

# The impact of sensor-enhanced regional health information systems

Klaus-Hendrik Wolf<sup>1</sup>, Michael Marschollek<sup>1</sup>, Jürgen Howe<sup>2</sup>, and Reinhold Haux<sup>1</sup>

<sup>1</sup> Peter L. Reichertz Institute for Medical Informatics  
University of Braunschweig - Institute of Technology and Hannover Medical School  
Muehlenpfordtstr. 23, 38106 Braunschweig, Germany  
[Klaus-Hendrik.Wolf@plri.de](mailto:Klaus-Hendrik.Wolf@plri.de)

<sup>2</sup> Institute for Gerontopsychology  
University of Braunschweig - Institute of Technology  
Muehlenpfordtstr. 23, 38106 Braunschweig, Germany  
[J.Howe@tu-braunschweig.de](mailto:J.Howe@tu-braunschweig.de)

**Abstract.** The expected economic impact of new health enabling technologies is often used as motivation for their development. Another motivation is the predicted positive impact on health care in general. The objective of this paper is to give a simple example for an economic calculation based on statistical data. A positive effect on health care in general can only be gained if the new technologies are sustainably integrated in health care processes.

**Keywords.** Ageing society, health information systems, sensors

## 1 Introduction

In our ageing societies, advances in medical diagnosis and therapy permit active, self-sufficient and self-determined lifestyles at high quality for increasing numbers of our fellow citizens. Information and communication technologies are critical for early detection and prevention of diseases in the pre-clinical stage, as well as for alleviating chronic diseases. The intensive use of technology and, as a consequence, changing healthcare systems, with an increased focus on cooperative, shared care, may significantly contribute to high-quality, efficient, and affordable healthcare.

## 2 Economic impact

Unfortunately there are very little information on the possible financial implications these additional technologies might have. Based on current figures from the German federal statistical office ([1]) we offer a rough estimation of the possible economic impact of new health enabling technologies.

Using the statutory rates for the three different care levels we can calculate the amount of money the German care insurance (Pflegeversicherung) paid in the year 2005. For the 665 761 persons living in nursing homes 814 million Euro were paid by the insurance and 335 million Euro for the 471 543 persons who lived at home, but received assistance from professional nursing services. The estimated average stay in a nursing home is three years, resulting in about 221 920 people moving to nursing homes per year. Let us assume new health enabling technologies could delay the admission to a nursing home for three months. Let us further assume these three months are just shifted from nursing home to ambulatory professional nursing services. This results in a monthly saving of 511.56 Euro per person and month for the care insurance. Multiplying these calculated values we end up with a potential overall saving of 340 million Euro per year. These are just the savings for the care insurance, not taking into account further costs of nursing homes usually conducted by relatives [2]. For the overall savings the costs for required new technologies have to be subtracted from these possible savings.

Though being a simple and very rough approximation this calculation demonstrates the economic impact new technologies might have on healthcare. Compared to the same figures from the 2003 statistic, the amount of potential savings is increasing. A projection to the year 2020 shows an increase in the numbers of people how are in need of care from 2.04 million in the year 2001 to 2.83 million in Germany. In the same period their percentage of the total population will increase from 2.5% to 3.4% [3].

### 3 Organizational impact

The impact of new health enabling technologies is not only a financial one. Providing more means for the individual to manage one's own health, these technologies will hopefully have a beneficial influence on the person. Adding technology to assist people will change the way these persons live their lives. These changes are intended as improving the live of these people is the key motivation to invent and build health enabling technologies. Often ignored or left to deal with later are the influences these inventions will have on organizational structures. We expect the new ways of living on a personal level to have positive effects to the overall health system as well. But can current health care systems cope with the health enabling technologies of the future?

There is no simple answer to this question. In the field of medical informatics the insertion of new technologies into the medical domain has been observed for decades [4]. It is broadly agreed that health information systems have to be considered as socio-technical systems [5]. While sustainable management of information systems in a single organization is understood to a great extent, management of trans-institutional or regional health information systems is a topic of ongoing research [6]. Adding health enabling technology, like sensors continuously measuring health related parameters, to the socio-technical regional health information system adds new architectural challenges to an already complex sys-

tem [7]. The authors expect the introduction of new health enabling technologies to transform health care systems towards a more patient centred view, requiring an increased focus on cooperative, shared care, probably resulting in a new view on medicine.

## 4 Conclusions

Developing new technologies to support people with special needs and especially the elderly, research has to focus on the individual person with its unique needs and abilities. However, concentrating on the individual the regional and global economic and organizational consequences should not disappear from sight. The positive economic impact on the ageing societies is often the key motivation. But to achieve positive effects on the society we have to integrate the new technologies into health care processes in a meaningful and sustainable way. Therefore, seamless integration of new health enabling technology into medical information systems has to be considered from the very beginning to be able to prove its positive effects on health care.

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