Emerging Trends: Shaping Age By Technology and Social Bonds

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Abstract

Global ageing is a challenge, particularly with the high speed of the ageing process. As the orientation toward nuclear families without extended family members is growing and the number of children is decreasing, fewer senior citizens in developed countries live under the same roof with their children as in past decades. Families are less and less able to provide support and comfort for older people. Social communities are expected to secure the quality of life of senior citizens as well as their ability to lead a self-reliant, autonomous life. Social policies emphasize ageing in place and therefore the enhancement of neighborhoods and community resources. Digital technologies can contribute to the welfare of the elderly, as they offer communication opportunities, safety functions or health support. More and more the question of enabling contacts and service provision is increasingly based on access to broadband and ICT.

In this essay the question is pursued as to which extent new intelligent devices in senior households, often referred to as *Ambient Assisted Living* (AAL), increase comfort and safety, provide support and facilitate social contact for elderly people in their homes. Already by now, older people are able to use assistive technologies on a regular basis and in very different ways. Modern user interfaces empower senior citizens, ensuring information and entertainment of the Internet. AAL technologies do not diminish direct social contact, but strengthen the sense of belonging by offering new possibilities of getting and keeping in contact.

INTRODUCTION

Rising life expectancy combined with decreasing numbers of young people results in an increasing weight of elderly people in relation to younger generations (United States Census Bureau, 2011). As a global consequence, societies rapidly age, the process of ageing is even faster in developing than in old industrialized countries. It is expected that in 2050 over 2 billion persons older than 60 live in the world (810 million in 2012; United Nations Population Fund (UNFPA) and HelpAge International, 2012), and the proportion of elderly compared to younger generations increases significantly (2030; European Commission, 2011). At the same time, the traditional support

system for the elderly decreases because of changing family structures, for example, rural to urban migration, divorces, childless marriages and increasing flexibility demands of the labor market (BMI, 2011; Wu & Pollard, 1998). Feminization, singularization, centenarization, and autonomy are the key words for demographic change in developed countries (UNFPA & HelpAge, 2012).

Welfare states differ in the responsibility they expect from families regarding elderly care (cf. welfare typology of Esping-Andersen, 1990; Esping-Andersen & Myles, 2009). In "social democratic" regimes, including most Scandinavian governments, the welfare state assumes nearly all social services, whereas countries, such as Germany or Spain, primarily involve families and give the state a subsidiary or residual role. There are legal obligations for adult children toward older parents and lower levels of service in areas that are traditionally a family responsibility (e.g., long-term care) (Haberkern & Szydlik, 2010). The global trends of a decline of shared households and an increase in female employment are no longer compatible with the involvement of the families in those countries. Thus, the impact of professional care and alternative support structures increases, however, in a culture-specific variation (Brandt, Haberkern, & Szydlik, 2009; Cornwell & Waite, 2009).

Aging in place is the preferred option of many older people and emphasized in social policies. Most seniors wish to stay in their self-chosen-environment as long as possible, even if they experience a growing loss in quality of life (Davey, 2006; Köcher & Bruttel, 2012; Vasuni-lashorn, Steinman, Liebig, & Pynoos, 2012). In Germany, a country with a comparably long-term residency, 93% of the 65-year-olds and older live in normal private apartments and houses, 3% in assisted living or congregate living facilities and only 4% live in nursing homes (skilled care facilities; BFW Research, 2007). A similar situation can be found in Canada, where 92% of the population aged 65 and older lives in private dwellings, 5% in nursing homes, chronic care or long-term care hospitals and 3% in residences for senior citizens (Statistics Canada, 2011). There is no indication of a future extension of demand for long-term care institutions, but an increase of demand for ambulant care and support for families (Bengtson, Kim, Myers, & Eun, 2000). Considering the constant growth of the number of older people, the risk of social isolation, the costs for professional care, and the lack of skilled care attendants, alternative ways of support are needed (Loader, Hardey, & Keeble, 2009; Ziefle & Röcker, 2011). These trends enforce developed countries to find new social and technical solutions enabling seniors to live independently as long as possible.

In this contribution, we focus on new developments of ICT in private households of senior citizens. A couple of years ago the term *Ambient*

Assisted Living (AAL) emerged in Europe. "Ambient Assisted Living enables the provision of equipment and services for the independent living of elderly people, via the seamless integration of info-communication technologies within homes and extended homes, thus increasing their quality of life and autonomy and reducing the need for being institutionalized. These include assistance to carry out daily activities, health and activity monitoring, enhancing safety and security, getting access to social, medical and emergency systems, and facilitating social contacts, in addition to context-based infotainment and entertainment" (VDI/VDE, 2006, p. 1). AAL technology requires a technology that is "invisible, embedded in the user's surroundings, adaptive to the user's needs, and acting autonomously" (Floeck, 2010, p. 3). Although single devices, as well as interconnected systems in the field of Smart Home, mainly cover aspects of comfort, safety and security, AAL systems (also) affect aspects of health, communication, and/or social services. AAL has become a well-established international research domain ever since (see AALA, 2014). The newly emerged research strategy of the EU "Horizon 2020" aims "at meeting the challenge of an aging population by encouraging the emergence of innovative products and services based on ICT, allowing seniors to live independently, in order to improve their quality of life and autonomy and reduce the cost of their care" (European Commission, 2014). In this follow-up program, the term *Ambient* was replaced by "Active," as a more understandable and person-centered term: *Active and Assisted Living* (European Commission, 2014). cyber-physical systems (CPS, Baheti & Gill, 2011) combine computation and physical processes, for example in physical prostheses, vehicle control systems, smart grids and smart metering. Wearables subsume technologies such as smart watches, smart belts, or smart plaster that gather vital data such as blood pressure, pulse frequency, or insulin level and transmit them to the mobile application or via Internet to a medical doctor or service station (Lanagan, Smeaton, & Caulfield, 2011). Related new developments are characterized as "Internet of Things," "Smart Buildings and Cities," "Intelligent Driving," and "Ambient Persuasion." The areas of living, mobility, technical infrastructure, individual behavior, and health are continuing growing together (ERCIM News, 2011).

Besides technical support social bonds are crucial for independent living and quality of life. As families more often are distributed in different places, neighborhoods and communities become more important for the elderly, who are not as mobile as younger age groups (Rosenbloom, 2003). Local communities become a central resource for elderlies, not only for support, but also for conviviality, empowerment and participation. Developments in social bonds and new technologies both shape the increasing third and fourth period of life.

CLASSIC FOUNDATIONAL RESEARCH

AMBIENT ASSISTED LIVING

Facing the big success of ICT, researchers have been trying to bring intelligent artifacts into private homes for decades. Systems and services aim at meeting the needs for an aging society, providing access to the information society, empower people to participate in society and improve their quality of living. In pilot projects home automation is combined with health issues, such as the EU-initiatives "SAFE21," "TeleCare for Seniors," or "IST@home" (all projects listed at www.aal-europe.eu). In the US, the "AwareHome" in Atlanta Georgia, the "Blacksburg Electronic Village" in Virginia, "At home and in touch" in Columbia, or smart homes in Edinburgh and York in the UK can be named.

Nonetheless, a breakthrough cannot yet be recognized, because apart from pilot projects AAL-technology is barely prevalent in senior households. Reasons for the reluctance of housing companies and private owners are manifold and can be attributed to reliability and knowledge combined with high costs for installations and maintenance as well as missing business models or even aesthetical reasons. Housing companies and scientists who conducted pilot projects often experience disappointments, because the needs of elderly people are not considered adequately (Spellerberg & Schelisch, 2012; Wichert, Furari, Kung, & Tazari, 2012; Salvi, Colomer, Arredondo, & Walderhaug, 2012). First, projects had to rely on a slow internet on one hand and on the other hand failed to address human anxieties and needs adequately (Moran, 1993). Older people were regarded as customers, subjects to data collection and not as co-creators, having an interactive engagement with the system (Loader *et al.*, 2009). Until now it is not clear which technological concepts and which single devices are of use for elderly people (Haigh, Kiff, & Ho, 2006; van Berlo, van den Heuvel, Nap, Bierhoff, & Rijnen, 2012). Acceptance, social acceptability, utility, and usability are criteria that have to be met for achieving autonomy, support, and social inclusion of older people (Kuneva *et al.*, 2010). One solution can be seen in the combination of social support and technical assistance—such as AAL—enabling elderly people to live independently as long as possible.

SOCIAL BONDS

Social bonds are understood as relationships individuals have with others based on a sense of belonging (Lin, 1986). According to the results of various representative studies (German General Social Survey. Retrieved from www.gesis.org/en/allbus) elderly people have a slightly above average frequency of neighborhood contacts, and are generally satisfied with the

relationships in their neighborhoods. Gerontologist have stressed that the significance of close spatial contacts increases with age, due among other to increasing restrictions on mobility, and hence a reduced radius of contacts, reduction in size of households, and the thinning out of social networks (Oh, 2003; Heuwinkel & Borchers, 1999). Elderly people, moreover, generally spend a larger proportion of their time in their dwellings or in their imme-diate vicinity, which increases the probability of contact with neighbors (Saup, 1993). An extended period of residence at a single place, which is often the case for elderly people, increases the probability of getting to know one another. The resulting closer ties to one's place of residence are also expressed in the desire not to change one's living situation (cf. e.g., Banse, Oertel, & Deilmann, 2008; Höpflinger, 2004).

Emergency help, communications, and social control are functions that are expected of neighbors, and are fulfilled by them (cf. Hamm, 2000). However, support activities in neighborhoods are generally assumed as subsidiary at the other reference groups and institutions (cf. Künemund & Hollstein, 2005, p. 253). People normally do not want to depend on their direct neighbors. They do not want to violate the principle of reciprocity, and feel ashamed if they cannot give back what they get (cf. Putnam, Leonardi, & Nanetti, 1993). The benefits of social proximity, "everyday life-worlds," and "place-based communities" (Davies & Herbert, 1993) cannot replace social service provision.

Especially in the context of demographic change, the activation of neighborhoods is an approach which is supported by social planners and policymakers in order to compensate for supply deficiencies. A lack of neighborhood support is seen as disadvantageous for individual integration and societal cohesion. However, neighborhood and community relations are not always seen as different concepts (Blokland, 2003). Spatial proximity in and of itself does not create community ties; only emotionally oriented rela-tionships result in the creation of communities (see also Gottdiener & Budd, 2005, p. 11; Smith, 2001). Closer interactive relationships, such as regular assistance or visiting one another are more common if other similarities also exist, particularly similar lifestyles. Hence, the likelihood of interaction and assistance are more common in socially homogenous neighborhoods that in heterogeneous neighborhoods. Putnam (2000) declared that communities are vanishing in the US, but since the start of the Internet the term *community* gets new meanings, as geographical limitations are less important to stay in touch and—as retirement communities still are not very widespread—the need for social contacts and social bonds may be enhanced by ICT.

CUTTING-EDGE RESEARCH

After 25 years of experiences with smart homes, new solutions and functions can be identified. Displays are more user-friendly and less complicated and older people are more attracted to computers and the internet. In the year 2013, 30% of older German men and women aged 70 and older were "online," the proportion of persons in their 60s was much higher (64%; Initiative D21, 2013). Similar numbers can be found in the US, where 57% aged 65 and older use the internet (87% of American adults; Fox & Rainie, 2014). The majority of two thirds of internet users proclaim that online communication strengthened relationships with friends and family members, instead of weakening them. Use of media and social contacts are the most frequent leisure activities of elderlies, such as conversations, watching TV, reading, listening to the radio, visiting friends, dining out, shopping, or playing games (Strain, Grabusic, Searle, & Dunn, 2002; Spellerberg, 2014; Adams, Leibbrandt, & Moon, 2011).

   In the following paragraph a research project in Germany is described, fostering a combination and mutual development of both aspects of quality of life, newest technical standard as well as sense of community and belonging. The project in the German city of Kaiserslautern emerged from a cooperation of the University of Kaiserslautern and a local housing company. The ambient technology comprises of home automation components, such as motion detectors, door, and window reed contacts, wall switches, a door camera, remote controlled door openers, and others. The core element of the AAL-technology is a touchscreen PC called PAUL, the *p*ersonal *a*ssistive *u*nit for *l*iving,[1] which 19 participating households were equipped with in 2007. PAUL provides—functionalities for comfort (e.g., electric shutters), entertainment (e.g., Internet access, electronic bulletin forum, web radio, serious games), safety functions (e.g., video entry phone), and communication (videotelephony). The data sent by the home automation sensors is used for monitoring the activity of a user. Any untypical inactivity period detected in the tenants' apartments may indicate a potential emergency, like falls. In this case, PAUL would automatically trigger an alarm (Floeck, Litz, & Rodner, 2011; Litz & Gross, 2008). The design of the display (functions, colors, numbers, symbols, pictures) was developed with the input of the (future) users. The evaluation of the requirements, experiences and acceptance of technical solutions showed that PAUL is operated with ease and is used in manifold and different ways, and in most cases on a regular day-to-day basis (Floeck, Litz, & Spellerberg, 2012). For the tenants, the implemented technical devices do not represent "technology," as they

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1. In late 2011 the trademark rights of "PAUL" were sold to CIBEK technology & trading GmbH (CIBEK), while research and development in the research project continued.

would think of technology being complicated and can only be understood using a manual. Instead, most features were inconspicuously integrated into their everyday life and adopted playfully, although the features of PAUL met with differing levels of acceptance and there are a few nonusers (Schelisch, 2014).

Next to technology, social integration played an important part in the project. Already a few weeks after moving in, the residents had begun forming a community: they organize afternoon coffee parties as well as excursions, watch TV together, and look after each other. Tenants organized a computer course for those, who were interested in working with a PC. Trust toward the AAL-system is enhanced through the community building process, as "PAUL" is a connectional topic of conversation (Spellerberg, 2010). Furthermore, the usage of the touch screen-PC PAUL is related to social contact, self-esteem, safety feeling and entertainment. The decisive factors for feeling at home are primarily the close-knit community, respectively the fact of not being alone (anymore) and the fact that the tenants feel comfortable in their apartments and in the building. Two thirds of the respondents call the house their (new) home (Floeck *et al.*, 2012). The older people, most of them between 60 and 80 years old, not only enjoy meetings, outings, and new friendships, but also started to compare their use of and the bill for energy, heating, and water supply, which is considered quite private information. They found out that meters did not work and that meters were assigned to wrong households. The landlord prevented the tenants from getting the mismanagement of the city-owned supplier published in the local newspaper. Mutual trust, self-confidence, and community enabled the older persons (nonacademic with one exception) to disclose mistakes and take things very actively into their own hands.

In the project, living in the social community with neighbors and preserving this integration were considered crucial factors for a good quality of life. Also, the advanced technology including transponders to open the entrance door and the AAL-features as well as barrier-free flats, living in the inner parts of the city and access to social and medical infrastructure were positively evaluated (Spellerberg, 2010). Similar approaches can be identified in so-called smart communities, which foster social learning and social inclusion using ICT: "a holistic approach to helping entire communities go online to connect to local governments, schools, businesses, citizens, and health and social services in order to create specific services to address local objectives and to help advance collective skills and capacities" (Hollands, 2008, p. 309; similar Coe, Paquet, & Roy, 2001).

KEY ISSUES FOR FUTURE RESEARCH

To reach broader acceptance and new steps toward a socio-technical support system it will be necessary to continue developing technology and accompanying service packages in close contact with the end-users (elderlies, carers and relatives, and institutions and enterprises). Devices and functions should be designed " … to be utilized socially in ways that empower and educate people, and get them involved in a political debate about their own lives and the urban environment that they inhabit" (Hollands, 2008, p. 315). Besides technical solutions it is still necessary to find specific forms of service organizations which fit into the established structures. An interdisciplinary and trans-disciplinary approach is necessary, including information and communication technology, housing research, spatial planning, and social sciences. Furthermore, ageing in place needs to overcome the divide between housing, service providers, commercial services, and the medical sector. More and more, information and communication technology is essential to integrate services of general interest and to guarantee access to information and entertainment and enhance personal contact.

However, social exclusion via lack of access to the Internet seems to be a new societal challenge. Furthermore, possibilities of surveillance (dataveillance), loss of data ownership, digital inequality, outcasts, and adverse affection have to be taken into account as negative aspects in the development toward multifaceted technical and social connectedness. In order to avoid undesirable effects of AAL-technology, ethical decision making is demanded, considering the principles of autonomy of persons, benefits, avoidance of harm and justice.

The neighborhood approach is promising for ageing in place and using ICT. Firstly, adapted houses, an accessible environment and adequate care facilities are basic elements for quality of life. Secondly, neighborhood support is seen as advantageous for individual integration and societal cohesion (Richardson, 2008, 2012). Thirdly, ICT allows new possibilities for Active and Assisted living, for example, networking on a broader basis, communication via videotelephony, access local information, playing games, coordinating activities such as shopping, baking, or cooking together and getting advice and support. This potential and the everyday local practices also include a large, hardly tapped potential for new ideas, and their realization that extends beyond the realm of leisure and cultural activities into the field of government policy, to include services and participation. Regarding the share of computer literate senior citizens, intuitively usable information technologies may contribute to a further closure of the "digital divide" between young and old (Korupp & Szydlik, 2005).

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