Computation and Networking - Compunetics - promoting digital inclusion of elderly, cognitively impaired, and Alzheimer´s patients

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L.R. Ramos, A.J. Xavier, D. Sigulem. Computation and networking – Compunetics – promoting digital inclusion of elderly, cognitively impaired, and Alzheimer´s patients. Gerontechnology 2005; 3(3):123-125. Our society is aging fast, and the prevalence of chronic, potentially disabling diseases is increasing exponentially, with a sizeable proportion of cognitively impaired and demented people. We urgently need new strategies for large scale physical and cognitive rehabilitation in our aging societies. The size of the need, however, contrasts with the scarcity of resources of the existing health systems. The degree of dependence on the activities of the daily living (ADLs) and the measure of cognitive impairment are good health indicators. Computation and cooperative networking can be extremely instrumental to help meet the demands of daily life. Health promotion might be well supported by interactive devices like personal computers, cell phones, global positioning devices, and electronic banking. These technologies can be reached by the Internet, ubiquitous computation, artificial intelligence, and telecommunications and they can be fundamental to maintain autonomy and independence of cognitively impaired people, helping them through their ADLs. Digital inclusion of the aged and cognitively impaired is a promising challenge, and should be based on the sound principles of human-computer interaction, networking, neuroscience and gerontology. The core objective is to construct environments that could empower cognitively impaired people and Alzheimer´s patients, enabling them to exercise their citizenship, participate and share with their community their life experiences and aspirations.

Key words: digital inclusion, health promotion, cognitive impairment, Alzheimer disease, elderly

The world population is aging fast and massively, creating a new health paradigm: as we age the important health indicator is not the presence or absence of a disease, but the actual degree of functional capacity, despite having one or more chronic diseases. Functional capacity is a measure of global function which is the result of an interaction of all the physical and mental capacities developed during the lifetime. Functional capacity measures range from a degree of total independence in all the activities of daily living, with full autonomy for decisions, to one of total dependence in all the activities of daily living and loss of autonomy for decisions.

THE EPIDEMIOLOGY OF AGING

The epidemiology of aging shows that aged populations have a high prevalence of chronic diseases - less than 10% of people aged 65 or more are free of any chronic health condition liable of a medical diagnosis, and more than 10% can refer to at

least five chronic diseases. Nearly every elderly person has limiting sensory losses in old age, particularly in terms of visual and auditory skills, and more than 30% have a mild cognitive impairment. The consequence is a high prevalence of physical and mental disabilities - on average 30 to 40% of elderly residents in the community have the need for some help to perform at least one of the core activities of daily living (keeping the house, dressing, eating, washing, etc…) [1]. In fact, the majority will have, in old age, less independence and less autonomy in daily life, when compared to young adulthood. Associated to this scenario of personal limitations and demanding health and social needs, there is evidence worldwide that a high proportion of elderly people will experience social isolation, and a non-negligible proportion will suffer violence and abuse. Alzheimer´s disease (AD) is an idiosyncratic example of the current dilemma regarding health care, as its incidence is strongly associated with age, thus increasing exponentially. Its evolution leads to a drastic decline in functional capacity due to disabling cognitive losses, for a fairly long period, and followed by social isolation, family burden, and loss of citizenship.

That brings to the center point of a global political agenda the discussion on how are we going to promote good health and quality of life in old age in a global society, in the near future?

THE PUBLIC HEALTH PATHWAY

The public health pathway has three agendas: first, prevention, which will require much of health education to develop healthy life habits and have a better lay understanding of the aging process; second, proper health care, including early diagnosis, and interdisciplinary management of diseases, seeking to preserve functional capacity; and third, rehabilitation, meaning the constant exercise of functional independence and mental autonomy, given any degree of physical or mental disabilities. In all the agendas, digital inclusion might be an answer to the question of how to overcome the physical, mental, and social limitations associated with old age and promote the empowerment of the aged individual, and the rescue of his or her independence and autonomy in daily life. Using digital environments of computers and networks, even a very disabled person can be able to think, create, organize, and share new forms of production and distribution of society's material and symbolic wealth, in all domains of social life - citizenship (e-gov), health (telemedicine), education (online courses), labour and leisure activities (special sites), family and social life (virtual community, chats), for example (Figure 1). For those with cognitive impairment, the virtual inclusion can further promote cognitive rehabilitation, with tools to reduce the impact of incapacitating and disadvantaged conditions, and empower cognitively impaired people to reach maximum social integration. Both, digital inclusion and cognitive rehabilitation can and should work together. Nowadays, there is affordable technology to simulate and support almost all the ADLs [2,3,4].

DIGITAL INCLUSION

The basis for digital inclusion is the use of interactive informational devices in networks, with a universal design, good ergonomics, and global reach through internet and telecommunication facilities, to surpass the isolation that worsens the life of cognitively impaired people.

Compunetics can promote the digital inclusion of elderly people in general and those cognitively impaired in particular[5]. Participants of an epidemiological cohort with more than 10 years of follow-up in a large urban center were classified in cognitively normal, with mild cognitive impairment, and with AD in its early stages[1]. They are being introduced to compunetics and trained to use the internet site designed for

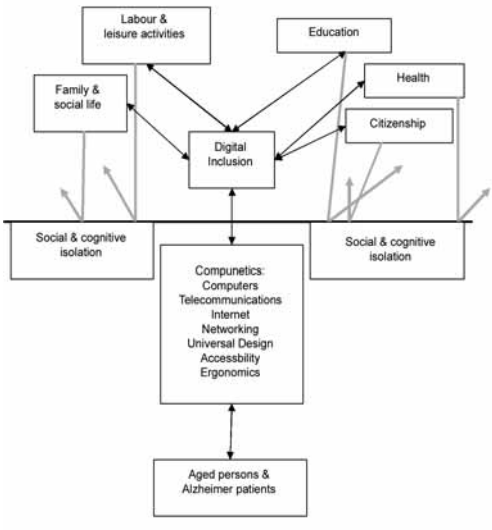

Figure 1: Schematic role of compunetics in the digital inclusion of elderly people

the project, to evaluate the degree of cognitive impairment and identify the tasks that might benefit them, monitoring functional capacity[5]. The impact of the digital inclusion on measures of independence in daily life and power of autonomy can prove cost-beneficial when compared to more manpower intensive strategies of cognitive rehabilitation, as one site can assist a large network online. This can support health policies based on a home computer, with devices for dual operation (two mouses in one personal computer), enabling the carer of a severe Alzheimer's patient, for instance, to cooperate during the interaction with the patient. Digital inclusion might prove to be an effective tool for promoting functional capacity of the elderly, particularly among the cognitively impaired.

References

1. Ramos LR, Simoes E, Albert MS. Dependency on daily living and cognitive impairment strongly predicted mortality among urban elderly residents in Brazil: a two-year follow-up. Journal of the American Gerontology Society S 2001;49:1168-75
2. Kautz H, Etzioni O, Fox D, Weld D, Lokendra S. Foundations of Assisted Cognition Systems. Technical Report CSE-02-AC-01. Department of Computer Science & Engineering, University of Washington, International Computer Science Institute Berkeley; 2002
3. Smith MW, Czaja SJ, Sharit J. Aging, Motor Control, and the Performance of Computer Mouse Task. Human Factors 1999; 41:389-397
4. Story MF, Mueller JL, Mace RL. The Universal Design File: Designing for People of All Ages and Abilities. Raleigh: The Center for Universal Design, North Carolina State University; 1998; http://www.design.ncsu.edu/cud/pubs/center/books/ud_file/toc3b14.htm
5. Xavier AJ, Ramos LR., Sigulem D. Cognition, Interaction and Ageing: an Internet workshops exploratory study. In: Bos L, Laxminarayan S, Marsh A, editors. Medical and Care Compunetics in Technology and Informatics. Amsterdam: IOS Press; 2004; pp 289-295