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## Technological and architectural solutions for Dutch nursing homes: Results of a multidisciplinary mind mapping session with professional stakeholders

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### ABSTRACT

There is an increasing call in society for the improvement of well-being for nursing home residents and the support of care professionals through a wide array of architectural and technological solutions that are available in modern nursing homes. This study investigated which of these solutions are considered essential by stakeholders from healthcare and technology. Data were gathered via 22 simultaneously held multidisciplinary mind map sessions with 97 stakeholders, resulting in 43 mind maps. These, in turn, were grouped into a single mind map of the nursing home in general, the private rooms for residents with somatic or psychogeriatric health problems, and the group living room. A prioritization of solutions was added. The contents of the mind maps reflect a Dutch consensus on the necessary architectural and technological features for the design of nursing homes.

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### 1. Introduction

There are approximately 165,000 persons residing in Dutch long-term care institutions (of whom about 65,000 in nursing homes). This is equivalent to around 6% of the

Dutch population aged over 65 [1]. In the year 2008, there were 299 nursing homes for somatic residents, and 398 nursing homes for psychogeriatric residents [1]. Those older persons who live in institutions are assumed to require an increasing amount of care [1]. The built environment, i.e., the nursing home building, its architecture and the technologies applied, is seen as an indirect means of support. This implies that professionals from the domains of healthcare, technology and design need to work together in order to program and design the ideal nursing home of the future. Despite the challenges involved in working together between the two domains, the main goals in creating an ideal nursing home are quite similar. Ideally, the nursing home should be a true home instead of a healthcare facility in which they reside. A sense of home in residential care involves strategies related to three dimensions of the environment, namely, the attachment to place, to space and attachment beyond the institution [2]. Terms often heard in relation to the construction of new nursing homes as part of the continuum of healthcare facilities are evidence-based design and healing environments [3,4]. In the case of nursing homes, technology and architectural solutions are considered to support the well-being, activities of daily living and quality of life of older residents, and support and optimize the work processes of care professionals and professionals in the domain of maintenance.

Heylighen and Bianchin [5] state that in case of inclusive design, the designing should be done together with people who will use the artefact, i.e., nursing home. Both the In2Health Design Model [6] and the CeHRes Roadmap by van Gemert-Pijnen et al. [7] can be used to help plan, coordinate and execute the participatory development process of architecture and technology of healthcare facilities. Both models entail a holistic research and development approach. Getting stakeholders to work together in the design process by accounting for contexts and values of the end-users is a key element in both approaches. In this study, we have professionals from the domains of healthcare and technology work together on identifying the necessary aspects of nursing homes and relevant innovations in the fields of housing, interior design and technology. This goes together with the knowledge that the evidence of design solutions is not widely available, and that the priorities identified will reflect the views from practice rather than those from practice-based science. The factors that are to be identified can be used for two purposes: (1) making a program of future nursing homes which accounts for the needs of the main stakeholders, and (2) setting research priorities for evidence-based design. The set of identified solutions should reflect the dual character of a nursing home as a place to reside and as a place to work.

This study investigates the state of the art in technological and architectural solutions and domains as are known to, and prioritized by, professionals working in the domain of nursing home care and the implementation of technological and architectural solutions in the field, through multiple parallel sessions with professional stakeholders. The goal of the interactive sessions was to find out how various multidisciplinary groups of

stakeholders envisage the nursing home of the future (as a place to reside and work) and which innovative elements are necessary for its creation. Four types of spaces in the nursing home are discussed: two private rooms (somatic and psychogeriatric residents), the living room and the nursing home in general. There was a focus on innovations that were available in terms of the design and construction, the interior design, technology, furniture and assistive aids, and on a sense of home and home likeness, the support of work processes, et cetera.

## 2. Methodology

The methodology section deals with the procedure followed, the activity, including mind mapping and ranking of identified solutions, as well as data processing.

### 2.1. Procedure

An interactive, qualitative study design was chosen for the investigation. A total of 97 external participants joined in one of 22 mind map groups that were held simultaneously on June 11th 2013 (Table 1, Figs. 1–3). Each session lasted for 90 min. Prior to the start of the group sessions, the procedure and methodologies were explained to the group in a plenary session. Thereafter, the groups split up. All participants signed informed consent for the use of written data and photographic material. At the same time, personal data were taken, including name, sex, date of birth, organisation and position, and years of work experience. The participants either had a background in healthcare, technology and/or construction. The groups were heterogeneous in composition, meaning that professionals of various backgrounds were exchanging and discussing ideas together, as the main goal of the sessions was to explore innovation for four types of rooms in the nursing home. The group size varied from 3 to 6 persons (facilitators excluded).

Every session was guided by a facilitator. All facilitators had been briefed about the procedure and had access to a manual and instruction guide. The main role for the facilitator was to stimulate creativity and to obtain a maximum of variety in input to the mind map. The facilitators were lecturers/investigators working with the organising university, who work in the field in healthcare and technology, or students of the Department of Industrial Design of a collaborating university of technology, one staff member with a background in Industrial Design, and two students from the Bachelor course of Applied Gerontology, who were skilled in the procedure and methodology applied.

### 2.2. Activity

At the start of the session, a scenario was read out aloud by the facilitator. This scenario was the same for each group, and was linked to the needs of stakeholders.

“In this project we look for future solutions that contribute to a positive, though realistic image of living/residing, and working in a nursing home. Three elements are of importance:

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