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Smart Living in Old Age:

Options and Implementation

- Rolf G. Heinze

Collective aging of the population and new requirements

For decades, all Western countries have experienced a demographic change that is characterised by both an overall decline in the population and an increasing share of older people in the total population. However, not only the share of the elderly in the total population but also their absolute number is rising. The demographic change in Germany arises from two development trends that reinforce each other: a low birth-rate and a rising life expectancy. Simultaneously with the low birth-rate, life expectancy has been on a constant rise in the past years. Thus a growing number of old and very old people contrasts with a constantly decreasing number of young persons. A glance at current demographic forecasts shows that the population in Germany in 2010 consists of 21.1 percent children and adolescents under the age of 20, 55.7 percent middle age cohorts between 20 and of 60 years of age and 25.6 percent older people aged above 60. Until 2030, the percentage of children and adolescents will decrease and that of the middle age groups will drop considerably by approx. 10 percent – while the share of elderly will rise correspondingly (to 34.4 percent) (cf. Kaufmann 2005, 41).

The assessments and political consequences will not be discussed in detail here (for a summary, see the contributions in Heinze/Naegele 2010). The bottom line is that the future age-composition of the German population is a challenge for the social security systems as well as for the balance between family, voluntary, semi-professional and private providers of social services. A new welfare mix is needed.

Just a few years ago, the aging of society was almost exclusively perceived as a threat and burden to the future prospects of economy and society. This perception of the perspectives of an aging society is now changing; the deficit thesis is being pushed back in favour of a focus on skills and potentials. This is, inter alia, shown by the German government´s Fifth Report on the Elderly that focuses on the "potentials of the elderly in business and society". On the basis of the latest figures, recent studies make it clear that "no other generation of elderly will ever be as well-off as the current one. Poverty in old age does exist but it is less prevalent than in the total population. Generally, older people have a respectable income and financial situation. The older consumer group is thus qualitatively and quantitatively becoming an important target group. The rise in numbers, the longer lifespan and the changes in the spending patterns over the life course likewise contribute to the interest in this group. The consumption pattern also changes with age. Expenditures in the family phase (e.g. high share of non-durable goods, loan repayments) vary with increasing age and the changes in the life cycle (e.g. retirement, children leaving their parents homes, death of the partner) lead to a re-orientation of consumption spending" (Eitner 2008, 335; see also Fachinger 2009). Above all, various segments of the health industry profit from these changes but this also holds true for the housing industry as well as for housing-related services. Housing accounts are the highest costs in households of old people.

In the following the argumentation will focus on an issue that is of particular importance especially for the elderly – housing and new options for more independence and personal responsibility in old age. This is directly connected to the topic of ehealth and telemedicine; the household/home is increasingly being referred to as a "third" health location. In the course of the demographic change, not only the number of the chronically ill will be

rising but also generally the need for support services and smart home systems for lifetime housing and living. However, the implementation of embedded household technologies in particular calls for the control of complex and above all heterogeneous networks.

Ambient Assisted Living (AAL) in response to the aging society

The increasing use of household technologies to promote independent living in old age is boosted by the fact that the number of years of healthy life has grown considerably. The state of health in old age has generally improved the life expectancy in Western and Central Europe has risen rapidly since the late 19th century. Between 1880 and 1980, the average life expectancy at birth doubled from approx. 36 (men) or 38 (women) to around 73 or 78 years respectively. It is expected that this development will continue. Closely related to the state of health is the need for help and care. The risk of requiring long-term care rises disproportionally with increasing age: this reflects the increasing life expectancy and the simultaneously rising disease incidence, often of chronic diseases. In the meantime, various studies on the structure of the need for help and care in old age have been conducted. An important turning point in this context was the introduction of the long-term care insurance, that for the first time provided a relatively specific definition of the respective levels of need for care (cf. inter alia, Bäcker/ Naegele et al 2008, (volume 2), 178ff as well as Pfau-Effinger et al 2008). The data of the long-term care insurance, however, only comprises a part of the real need for help and care of seniors, as the granting of benefits is linked to certain preconditions and is based solely on the need for medical care and not for housekeeping or social support. The granting or claiming of these insurance benefits can therefore not be equated with care dependency in a broader sense.

Among the younger age cohorts, the vast majority of persons in need of care make use of outpatient or day care benefits of the long-term care insurance, with rising age, the share of elderly who need inpatient nursing care increases. From the age of approx. 85, the need for inpatient nursing among those dependent on care preponderates. It is not yet clear whether these age-specific probabilities of requiring long-term care will remain constant in view of further medical advances and the growing life expectancy. Furthermore, it must be noted that the definition of the need for care and the respective classification criteria were the product of a social and political process. However, it must be emphasised that up to a ripe age, care dependency is more exception than rule. In the light of the demographic challenges, more attention must therefore be paid to outpatient nursing services, information and communication technologies for independent living in old age as well as to social support networks that can help to delay the need for inpatient nursing.

The housing offers that comprise a smooth transition from complete independence to graded caring and nursing assistance are still at the beginning stages. Such projects are often initiated by the persons concerned and are mainly implemented in new buildings. Often only a small group of people can afford them because of their high costs, the technological systems and home-care solutions employed in these cases are, however, not always adapted to the needs of the inhabitants. In future, the maxim should always be that technology serves the inhabitants (and not the other way around!) and that it should be necessary and affordable. That said, the information and communication technologies open up completely new opportunities for assisting patients and clients in their own living environments, e.g. by means of the remote monitoring of vital parameters, medical (and other) expertise and - if necessary - by ensuring rapidly initiated remedial measures and interventions. Furthermore, they can help to make households so barrier-free and adaptable that several handicaps and limitations can be compensated for. Adequately designed housing can also - in terms of a preventive technology and service deployment – contribute to putting off or more effectively "managing" the need for help (cf. Wilde/Franke 2006 as well as the contributions in Kimpeler/Baier 2006). Moreover, the internet offers health-interested clients and patients abundant opportunities to inform themselves and to profit from an exchange with other interested and concerned persons (keywords self-help and self-responsibility).

The aging of the population tends to result in a growing need for support services and intelligent assistance systems (AAL) for senior-friendly housing and living. Embedded living in this context does not only include the installation of information and communication technologies in the homes but also networking with different sectors, technologies and the respective actors. It can, however, be assumed that the demand for embedded housing structures will grow. This has various causes: Thus the incidence of chronic diseases, many of which may lead to care dependency, has risen considerably in recent decades. This trend will be reinforced by the demographic change. This does not only apply to typical geriatric diseases including dementia diseases but also to the rapidly growing group of persons suffering from diabetics and cardiovascular diseases. Meanwhile, around 50% of Germans suffer from a chronic disease and this share rises with age. Although the percentage of the elderly (65 years and above) in the total population only amounted to 19.5 percent in 2006, their medical costs accounted for more than 47% of the total medical costs. Here there is considerable potential for reducing costs, that could be tapped e.g. if one succeeds in making productive use of technical support and service systems for an independent life in old age (which most seniors wish for anyway).

In connection with the spread of new telemedicine procedures that facilitate an individualised treatment (or rehabilitation) at home, the issue of the household as "third" health location is generally being broached of late. However, although there are some "best practice experiences", it is not yet being implemented as a matter of course. One has to keep in mind though that despite all euphoric appraisals, telemedicine is dependent on an environment that is not well-integrated in Germany, in fact the German health system is still characterised by a relatively distinct segmentation. It is therefore difficult to break down the prevalent sectoral division between inpatient and outpatient treatment and to introduce innovative care models. These goals can only be achieved step-by step. This is also true for the relation between social service organisations/nursing services and the housing industry which have only begun to confer with each other in the past few years. Many discussions and policy recommendations are moreover adversely affected by the fact that the focus is too strongly on the housing space instead of on an integration of the living quarters and its inhabitants into the "restructuring process".

Despite the generally improved facilities, there are still considerable barriers in the living environments that significantly influence the quality of life of seniors. But even relatively small changes in the building structures can lead to an improvement in the quality of life of seniors with physical impairments (e.g. elimination of thresholds, reduction of barriers in the bathroom) and can enable them to stay in their homes for a longer time and to participate in society. One of the effects of age-related illnesses is that the spatial sphere of action diminishes. Therefore, at an advanced age, housing becomes of central importance for the daily lifestyle. Communication, social life and recreation are all experienced in one´s own home. The own four walls increasingly become the centre of life. This is also shown by findings of time budget studies on everyday life (cf. Engstler 2004). Studies on housing wishes show that the majority of the elderly are basically satisfied with their housing condition. Nonetheless, seniors are increasingly expressing their wishes regarding reconstruction measures. These in particular concern the removal of barriers in the bathroom, barrier-free access to their homes and residential buildings but also an improvement of the infrastructure in the residential environment (cf. Schneiders 2010).

As an alternative to nursing home care on the on the hand and "normal housing" on the other hand, a number of "senior-friendly" housing forms have established themselves in recent years. The current differentiation process is characterised by technical, structural and social or organisational innovations. The "senior-friendly" apartments that were built in the course of federal state-specific lines of funding in the 1970s and 1980s, primarily differ from other apartments with regard to their smaller size (approx. 40m² for a single-person and approx. 55m² for a two-person household) as well as the corresponding price fixing and controlled tenancy. Normally, however, they do not meet today´s requirements regarding accessibility and facilities. To which extent the inhabitants need or wish for accompanying social or housing-related

services in addition to improvements in the housing structures is being discussed controversially.

Studies with a regional or local focus have shown that younger age cohorts generally view services more positively, but the price expectations are often unrealistic. The willingness to pay and the technology affinity in old age differ; here the affiliation to certain lifestyle groups or social milieus plays an important role. Only selected findings are available on the housing wishes and the likelihood of moving. The great attachment to the own home and environment, however, is a phenomenon that can be encountered in all milieus. The vast majority of seniors wish to remain in their familiar surroundings or their current homes. This wish is even stronger among the young old than among the very old. For more than 90 percent, the own home is the preferred housing form in old age too, special housing arrangements for seniors find little acceptance. This applies in particular to institutionalised living forms such as old age (nursing) homes, but also to shared housing for the elderly (up to 8 percent) as well as to residential homes for the elderly (at most 4 percent) in the age group of the over-50-year-olds.

Differentiated analyses shows that especially the age group of the 50-to 65-year-olds does not (yet) look into the topic of special living arrangements for old age and that it is perceived as stigmatising. Despite all offers of alternative housing forms, most people want to continue to live in their own four walls; it is therefore essential "to increase the mobility between friends, to plan and carry out joint trips and holidays and to familiarise people with assisted living in their own homes" (Gross/Fagetti 2008, 115).

New technologies allow older people to remain in their own homes for longer and still existing mental barriers to new technology will be overcome in the coming years, as the future old differ from the current generation of elderly in that they are significantly more open to technological innovations. Meanwhile, various building companies are offering modules of smart living (cf. Heinze/Ley 2009 as well as Westphal et al 2010).

Without the increasing use of modern "welfare technologies", the care for the chronically ill and persons in need of nursing will be virtually impossible. In the field

of prevention too, home automation appears to be a growing market. But if ehealth and telemedicine applications can both raise the quality of treatment and lower the costs, the question arises why the available findings have not yet been taken up across the board and been put to practice in standard care. Meanwhile, the pilot phase has been more than completed and the housing industry and the tenants are ready for practical implementations. First isolated projects have already demonstrated the positive aspects of home networking.

There are, however, various barriers that have to be overcome. Empirical experience shows that the new technical solutions are often perceived as impersonal and technocratic. Therefore the technology-supported value-added services may not be too technology-centred but also have to take into account social factors. Furthermore, surveys show that the willingness to pay for home-based services is still relatively low.

These considerations can explain why most of the concepts of smart living or ambient assisted living have not yet overcome the status of research and development projects and have not yet been adopted in standard care. So far, the necessary interfaces with the potential areas of application only work in individual projects but the application is slowly spreading. Above all, the technological development must focus on the user benefit. Technical solutions will only be successful and establish themselves in the market if a distinct added value is generated for the user, which can only consist in an improvement of the quality of life and a facilitation of daily activities. Moreover, the technical solutions have to be coordinated with the offers and services of the traditional providers of the health industry.

The household as "third" health location

For some time now, the "classic" locations of health and medical care, the hospitals and medical practices, have been supplemented by a third location: the household. In fact, the household had never lost its function as collecting basin for lesser everyday illnesses, ranging from small injuries, colds to serious kinds of flu, but over and above these health activities, additional health-related,

economically significant fields of action have been added: homecare for older people in particular and the treatment of chronically ill persons at home on a permanent basis. A look at the demographic development and the predictions on hospital stays and care dependency points out the great potentials of smart living and of the possibility of remaining at home even in the case of illness or the need for care.

Even today, the demographic change is already leading to a growing assistance need of seniors living at home that can only be met by means of the expansion of the respective services. The modern information and communication technologies (ICT) offer abundant starting points for this, be it for the design of the living space itself, for the communication with the elderly living at home or for the monitoring and regulation of the vital parameters of ill and health-impaired people. With the aid of ICT, new opportunities open up for older, ill and care-dependent persons to continue living more safely at home for a longer time.

At present, 2.25 million persons receive in Germany benefits from the long-term care insurance, as they are "officially" recognised as being in need of care. A further 3 million people are currently considered to be "merely" in need of assistance and are thus not entitled to benefits from the long-term care insurance. The majority of these people are cared for at home – in close co-operation with the inpatient and outpatient health services. Ambient Assisted Living makes life at home easier in old age or in the case of nursing needs and can moreover potentially cut costs. The transition from technically-supported "assisted" living to nursing care services is, however, smooth and, in addition to care from family members and friends, grey market activities abound in this area. Home care also profits from the new technological options in the field of ehealth.

Modern information technologies generally progressively transform the environment of people into an interconnected system. These systems often consist of barely perceptible intelligent sensors that can be integrated into a comprehensive network. The technological base for "smart" homes has been available

for more than 10 years. A "smart" environment is one that can react to the presence of people and, depending on their needs, provides different services . The reactions and services are usually made available by computers that are almost invisible to their users. These computers are interlinked and have sensors with which they gather and analyse information about their environment. In addition, they are also fitted with actuators with which they can influence their environment. AAL (or smart living) can be deployed in all areas of life; from monitoring to emergency alarms. In the past few years, many homes have been technically upgraded and increasingly have universal information technology infrastructures at their disposal. Meanwhile, the setting up of an internet access is possible in (almost) every existing home. And still existing mental barriers to new technologies will be successively overcome in the coming years. This is especially true for seniors, as the future old will differ from the current generation of elderly in that they are significantly more open to technological innovations and ehealth (on the acceptance of new home technologies on the part of seniors cf. Meyer et al 1997 as well as Mollenkopf 2008).

What is common to all AAL-concepts though, is that they are still at the stage of research and development projects and are not yet ready for everyday practical use. The necessary interfaces to the potential areas of application do not yet function sufficiently. Here it might be useful to analyse not only successful projects but also failed projects to gather evidence and success criteria for the future development. Above all, the technological development must focus on the tangible user benefit. Technical solutions will only be successful and establish themselves in the market if a distinct added value is generated for the user, which can only consist in an improvement of the quality of life and of substantial help with daily activities. Moreover, the technical solutions have to be adapted to and coordinated with the offers and services of the traditional providers of the health industry.

In Germany too, the deployment of technology within the scope of home embedding is increasingly being recognised as an effective way of supporting independent living in the case of illness or care dependency (for instance in connection with senior-friendly housing adaptation). This

inter alia includes measures of computer-assisted house automation which facilitate household management, e.g. by means of self-steering screening and darkening systems or by electrical appliances that shut down automatically in case of malfunction. Modern computer technology even makes smart homes possible. This in particular concerns the embedding of appliances (e.g. washing machine, stove, blinds) and systems (e.g. heating, water, electricity, security) that so far operated separately from each other. The better part of the home control is automatic, i.e. primarily via voice control. The following technical fields of application can at present be identified: security, but also health promotion and communication. Furthermore, systems for the localization of seniors suffering from dementia are also in use.

In the area of technology-supported communication, a personal emergency response system has been available in households since the 1970s. The main objective of this system was originally to organise help as quickly as possible in the case of medical emergencies. Now the enhanced emergency call systems also offer additional support in the case of unexpected nursing problems and practical support and services, latterly increasingly also communication offers. Among the latter rank, for instance, support for the participation in phone chains or virtual senior citizens´ meetings or for the access to cultural and social events. These enhanced home emergency response systems can thus, all in all, be regarded as activation and communication offers. On the whole though, in contrast to countries such as Great Britain, in which private senior households have an equipment rate of around 38% and the Netherlands and Sweden with each 9 percent, the diffusion rate in this country is very low at approx. 3 percent of all elderly households,

There is already a great interest in easy to apply technologies (smoke and burglar alarms etc.), more complex solutions are –as yet – slow in demand. As regards security systems, personal emergency response systems in particular are in high demand with senior citizens – particularly since their handling has been significantly simplified. At present around 350,000 households or persons have a personal emergency response system. Meanwhile only a telephone connection,

which is available in (almost) every home, is required for its installation. The acceptance of this service rises among people above the age of 70 in particular. However, technology that enters the own living environment and private sphere can easily be perceived as a threat – which is why technical solutions are not always accepted by their potential users. For the users and patients, the technology therefore has to be manageable, easy to understand and reliable and, above all, it must function from the very beginning and in each conceivable situation. The top priorities of AAL- solutions must therefore be reliability and user friendliness. Staffs (from the housing industry, artisanry, and the social services) that have the task of installing and servicing the technology need a special training so that they can comport themselves appropriately in the living environment and homes of the patients.

All implementation concepts require an embedding of different sectors. By explicitly formulating areas of expertise (or also clusters), new constellations can be created that can to some extent attain scope for development /room for manoeuvre. Especially in the emerging cluster of home embedding, that comprises both public institutions and private companies from various economic sectors, these interconnections have to be organised. This presupposes trust.

Technology and IT-based concepts for the promotion of independent living in old age do not only convince from a theoretical standpoint but, with a view to the enhancement of the quality of life, also from a practical one. Nonetheless, they depend on an innovation strategy that both promotes technical innovations and creates real support networks. Moreover, many of the new technological options (for instance in the field of outpatient care and telemedicine for risk patients or outpatient rehabilitation) are not yet profitable from a purely economic point of view. Therefore these processes must, on the one hand, be optimised (i.e. the infrastructure has to be brought up-to-date) and support services from the classic professional services (e.g. doctors or the outpatient caregivers in welfare stations) have to be enlisted and, on the other hand, the field of the technical-

social services also represents an experimental ground for new concepts of the "welfare mix".

Community Living in old age – concepts "under construction" in Germany

The discussion on "living arrangements in old age" as well as explicitly on "smart homes" too has recently gathered in momentum, even though one has not yet succeeded in making integrated care models standard practice in care giving in Germany. Corresponding business models still have to be developed; this only makes sense if the service providers are actively involved. Above all, solutions for independent living in old age presuppose a new interface management between the different actors.

Nonetheless, manifold experiments are being conducted in Germany in the field of home networking, assisted living and community living. These include various local initiatives of "community living" that have been organised in almost all regions in recent years. Here it is primarily the cooperation of professional, semi-professional and voluntary work that determines the innovative character of at least some of these living projects. Thus the former mayor of Bremen, Henning Scherf, actively canvasses for an end to the separation between young and old and advocates shared housing for seniors: "We have to do away with these old-age ghettos, these retirement villages somewhere in the loneliness outside the cities. That only leads to all people becoming care dependent at the same time. Mixed quarters are the keyword! The old lady living on her own next to the young family, the retired coupe next to the single parent […] In such mixed-generations quarters, I hope, it will be possible for the neighbourhood to look after someone in their midst who needs help. That there will always be someone who can do the shopping or call the doctor if needed" (Scherf 2006: 150f, see also Otten 2008).

Shared housing for seniors as well as multigenerational housing attract enormous media attention and are regarded as a way out of the dilemma of growing numbers of elderly in need of care and help coupled with a simultaneous decrease in economic and social resources. However, one should not overlook the fact that only a

relatively small number of seniors can imagine and wishes for such living arrangements. As yet, the preferences of the future elderly regarding "community" living are still a black box. The fact that a part of the baby boomer generation has experience in living in shared housing lets some observers jump to the conclusion that this form of housing is also desired in old age. But one should not forget that only a (relatively small) part of the baby boomer generation (the formerly student milieus) have experience in such living arrangements.

New generations of the elderly will differ quantitatively and qualitatively from present generations of seniors: They will be numerically strong and have a high plurality as regards their social positions as well as their values etc. Therefore concepts have to be developed which leave enough room for the different lifestyles, mobilise the endogenous potential of the target group regarding civic involvement and provide for as high a quality of life as possible at justifiable costs. The living situation must facilitate individuality and community alike. Such residential quarter concepts do not only enhance the quality of life of the target groups but are also necessary from the point of view of society as a whole: our society can ill afford to do without the potentials of its older citizens for both social and economic reasons. In the interest of a sustainable social policy, not only the needs of the future generations of seniors should be focused on but also productivity in old age.

Security in old age in all its dimensions (also with regard to health) is thus a central issue and offers numerous starting points for supplementary service concepts. For years, trial projects have been conducted in this field at great cost and effort, but they were often off the mark. So far, the offers have not yet been successfully dimensioned in such a way that they are widely accepted by the cost bearers and the end clients. The reasons for this could be a (too) strong orientation on technically feasible solutions and too little consideration for the preferences, needs and interests of the potential users. Meanwhile, practical projects in the housing industry tend to focus less on technology, as t the implementation chances can thus be improved .

Various housing companies and providers of social services have in the past few years begun to set up a network of social services especially for older people. In empirical studies which we conducted on home-based social services at the Institute for Housing, Real Estate, Urban and Regional Development (InWIS) at the Ruhr-University in Bochum, the following (condensed) findings were made (cf. Schneiders 2010 as well as Schneiders/ Eisele 2007):

- The use of home-based services tends to increase with age

- The extent of the usage depends on the social structure of the residential quarter

- Special interest is shown in services that relieve the elderly from "burdensome tenant responsibilities" as well as in services that concern the field of security

- The extent and magnitude of the willingness to pay is rather low

- 15% are in principle willing to pay, the average amount per month they are prepared to spend on such services being 21 Euros

- The providers of assistance services are for the most part family members or friends

- If there is a person with disabilities in the household, the use of and the willingness to pay for services increases considerably

Even though there are still implementation problems regarding the economic realisation of IT-services, calling for the development of viable business models, new offers in the social service sector regarding the "health location" household have already established themselves. From a realistic point of view, the following appraisal can be made:

- Firstly, more and more persons are interested in a health-oriented lifestyle and also pay for it privately;

- secondly the actors from the housing and health industries are creating new offers of social services and

- thirdly the health policy as well as health insurances are developing economic incentives for more self-responsibility in matters of health.

Practice models

Options for embedded living are only operational and above all viable if all actors (including the cost bearers) actively work together and stable project and innovation networks are formed. Co-operation is therefore the keyword of the day. The active participation of the central health care providers in the German health sector, such as the health insurances, plays a major role for the successful implementation of these new, in the broadest sense, welfare technologies in the health sector in particular. Now that the technical infrastructure for AAL is available, and the homes have been correspondingly upgraded, the next step after the model project phase is the concrete implementation of AAL in standard care and the setting up of innovative alliances. For this purpose, new forms of cooperation have to be developed between housing companies, social and health services, the information and communication industry as well as health and long-term care insurances. To achieve a broad effect, further cost bearers -in addition to the private households - have to be convinced of the advantages of the new option of technology-supported living and aging at home. Ultimately, AAL-concepts have to be included in the list of services covered by health and long-term care insurances.

By means of three practical examples ("WohnFortschritt" in Dortmund (1), Service4Home (2) and (3) the "Niedersächsische Forschungsverbund Gestaltung altersgerechter Lebenswelten (GAL)" both the potentials and the implementation problems (in particular regarding the cooperation of heterogeneous actors) of embedded living will be pointed out. These examples show how difficult the coordination and organisation of innovations is, as various sectors and different organisational and learning cultures have to be interlinked with each other. Despite the undoubted challenges of the demographic

change and the high priority that independent living in old age with the support of embedded household technologies enjoys in social policy, the transformation process is up against many barriers.

1. The starting-point of this project were the endeavours of DOGEWO 21 to react betimes to the challenges of the demographic development and to adapt their housing supply to the needs of an aging society. These endeavours also include new cooperation relations with other actors (for instance from the social service sector). With slightly more than 16,000 housing units, the DOGEWO21 is the largest provider of housing space in Dortmund. The vacancy rate amounts to less than 1 percent, which is well below the Dortmund average of an estimated 3 percent. A central cooperation partner in the area of embedded living is INDISO. The INDISO gGmbH (Individual Social Care Service) is a non-profit-making organisation of the Arbeiter-Samariter-Bund (Workers´ Samaritan Foundation) RV Unna e.V. It was founded in the 1980s by the regional association of North Rhine-Westphalia of the Workers` Samaritan Foundation as supporting organisation for its social welfare institutions. As a provider of long-term care and of assisted living, INDISO is more economical than nursing homes, although it also offers its services up to the highest care level (3+).

The DOGEWO21 and INDISO jointly initiated the project "WohnFortschritt" (HousingProgress) with currently 350 apartments in Mengede (a residential quarter of Dortmund) with the aim of optimising the inhabitants´ supply situation with social and household-related services. The apartments are located in multiple dwellings as well as in a high rise complex. The average rent is 4.75 Euro per m². In this quarter, already more than 35% of the inhabitants are older than 60 years; hence this quarter is particularly suited as pilot project. A further special feature is the municipal retirement/nursing home directly adjacent to the quarter.

Prior to the implementation of the project, the tenants were surveyed. With a return rate of almost 100%, this survey is of high informative value. The central finding of the survey confirmed the assumptions made so far: The vast majority of people wish to remain in their homes for

as long as possible and not only in their neighbourhoods. Furthermore, the assumption that tenants only accept very little and easy to use technology in their homes was verified. Therefore, the project in Dortmund-Mengede inter alia comprises the following technical aspects: connection to a service platform, installation of electronic door opening devices, interface for an emergency call system, installation of networked fire alarms and an electronic stove shutdown, multimedia access in all living rooms and bedrooms.

The facilities are completely networked and dimensioned in such a way, that they can at all times be upgraded without much technical or financial effort. Moreover, it is also possible to transmit medical data from the housing units. This can, for instance, facilitate an improvement in postoperative follow-up care, the monitoring of chronic diseases but also the signalling of critical vital signs as well as the monitoring of the taking of medicine and , if necessary, repeat orders for medication. A central finding of the tenant survey was the wish for lower-cost home-based services and, of special importance, an orientation and reliable recommendation regarding the provider choice. For this reason, the DOGEWO21 decided to cooperate with INDISO. Jointly they run the service-oriented network, in which every tenant can participate free of charge. The following services are offered: service platform with a 24-hour availability, information, counselling, discussions as well as the organisation and procurement of special services, community activities to cultivate neighbourhood social ties and paid optional services (meals services, housekeeping help, emergency call service, long-term care, therapeutic care).

The service platform is no emergency call system, instead it guarantees the 24-hour availability of a personal advisor and conversational partner. The employees of the platform reside in the quarter and can visit the tenants in their apartments at any time. The employees are social workers or elderly care nurses or carers. The DOGEWO21 pays the basic rate of the service platform and refinances these costs by generating and feeding -in solar electricity (made possible by the tower block). The tenants have to settle their accounts for all further services, such as the meals service or the emergency call system, directly with

INDISO. For housekeeping services, e.g., DOGEWO21 arranged a price of 14.50 Euros with INDISO. The tenants of the tower block (68 housing units) moreover have access to a virtual tenant portal. This function is made available by means of the television set which , with the help of an additional component, can be used a central control set that is connected to the internet via a set-top-box. The tenant portal enables the tenants to avail themselves of the services of INDISO, furthermore it can be used as a means of communication with other portal users. Due to the short duration of the project, little experience has been made with whether and in which form the tenants make use of this device.

2. The project **Service4Home** (S4H) is planning and preparing for the set-up of a service agency for services in a residential quarter in Bochum. To order a service, the clients make use of a pen equipped with micro-system technology.   This is a joint project of the Chair of Information and Technology Management (IMTM) and the Chair of Sociology, Labour and Economy at the Ruhr-University of Bochum, various research institutions as well as the VBW Bauen und Wohnen GmbH and a welfare association. Within the framework of the project, that started in September 2008, a service model and a service agenda are being developed that bundle the requested services and coordinate the work of the individual service providers. A combination of voluntary support in terms of an intergenerational exchange and professional services will, it is hoped, contribute to limiting the costs for the use of these services. In addition to the coordination of services, the service agency is also responsible for their continuous quality assurance. Micro-system technology will facilitate the information exchange concerning the request and provision of services and thus supports the organisation or management of the service provision. The service agency will go live at the end of 2010.

3. The "Niedersächsische Forschungsverbund Gestaltung altersgerechter Lebenswelten" (GAL) (Lower Saxony Research Network "Design of Senior-Friendly Environments") attempts to identify, enhance and evaluate new techniques of information and communication technology for the design of senior-friendly environments (see GAL 2009). Cooperation partners in the network are

OFFIS - Institute for Information Technology (Oldenburg), the Technical University of Brunswick, Hanover Medical School, the Carl von Ossietzky University of Oldenburg, the Centre of Excellence HörTech (Oldenburg), the Fraunhofer-Institute for Digital Media Technology, project group Hearing, Speech and Audio Technology (Oldenburg), the Centre for Research on Aging and Society at the University of Vechta, the Research Group on Geriatrics at the Charité (Berlin) and the University of Potsdam. To support the maintenance of independence and quality of life, the project promotes the deployment of assistive technologies. Target groups are "[…] in particular people in the second half of life who can make barrier-free use of these technologies according to their individual needs but also persons from their social environment (relatives, doctors, nursing staff)" (GAL 2009:9). In addition to assisting the elderly and their families, the sensor technology and sensor-enhanced information systems are deployed to help to detect illnesses sooner or to facilitate a better health care for the chronically ill. To achieve these objectives, four scenarios for new ways of living and new forms of care have been implemented:

- Personal activity and household assistant,

- Monitoring of vital functions while the patients engage in preventive and rehabilitation sports,

- Sensor-based activity determination and

- Sensor-based fall prevention and recognition.

As the project only started in October 2008, no findings are available yet on the implementation of these four scenarios. Although as yet no evaluation findings of the projects are available, it must be assumed that while new opportunities and ways of living are thus opened up, the use of embedded components and services will also come up against various barriers. As already described, the willingness to pay for such services is quite low. Another point that must be taken into account is the technology acceptance of the elderly. The perception and assessment of technology depends to a great extent on its context of use and on the area of technology. The readiness to use the AAL-Technology must therefore be differentiated according to the area of application and depends on

various other variables such as social structure, competence as well as personal attitudes.

Conclusion:

The technological base for home automation is in many cases available, but what is still lacking after the model project phases are sustainable business models and innovative entrepreneurial alliances for a comprehensive implementation. Therefore, a breaking down of the prevailing sectoral division between inpatient and outpatient care (for instance by introducing innovative, integrated care models) can only succeed in an incremental manner. This is also true for the relation between social service providers and the housing industry that have only begun to consult with each other in recent years. Without a closer co-operation of different economic sectors and service providers, the manifold approaches ("threads") of embedded living cannot be integrated into standard care.

For this purpose, new forms of cooperation between housing companies, social and health care systems, technology providers from various sectors as well as health and long-term care insurances have to be developed. However, the already implemented solutions show that although the actors of different sectors cooperate successfully within the framework of model projects, these structures were only in few cases incorporated into standard care procedures. Often no durable business models were developed during the project phase which could have secured the continuance of the cooperation relations after the end of the project promotion. The actors have to be actively convinced of the advantages of cooperation. The mobilisation of the social security providers in particular is a central challenge for future embedding strategies in an aging society. But because of the fragmented structure (within one residential quarter, many different health care and long-term care insurances have to be approached) it is difficult to put into practice. And ultimately one will only succeed in convincing the socials security providers - in their function as cost bearers -if there is clear evidence for cost reductions (e.g. by means of an empirically supported comparative calculation between inpatient and outpatient

nursing or the calculation of the potential cost cuts due to an avoided or delayed institutionalisation). Already today, there are some health insurance companies that pay for the telemedical care of e.g. risk patients or chronically ill people or for the telemedical surveillance of people who have just undergone surgery.

Cooperation, embedding, more competition and the management of social and housing-related services at the communal level are key issues in the area of social and housing policies. The hitherto unconnected institutions must be embedded in such a way that friction and communication losses are minimised and resources are bundled. This is the only way of ensuring the long-term success of smart living. The linking of effective and easy to use technologies for the elderly in particular with social services in the living environment could – if appropriately encouraged – lead to the development of a new internationally esteemed "lead market" for "welfare technologies". In the light of the structural problems of the business location and social state Germany, this option is not only an appealing strategy from a senior citizens and social policy point of view but also of economic policy interest. Moreover, the promotion of innovative technologies can also serve to raise the population´s awareness of the challenges an aging society faces.

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