H.S.M. KORT (Convener) ***Creating enriched environments for ageing adults.*** *Gerontechnology 2014; 13(2):85;* doi:10.4017/gt.2014.13.02.051.00 **Participants** H.S.M. Kort (Netherlands), E.R.C.M. Huisman (Netherlands), N.H.A.M. van Hout (Netherlands), S. Vorrink (Netherlands), and G. Wets (Belgium) **Issue** The world's population is aging rapidly. More people have to continue working to an older age and they want to participate in society even after they have retired. New technologies support older adults in their efforts to reach emotional and intellectual fulfilment and to integrate into today's society. The elderly in both developed and underdeveloped countries face a variety of challenges. The challenges include knowing how to stay healthy, how to live with chronic conditions, how to continue working and stay productive, how to age-in-place and how to commute safely to and from work. **Content** The International Classifications of Functioning, Disabilities and Health (ICF) model from the World Health Organization[1] offers a workable frame to examine how environmental factors limit or support older people in these challenges. Environmental factors make up the physical, social and attitudinal environments in which people live. Some of these factors are related to physical challenges include: light (e240), time-related changes (e245), sound (e250), the design, construction and building of products and technology within buildings designed for private use (e155), air quality (e260) and products and technology designed to increase a person's indoor and outdoor mobility and to provide methods of transportation (e120). The factors are used to identify facilitators and barriers in the environments of the elderly. Their identification offers the possibility of creating an enriched environment for aging adults. The symposium participants will discuss the work done within the Dutch-Flemish chapter of the ISG. **Structure** There will be a short introduction of four oral presentations, followed by a panel discussion. Two presentations will emphasize using daylight or acoustical interventions to create enriched care facilities for people with a chronic conditions. The remaining presentations will emphasize how physical activity may contribute to social inclusion of older adults. **Conclusion** Varied and complex environmental factors affect the lives of aging adults. The presentations at the symposium will show that barriers to aging adults who are limited by their health conditions can be transformed in facilitators for those same adults. This can be done with building-related interventions related to environmental and physical factors as described in the ICF model. These insights will contribute to the design and development of products and services to create life-enriching environments.

References

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E.R.C.M. HUISMAN, M.P.J. AARTS, P.L.W. KEMENADE, H.S.M. KORT. ***Quality of light in a long term care facility in the Netherlands.*** *Gerontechnology 2014; 13(2):85-86;* doi:10.4017/gt.2014.13.02.180.00 **Purpose** Several studies describe the importance of light for our physical and psychological wellbeing. Exposure to light can affect human experiences, performance, and physiology via both image-forming and non-image forming processes[1]. (Day)light is a key concept for life enrichment care facilities. 'Life enrichment care' is a concept based on healing environments, which targets long term care facilities (Ltcf) rather than hospitals. This concept focuses on the well-being and quality of life of frail elderly in Ltcf[2]. Among Lctf residents are often people who suffer from some form of dementia. For this group, the image-forming and non-image forming aspects of light play a role. The image-forming or visual aspects of light include the ability to perform daily tasks, and are related to the prevention of falls. The most important non-image forming aspect of light is light's influence on controlling circadian rhythms, or the "biological clock". Older adults with dementia often suffer from disturbances in circadian rhythm, which can lead to behavioral problems including nocturnal unrest[3]. This nocturnal unrest is mostly treated with sleep medication. However, in previous research, the emphasis was on light in general and electric lighting in specific. No clear distinction was made between electric lighting and daylight[4]. This study investigates the effect of (day)light on the

well-being of frail elderly and healthcare professionals in Ltcf. This paper describes the current quality of light at a Ltcf in the Netherlands, which is discussed with reference to currently available recommended values[4,5]. **Method** The study was conducted in four living rooms of the psycho geriatric department of a Ltcf in the Netherlands, in July 2012. In order to chart the current quality of light in the Ltcf, several methods were used. The following parameters were quantified[4] both for electric lighting and for daylight: the horizontal and vertical illuminance at relevant positions and viewing directions; vertical colour temperature at eye level of a sitting resident; and, measurement the luminance ratios for the visual effects of light. To determine the contribution of daylight in illuminating the four living rooms, one series of measurements was done with the electrical lighting switched on and one series with the electrical lighting switched off. **Results & Discussion** In the current situation, about half of the measured positions meet the recommended values of at least 750 lux for the horizontal and vertical illumincance[6]. In the several studies, a minimum horizontal and vertical illuminance value of 750 lux is recommended[6]. However, in other studies values of 1000 lux are mentioned[4,5]. The aforementioned values of 750 lux were mainly reached on which are relatively close to the window. For positions further away from the window, the illuminance values notably decreased. The measured colour temperature in the living rooms were between 4000 K and 5500K, with some peaks up to 7000 K. A minimum colour temperature value of 5000 K is recommended[6], and is usually reached when only daylight is present and when viewing in the direction of the window. The measurements in this study took place during summer; it is expected that the illuminance levels in winter do not reach the recommended values. The results will be used as input for the development of another light strategy for Ltcf.

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N.H.A.M. VAN HOUT, C.C.J.M. HAK, S. SEUREN, H.S.M. KORT. ***Acoustic measurements of sound levels in common rooms and sleeping rooms of care facilities for older adults.*** *Gerontechnology 2014; 13(2):86-87;* doi:10.4017/gt.2014.13.02.156.00 **Purpose** The International Classification of Functioning, Disabilities and Health model from the World Health Organization[1] offers a framework designed to examine how environmental factors can influence the physical, social and attitudinal environment in which people live in a positive or negative way. In other words, these factors can act like facilitators or barriers. Sound is one of these environmental factors. Especially for the frail elderly people, sound can act like a barrier. Older adults dealing with hearing loss can encounter problems in understanding the speech of other people and in holding conversations in noisy environments. High sound levels in sleeping rooms are likely to contribute to abnormal sleep/wakefulness patterns[2] that older adults often suffer from. This study was designed to examine and gain more insight into the sound sources and the sound levels occurring in rooms of care facilities for older adults. **Method** A field study was performed in five common rooms and five sleeping rooms of care facilities for older adults. Long-term sound level measurements were performed to determine the background noise levels as a function of time and frequency. Sound levels were recorded continuously day and night. The types of sound sources causing the peak levels were determined by listening to

the recordings. **Results & Discussion** Peak sound levels are mostly caused by the slamming of doors (e.g. closets) and activities of residents and professional caregivers. Averaged over the five sleeping rooms the results show in the night period a mean A-weighted background noise level of 32.1 dB. The maximum A-weighted peak levels go up to 97.8 dB. During the day in the common rooms a mean A-weighted background noise level of 55.3 dB was measured with a maximum A-weighted peak levels up to 115.0 dB.

Table 1. Measurement results of five common rooms and five sleeping rooms; Aeq=A-weighted background noise level; Peak.max=Maximum peak sound level; Peak, 5min= 5min Mean sound level

	Common rooms		Sleeping rooms	
Parameter (dB)	Mean	Range	Mean	Range
$L_{Aeq\ day}$	55,3	53,4–57,0	42,7	41,0–45,6
$L_{Aeq\ night}$	32,2	29,6–33,7	32,1	28,5–36,5
$L_{A,peak,max\ day}$	108,6	101,9–115,0	107,5	99,2–117,0
$L_{A,peak,max\ night}$	92,1	83,9–105,4	89,0	83,7–97,8
$L_{A,peak,5min,>80,avg\ day}$	90,0	88,6–91,6	88,9	86,9–92,6
$L_{A,peak,5min,>80,avg\ night}$	86,1	83,5–89,2	85,2	83,2–87,7

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S.N.W. VORRINK, H.S.M. KORT, T. TROOSTERS, J-W.J. LAMMERS. ***Development of a mobile phone application for stimulation of personal mobility for COPD patients.*** *Gerontechnology 2014;13(2):87-88;* doi:10.4017/gt.2014.13.02.208.00 **Purpose** Chronic Obstructive Pulmonary Disease (COPD) is a disabling airway disease with variable extrapulmonary effects that may contribute to disease severity in individual patients[1]. Patients with COPD show reduced levels of spontaneous daily physical activity (DPA) compared with healthy controls[2].This results in a higher risk of hospital admission and shorter survival[3]. Pulmonary rehabilitation can help to

T=1 T=2 T=3

Figure 1: Three versions of the app, adjusted from left to right; the newest version is on the right

improve the DPA level, but the benefits obtained decline after 1-2 years[4]. **Purpose** In order to maintain DPA in COPD patients after rehabilitation, we developed a mobile phone application[5]. It measures DPA as steps per day, measured by the accelerometer of the smartphone, and shows the information to the patient via the display of the mobile phone. A physiotherapist can monitor the patient via a secure website, on which DPA measurements are visible for all patients. Here DPA goals can be adjusted and text messages sent. This presentation focuses on the development of the mobile phone application (app). **Method** A list of requirements for the app was created by the research group, keeping the main research purpose in mind. An algorithm was written that measures steps by looking at sinus movements. Preliminary testing was performed by carrying the smartphone with the app for 3 days in combination with a validated accelerometer (*Figure 1*, T=1). Subsequently adjustments were made and testing was repeated. Results have been discussed in an interactive workshop. Development of the app was iterative (SCRUM methodology[6]). Subsequently, three pilot studies were performed to test the mobile phone application for usability, user friendliness, and reliability, and were assessed with questionnaires. The application was tested with students and COPD patients, who wore the phone in their pocket. Pilot studies 1, 2, and 3 (*Figure 1*, T=1, T=2, and T=3, respectively) lasted for a week (n=10 students), 3 days (n=3), and 3 weeks (n=7), respectively. Feedback was collected in an interactive workshop. Subjects also wore a validated accelerometer (Sensewear) during the period of the study in order to compare these data with the DPA measurements of the mobile phone application. Mix methods have been employed for quantitative and qualitative data analysis in SPSS. **Results & Discussion** The findings from the interactive workshop indicated that the design for description of the data needed to be explored. It also provided insight in the feedback to be given in text to persuade users to be physically active and which type of widgets motivate users to increase their physical activity. The application was found to be useful and easy to learn.

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A. NEVEN, T. BELLEMANS, D. JANSSENS, G. WETS. ***Application to support elderly while taking public transport services.*** *Gerontechnology 2014; 13(2):88-89;* doi:10.4017/gt.2014.13.02.150.00

Purpose On-demand responsive transport (DRT) services are frequently offered in the context of door-to-door transportation of the elderly with their social participation as the ultimate goal. In Flanders, however, the supply of accessible transportation is fragmented. There are many different types of transportation provided, but many of these are especially expensive. Therefore, we aimed to support the elderly in using regular public transport (PT) services through coaching sessions and personalized monitoring during their trips. We also aimed to meet the specific transportation requests of elderly that cannot be met by using the regular PT network, in order to provide a wide inclusive mobility system in Flanders. **Method** In order to monitor elderly during their PT trips, the smartphone application 'Viamigo' was developed (in cooperation with Thomas More). This app allows the registration of newly learned PT routes by means of their GPS coordinates. The routes can be monitored from a distance by a coach (e.g. family member or care giver), who can receive a signal when the user gets too far from

the planned route. Based on the registered GPS coordinates, we can monitor the travel patterns of the elderly and pinpoint locations that cause the most problems for them. If no accessible PT is available (e.g. because they are not area-wide covering), we worked out the methodology of a 'Mobility Center Adapted Transport', which integrates this fixed PT transport network with door-to-door services. In such a case, the elderly can go to this center with their specific transport request, and this mobility center will assign the person to the most adequate transport provider, based on the client's specific profile and a number of associated criteria.
Results & Discussion Viamigo is being tested in a number of care facilities by 20 users. Preliminary results show that the independence of the users greatly increases, which contributes to a higher quality of life. Compared to the use of specialized transport, the possibility of making use of the regular PT network is much more affordable for the government. The implementation of the mobility centers showed positive results, mainly because elderly could know make use of more different transport service providers that they didn't know of before. Currently, a more effective scaling method is being developed to assign a person's transport request to a suitable transport provider, which would be based on personal as well as situational factors, and is necessary as budgets for (adapted) mobility services are limited.
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