated with different outcomes of people with dementia. Matrices were generated to visualize these intervention-outcome-relationships and to help

		behavior	cognition	function	well-being	social abilities	orientation	care outcomes
environ- mental cues	2						■ ■	
	3a			■			■ ■ ■ ■	
	3b						■ ■ ■ ■	
	5			■			■	
visual barriers	2	■ ■ ■ ■						
	3a	■ ■ ■ ■ △						
	3b	■ ■ ■ ■			■			
	5	■ ■						

Tabelle 4: Environmental information.

designers and architects to transfer the research findings into design practice. They can use the matrices to get an overview of the literature and to make design decisions according to the concept of evidence-based design

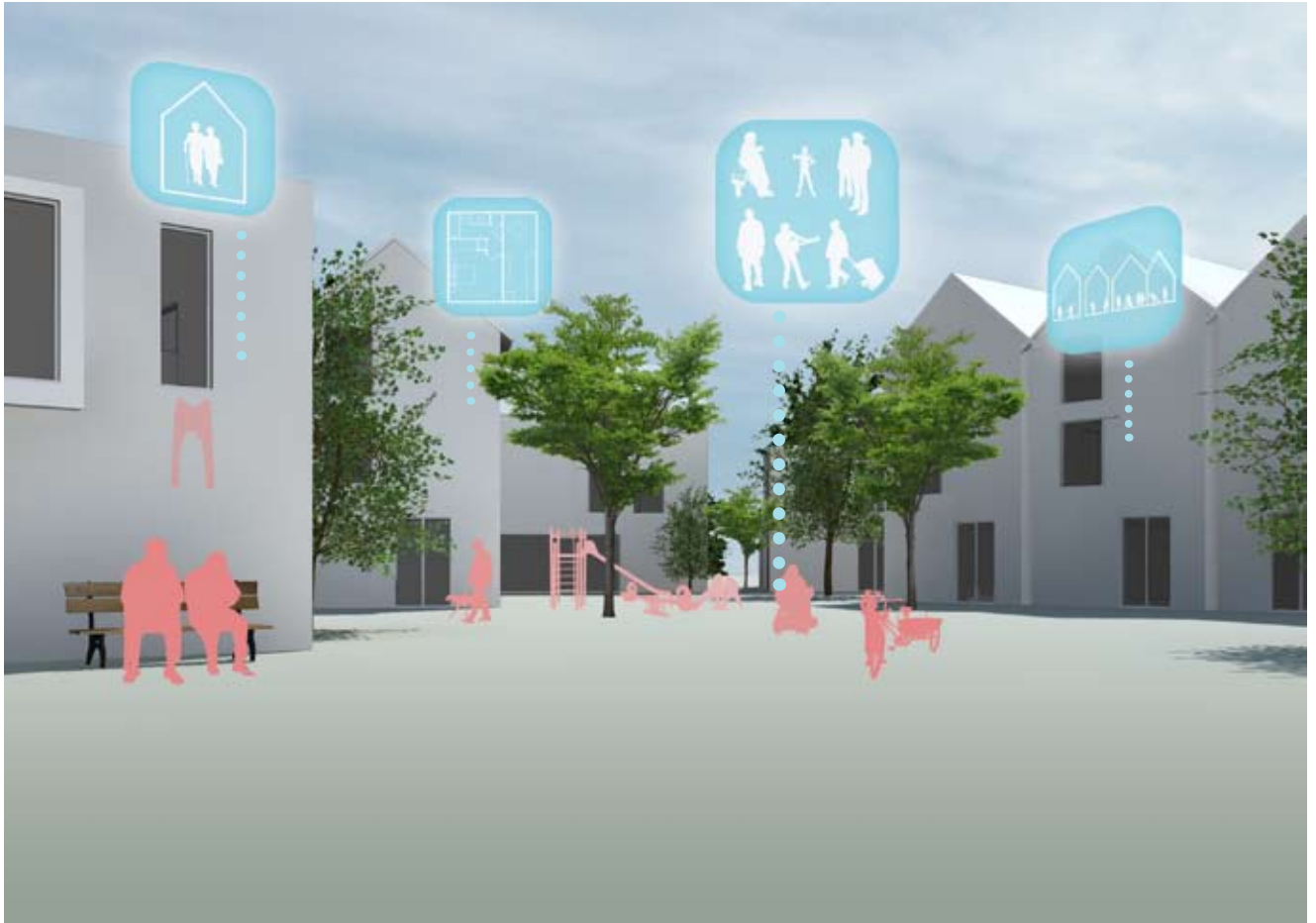
### ***Basic design decisions***

Evidence shows that providing segregated care in SCUs has a positive impact on residents' behavior, their social abilities and care outcomes. By contrast, cognition and function do not seem to be influenced by the type of care provided. The reason may be found in the fact that the term "special care unit" is not standardized. While offering segregated care for people with dementia is always a feature of an SCU, spatial characteristics can vary. The impact of small scale environments on residents with dementia provides a deeper insight: results indicate mainly positive effects on all outcomes investigated. Strong evidence was found for improved social abilities, functionality and well-being. But in the fields of behavior, cognition and orientation the results are conflicting. Still, there is strong evidence that small-scale care environments lead to positive outcomes for people with dementia and they should be implemented whenever possible. This is further supported by findings, showing that a low social density is positively associated with residents' behavior, social abilities and care outcomes. However, some studies also pointed out that a low density could cause

a decrease of social contact. Therefore, efforts should be made for residents to regulate the degree to which they wish to interact with other residents and staff. When designing a building's spatial layout, research findings need to be incorporated. The research studies analyzed in this review show some associations with behavior and functionality, while a relationship between the spatial layout and the residents' orientation abilities has been established. Supportive spatial features include a straight circulation system, visual access to relevant places and the integration of meaningful reference points.

### ***Environmental Attributes***

In order to create a pleasant environment which positively affects the outcomes of residents with dementia, an informed design of environmental attributes such as lighting, acoustics, room temperature and the use of colors, contrast and patterns is necessary. Among these environmental attributes, the impact of light on people with dementias' outcomes has been investigated the most. However, the results are conflicting. Drawing from the evidence, it can be stated that bright light therapy has a positive impact on sleep. Associations with improved behavior and well-being have also been established, but not been confirmed by all studies. Also, there may be a positive correlation between bright light therapy and cognition. Lighting sources that simulate daylight were tested by very few studies and did



Picture1: Basic design decisions.



Picture 2: Environmental Attributes.

---

not yield the desired results. Adequate general lighting, however, may lead to decreased disruptive behavior. A higher luminance level to improve vision, for example at the dining table, might be effective for resident's functional abilities and oral intake. Therefore, providing sufficient lighting should be one of the key architectural efforts in care environments for people with dementia. This can be stated for good acoustics as well. There is strong evidence showing a relationship between high noise levels and unwanted behavior, while pleasant sounds were found to be positively stimulating. A comfortable room climate may further contribute to improved behavior and well-being in residents. As visual impairments are frequent in older adults and are therefore also found in people with dementia, they need to be considered in design. The evidence shows that residents benefit from the informed application of colors, including a strong color contrast. However, caution is necessary when using patterns and dark lines on flooring which may be found confusing and even cause falls.

### ***Ambiance***

Offering residents an environment which is not of an institutional design but has a home-like appearance and allows for individual transformations has positive effects on behavior, well-being, social abilities and care outcomes. Among other results, residents were found to display less behavioral disturbances, experience

a higher quality of life and to interact more with each other and staff. However, most of these studies included interventions in addition to the appearance of the environment, such as changed care routines. Therefore, the effects observed may also result from a combination of environmental and organizational interventions. Still, a homelike, personalized environment provides the frame for less institutional care routines and thus is beneficial for people with dementia in care homes. For example, studies suggest that a homelike dining atmosphere, which is characterized by residents dining on the unit in a small and dining room with familiar mealtime routines such as residents serving themselves, results in improved eating behavior and more communication. Further, the environment needs to provide sensory stimulation through visual, auditory, tactile and olfactory stimuli. Evidence shows that this way unwanted behavior, especially agitation, can be reduced and care outcomes will be improved. However, it is necessary to control the degree of sensory stimulation in order not to trigger any reverse effects through overstimulation. Using multi-sensory environments for Snoezelen sessions further contributes positive impacts on residents' behavior and mood.

### ***Environmental information***

Visual cues can support the ability of people with dementia to orientate themselves. Effective cues were identified to be for example sig-



Picture 3: Ambiance.



Picture 4: Environmental information.

nposting, room numbers, and colors. However, the type and the design of the cues are of great importance. Signs, for instance, should contain icons and text. Especially the personalization of cues has been found to be supportive. Nameplates, portrait-type photographs or personal memorabilia can be placed outside of bedrooms to help residents locate their room. Visual barriers, such as camouflaged doors or door knobs, are effective to reduce people with dementia's attempts to leave the facility and may even increase their well-being.

### ***Strengths and limitations***

This review summarizes the broad spectrum of research in the field of design for people with dementia. Since a wide range of studies with very different methodical approaches was found, it was necessary to provide the reader with some guidance on the studies' credibility. In the approach chosen here, this was done by assessing the studies' quality through rating their study design. The results were visualized using matrices that offer an overview of the intervention-outcome-relationships and their evidence level. This way architects and designers are guided in developing designs which are based on current, systematically acquired and appraised evidence. However, this review has also some limitations. Because of the wide range of heterogeneous methodical approaches and study qualities, the appraisal of the studies' quality focused mainly

on the study design. This way, not all aspects which determine the methodological quality of a study, and thus the credibility of its outcome, can be taken into account. However, the study design itself can be seen as an indicator of the methodical quality of a study.

### **CONCLUSION**

Results of this review paper show the impact of characteristics of the built environment in care homes on residents with dementia. Only the outcome cognition seems not to be affected by the built environment. However, a progressive cognitive decline is a key characteristic of dementia. Thus, tracing back changes in the resident with dementia's cognition to environmental characteristics may provide a methodological challenge. Through the evidence-based approach that takes the methodological quality of the studies reviewed into account, it also shows how well researched the specific intervention-outcomes relationships are. By visualizing these relationships through matrices it becomes evident that the field of dementia design is well researched in many aspects. However, there are also some gaps that are either the result of conflicting study outcomes (such as whether daylight control has an impact on outcomes of people with dementia), or that represent less researched aspects (such as the use of a sensory environment). The matrices provided in this paper contribute to exposing these shortcomings which



need to be enlightened by further research studies. Further, the results of this review could be used to derive planning recommendations and design guidelines. For this process, the expertise of dementia design experts from all professional groups involved needs to be included.

## Literature

For a full reference list, please contact the authors. It can further be found in the following article:

Marquardt, G., Bueter, K., & Motzek, T. (2014). Impact of the design of the built environment on people with dementia: An evidence-based review. *Health Environments Research & Design Journal*, 8(1), 127-157.

## The Virtual Care Home

Professor June Andrews

### Abstract

The Virtual Care Home is an online resource that demonstrates dementia-friendly design in care home settings or people's own homes.

Since its launch in March 2012, the Virtual Care Home has been viewed 30,000 times by users in 72 countries, and won a number of awards. Feedback indicates that it is both welcomed, and making a difference.

The Virtual Care Home is intended for use by architects, planners and commissioners who may be considering new builds, as much as for people who are already providing care in a variety of settings – including family carers who are looking after loved ones with dementia at home.

Using computer-generated room settings, evidence-based design points are highlighted. The layouts of seven individual rooms are modelled with information revealed interactively as 'tips' on how the features can make a difference for people with dementia.

Many of these tips are deceptively simple – maximise light levels, employ colour and tonal contrast to aid navigation, create clear sightlines to facilities such as toilets, use familiar fittings such as old-fashioned taps, and position understandable signage at an accessible height.

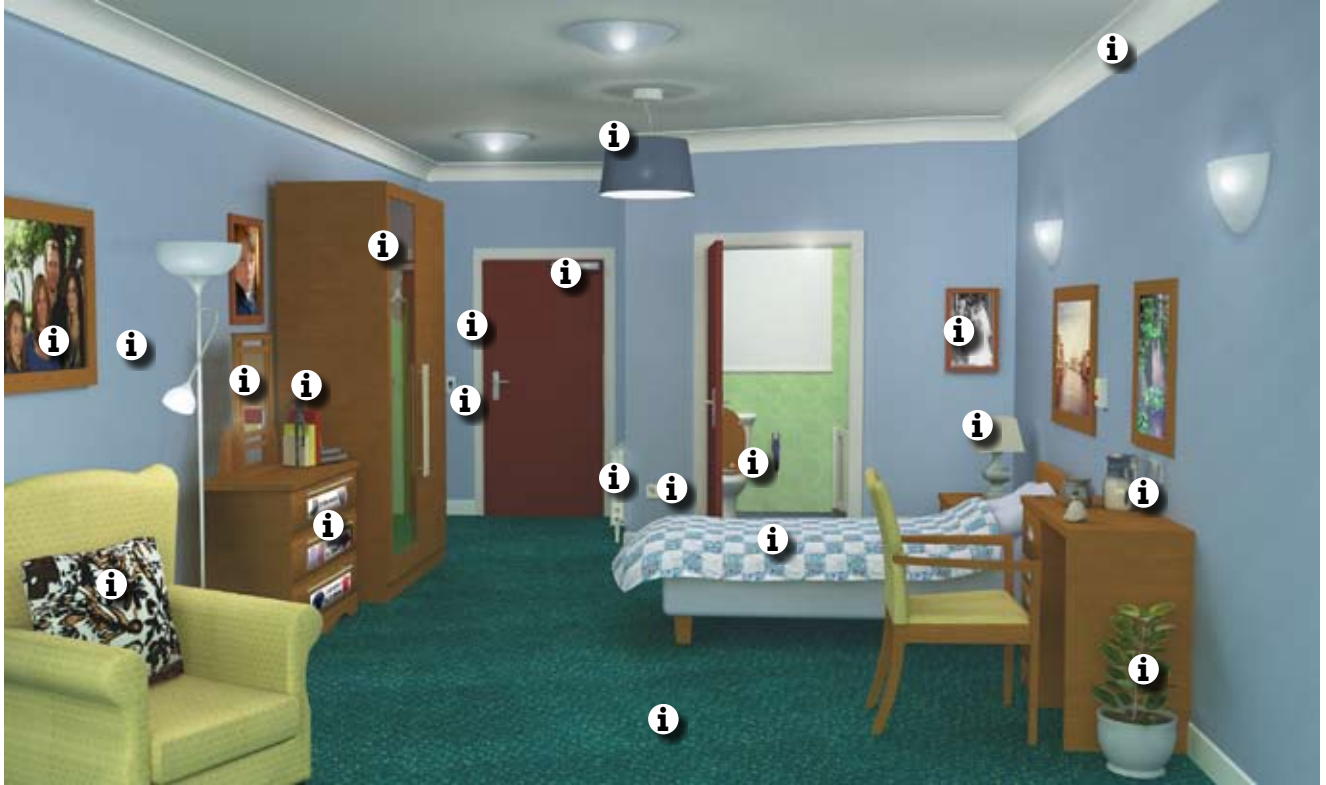
The DSDC team has an expert understanding of

the physiological impacts of dementia and the impairments that it can bring, and looks at surroundings through the eyes of people living with the condition.

Understanding age-related changes and impairments is the first step towards creating living environments which support the needs of older people and those with dementia, keeping them safe from dangers such as falls, which can have a devastating effect on an older person; allowing them the freedom and confidence to use their abilities to the fullest extent, in all things from the mundane to the creative; aiding memory in day-to-day living; and reinforcing personal identity.

The challenge is to design enabling buildings thoughtfully, with concern for the people who will live there.

For using the Virtual Care Home please visit the homepage of the Dementia Services Development Centre: [www.dementia.stir.ac.uk](http://www.dementia.stir.ac.uk)



*Example of the design of a resident's room. Interactive tips offer information about dementia-friendly architecture.*

## Designing Architecture in Dialogue with User Expertise

Iris Van Steenwinkel & Professor Ann Heylighen, PhD

### Abstract

All too often buildings are still designed for a so-called average user, “a six-foot-tall, 20-year-old male, with perfect vision and a good grip” (Fletcher). People who differ from this average user, e.g., because they are living with an impairment, are associated with accessibility legislation, which is felt by architects as hampering their creativity and taking away their chal-

lenge as designers. The aim of this contribution is to counter this association by demonstrating that the perspective and experience of people living with an impairment or particular condition can represent a valuable resource for architectural design. Because of their specific interaction with space, these people are able to appreciate spatial qualities that architects are not always attuned to. To some extent, their perspective may thus be considered as an example of connoisseurship, a form of expertise that develops through perceptual learning, i.e., discovering distinctive features and invariant properties of things and events. As a result of this perceptual learning, experts are able to differentiate, in their body or surrounding world, variables that are meaningless to novices. This holds for people living with a mobility or sensory impairment, but also for people living with particular mental conditions such as autism or – the focus of this conference – dementia. First we provide an overview of the research methods we apply to gain empirical access to these people’s experience, and of lessons learned so far. Subsequently we zoom in on the case of a woman with early onset dementia. All too often, dementia is assumed to obliterate people’s ability to share their experiences with others. By writing poems and making changes in her house, however, this woman makes her experiences explicit both as verbal account, and in the (re)organisation of the little worlds



she creates. Because of her altered relationship with space, time and her sense of self, the little worlds she creates make observable how she tries to maintain as many connections as possible to the house she had made her own before living with dementia, and what adaptations she makes in order to feel comfortable. In living with dementia, we argue, this woman thus helps architects to gain a nuanced understanding of how to design living environments where people (with and without dementia) may feel at home, or at least may feel at ease, by reducing their feelings of confusion, anxiety and loneliness and by enhancing agency and feelings of relatedness and security.



*Picture 1 und 2 photographer Iris Van Steenwinkel.*

## **The Power of Nature and Outdoors: Architecture, Nature and People**

**Garuth Chalfont, PhD**

### **Introduction**

Through science and research, as well as anecdote, we now understand much more fully the importance of connection to nature for people with dementia. Establishing and maintaining a connection is vitally important and must be achieved both inside and outside the home. This requires a wholistic view of the home as not just architecture and not just a garden, but an integrated whole in which nature touches the person's experience on a daily basis throughout the year. As a landscape architect with a PhD in architecture, I both design and research the lived space of the dementia care environment. Having come to understand the needs of the people who manage, work in, live in and visit the home, I have been commissioned to design gardens and consult on the building design, as well as provide training for care workers and managers. Through this work I have developed an indepth understanding of how spaces, both indoor and out can benefit a person with dementia. This paper results from this insight and looks at three different aspects of putting people more in touch with the benefits of the natural world.

First, I will discuss the design criteria for a garden that is especially conducive to therapeutic use by residents or service users. This very much includes aspects of the building as well as the built structures within the garden realm. You will come to see how structure and nature are very much intertwined. I then go on to discuss ways of getting nature into the interior of the home. Architects pay attention! This is very much to do with the building – how it is positioned on the site; the mediating influence of windows and doors, use of canopies and connecting up indoor and outdoor spaces through shared usage. Lastly, drawing upon my PhD work on 'Edge Space' I share knowledge with you about this transitional zone in the care environment context. In what ways can this richness of space be beneficial, sensory and comfortable, and at the same time offer more than the sum of its parts?

### **Design Approach**

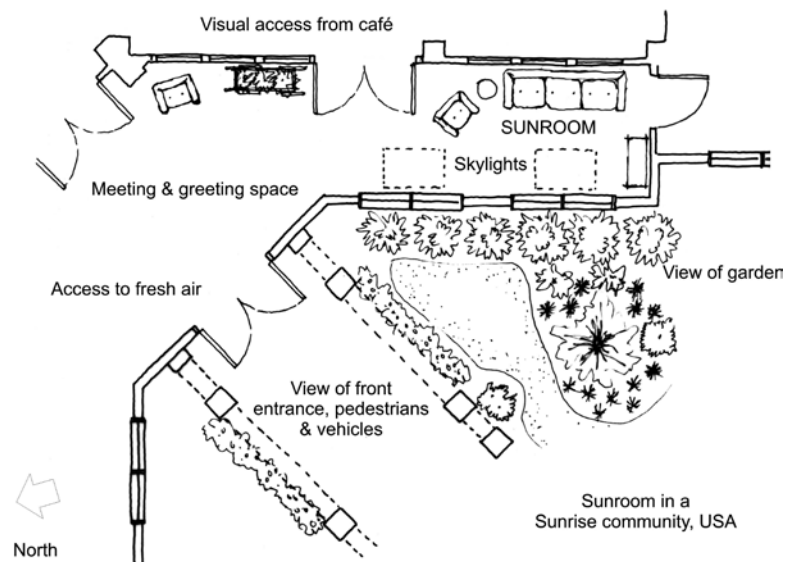
My approach to design is very focused on therapeutic outcomes for people with dementia. I am not concerned with controlling or managing people's behaviour. I aim to stimulate and engage residents, staff and families in ways that interest them. In this way the person with dementia benefits from the environment through independent or supported use. This often affects their behaviour positively, without that being the main objective. My approach is also

wholistic and looks at care of the total person: heart, mind, body and spirit. Environments that have this integration of building, nature and use, and which intentionally operate to achieve therapeutic aims for residents are the best places to live.

### ***Nature and Outdoors: Needs and Benefits***

We now have ample evidence about the benefits for older people and those with dementia. For instance, nature and being outdoors provides sensory stimulation, improves orientation to time and space, helps regulate circadian rhythms, lowers blood pressure, improves attention and focus, and also stimulates communication by enhancing and facilitating social interaction. Research also shows that contact with nature and being outdoors helps to reduce agitation and aggression. Exercise and movement outdoors has been shown to improve sleep patterns, mood, memory, appetite, strength, agility and balance. We now also know that nature contact and being outdoors contributes to emotional and spiritual wellbeing, and provides cognitive stimulation. These are some of the reasons why a lifestyle that includes nature and outdoors delays the onset of dementia for people living at home. What was once intuitive is increasingly evidence-based. A care environment must respond to these human needs through design indoors and out. Increasingly, in today's care environment there are people with dementia symptoms that can

range from mild to very severe. Regardless of the severity of our disabilities, humans can still benefit from contact with the natural world all the way up until death. Even when a person can no longer speak or even move, they still experience the world through sensory stimulation. In fact, connection to nature (like music or massage) can have a therapeutic effect on the brain in all stages. We now know that the brain, like a muscle, can grow if it is stimulated. The brain's ability to grow grey matter is called neuroplasticity. Over the course of a lifetime we can build up cognitive reserve. So when the brain starts to atrophy, we will have more to lose before we start to experience the



*Sunroom floor plan, USA.*

symptoms, or before our cognitive impairment becomes obvious to those around us. A critical time to build up our brain is when we stop working. Research shows that dementia is more likely to start within a year of retirement (Adam, et al., 2013). To offset this, stay socially active, learn an instrument or a foreign language; keep yourself fit by exercising, changing your diet and training your brain. Focus on stimulating your brain at all ages, as studies are beginning to show that dementia is preventable, or you can delay the onset or people with dementia can slow down the rate of decline. (Please find 'Dementia Beat Camp' on facebook and 'like' it.)

### ***PROSENTIA HYPOTHESIS***

One way to embed nature and sensory stimulation into care practice is by using the Prosentia Hypothesis. When a person with dementia engages both with nature and another person, the interaction is more stimulating to them than either on its own. Nature can be used as a tool for interaction between people to enable wellbeing for a person with dementia (Chalfont, 2010). Focusing on a 'Third Thing' such as nature enhances the person's ability to communicate. Social interaction is an indicator of wellbeing.

What do we need from being outdoors?

- Pleasure, enjoyment and relaxation
- To maintain skills and abilities
- Physical activity and exercise
- Meaningful occupation
- Visiting and social interaction
- Caring for something living
- Escape from indoors
- Peace and quiet

Perhaps the main reason for nature contact is:

- to keep the spirit alive

For without the will to live, nothing else really matters to that person and they will not want to engage in any activity. Perhaps the most important role of the design of a care environment is to facilitate contact and access to the living world – to maintain the spirit's connection to the life force.

### **1. (Beyond) the 'Dementia-friendly' Garden**

A garden for people with dementia must contribute to health and well-being. To be 'dementia-friendly' is needed for all public space, cities and towns. But it is simply not good enough for care environments. Just as 'mainstream' dementia day care is being phased out in favor of an 'enhanced' level of service, so must the care environment garden be designed to work harder. It needs to be rehabilitative and therapeutic. Hence, the design criteria must enable that kind of a garden to be achieved. This begins with an



agreed ethos. For a garden to be therapeutic and rehabilitative how do we intend that it be used? This is our design brief:

ETHOS = Engagement + Occupation + Purpose + Being Needed

Architecture, Nature and People must all play supportive roles to enable this ethos. In particular, care culture must evolve from their highly risk averse service delivery and allow for 'calculated risk' if they are to provide a service that is both therapeutic and rehabilitative.

### ***Supportive Architecture***

The big role of architecture is to enable people to get outside, so this ethos can be achieved, and activities can take place. Architecture can facilitate this by providing:

1. Joined up thinking about the building and the gardens so you have a correct positioning of the building on the site - before you seek your planning permission
2. Plentiful and usable outdoor areas - spaces located for shelter, sun and thermal comfort at key times of the day when people are able to be outside
3. A direct accessible connection to a garden space from a communal area that residents can access independently
4. Some structural element that allows nature contact on every level of the home: Ground

floor garden, veranda, balcony or terrace and a roof garden. Upper floors with no outside access are unacceptable - unless the most independent people live upstairs

5. Sheltered or covered areas over walkways and entrances (with seating)
6. Stimulating views from indoors, with windows and doors that enhance nature contact

### ***Supportive Nature***

The Landscape also needs to play an enabling role. Suggestions include:

1. Diverse spaces to accommodate different levels of need and a wide range of abilities
2. Separate gardens for each living group, visually connected but distinct & secure
3. An abundance of plants – emphasise living plants and greenery
4. Seasonal, familiar plantings that are useful, edible and beautiful
5. Design to facilitate independent, spontaneous use by the individual, as well as supported or supervised use with staff or families
6. Wildlife habitat so people can experience creatures of the living natural world

Many specific features can add to the enabling quality of the space. There is good design guidance available on [www.chalfontdesign.com](http://www.chalfontdesign.com) where you can download the Dementia Green Care Handbook of Therapeutic Design and Practice (2013). Also recommended is Desig-

ning Outdoor Spaces for People with Dementia (2012), edited by Pollock and Marshall.

### ***Supportive People***

Perhaps most importantly, care practice needs to support this effort to harness the power of nature and outdoors for the benefit of residents and service users. This requires owners, care staff and managers to adopt a philosophy that involves taking calculated risks. In this way people with dementia can become engaged with true occupation and practical tasks. This is something we all need and gives us a purpose to our day. It also allows people to be needed, to be of service to others and to care for something living - a plant or animal.

The four main tasks staff, families and volunteers will want to be involved in are these:

- Taking people outside
- Encouraging independent use of the garden
- Enabling activities
- Interactions with wildlife and other animals

The physiological needs of older people are widely recognised but the care environment largely determines their health outcomes. We all know that vitamin D is the sunshine vitamin and direct sunshine is the main source. We know that calcium and vitamin D build strong bones and teeth. But you may also know that vitamin D has been used to either treat or prevent cancer,

cardiovascular disease, diabetes, hypertension (high blood pressure), mood disorders, multiple sclerosis, psoriasis and tuberculosis. It is also prescribed specifically for older people to improve cognition; prevent falls and fractures; treat osteoporosis, rheumatoid arthritis, senile warts, muscle weakness or pain. The recommendation for vitamin D is not that difficult to attain. It requires 5 to 15 minutes of sunlight 2-3 times a week (between 10am – 3pm) on arms and legs. Some children in the UK have developed rickets (a problem unheard of for generations) from spending too much time indoors. Dark-skinned people who migrate north will become vitamin D deficient. Research showed that Muslim women in Toronto who wear full-body clothing are deficient. Older people who spend a lot of time indoors are at great risk of vitamin D deficiency.

### **2. Getting Nature Inside - Architecture supports. Nature stimulates. People interact.**

The importance of daylight is more obvious the further you are away from the equator where people are more affected by SAD (seasonal affective disorder). Daylight helps combat depression. Orientation to time of day moderates circadian rhythms (or the sleep-wake cycle, also known as the body clock). Ample daylight also helps us know what time of year it is. Even without going out one can notice the weather and what is growing and blooming.



*Bird house in window view, Norway.*

### ***Supportive Architecture***

Windows and doors have a role to play in moderating sunlight and daylight. Tall windows, clerestory windows and light trays help, as do low, wide window ledges which reflect light into the room, as well as provide places indoors to grow plants. Indoor activity rooms or communal areas need to be connected to outdoor areas with compatible uses. The connection can be visual. An example of this is a family kitchen

designed next to a kitchen garden - a horticultural area for growing food. This helps to prompt and cue people when they look out the window. A direct physical connection is highly effective. For instance, a simple renovation could involve changing two windows on a Garden Room into a set of french doors, then adding a raised bed and a porch roof over a ramp. For people sitting or lying down inside, design so that the furniture can be positioned near a

window looking out. If seats are turned, is there a view to the garden? If there is a balcony, is the door wide enough to wheel a hospital bed out onto the balcony? Is there a smooth lip at the threshold of the door, so wheelchairs and walking frames can easily travel over it without a struggle? To enable residents to access the garden, ensure the door handles are designed to withstand heavy wear and can be opened and closed, rigorously and often.

### ***Supportive Nature***

Choose plants for the garden which are seasonal, familiar, useful, edible, flowering and/or beautiful. People will harvest and use the plants indoors – bringing nature into the home. Create habitat for wildlife with trees, shrubs and vegetation, water features and water sources, climbing vines and wild areas. Use plantings that provide feed, forage and nesting materials for wildlife, or that attract insects and invertebrates. Adding features to the garden that provide food or shelter will stimulate human interactions with wildlife and encourage people to actively participate. For example, use bird baths, nesting boxes, feeding stations, logs and bug hotels.

### **3. Edge Space - Architecture supports. Nature stimulates. People interact.**

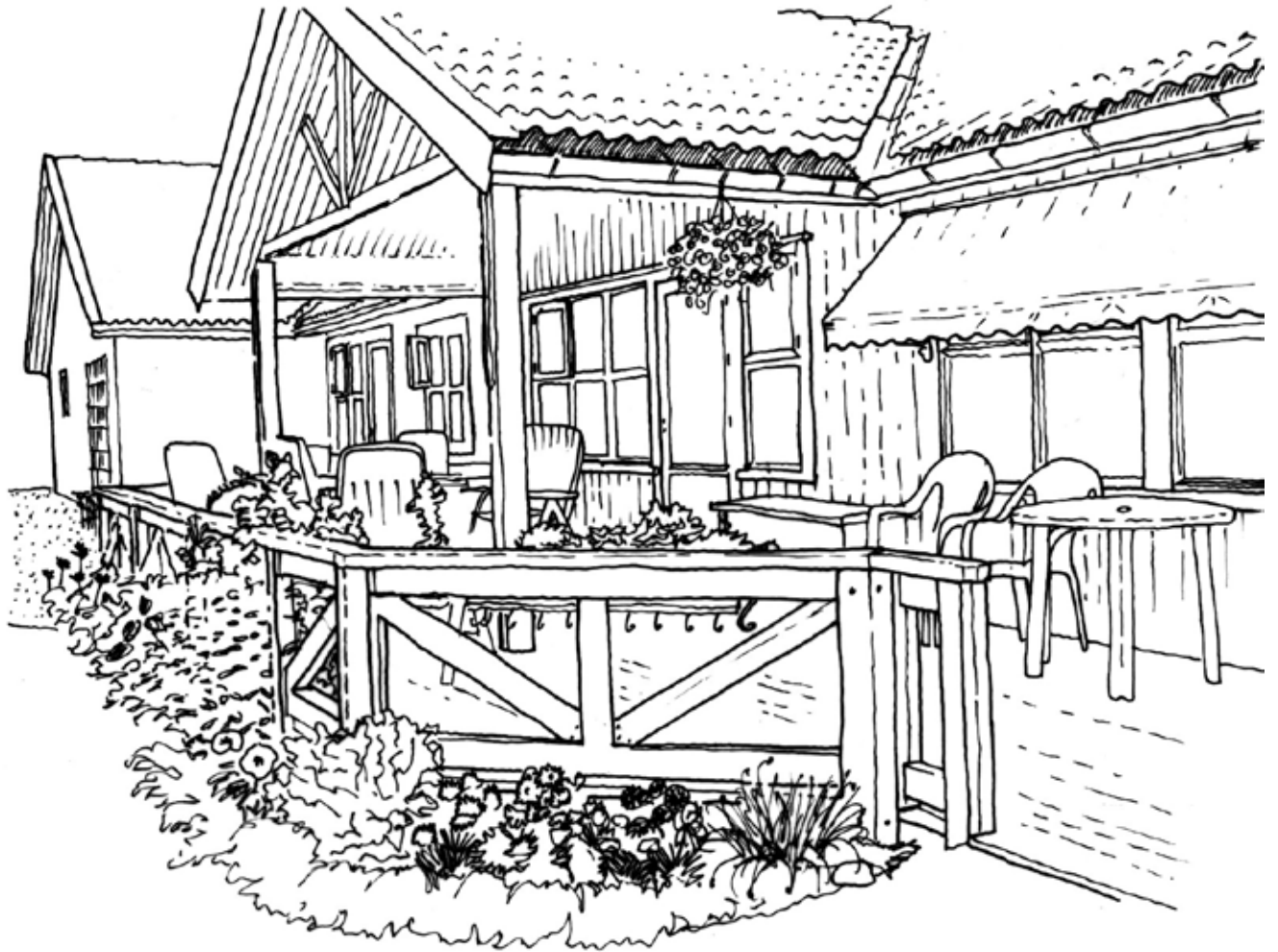
Edge Space is that transitional area at the external building wall, encompassing both indoor and outdoor space. Where the indoors and outdoors

overlaps there is great potential to bring nature and activity into the lives of the residents. It is an area in which people are supported by the comfort of architecture and stimulated by the sights, sounds and smells of nature. Within this contact with the natural world increased social interaction is possible, as well as improved communication.

In order to maximise use of the edge, include interesting and stimulating views out. Design entrances to include seating areas. Utilise porch roofs over entrances that residents actually use each day (not just the main front door). Harnessing the power of nature and the outdoors takes an integrated approach in which architecture supports, nature stimulates and people with dementia interact and engage, for possible therapeutic and rehabilitative benefits.

### **Literatur**

- Adam et al.( 2013). Occupational activity and cognitive reserve: Implications in terms of prevention of cognitive aging and Alzheimer’s disease. *Clinical Interventions in Aging* 2013; 8:377-390
- Chalfont,G.(2010). *Connection to Nature of the Building Edge: towards a therapeutic Architecture for Dementia Care Environments*, Saarbrücken: Lambert Academic Publishing
- Chalfont, G (2012). Lebensräume alter Menschen gestalten, in: *NOVAcura*, 9(12),S.30-33



*Porch with shelter and sun, Norway.*

---

## The Design of a Demonstration Dwelling for Older Persons with Dementia

Dr.ir. Joost van Hoof

### Introduction

Older adults with dementia are in need of homes, which support ageing-in-place and the provision of care at home. Traditional modifications and technologies primarily provide a solution for persons with impaired mobility. This means that the homes which have undergone modifications or have been designed according to the needs of older adults, such as single-level homes, are not fully supportive to people with dementia and their family carers. Supportive housing facilities are not only practically non-existing, but there are very few studies and documents focusing on how such housing facilities should be designed and built for persons with dementia (Ministry of Community and Social Services of Ontario, Canada, 1990; Rommel et al., 1998; Blom et al., 2000; van Hoof et al., 2010a). In addition, demonstration homes are few in number and often linked to university research programmes. Therefore, the aim of this study was to design for a home for people with dementia that aims to support ageing-in-place, and which can be used as a demonstration dwelling for training and education. The study deals with the development and design process of this conceptual

home, and addresses and integrates the following aspects of the home environment:

1. architectural and interior design,
2. the physical indoor environment, and
3. technological solutions connected to the dwelling.

### Methodology

A demonstration for persons with dementia was designed and officially opened 26 April 2012 in Woerden, The Netherlands. The dwelling had to meet a number of conditions. First of all, the design should be suitable for habitation by a couple, of which one of the spouses deals with early-stage dementia. The design for the dwelling for people with dementia should demonstrate that the integration of architectural and technological solutions can be achieved within a single design. The dwelling in this project has a surface area of approximately 60 square metres (size of final design 57 m<sup>2</sup>), a normal-sized home for older people. Another condition was that the home could also be fit for other target groups, such as parents with a disabled child or first-time buyers getting into the housing market, although claims of efficacy would then need to be researched in more depth. The design of the dwelling was based on literature research, and focus group sessions with experts in the field of dementia and housing for older adults. The first focus group was held on June 29 2011 with 12 participants, and the second on September

14 2011 with 6 participants. These participants have a background in design of buildings for older persons, or care for people with dementia. Both sessions lasted for 3.5 hours and resulted into amendments to the home's design.

### Results: the design of the dwelling

The lay-out of the dwelling is shown in Figure 1. The home can be accessed via a small hallway, providing access to a toilet space, the main living room and the master bedroom. The meter cupboard is placed externally. An important feature is the open plan living room. Occupants can observe all parts of the dwelling from practically all positions in the home, and thus watch each other. The wide sliding doors in the centre of the home can be easily operated and allow a view to the toilet from the living room. The bathroom is wheelchair-accessible and is equipped with modified sanitary equipment. Between the master bedroom and the bathroom, there is a shortcut in the form of a sliding door. The kitchen is positioned in the living room and includes design features in order to improve safety and security. The partner with dementia can take a seat and participate in easy food preparation tasks. A second bedroom offers room for the caring partner to retreat, or as a time-out room for the person with dementia. The main design solutions are summarised in Table 1. The vast majority of design solutions are taken from van Hoof et al. (2010a). That document provides extensive lists

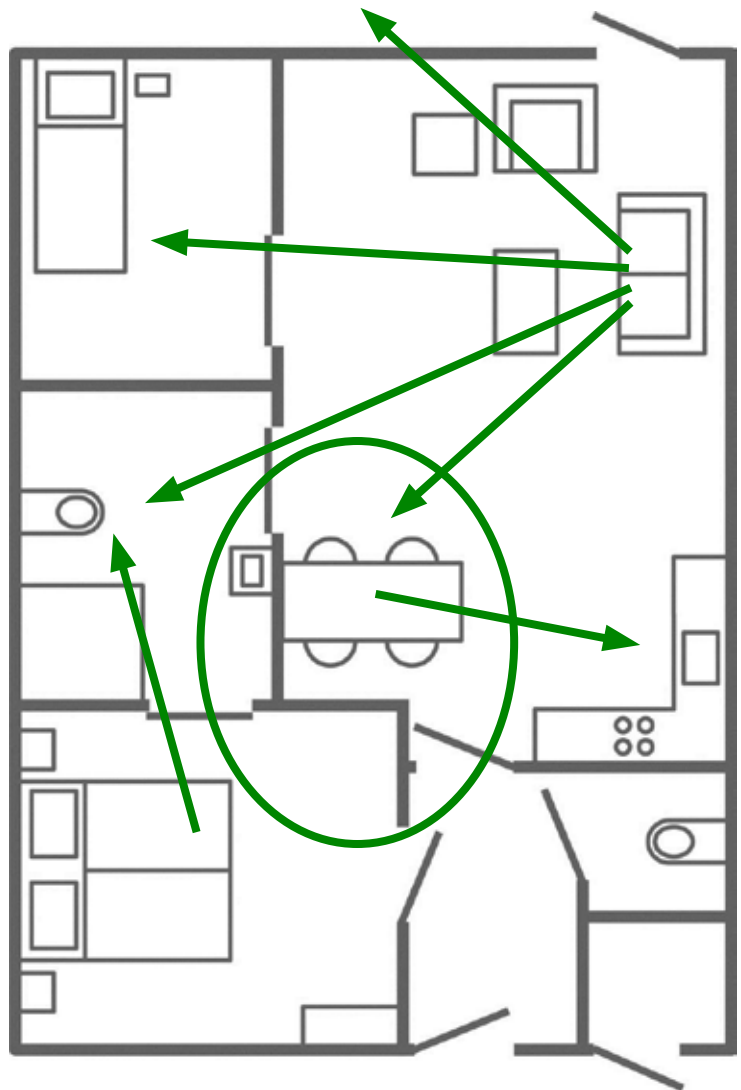


Figure 1. Schematic representation of sightlines and circular pacing route in the dwelling.

*Table 1. Main technological focus points of the dwelling.*

Front door	<ul style="list-style-type: none"> <li>Camera</li> <li>Doorbell</li> <li>Numeric lock</li> <li>Door can be opened and locked with an app for a tablet computer (family carers)</li> </ul>
External meter cupboard	<ul style="list-style-type: none"> <li>Automated shut-off valve for gas</li> <li>Storage space for wheeled walker</li> <li>Home automation systems</li> <li>Fire alarm</li> </ul>
Hallway	<ul style="list-style-type: none"> <li>Front door, coat rack (wandering) and 'home-switch' camouflaged by curtain</li> <li>Turning directions of the doors are such that they prevent persons from leaving the home during wandering</li> </ul>
Toilet space	<ul style="list-style-type: none"> <li>Separate toilet for guest, and for person with dementia at night</li> <li>Lock can be opened from outside</li> <li>Electricity available for shower toilet</li> </ul>
Kitchen	<ul style="list-style-type: none"> <li>Open lay-out kitchen</li> <li>Tap with blue and red markers for hot and cold</li> <li>Valve to limit water temperature (up to 40°C)</li> <li>Hob (gas) with barrier for pans</li> <li>Shut-off valve for gas (key)</li> <li>Electrical connection present for electrical hob in the future</li> <li>Protective covers inside plug sockets</li> <li>Magnetic locks on cupboards</li> <li>Waste container inside cupboard</li> <li>Sieve placed in the drainage</li> </ul>
Living room	<ul style="list-style-type: none"> <li>Ceiling-mounted luminaires for light therapy</li> <li>Large (lifter) chair placed near windows</li> <li>Curtains, blocking daylight</li> <li>Infrastructure along the ceiling for data and electrical wiring</li> </ul>



---

	<ul style="list-style-type: none"><li>Small dining table with memory board</li><li>Telephone with large touch buttons</li><li>Analogue clock</li><li>Imitation hearth</li><li>Door frames painted in contrasting colours</li></ul>
Second bedroom	<ul style="list-style-type: none"><li>Wide sliding door for sight lines with second bedroom or time-out room</li></ul>
Bathroom	<ul style="list-style-type: none"><li>Wide sliding door for optional sight lines during daytime with toilet</li><li>Short walking distance to toilet and bathroom appliances</li><li>Design radiator for towels</li><li>Container for incontinence material</li><li>Raised washing machine</li><li>Height adjustable toilet with flush buttons</li><li>Colour contrasts applied to toilet bowl, seat, and tiles, for better orientation</li><li>Roll-in shower with robust shower curtain and rails, no threshold</li><li>Hand-held shower, turning handles on tap</li><li>Anti-slip tiles</li></ul>
Master bedroom	<ul style="list-style-type: none"><li>Sight line and short walking distance to bathroom</li><li>Door frames painted in contrasting colours</li><li>Darkening curtains</li></ul>
Miscellaneous	<ul style="list-style-type: none"><li>Absence of thresholds</li><li>Rough floor covering</li><li>Turning direction of doors is such that people can walk in circles during pacing</li><li>Radiant floor heating instead of radiators</li><li>Thermostats for separate rooms</li><li>Fire alarms in every room</li><li>Data access points in every room</li><li>Use of colour contrast and pictograms</li></ul>

---

of environmental solutions for persons with dementia, and a full list of references. These environmental interventions are related to toileting, bathing and personal care, dressing and doing laundry, sleeping, cooking, dining, as well as to general safety and security-related interventions at home, and assistance with perception, orientation, and memory.

### **Discussion**

The dwelling presented in this study is a three-dimensional showcase that can be experienced by visitors and potential end-users alike. In a co-creation project, best practices and evidence-based solutions have been included into a single design. But the home is more than just a showcase. The building services sector can show to the world what the sector can contribute to care for older persons and ageing in place. Social housing organisations, care organisations, education and future care consumers can visit the dwelling and be inspired or have discussions about the feasibility of the solutions presented. Another goal of the dwelling is to create awareness about the role of national building codes and the interests of real estate developers in relation to new construction plans.

Policies and legislation dealing with dementia and housing facilities should widen their scope to include ageing-in-place in one's own home. The dwelling itself shows how demand and supply can be brought closer to one another.

In order to improve the current situation, it is essential that all people involved have access to relevant information. Family carers and people with dementia should have easy access to usable and understandable information about architectural and technological solutions, which can support ageing-in-place. The dissemination of knowledge should also address professional carers, professionals from the domain of building and technology, and policy makers and civil servants. This knowledge can help bridge the gap between demand and supply. Moreover, working with persons with dementia calls for a paradigm shift in the way designers and contractors operate. Civil servants at the municipal level should increase their skills and knowledge in order to adequately support people with dementia and their family carers in implementing architectural and technological solutions as people with dementia wish to age-in-place.

### **Conclusion**

The design process of the dementia demonstration dwelling has shown that it is possible to integrate evidence-based architectural and technological solutions, which support both persons with dementia and their carers in daily life situations. These solutions could also be used in the private home of older adults with dementia, which should facilitate, ageing-in-place and delay the demand for expensive institutional care. Whether a modified dwelling is supportive

---

in relation to ageing-in-place, and, if so, for how long, depends on the specific needs of people with dementia. There may come a time, as the dementia progresses or when family care comes under pressure, when architectural and technological solutions no longer offer sufficient support and institutionalisation becomes inevitable. The dementia demonstration dwelling is one of the steps taken in The Netherlands to make the public aware of housing-related solutions for dementia care.

## Literatur

- Blom M, Tjadens F, Withagen P (2000) Weten van vergeten. NIZW, Utrecht, The Netherlands [in Dutch]
- van Hoof J, Kort HSM, van Waarde H, Blom MM. Environmental interventions and the design of homes for older adults with dementia: an overview. *American Journal of Alzheimer's Disease and Other Dementias* 2010;25(3):202-232
- Ministry of Community and Social Services (1990) Dementia and activities of daily living. A report on technologies and environmental design that can assist people with Alzheimer disease and related dementias. Ministry of Community and Social Services, Toronto, ON, Canada
- Rommel W, Declerq A, De Clerq J, Van Audenhove C, Lammertyn F (1998) Tussen autonomie en geborgenheid: Dementerende ouderen en hun omgeving. Garant, Leuven Belgium/Apeldoorn, The Netherlands [in Dutch]

## Housing for People with Dementia

Alexandra Brylok

The majority of elderly wants to live independently and as long as possible in their familiar environment. This form of housing should be adapted to the personal circumstances of life and offer possibilities for maintaining and strengthening social contacts as well as assisting services. Also, people with early signs of dementia are agreeing to this procedure. Securing an independent elderly way of life and a household of his/her own (as far as possible) is one of the central challenges for health and social policy. This is also due to handicapped people in need of care. To maintain independence, physical capacities are not only of importance but also the quality of designed environment. In psychological terms, this is called "supporting environment." Indeed, the influence of the housing environment is increasing when skills and capacities are reduced by dementia. In this context, we have to regard it as a complex issue.

When we talk about dementia, we mean an accumulation of symptoms, caused by different deceases, which hamper or damage parts of the brains (e.g., vascular illness; brain tumors; shortage of oxygen and vitamins; infections; illnesses of immune system, liver, and metabolism) One of the most frequent illnesses of

dementia is Alzheimer's disease. Caused by specific disturbance (e.g., disturbance of thinking, speaking, partly or total loss of memory, disturbance of feelings, equivocation of noticing). So people with dementia are extremely limited in their daily competence.

Caused by these restrictions, problems of orientation and smaller areas of action occur. People with dementia depend more and more on supported conditions of housing. Most of them do not live in care institutions or specific forms of housing, but in normal dwellings, where generally family members fulfill the task of daily care. Nearly a third of all people with dementia are exclusively cared and looked after by their family members (Statistics of Care, 2011). However, what does that mean for the housing sector?

Housing is some kind of a social barometer, where for the first time, social and personal changes can be noticed. Thus, housing and infrastructural provisions are the basic foundations of our society, as the central point of life is the residential housing unit. It is determined by the dwelling itself and its surrounding environment. For all people, housing is a central dimension of their life. A great part of life time—for some people, even most of their life time—is spent in the dwelling. It is the location for family communication and social development of life. However, it can also become a source of dissatisfaction, conflict, and burden. A dwelling is a special pri-

vate place, which is also secured by constitution (Backes und Clemens, 2008).

For people with dementia, the dwelling is an individual and familiar place and may serve as an important element to remember important things as an orientation for identification of activities because it contains objects of biographical value—objects that serve as a memory assistant. A sudden change of location would mean a loss of confidence.

**For people with dementia:  
What kind of difficulty is connected  
with housing?**

People with dementia suffer from typical problems of housing and security. Especially, dangers for the person himself/herself and for other people are of importance.

Examples of endangering oneself:

- Danger of falls through ignorance of obstacles (e.g., barriers, stairs, glass doors) or furniture, which is placed in a low position.
- Fear, caused by reflective or dark patterned materials (e.g., pavements, floors, wall paper) and more motivation to leave the dwelling through bright design of entrance areas
- Worsening of orientation, caused by insufficient lightening and unclear contrasts
- Confusion of dangerous substances with food.

Examples of endangering other people

- Flooding or fire in the dwelling, caused by open water taps or electric devices, which had not been switched off (e.g., stove).

For people with dementia, adaptations of their dwellings and their living area—especially in the field of security—will increase the quality of life and facilitate the care of family members. These matters should have priority for a continuous adaptation, as widespread changes would cause additional confusion for the affected residents. Furthermore, they suffer from fears to lose their biographical points of orientation. Objects of this type of orientation should remain in their original location. Furthermore, wishes, needs, resources, and restrictions of the person and the building design and other environmental conditions have to be carefully considered to find a suitable solution. The following aims should be envisaged:

- Independence, self-estimation, and competence of the resident should be strengthened and supported through measures of adaptation.
- Security has to be created for residents with dementia and their environment
- An orientation for a self-determined life should be stimulated.

### **What Kind of Role Could Be Played by the Housing Sector?**

There is a tendency that completes new housing conceptions that will be necessary to correspond to the demands and needs of an aging population. Initiated by the age structure of their members and with their traditionally strong social commitment in housing areas, the Saxon Federation of Housing Cooperatives developed its concept of "living the age." The aim of this concept is to adapt the housing units of the Saxon housing cooperatives to the changing needs of an aging population. The tenant shall be able to remain in his/her familiar housing and living environment despite his/her increased age risks. This is possible through an adjustment of his/her sensory, cognitive, and physical functional restrictions.

Technical solutions are elaborated and combined with individual services, which help to adjust age-specific physical restrictions (e.g., sensory losses) and cognitive reductions (e.g., by dementia) as well as typical age-conditioned diseases (e.g., diabetic illness, heart and circulation problems, and stroke).

The assisting systems shall support the user's daily activities in the best way of taking over control and steering performances. As far as possible, this is done in a discrete form.

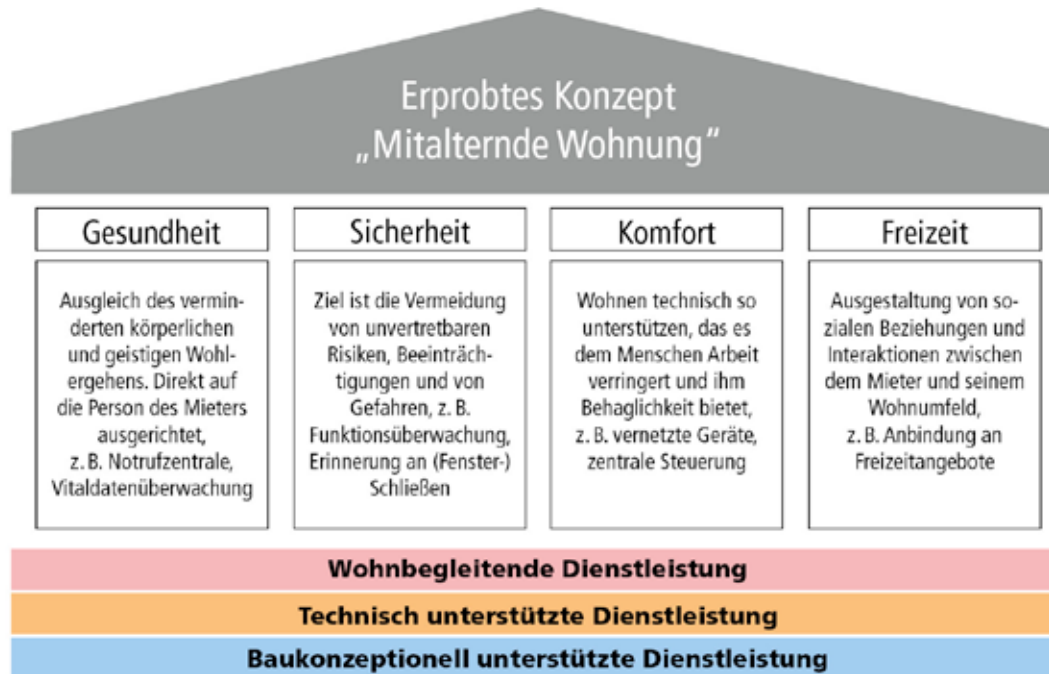
Aging with the residents means an age-specific design of the concept approach. The socio-technical system combines social and technical components of the overall system, "self-deter-

mined housing for elderly" toward a complimentary organization.

Through building and technical design approaches, measures against endangering oneself or other persons are implemented to take off sources of stumbling and other dangers toward a barrier-free or low-barrier dwelling. Orientation and security are improved through light and color design, technical assisting systems, technical support such as signals and alarm systems (a.o. motion and smoke detectors, water sensors, emergency call systems, fall detectors), sensors for programmed or situation-specific switch-off systems for electric power (e.g., stove) or water, reminders of remedy taking, and location of persons or systems for room surveillance. Examples are shown in picture 2.

People with dementia are living in a world with a clear daily structure and recognition. The service of permanent care is offered for the last stage. The concept enables the application of electronic systems, which can be programmed with such a repeating daily structure. Differences from that structure can be managed by signals and information to the partner or the professional carer. A functioning network is possible and is supported by monitors, tablets, and other devices, which reflect familiar pictures and sounds taken from the experience of the affected person with dementia.

Various security systems enable people with dementia to live at home without any measures,



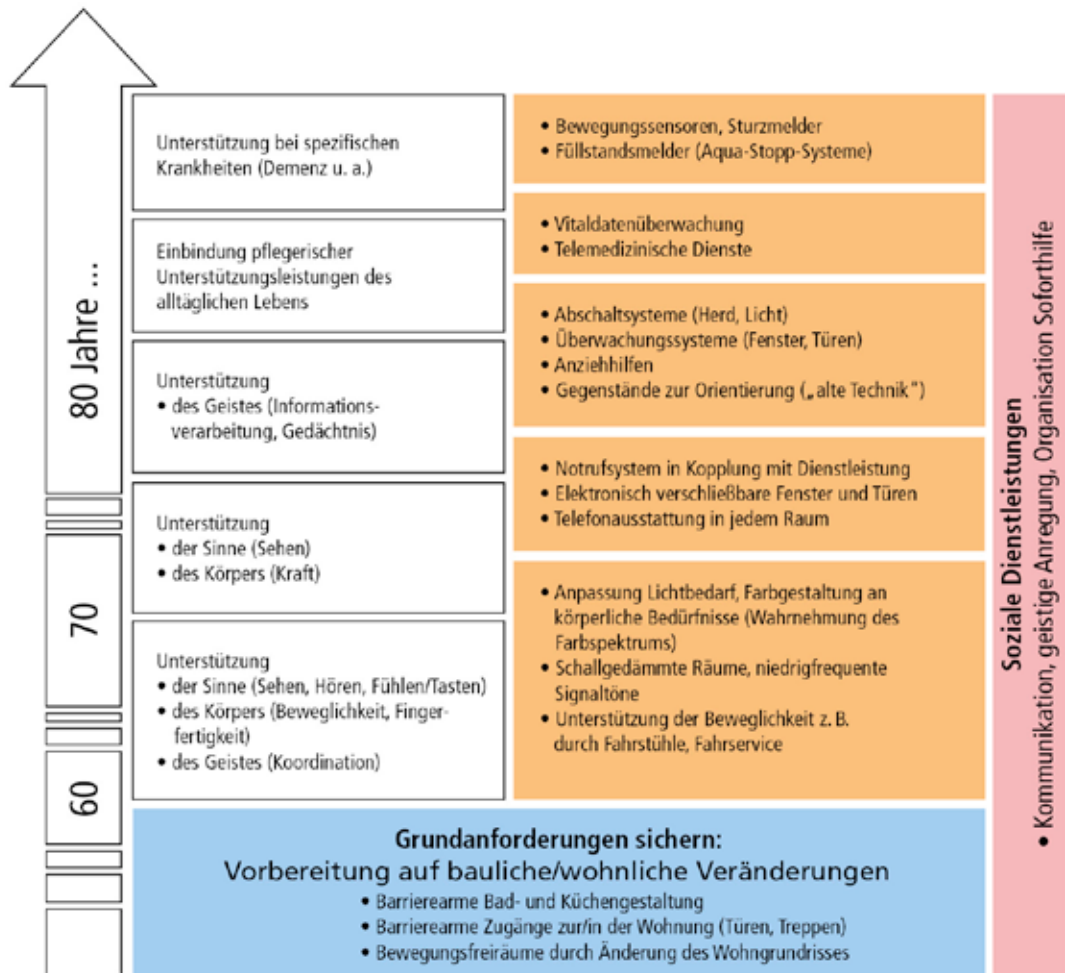
Picture 1: Concept of "Aging Dwelling:"

which cut their freedom (which is also questionable in ethical and moral terms). The systems offer information about the resident's leaving his/her dwelling. Also, systems, which are in a position to locate people with dementia by GPS or GSM, can be used to find them after their leave.

Family members should put their attention on the fact that the system can well be used for daily matters. It can be linked to a supporting service or an emergency call center. There is a great offer for different suppliers.

### The following necessities can be taken from the daily reality of housing:

Dementia is not curable and is a continuous process, which can have different appearances, forms and ranges. There is no single form of dementia, and therefore, there is no simple form of housing for the people affected by this disease. An individual observation and consulting for the affected person is absolutely necessary. If the building capacities and the financial possibilities of the housing cooperative permits,



Picture 2: Examples of functionalities in an "Aging Dwelling":



it is important to offer a low-barrier dwelling. Housing units should be equipped with elevators in these areas. Also, a caring partner or a professional carer with a significant volume of care could live in a close-by dwelling, which can be reached by elevator. It would be an optimal way, if the housing situation opens the possibility to live together. This means, that an affected person could change to a group with dementia, living in the same building, once, the changed nature of dementia is reached. In this case, also the partner is living close-by.

New dwellings (in case, a transfer to another dwelling becomes necessary), where people with dementia are living with their partners, should offer certain possibilities, which could be used in another way.

Nevertheless, the dwelling equipment should contain many objects, which belong to the familiar environment of the person with dementia. This means, there should be enough space for furniture from the former dwelling. However, frequently, new apartments are planned with short walls with hardly any storage place for wall units. A resident with dementia needs impulses from his/her past, which delay the reaching of the final stage of dementia and makes life much easier.

### **The use of technical assistance can facilitate the caring process.**

In case of dementia, there are always two persons: the one with dementia and the partner

or another family member. Living and housing together mean that both interests have to be regarded. The caring partner is psychologically and physically much more requested than the person with dementia. This means that the caring partner needs some room for his/her withdrawal, possibilities of communication, and some psychological care for him/herself.

The housing environment of the healthy tenants has to be accustomed to the special situation of the person with dementia and may not regard this as abnormal or abhorrent. For that reason, clarifications about the disease and the acceptance of the healthy tenants will be necessary. Some possibilities of communication should be created within or in front of the building to integrate persons with dementia and their partners into daily life (e.g., group of seats, grilling places, children's playground, etc)

Neighborhood assistance and self-help groups have to be organized. The worst thing would be the exclusion or discrimination of people with dementia and their partners. In this situation, two cooperative principles "solidarity" and "community" are more important than ever. Frequently, families or partners are anxious to keep the diseases emotionally top secret, at least in front of their neighbors. They isolate themselves from the community. The concrete talk of friends or neighbors is not made by curiosity, but it might help the affected person with dementia.

Training of the memory and group activities

are important and should be offered in housing groups, where people with dementia are living together or in the form of ambulant care. For the affected person with dementia, solid contact persons are very important, as they have more influence than permanently changing people. This fact is also well known from childhood. It can be observed in the case of cleaning staff within the dwelling.

Housing people with dementia means that there should be a possibility of an ambulant 24-hour care service and a combination with a daycare center. The offer for a short-term care is important to enable the caring person to have a certain time for recovery.

A broad offer of close-by services improves the confidence of a stressed partner and of a person with dementia. Also, cleaning of the dwelling and washing of clothes as well as driving services to the doctor's are important parts of assistance.

Providers of housing for people with dementia have to lobby and that public transport is connected to the housing area and the availability of pharmacies and doctors, making home visits, as well as shopping possibilities secured. The architects for infrastructure and the providers of all the necessary facilities have to be in line with the consequences of dementia and respect these people living in close neighborhood. This means, that there should be assistance of recognition through signs, colors, and low barriers

er areas, for example, in shops and a changed pattern of behavior toward affected people with dementia.

### **Conclusion**

In principle, dementia should be regarded from an overall perspective (people with dementia together with their housing and living environment, their daily life, and their caring family members), which means using a comprehensive approach. This facilitates the generation of sustainable solutions. Therefore, all relevant actors of housing, service, and care providers as well as further relevant institutions and networks should form local cooperation for partnership in networks to be in a position to create common and joint solutions in favor of people with dementia.

### **Literatur**

Backes, G. M.; & Clemens, W. (2008): *Lebensphase Alter. Eine Einführung in die sozialwissenschaftliche Altersforschung. Grundlagentexte Soziologie*, 3. erw. und überarb. Auflage, Weinheim: Juventa, S.233



---

## Dementia-Friendly Hospital Architecture - What Lessons can be learnt from Long-Term Care Facilities?

Kathrin Büter, M.A.

Acute care hospitals face big challenges caused by the increasing number of elderly patients and among them people with dementia. In Germany nearly half of all hospital services are attributable to the elderly. It can be observed, that there is a significant increase in the number of hospital treatments for patients aged 60 years, tending upwards with rising age (Statistisches Bundesamt – “Federal Office of Statistics,” 2010). Increasing age is a risk factor for developing among acute illnesses also dementia. Currently, no reliable dates on the exact prevalence of patients with dementia staying in hospitals are available. In many cases cognitive impairments and dementia are not assessed upon hospital admission. Thus, a great proportion of dementia diagnosis’s remains undiscovered (Joray, Wietlisbach & Bula 2009; Sampson et al, 2009). In various studies different numbers on the prevalence of dementia in acute care hospitals had been calculated ranging from 3.4 % to 43.3 %. According to Pinkert and Holle (2012), the varying results can be explained by the different study designs used. If you consider only those studies, where patients with dementia had been identified using detailed diagnostic and

screening methods, it can be assumed that about one in five older patients in hospitals are suffering from dementia. In most cases, dementia is rarely the reason for admission to a hospital. It rather represents a secondary diagnosis in a significant number of elderly patients, however, affecting the daily care routine tremendously.

Hospitals are predominantly aligned to the efficient treatment of somatic diseases. The highly standardized care processes offer little room for the individual needs of patients with dementia. The unfamiliar hospital environment and the sometimes hasty care routines may cause patients’ fear, worsening their disorientation or provoking challenging behaviour (Alzheimer’s Society, UK 2009) which in turn, place a heavy burden on hospital staff and other patients (Rüsing et al, 2008 ; Schütz & Füsgen, 2013). The enforced passivity of patients during hospitalization may further lead to a deterioration of their physical condition (Morton & Creditor, 1993) and cognitive status. Many older patients are leaving hospitals with reduced ADL (activities of daily living) function (Covinsky et al, 2003). Thus, a transition to a nursing home following hospitalization is inevitable (Joray et al, 2004; King, Jones & Brand, 2006).

In recent decades, dementia friendly care concepts have been well established in different care facilities. In this context, the adaption of the built environment to the needs of people

---

with dementia plays a vital role. A variety of studies shows the positive impact of specific features of the built environment on well-being, orientation, behaviour and ADL function among people with dementia (Day, Carreon & Stump. 2000; Fleming & Purandare, 2010). However, most of these findings are related to the nursing home setting. Dementia-friendly design concepts were hardly introduced to hospitals. But also in hospitals measures of dementia-friendly architecture should be taken. Here, the aim should also be the activation of patients to preserve their functionality and independence, the reduction of challenging behaviour and to keep burden on caregivers and other patients as low as possible. Nevertheless, hospitals exhibit specific medical and organisational structures, which preclude a direct transfer of the research findings to this setting. In a systematic literature review on building design for people with dementia we examined and rated currently available research findings (see contribution of Marquardt, Büter & Motzek). Table 1 provides an overview of the influence of various features of the built environment on residents with dementia in long-term care facilities. The transferability to hospitals is discussed below.

### **Special Care Units**

In many nursing homes, special care units have been established, in which usually only residents with dementia are cared for in a physical

and social environment adapted to their needs. Studies show that a segregated type of care has a positive impact especially on the social abilities and care outcomes, but also on well-being and behaviour among people with dementia. This approach has been already applied in some hospital. For example in the USA, the model of an interdisciplinary Acute Care for the Elderly (ACE) Unit was developed. A cost-effective and sustainable provision of care as well as the preservation of functionality of older patients are objectives of these ACE units. In recent years, also in Germany, special hospital wards for geriatric patients, exhibiting also cognitive impairments, were opened. However, there is no general concept for these wards so that they differ in many characteristics, such as ward size and number of beds or the lengths of stay of patients. Similarities exist in some environmental features (milieu therapy) and the training of staff. The mostly interdisciplinary team includes in addition to the disciplines relevant specialists in geriatrics, pharmacists, occupational therapists, physiotherapists, social workers and volunteers (Rösler, Hofmann & von Renteln-Kruse, 2010). Also here, the positive effect of such special wards is supported by various studies: patients cared for in ACE Units are less likely to be admitted to nursing homes after their hospital stay (Landefeld et al, 1995) and also mortality rates are lower (Saltfeldt et al, 2002). Furthermore, a pilot project from Germany suggests,

that setting up a dementia-unit in an acute care hospital can help to reduce patients' challenging behaviour (Zieschang et al, 2010). Consequently, the establishment of special units can be seen as an important step towards an improved care for these patients in hospitals. Nevertheless, due to the high estimated number of patients with dementia in hospitals, a dementia friendly design of regular wards will be needed to be able to provide care for as many patients with cognitive impairments as possible.

### **Building Structure**

Special attention needs to be paid to the spatial structure of buildings when planning new or redesigning dementia friendly hospital wards. For example, the size of a ward itself can have a major impact on patients with dementia. Table 1 clearly shows, that small scale units with a limited number of residents (8 - 12 people are recommended by KDA-Kuratorium Deutsche Altershilfe) turned out to be beneficial to people with dementia in long-term care facilities. Small units allow particularly for good interaction between nurses and residents or residents with each other and also promote ADL function. A good connection to a caregivers can be essential for patients with dementia, especially in an unfamiliar hospital environment. Therefore it is important to find ways to restructure or subdivide large wards especially in existing buildings. Another example from

the USA offers interesting suggestions. Some American hospitals combine a number of patient rooms within large wards to sub-units – so called nursing pods. A workstation for a nurse with a computer, hand basin and further necessary utensils are located in close proximity (Marquardt 2011). Both patients and staff may benefit from this spatial proximity. Initial studies suggest that nurses working in nursing pods walk less distances, thus work more efficiently and spend more time with patients. The visibility and accessibility of staff is improved and patient satisfaction increased (Donahue 2009; Friese et al, 2014). Associated with such structural changes is always a rethinking of organizational issues and action sequences. The feasibility and implementation of nursing pods in German hospitals need to necessarily be discussed with different stakeholders of the institution.

Furthermore, small scale buildings offer the potential to promote spatial orientation in people with dementia. As it is known from long-term care facilities, residents with dementia find their way around better in buildings with straight, short and open circulation systems. Here visual connections between relevant places and the creation of spatial reference points need to be considered. Within hospital environments a centrally located common room could act as an important reference point for patients with dementia and promote their activity.

Table 1: Overview on the impact of the built environment on people with dementia in long-term care facilities based on a systematic literature review.

	Behaviour	Cognition	(ADL-) Function	Well-being/ Quality of Life	Social Abilities	Orientation	Care Outcomes
Special Care Units	+			+	++		++
Small-scale units/ limited number of residents	++	+	++	++	++	+	++
Homelike character/ Personalization	++			++	+		
> Familiar, homelike dining room	+		+		++		+
> Homelike bathroom design	+						
Privacy in single and multi-occupancy bedrooms	+				+		+
Straight and short circulation systems	+		+			+	
Reference points					+	+	
Visual connectivity			+		+	+	
Signature						++	
Environmental cues			++			+	
Visual barriers	++			+			
Colour contrast to promote vision	+		+			+	++
Improved lighting to promote vision	+		+				+
Floor surfacing with low contrast and motifs	+		+			+	
Adequate overall lighting	+			+			+
Quite environments, reduction of noise	++			+	+	+	+
Comfortable indoor climate	+			+			
Sensory environments	++	+					+
> Sensory bathroom design	+						
Multi Sensory Environment Approach/ Snoezelen	++	+	+	++			
Music	++						

+ | 1 - 2 studies suggest a positive impact of the design factor on residents

++ | 3 or more studies suggest a positive impact of the design factor on residents

### **Environmental Cues**

Besides the building structure wayfinding signs and color coding are seen as environmental cues promoting orientation among people with dementia. Especially doors to bathrooms should be clearly marked in order to be found. In a bathroom itself a sufficient color contrast is needed of sanitary equipment to the walls behind them. Therefore, they can be located by elderly with visual impairments. But also the development of orientation systems in patient rooms in the hospital is an important task for architects. Especially in double occupancy rooms marking beds and closets through signs, colors or symbols can help patients to find their personal place without having conflicts with other patients. On the other side, areas, which are not to be used by patients, like storage or technical rooms can be taken off their attention by a more subtle design.

### **Ambiance**

Meanwhile, more and more nursing homes are based on a normality principle. In small units, activities and everyday live can be adapted to the individual routines and lifestyles of the residents. One key feature of these units is the homelike character avoiding an institutional appearance. The aim is to give residents a sense of „being at home“ and to facilitate their situational orientation and integration to the living environment. In homelike environments residents with

dementia experience more quality of life, show less challenging behavior and more social interaction. If a homelike character would be suitable for hospitals, however, is questionable. Due to their exceptional medical situation, it may well be important to make patients with dementia aware of being in hospital because of a medical treatment. Here the question of how the aspect of a homelike character can be reinterpreted and adapted to the hospital environment arises. On one hand, providing more environmental cues to facilitate situational orientation in patients could be important. On the other, an atmosphere needs to be created in which patients with dementia can feel safe and comfortable despite the unfamiliar surroundings. In care institutions the use of personal items like photographs is regarded as important. Due to patients' short length of stay this seems to be difficult to offer also in hospitals. Here elements with a regional character and a recognition for a wider group of patients might be helpful.

### **Activity Promoting Design**

The aspect of familiarity should further be used to activate patients with dementia and promote their independence. Studies from nursing homes, for example, suggest that residents in homelike dining areas with familiar routines show improved eating behavior. They eat more independently and are more communicative. In hospitals, meals are often eaten in bed, which



is an unusual situation for many patients. Therefore, a common dining area for a limited number of patients with dementia in a hospital ward could be advantageous to encourage patients to eat. This would in turn also provide an opportunity for hospital staff to assist several patients at mealtimes. While residents in care institutions can be easily engaged into daily activities like homework or the preparation of meals, options in hospitals are limited. Here, on the one hand, guided activities and the provision of relevant rooms for them are needed. On the other hand, possibilities for informal activities like comfortable seating areas in corridors with pictures on the wall and reading material could activate people with dementia.

## Conclusion

Building and design recommendations for dementia-friendly architecture from long-term care facilities can be partly transferred to hospitals. In many cases, an adaptation to the hospital setting, or even a re-interpretation is required. Especially with the topics activity promoting design and the facilitation of situational orientation in hospitals, new concepts need to be developed and scientifically evaluated. Design Recommendations for dementia-friendly acute care hospitals are currently developed at TU Dresden by the DFG-funded Emmy Noether Junior Research Group „Architecture in demographic change“

## Literature

- Covinsky, K. E., Palmer, R. M., Fortinsky, R. H., Counsell, S. R., Stewart, A. L., Kresevic, D., Burant, C. J., & Landefeld, C. S. (2003). Loss of Independence in Activities of Daily Living in Older Adults Hospitalized with Medical Illnesses: Increased Vulnerability with Age. *Journal of the American Geriatrics Society*, 51, 451-458.
- Day, K., Carreon, D., & Stump, C. (2000). The Therapeutic Design of Environments for People With Dementia: A Review of the Empirical Research. *The Gerontologist*, 40(4), 397-416.
- Donahue, L. (2009). A pod design for nursing assignments: eliminating unnecessary steps and increasing patient satisfaction by reconfiguring care assignments. *The American Journal of Nursing*, 109(11 Suppl), 38-40.
- Fleming, R. & Purandare, N. (2010). Long-term care for people with dementia: environmental design guidelines. *International Psychogeriatrics*, 22, 1084–1096.
- Friese, C.R., Grunawalt, J.C., Bhullar, S., Bihlmeyer, K., Chang, R., & Wood, W. (2014). Pod nursing on a medical/surgical unit: implementation and outcomes evaluation. *The Journal of Nursing Administration*, 44(4), 207-11.
- Joray, S., Wietlisbach, V., & Büla, C. J. (2004). Cognitive Impairment in Elderly Medical Inpatients: Detection and Associated Six-Month Outcomes. *The American Journal of Geriatric Psychiatry*, 12(6), 639-647.

- King, B., Jones, C., & Brand, C. (2006). Relationship between dementia and length of stay of general medical patients admitted to acute care. *Australasian Journal on Ageing*, 25, 20–23.
- Landefeld, C. S., Palmer, R. M., Kresevic, D. M., Fortinsky, R. H., & Kowal, J. (1995). A randomized trial of care in a hospital medical unit especially designed to improve the functional outcomes of acutely ill older patients. *The New England Journal of Medicine*, 332, 1338-1344.
- Marquardt, G. (2011). Architektur für an Demenz erkrankte: Amerikanische ACE-Units geben Orientierung. *Health & Care Management*, 2(9), 28-30.
- Morton, C. & Creditor, M. D. (1993). Hazards of Hospitalization of the Elderly. *Annals of Internal Medicine*, 118, 219-223.
- Rösler, A.; Hofmann, W., & von Renteln-Kruse, W. (2010). Spezialisierte Stationen zur Behandlung von akut erkrankten geriatrischen Patienten mit zusätzlichen kognitiven Beeinträchtigungen in Deutschland. *Zeitschrift für Gerontologie und Geriatrie*, 43, 249-253.
- Rüsing, D., Herder, K., Müller-Hergl, C., & Riesner, C. (2008). Der Umgang mit Menschen mit Demenz in der (teil)stationären, ambulanten und Akutversorgung: Problematische Situationen, Wissensbedarfe und Selbsteinschätzungen. *Pflege & Gesellschaft*, 13 (4), 306-321.
- Saltvedt, I., Opdahl, E. S., Fayers, P., Kaasa, S., & Sletvold, O. (2002). Reduced Mortality in Treating Acutely Sick, Frail Older Patients in a Geriatric Evaluation and Management Unit. A Prospective Randomized Trial. *Journal of the American Geriatrics Society*, 50(5), 792-798.
- Sampson, E., Blanchard, M., Jones, L., Tookman, A., & Michael, K. (2009). Dementia in the acute hospital: prospective cohort study of prevalence and mortality. *The British Journal of Psychiatry*, 195, 61–66.
- Schütz, D. & Füsgen, I. (2013). Die Versorgungssituation kognitiv eingeschränkter Patienten im Krankenhaus. *Zeitschrift für Gerontologie und Geriatrie*, 46, 203-207.
- Statistisches Bundesamt (2010). *Demografischer Wandel in Deutschland. Auswirkungen auf Krankenhausbehandlungen und Pflegebedürftige im Bund und in den Ländern*. Heft 2, Statistische Ämter des Bundes und der Länder, Wiesbaden.
- Pinkert, C. & Holle, B. (2012) Menschen mit Demenz im Akutkrankenhaus: Literaturübersicht zu Prävalenz und Einweisungsgründen. *Zeitschrift für Gerontologie und Geriatrie*, 45, 728-734.
- Zieschang, T., Dutzi, I., Müller, E., Hestermann, U., Grünendahl, K., Braun, A. K., Hüger, D., Kopf, K., Specht-Leible, N., & Oster P. (2010). Improving care for patients with dementia hospitalized for acute somatic illness in a specialized care unit: a feasibility study. *International Psychogeriatrics*, 22, 139–146.



## Multi-Sensory Rooms — Dwellings for the Elderly

Prof. Dr. phil. Christoph Metzger

At present, the development of elderly adequate forms of living are discussed at federal level. Our aging society is decently presenting its requirements. Modified housing and the step-by-step changing of elderly care present a kind of an electric field and underline the need for action, where its political dimension cannot be defined clearly so far. We are within a process of demographic change, which will

lead to an erosion of our social system if no fundamental reforms take place. Now, it is our role to force architects, planners, and project developers for a change, which will have its effects on modifications for our society. I rely on the voice of the next generation of elderly, who will surely have more relevance in the year 2020. These elderly will be loud, as the rebel generation from 1968 will reach the age of care. Alternative forms of housing of the seventies will be rediscovered, and further development will take place, which is now still missed in nearly all fields of our society.



*Hotel Steinbock, Summe ortstypischen Materials, Foto: Christoph Metzger.*

I  
It does not matter if it is a nursery home or care institution for the elderly, individual cared housing units, or a solution in a residential area. Simple standards are claimed: free of thresholds, sufficiently big, adaptable, secure, and comfortable. These are the five points, which are listed as criteria for an adequate housing for the elderly by the Federal Institute for Building, Urban and Spatial Research (See: Institut für Wohnen und Entwerfen, Stuttgart 2013).

We, the "Open Minded Projektentwicklung AG", Frankfurt/Main received the leaflet "Ready" from the Museum for Architecture in Munich and discussed it in the center of the project. There are different sizes and designs. Three variants of bathrooms and rooms for mobility were presented from 90 × 120 cm via 120 × 120 cm up to 150 × 150 cm, defining the minimum standard of comfort. Also, the following details define how broad home doors and inside doors should be. Maximum thresholds of 2 cm, automatic locking systems, low window parapets, and stairs with pitches of 16.5 are added by balconies between 3.5 m<sup>2</sup> and 6 m<sup>2</sup>. Security is a top priority, and there are some comments about the points, defined by the national norm DIN 18040. Under this norm, a barrier-free building is described. However, technical working requirements are not enough to reach the necessary quality and security, which is so important for all age groups.



*Holzhütte, Vals, Graubünden, Foto: Christoph Metzger.*

Individual color and light design, regulation of heating, air condition, air humidity, and natural building material create a good living atmosphere. Housing for the elderly? Quality, which cannot be secured by DIN norms, still remains to be developed, to be built, and to be identified within the society to stand for it. The human body is affected by a permanent modification and change. Therefore, the body of architecture should be oriented to the specific needs of aging people. It is not the human being, who has to be forced into architecture and less in such a way to humiliate him/her in daily life — probably without any intention.

**II**

The official standards of 2013 – are they really sufficient for the housing of the elderly? Where and how do they want to live anyway? With this type of questions, you are not alone; however, for another reason, you are left alone. A lobby for affordable housing with a certain quality standard is missing so far because the number of people in need of care will increase by nearly 3.4 million until the year 2030. Until the year 2020, there is a need for investment of nearly 15 billion € for the construction of new nursing homes as well as 35 million € for the refurbishment and modernization of the existing ones. Other forms of housing with care service and the increasing need of care staff is not even included in these figures. Following the “EXPO REAL 2013 – Alternative forms of housing” Care Invest, a leading magazine and sector service of professional care, dedicated its October issue to the framework of stationary care for elderly: how does an adequate housing for the elderly look like?

The chairman of the board of DPF (Deutsche Pflege Fonds AG/“German Care Fund”), Felix von Braun stated: “There is a clear answer to the question. How do people live in their old days? Most of them are living in their own dwelling and as far as they are living in a multi-family building (56 %) they are tenants” (64%) (See: Braun und Rothe, 2013, p.8). Following the study, people 50 years or older are living

in dwellings of 105 m<sup>2</sup> and, on federal average, in dwellings of 90 m<sup>2</sup>. The desire for a smaller dwelling is mostly connected with the tenants’ readiness to cover the same costs for a higher quality of housing. Even 12% of higher income groups are ready to pay more. It came out that younger ones would also like to buy their dwellings. Only 5% of people, aged over 50 years, are living in flat-sharing of elderly. People aged older than 70 years generally reject this form of housing. However, this form of flat sharing, combined with care, will be asked for much more in the future. At present, that is the study conclusion, “there are not enough adapted housing units. Central city locations are more demanded than peripheral areas. To avoid so-called “homes for elderly,” it is recommended to integrate barrier-free ensembles into the city and to offer care services close by the buildings (Braun and Rothe 2013 p-9). Changed forms of housing need new building approaches. Which concrete requirements for elderly and people of a very advanced age are to be considered in the future? How does the building task look like in the future, intending to cover the need of a self-determined and independent lifestyle? Is architecture in a position to offer a specific quality for the elderly? We do think “Yes” but under the condition, those needs and wishes are well defined and addressed, and a potential solution offered. Security and safety as well as a nutrition, which change because of season conditions

---

and an integration; an adequate addressing way of communication; promotion of health, body, and spirit is essential—not only for people, who suffer from dementia.

### III

Caused by the decreasing notice of people with dementia, an architecture is necessary, which offers security, orientation, and housing comfort. A good and elderly adequate architecture has to consider handicap restrictions of wits, body, and mental capacity. Our most important visual acuity is decreasing because of age. In many cases, structural changes of the body have functional consequences. Already with the age of 35 years, the necessity for light increases and from the beginning of the 40th Birthday, a higher blinding sensibility, a worsened adaptation to extreme lightening, and a decreased notice of depth have to be stated. The visual power is decreasing with the age of 50 years, and a worsening of darkness adaptation can be observed. A narrowing visual field has the effect that an object can only be noticed at a later period. Color notice is decreasing with the age of 70 years. Similar to visual notice, the acoustic notice is decreasing, whereas the language understanding in most cases is caused by a frequency spectrum and is working until a very high age. The decreasing hearing capacity is starting with the age of 32 years (men) and 37 years (women). A common phenomenon is the easy provocation for

disturbing background noise after the age of 45 years. Severe disturbance of the understanding is generally turning up with the age of 90 years and more (Biermann and Weißmantel, 203, p.162). The level of cognitive capability, seeing, and hearing may work well after following the pattern recognition. From the very beginning, our wits are conditioned to divide well known from unknown things. However, this is getting more and more difficult with increasing aging. In terms of architecture, this means that an assisting measure is needed, but a complete one, including the service for all wits of human beings. An intelligent building block, which has to compensate elderly-specific deficits, first has to offer housing and living quality part from any DIN norm. In this ideal case, architecture is promoting health. However, on the other hand, it can also produce illness: hearing, seeing, smelling, tasting, and feeling—these are our wits since our pre-birth period until our death. It forms the horizon of notice and discovery until our world of experience. Our first wit is hearing—still in mother's body, and it is the best wit, working until the end of our life. In Asia, family members accompany the dying persons with reading from a Tibetan death book. They are doing it even after the clinically diagnosed death. Therefore, hearing is an elementary wit. By day and night, hearing is the elementary experience—an experience starting in the mother's body. As an elementary notice of human beings with the

outside world — how is hearing experienced in architecture? In terms of hearing in the body, where the body is an internal part of the surrounding environment and a location of daily staging. A private sphere goes public. Something from the outside is approaching the ear and stimulates a complicated process, which is necessary for lifetime. Locations without any acoustic impulses may drive people crazy after just a short time. Too much noise may cause physical stress, which can be measured. Hard walls, floors, and ceilings are generally experienced as unpleasant locations. Ceilings, walls, and floors covered with wood are regarded as comfortable. Wood is absorbing humidity and also certain smells. It sounds quite well. Not only dwellings for the elderly, these rooms are equipped with wood and are described as relaxing locations. Also, corresponding designed rooms like guest rooms, decorated with wood, are preferably visited. This is not only due in Southern Germany and the Alp region. These rooms have their own sounds. In combination with rooms, sequences and dramaturgies may take its rise, as they are more characterized through their temperature and light. Peter Zumthor, a philosopher and a traditional master of handicraft among architects, is talking about harmony between materials and rooms. He constructs such rooms presenting unique and mostly forgotten qualities. Zumthor says about the harmony of materials: "I take a certain quantity of oak wood and another quan-

tity of Tuf-Stone. Then, I add something more: 3-g silver. That is the key. What would you like to have more? I need you as a building owner, to create something with you. Then, we will draw a layout to turn things into a concrete way. First we do it in our spirit; then, we will come to re-



*Valsler Steinbruch, Vals, Graubünden, Foto: Christoph Metzger.*



ality. Look: How do materials react together! Materials have a common sound and come to glance. In combination of materials something unique is created" (Zumthor, 2004, p.27). Rooms are similar to sound producers, where we can live with all our might. „The sound of rooms. Please listen! Each room works like a big instrument. It is collecting the sounds, strengthening them and delivers them further on. This has something to do with its form, its surface, and the way how materials are fastened. Take, for example, a wonderful pine floor, and it is like a violin cover. Then, put it as a wood covering to your living room. Or another picture: take a glue and put it onto your concrete floor! Do you feel the sound difference? Yes, but that sound is not recognized by many people anymore. The room sound. That is the first, which comes to my mind. When I was still a small boy, I heard the working noise of my mother in the kitchen, and they have always made me happy. How should it sound when we are speaking? Do I want to talk with three good friends on a Sunday afternoon, or do I prefer to read? Closing the door, there are wonderful sounds. They tell me that I am welcome and I am not alone. This is probably the picture of a mother that I keep in my mind and I want to keep it there" (Zumthor, 2004 p.29). Now, we are going back to the security of our early years, to the reminded childhood and its pictures. Biographic work is part of a comprehensive concept of care, preventing us from



*Peter Zumthor, St. Benedigt, Graubünden, Foto Christoph Metzger.*

forgetting and losing our identity. Our memory saves us from loneliness in the different stages of dementia. This is an unrenounceable anchor to avoid an uncontrolled drift into an open and unknown area without any limit. Without a personal talk even, the best architecture has very little effect.

#### IV

Nursery homes as profit institutions? Natural or artificial, synthetic material, massive forms of building elements? Individual air condition or forced ventilation? Healthy light or energy-saving light? The picture of our society is reflected in the treatment of the elderly. It tells us through our behavior, with them more about our own childhood and youth than we think, it could really do. Rooms are determined by architecture and condition us, how we are living and in which rooms our memories are at home. This is due from cradle to bed. Living needs perceptible experienced materials, surfaces, and attractive forms, offering security and orientation. Housing, as a metaphor of sensual requirements, is always determined by wits (Kaltenbrunner, 1997, p.26). Good architecture can serve the essential human requirement for attractive surfaces and materials, which are atmospherically valuable. In terms of material values, this is true. Our homes are made of... One has to think further and to create work for life. Rooms are not only made for the elderly but also for the care staff.

#### Literatur

- Biermann, H. & Weißmantel, H. (2003). *Regelkatalog SENSI - Geräte: Bedienungsfreundlich und barrierefrei durch das richtige Design*. Retrieved from <http://www.emk.tu-darmstadt.de/~weissmantel/sensi/sensi.html>
- Braun, F. von, & Rothe, B. (2013). Wohnen und Pflege im Alter – Alternative Formen fehlen. *CARÉ Invest*, (21), 8–9. Institut Wohnen und Entwerfen. Universität Stuttgart.
- (2013). *ready – vorbereitet für altersgerechtes Wohnen.: Neue Standards und Maßnahmensets für die stufenweise, altengerechte Wohnungsanpassung im Neubau*. Retrieved from [http://www.uni-stuttgart.de/iwe/Publicationen/130903\\_ready.pdf](http://www.uni-stuttgart.de/iwe/Publicationen/130903_ready.pdf)
- Kaltenbrunner, R. (1997). Wohnen als die kulturelle Metapher schlechthin: Ein Bild der Gesellschaft in der Nebensächlichkeit des Alltags. *Neue Züricher Zeitung – Internationale Ausgabe*, (261), 26.
- Ketch, K. (2013). Helfende Architektur. Nach dem Zwei-Sinne-Prinzip. *CARÉ Invest*, (23), 8f.
- Zumthor, P. (2004). *Atmosphären: Wege zur Architektur*. Vortrag am 1. Juni 2003 in der Kunstscheune, Schloß Wendlingshausen, Wege durch das Land – Literatur – und Musikfest, in Ostwestfalen – Lippe. Detmold.



## **Additional Construction of a Quality led Care Oasis of KDA—a Pilot Project of the State of Saxony at ASB Senior Care Institution Willy Stabenau in Zwickau/Saxony: The Care Oasis in Zwickau**

**Matthias Sachse**

### **The Developer**

The ASB (Arbeiter Samariter Bund – A German Welfare Organization), local association in Zwickau e.V., was refounded in 1991. Since then, the organization could be further developed to an efficient social service provider in the field of care for the elderly, mobile social assistance, support for children, youth and families, and salvation services and disaster protection service. ASB Zwickau is divided into the following filials with their special fields of activity:

- ASB Local Association (Ambulant care. Completely or partly, support for children, youth and families, salvation services, and disaster protection services)
- ASB – Services for Generations Nonprofit Ltd. (Stationary Care—completely or partly, integration work, mobile social services)
- ASB Supported Housing Nonprofit Ltd. (Management of supported housing)

- ASB Social Services Ltd. (Medical provision center)

At present, there are 400 staff members in all four institutions. The ASB Nursery Home for Elderly „Willy Stabenau“ is a care institution in Zwickau, which is run in the third generation. The stationary nursing home is centrally located in a new building within an area, which is characterized by well-maintained old buildings and newly designed green areas and parks. Because of its central location in the city center of Zwickau, it is just a walking distance to the central railway station.

The home had been constructed between 1997 and 1999, cofinanced with state subsidies from Saxony. It is a legally based care institution (§ 71,2 SGB XI) and obtained its permission as a complete stationary nursery institution by the official Care Fund. Altogether, the institution offers a home for 84 elderlies. In each of the four floors, there is a residential area, where the number of care places is quite different (area I: 22 places, area II: 26 places, area III: 26 places, and area IV: 10 places). Eight short-term care places are located in area III. In total, there are 40 single and 18 double rooms for a complete stationary care and 8 additional single rooms for short-term care.

## Situation in the Beginning

Facing the demographic development, more and more people with dementia will reach a very old age, and they enter the nursery home in a period of illness, where they become needy for care, either to a severe or to a very severe degree. They could be completely immobile with or without dementia. In this situation, these patients are bound to bedridden. For them, nearly all daily activities are limited. In many cases also, the speaking capacity is lost. This means new challenges for stationary care institutions: offering care and attention for this group of people.

Approximately 70% of our residents are people with dementia of different type and stage. We have good experience with our integrative concept for people with dementia, who are still in a slight or middle stage, and with our segregative concept for severely affected people with dementia and psychologically seriously ill people. Nevertheless, we made the experience during the time that especially the care for people with dementia in a severe and advanced stage, despite of all efforts, very little improvement could be noted. We claim to offer and to maintain the best possible quality of life to our residents. It is our intention to implement a special and innovative form of care and provision of attention, called "The Care Oasis," which should be a possible form of care for people with a severe stage of dementia.

Concluding, we define the following target groups:

- people with a severe stage of dementia;
- people without verbal communication capacity or a very limited one;
- people with increasing fixation on their location up to confinement to bed;
- residents of care level 3 (defined by the German Care Fund);
- people with very limited capacity of hearing, seeing, feeling, smelling, and tasting;
- reduction of social contacts;
- limited recognition of environment;
- high degree of fear;
- reduced consciousness for privacy;
- no independent eating and drinking possible.

## Aims

We have three aims in mind at the start of the "Care Oasis," where we want to fulfill the special needs of people with a severe advanced stage of dementia: for love, consolation, identity, employment, integration, and liaison. In most cases, these aims cannot be offered during the daily work of a stationary care institution. In most cases, the necessary level of care and interhuman relations are concentrated on physical care, food, and some planned therapy measures. Within the "Care Oasis," there is a great chance to cover the needs of this target group in

a more adequate and flexible way. People with a severe stage of dementia need an improved way of life and activities for better human interrelations. Otherwise, this can quickly lead to a total loss of organs of notice.

In the "Care Oasis," it will be possible to move to different parts of the room, even within a care bed or a wheelchair. There will be different possibilities to change the perspective. This is normally very limited in a stationary care institution and its daily procedure.

An atmosphere of community and security should be created. Individual sensibilities, needs, and changes of the illness process can be taken into consideration by the care staff, as the presence of one carer with a good overview is always guaranteed. Reactions can also be improved and will be more flexible. The daily procedure can be organized in such a way as the residents will need it but without being forced to follow institutional strict rules. The capacity of notice should be improved. On one hand, this might occur with the feeling to overcome loneliness because there are always contact persons close-by. On the other hand, this can cause a better sensibilization of wits (aroma, light, sounds, etc.) and the whole package of sociotherapeutic measures. To prevent too much stimulation, the concept of single rooms is important, as residents can feel free for a withdrawal to a private room.

This concept, based on specific needs, improves

our provision for people with dementia during various years of illness.

Scientific studies show that the implementation of this project is worthwhile because the evaluation of the efforts had successful results. The studies checked different procedures and underlined different effects. All three studies had positive results. On the other hand, no negative results appeared. The results can be listed as follows:

- significant realization of the environment;
- improvement of the level of attention;
- improvement of verbal reactions;
- improvement of alimentation;
- more contact with positive contact persons;
- more activities to have fun;
- more frequently, there will be situations in a daily repeating friendly atmosphere;
- noncognitive disturbances reduced nearly to zero;
- family members are very satisfied;
- carers are more burdened with work, but they are more satisfied with their work.

These results encourage us that our aims can be achieved by using the concept of "Care Oasis."

### **Implementation**

Our "Care Oasis" shall be inaugurated as an additional building to the existing Housing Block

One in the first floor. To keep privacy of the residents, the building design shall be oriented to the "Care Oasis" concept of KDA (Kuratorium Deutsche Altenhilfe). It is planned that ten individual rooms will be located around a central kitchen and/or living room, where a joint life of all residents will be possible. To offer an open concept of an "Oasis," special doors will be ins-

talled, which may present a complete openness to the living area. Also, a big terrace place is planned.

At present, the implementation of this concept is realized by an interdisciplinary project group (Development Team of ASB, Architecture Office D&P Leipzig, University of Zwickau, Faculty of Health, Sciences and Professional Consultants of KDA).



A special and binding concept had already been developed in cooperation with KDA, where the target group, aims and basic principles, parameters of space, group size, methodological basic concept of care and qualification, and attitude and deployment of staff were integrated. Furthermore, possibilities of assistance, the services, ways of work implementation, integration of family members, basic principles of quality, financial provisions, and staff recruitment were considered. Of course, family members are involved into the concept as early as possible.

To enable an evaluation, an inventory survey of the status quo of care made by a student at the University of Zwickau is planned.

### ***Basic Principles of Implementation***

The work within the "Care Oasis" will be coordinated by the ASB Care Institution "Willy Stabenau," including the equipment and the principles of the concept of Monika Krohnwinkel and Tom Kidwood, which is especially important for caring people with dementia. This type of engagement will also form the care staff. It is important that they do not simply fulfill their interventions of care but also "spend a nice day" with the residents/customers, their family members, and volunteers.

### ***Size of the group***

A group size of 10 residents had been scheduled. There is still a transparent overview from the kitchen and the living room.

### ***Qualification of staff***

In contrast to the KDA "Care Oasis," there will be one permanent staff member in the "Care Oasis" Willy Stabenau, the main care institution, which is responsible for the early and late time shift of service in favor of a group of 10 residents. This leading carer will be assisted by a second one. The following professions are foreseen for the "Care Oasis":

- trained Specialist of palative service,
- trained specialist of care,
- assistant of professional carer,
- BED (Federal Union of Occupation Therapist),
- FSJ (Voluntary Social Year), and
- assistant of occupation therapists (§ 87).

The duration of staff presence is from 6.00 a.m. to 10.00 p.m.

The care institution "Willy Stabenau" puts much attention to a good palliative support during the latter stage of life. Members of the network "Palliative Provision of Elderly of the Foundation Robert Bosch" are conducting a meeting on a regular basis.

### ***Room Structure***

The building, which has to be erected, will have its basic form of an ellipse. The center of this basic form is a big community room with various functions. First, it is a meeting and community





room for the residents. At the same time, there is a possibility to prepare meals in a simple way and to distribute it so that the residents can have a joint breakfast, lunch, and dinner. Finally, the open room secures the possibility for a good overview of the care staff.

Around this centrally located room, there are 10 residential rooms, designed in such a way that as much natural light as possible is available in these individual rooms.

The functional room for the necessary care services are the bathroom and the toilets. The

storage rooms and office room are planned to be located within the transfer area to the existing main care institution.

Nature and light should accompany the residents in a special way. This was the basic planning idea. The residential rooms shall be illuminated by natural sunlight as much as possible and transfer this light to the community room through a centrally located building transparency. The central room receives its additional sunlight through a light dome. Apart from natural light, the natural building material

shall characterize the equipment of the “Care Oasis” internally and externally. Wooden floor pavement and wall decoration create a comfortable and warm atmosphere. The individual residential rooms shall offer a good living character, serving as a possibility for an individual withdrawal to privacy.

A broad room size enables a walking space at both sides of the mobile care bed. The necessary functional walls are integrated into the good living atmosphere through their wooden covering. All individual rooms are equipped with a cupboard, a small table with two chairs, a hand washing basin, and a place for a wheelchair.

Through the entrance room, which is partly glazed, the individual rooms are not separated from the community room and offer a way to privacy through an optimal darkening. Also, the care bathroom shall present a good and natural living atmosphere through wooden and stone covering. A mini-kitchen in the form of a counter is integrated into the community room, which shall provide a stove, a fridge, a cooking place, a dishwasher, dishwashing basin, and a cover for steam removal.

An office is planned at the front face of the internal room. A high glass wall up to the ceiling leads to the foyer and seems to have unlimited light to the residential rooms and to the community room. This office room has to be air conditioned, as medical stuff has to be stored and provided.

### ***The external space***

The external space shall add a park-like atmosphere—just as it is already made for the existing nursery home. A terrace shall be installed, which enables the residents to pass some time outside but still well observed by the care staff. A step-free building of the terrace permits even the use of care beds. Existing trees and bushes and additional planting shall separate the room from the neighbors’ buildings. Embankments and ground cuts that are well stepped contain planted flowers. The ways between the “Care Oasis” and the already existing nursery home shall enable a connection between both buildings.



## Project of a Multi-Generation House “Goldene Sonne” (“Golden Sun”) in Oelsnitz/Vogtland-Saxony

Susann Martin

Volkssolidarität Plauen/Oesnitz is a nonprofit association of „Freie Wohlfahrtspflege“ („Free Organisation of Welfare“), which a.o. is responsible for completely and partly stationary as well as ambulant care, ambulant care groups living in flat-sharing, emergency systems, mobile meals on wheels, consultancy in case of dementia, and care in general. Also, there is activity in professional training and education in 10 institutions, for example, for children: creche, kindergarden, and day nursery. The work with children and youth and care of elderly takes place in meeting centers and rooms, belonging to various town districts. At present, there are 2.000 members and 350 employed staff members in our association, taking care of 1,100 children and 550 people in need of care.

Our multigeneration house is located in the center of Oelsnitz, which is a small town in Vogtland/Saxony with approximately 11,000 inhabitants. In October 2010, the house had been opened. Several closely linked components belong to it: a Children and Youth Center, a Meeting Point with a connected Cafeteria, two normal rental dwellings, an ambulant Care Service Team, and two ambulant Care Groups, living in flat-sharing.

All these activities are located in a modified and completely modernized historical building from the year 1862. The external space is composed of a compound for small animals, gardens in the form of high beds, a terrace in the basement, and a protected park-like garden. Elderly subjects are living in flat-sharing groups (aged 82 on the average). They are living with different needs of care and assistance. Most of them are people with dementia at different stages. The groups of flat sharing are in a well-known neighborhood and form a family-like structure so that their daily life is planned in a coordinated way. This is a form of housing, which preferably aims at the independence of residents with their need of some ambulant measures of assistance. Our aims are as follows: maintaining existing capacities, enabling independence of residents, offering security, and enjoying life. There are gerontopsychiatrically trained staff members, working 24 hours around the clock. Furthermore, honorary assistants are specially trained for people with dementia and care. Why had we decided for this multi-generation concept? In our work, we stated that many elderly do not have any family members close by them because their children left after the political change. After the death of a partner and the decreasing health status of the remaining person as a consequence of illness or disease, many elderly do not leave the dwelling anymore, or they hardly go out. In such a situation, they become lonely. Also, in our work for youth, we have to observe

loneliness. Parents have only very limited time for their children, and teenagers do not live in big families anymore; they are spending their time in clearly structured patterns with certain responsibilities. Many youngsters do not even know what to do and how to use their energy in their leisure time. Schools are overcharged with their duties. In our project, located at the center of Oelsnitz, we realized from the very beginning that we have to create room for all groups but especially for the two a.m. generations. The groups with ambulant flat sharing are also in need of help. Many people do not want to go into a nursery home, even if they need a care of 24 hours around the clock. Furthermore, associations are looking for meeting rooms. This, the idea of a meeting room with a cafeteria was born. Lastly, our care staff needed bigger rooms, and our members in Oelsnitz

had already been looking for a long time to find a nice room. This room had to be easily reached by public transport. Finally, there was the subsidized pilot project, „Multi-Generation House;“ and in an interdisciplinary meeting, we checked all kinds of needs. Then, we found some compromise and could develop and realize our project. Since its inauguration in 2010, this project has become an important part of the town area and the whole local district. It became a true meeting point where children and youngsters have their own choice of use. To bake or to do some handicraft, they are meeting the elderly on a regular basis. Young mothers are coming with their children. Dancing, music, elderly afternoon meetings, sessions of associations, other joint parties and group meetings of people with dementia, meeting of different networks, and much more take place.



## **“Cura Maria” - Supported Housing Units for People with Dementia or with other Need of Assistance, Leipzig-Marienbrunn**

**Gilbert Then**

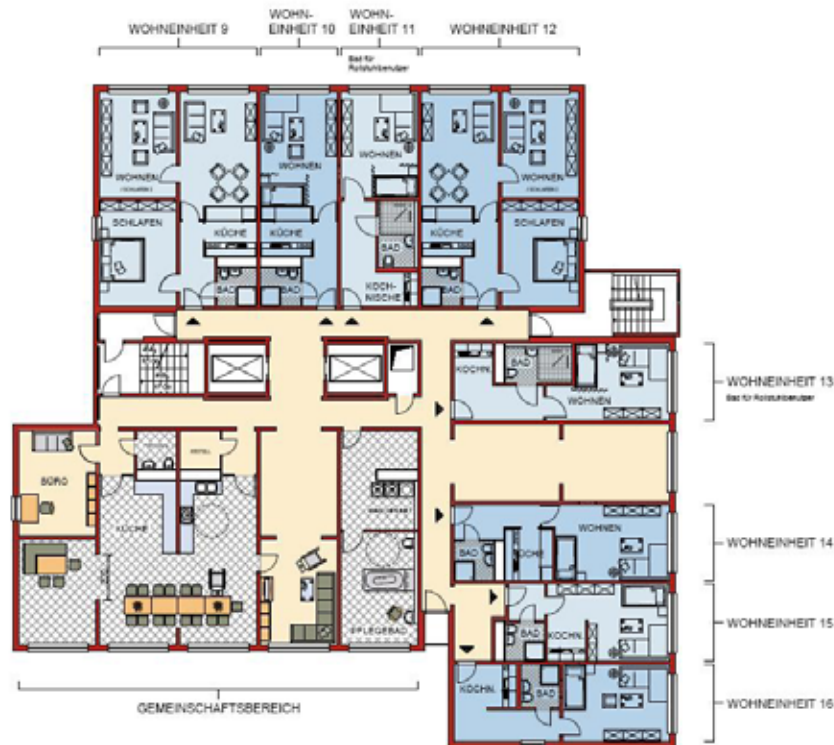
The housing sector, including housing cooperatives, are challenged by an increasing age structure imbalance of members, on average, and the necessity to integrate them into a mixture with young people and especially younger families. At the same time, the increasing number of elderly as well as people in need of assistance makes it necessary to develop and to hold available a more elderly friendly and adequate housing stock. Therefore, specific housing offers a home-like atmosphere and is getting more and more important. This is also as an alternative to care institutions for the elderly.

In two 16-story buildings of the Housing Cooperative Transport, erected in the seventies, a new housing and living form has been established, where young and older people are in a position to feel at home. Needs of elderly had especially been considered before the project could be developed. This is also due to the care necessities, once, more assistance will be asked by them. The idea is to avoid or at least postpone a transfer to a care institution for elderly and a loss of their independence.

For that reason, housing units for the elderly and handicapped had to be refurbished. Furthermore, numerous services were offered (e.g., physicians, physiotherapy, hairdresser, treatment of feet) as well as a solidarity and community oriented way of life in the framework of the building neighborhood. Together with the Federation of CARITAS, a meeting point with a broad offer of services had been opened. Additionally, an emergency call system could be installed by Maltheser Hilfsdienst (A German Welfare Organization) so that residents can stay longer in their own dwelling. Wishes of residents for designing and forming the housing unit could be considered.

Furthermore, the Housing Cooperative Transport changed two floors into supported housing units for people with dementia and other elderly with need of care. They called this project „Cura Maria.“ Here, a new integrated world of people with dementia and other elderly in need of help had to be created, where they can spend a self-determined and dignified last part of their life. They spend it in high quality. They experience well-being and the feeling of a functioning community. The aims of „Cura Maria“ are the following:

- integration into a normal housing environment
- Remaining in a familiar housing situation
- Promotion of daily structured leisure time and Avoiding a care institution for elderly



*Floor Plan of the First Floor, Living Area of Cura Maria.*

Apart from care services, the Federation of CARITAS offers the following modular elements of performance:

- Accompanying the residents in their daily matters
- Intensive care through presence at night
- Availability and good management
- All meals are served
- Cleaning of rooms and washing of clothes

Looking at the experiences until now and the increasing demand, especially for the form of housing in Cura Maria, this new project of living together can be characterized as a well-tailored one. It offers a new perspective for living in high-rise housing blocks. Members and tenants are able to use an enlarged offer of cooperative performance.

## Authors and Editors

---



**Professor June Andrews** is Director of the Dementia Services Development Centre at the University of Stirling. She has a Chief Nursing Officers of the UK Lifetime Achievement Award and received the prestigious Robert Tiffany International Award. She headed the Royal College of Nursing in Scotland, and directed the Centre for Change and Innovation within the Scottish Government in addition to her career in the NHS. She advises health departments and service providers around the world, and is a Trustee of the Life Changes Trust, an independent charity disbursing grants totalling £50m across Scotland. She is non-executive director of Target, a real estate investment Trust.



**Alexandra Brylok** studied Psychology with a focus on social, work and organizational psychology at the Technical University of Chemnitz. Since August 2009 she is the coordinator of the project „Living the Age“ („Alter leben“) and since January 2011 she is in charge of the Department for Social Affairs and Projects at VSWG (Saxon Federation of Housing cooperatives) e.V. Her core competencies are in the areas of planning and managing projects, in social issues, the social management, technical and structural design concepts and resource management. Furthermore, she is the contact person for social and interdisciplinary networks and issues within the Association.





**Kathrin Büter**, M.A., works as a scientific assistant and doctoral candidate at the Faculty of Architecture at the TU Dresden. She is currently involved in a research project on the topic „Architecture under Demographic Change.“ Here she is focusing on the development of dementia-friendly design concepts for acute care hospitals. She holds a master’s degree in interior architecture from the Fachhochschule Hannover. Her subsequent career path was already becoming apparent as she investigated the question how to design dementia-friendly holiday accommodations during her master studies.



**Garuth Chalfont**, PhD (architecture) ASLA creates therapeutic care environments for people with dementia, especially designed to provide the benefits of nature and the outdoors. By integrating the design of landscape and architecture, his designs enable optimal use of both indoors and outdoors for connection to nature. Built projects include day care, residential, nursing and hospital settings. He helps care providers improve the quality of their service through training, consultation and publications. His knowledge derives from constantly researching how well his designs are used to benefit people with dementia, and using this insight to improve his design criteria.



**Dr.-Ing. Gesine Marquardt** obtained her degree in Architecture at the University of Stuttgart in 1999. Having worked as an architect and a researcher, she was awarded a PhD and three research awards for her thesis on “Dementia-friendly architecture in Nursing Homes” in 2007. After a postdoctoral stay at the Johns Hopkins Medical Institutions in Baltimore, MD, USA, she received funding by the German Research Foundation (DFG) to establish her own research group on “Architecture under Demographic Change” at the Technische Universität Dresden, Germany. Dr. Marquardt is co-founder of Cooperation\_4 Architects where she consults Nursing Homes and Hospitals to implement dementia-friendly environments.



**Susann Martin** studied Care Management and graduated as Dipl. Pflegewirtin (FH). She then worked as an assistant for the nursing home management and in the area of care management, controlling and quality management for Volkssolidarität Plauen/Oelsnitz e.V.. Since 2008 she is a team manager at Volkssolidarität and is responsible for several facilities of ambulatory, outpatient and inpatient care as well as the low-threshold care. During her professional activity she earned a degree in QMB (Quality Management) as well as care consultant and completed an additional gerontopsychiatric qualification.



**Professor Dr. Christoph Metzger**, born 1962 in Munich, is a scientist in music and arts and works in the field of architectural theory and as a curator. Since 2008 he is a Professor of History and Theory of Sound Art/ Installation, at the Hochschule für Bildende Künste, Braunschweig. Together with his colleagues Bernhard Kaiser and Andreas Rüger he is a member of the board of the Open Minded Projektentwicklung AG, Frankfurt am Main with a focus on planning and development of multisensory environments for older people.



**Tom Motzek**, M.Sc., studied Gerontology and Health Sciences. His main research topics are living for the elderly and care for people with dementia. From 2010 to 2011 he worked at the Institute of Social Medicine, Occupational Health and Public Health at the University of Leipzig. Since 2012, he is a scientific assistant in the research group „Architecture Under Demographic Change“ at the TU Dresden. His focus is the development and evaluation of dementia friendly concepts for acute care hospitals.



**Matthias Sachse** is Vice Executive Director and Director of ASB Kreisverband Zwickau e.V., Executive Director of “Betreutes Wohnen Gemeinnützige GmbH” in Zwickau as well as a systematic coach. He has many years of professional experience in various fields, especially in administrative and non-profit sectors. Here he has experience in the development and implementation of care concepts for elderly, children, youth and family assistance, in public relations work, communication with target groups as well as negotiations with care institutions for elderly and financing bodies.



**Iris Van Steenwinkel** is a PhD researcher at the University of Leuven, Department of Architecture, Research[x]Design group, Belgium. She graduated as Master in Engineering: Architecture at KU Leuven. Through her research she is gaining insight in the spatial aspects of experiences in people with dementia, which are expected to enrich designers' expertise in designing living environments for all of us.



**Matthias Steindorf** holds a degree in Public Administration (FH) and has additional training in Social Management and Business Economy. In a Saxon district he worked as Social Administration Office Manager and Head of the Department of Assistance for Elderly in a Welfare Organization. He is also Executive Director of a Care Institution. Currently, Matthias Steindorf works at Paritätischer Wohlfahrtsverband Sachsen e.V.. He is employed there as a member of the Executive Board, Head of Social Work and Education, as well as a referent for the elderly and charges.



**Gilbert Josef Then** operates in the social management of the Transport Leipzig eG. Here he is engaged in counseling, crisis intervention, and mediation of members and tenants. Furthermore, he is responsible for relations and cooperation with social organizations and corresponding agencies. He was born in 1963 in Leipzig, graduated in theology and religious education, and completed a training as a Heilpraktiker (psychotherapy) and Gestalttherapeut. For nearly twenty years Gilbert Then has been working in youth and family education and counseling of volunteer and full-time staff of Youth Services. Since 2001 he is a deacon and since 2011 also freelancer as a Gestalttherapeut.



**Ann Heylighen** (PhD KU Leuven) is a professor at the University of Leuven, Department of Architecture, Research[x]Design group, Belgium. She leads an interdisciplinary team conducting research on design processes in architecture, particularly in the context of inclusive design. She studied architecture/engineering at KU Leuven and ETH Zürich, and conducted research at KU Leuven, Harvard and Berkeley.



**Dr.ir. Joost van Hoof**, Eur Ing (1980) is head of the Centre for Healthcare and Technology of Fontys University of Applied Sciences in Eindhoven, The Netherlands. He holds an engineering degree in Building Physics and Services (2004) and a doctorate (2010) in the field of ageing-in-place for older adults with dementia, both from Eindhoven University of Technology. His research activities are related to housing for older persons, in particular older people with dementia, and nursing home residents. Together with partners from the industry and the Dutch Alzheimer Society, he constructed a demonstration dwelling and a website on home modifications for people with dementia.



**Patrick Verhaest**, psychologist, is project employee at the Expertisecentrum Dementie Vlaanderen vzw, the Flemish expertise centre on dementia care. He is co-author of the book “Architectonica, een thuis voor mensen met dementie” (Architectonica, a home for people with dementia) and is doing consultancy on dementia friendly environments in Flanders. He is also coordinator of the course ‘Begeleider-Animator’ at the VSPW in Mol, a course for people working on leisure in the nursinghome.



**Dr. Axel Viehweger** is a board member for the sphere of interest of VSWG (Saxon Federation of Housing Cooperatives) e.V. in Dresden. He studied physics at the TU Dresden and subsequently worked as a scientific assistant. In 1985 he graduated to Dr.-Ing. From 1985 to 1990 he was head of department at the City of Dresden, in 1990, Minister for Building, Urban Affairs and Housing of the first freely elected government of the GDR. From 1990 to 1994 he was member of the Saxon Parliament.

## Editors:

Dr.-Ing. Gesine Marquardt  
TU Dresden  
Fakultät Architektur  
Institut für Gebäudelehre und Entwerfen  
Emmy Noether-Nachwuchsgruppe  
„Architektur im demografischen Wandel“  
01062 Dresden  
[www.a-i-dw.de](http://www.a-i-dw.de)

Dr. Axel Viehweger  
Verband Sächsischer  
Wohnungsgenossenschaften e. V.  
Antonstr. 37  
01097 Dresden  
[www.vswg.de](http://www.vswg.de)

## Coverdesign, Layout &amp; Typesetting:

Kathrin Büter, [kathrin.bueter@tu-dresden.de](mailto:kathrin.bueter@tu-dresden.de)

Translation of the contributions on pp. 6, 10, 76, 92, 100, 108, and 110 by  
Dr. Claus Jürgen Hachmann, Bachelor Professional of Translation (CCI),  
Edited by SPi professional editing services.

© of the complete edition by the editors

© of contents of the contributions by the authors

Authors are responsible for image copyrights of their contributions.

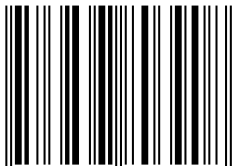
We gratefully thank Deutsche Forschungsgemeinschaft (DFG) for funding.

**DFG** Deutsche  
Forschungsgemeinschaft





ISBN 978-3-86780-390-8



9 783867 803908 >