Pervasive Computing Support in the Transition Towards Personalised Health Systems

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ABSTRACT

This paper discusses pervasive computing work in the transition from traditional health care programs to personalised health systems (pHealth). A chronological guided transition survey is discussed to highlight trends in medicine describing their most recent developments about health care systems. Future trends in this interdisciplinary techno-medical area are described as research goals. Particularly, research and technological efforts concerning ICT’s and pervasive computing in healthcare and medical applications are presented to identify systems requirements supporting secure and reliable networks and services. The main objectives are to summarise both the pHealth systems requirements providing end-user applications and the necessary pervasive computing support to interconnect device-based health care applications and distributed information data systems in secure and reliable forms, highlighting the role pervasive computing plays in this process. A generic personalised healthcare scheme is introduced to provide guidance in the transition and can be used for multiple medical and health applications. An example is briefly introduced by using the generic scheme proposed.

Keywords: Computer Science, eHealth, Emerging Communication Technologies, Healthcare, Personalised Health Systems, Pervasive Computing, pHealth

1. INTRODUCTION

Traditionally healthcare programs are conceptualized within an isolated vision in what a program can do to support a particular sector in the society. This vision generates the inherent feature that the healthcare management programs itself are responsible of people leaving aside by their specific health requirements. Healthcare programs have acquired a particular
interest and evolved in last decades as result of immersion and technological advances in the so-called digital era (eHealth) (European Commission, 2009).

Indistinctly called, eHealth or health informatics has opened, in fact, a new world of applications with multiple benefits in the medical sector. This advance is mainly result in the evolution of more powerful devices and with increasing processing capacities, efficiency and energy consumption. The difference between named in one or other form founds on the applications and implemented devices, as we will discuss later in this paper.

Systems deployment and implementation support also plays a decisive role to classify chronologically such health programs and/or systems evolution according with their health services and applications. Digital health (Gatzoulis & Iakovidis, 2008) emerges when the advances informatics are visualized as the tool to support health programs, to facilitate activity and improve services, typically and mainly for processing huge quantity of records and health patterns that before was almost impossible to do so.

In last two decades the technological development has suffered exponential advances and research activities for the application of Information and Communication Technologies (ICT) in healthcare sector has advanced enormously. These advances hampering interdisciplinary efforts to establish networks and tools assisting health care professionals (MobilHealth, 2010; HealthService24, 2010; Continua, 2010). This movement of research ICT support, where technological resources are directed towards healthcare and so called eHealth (European Commission, 2009) is every day attracting not only the attention of the scientific community else industry sectors where new products and services can emerge and explored as well.

In the last decade, late 1990s, the focus in health shifted, generic health programs have to be narrowed and use the advantages of the technological expansion and the development that device’s capabilities offers. Recently research in health supported by ICT’s expands widely the service possibilities, this time not only particular people sectors are recipients. Likewise in recent years an adoption of new culture in the society has changed, with virtual social models expansion, a new vision person-centric in healthcare emerged. This person-centric view is result of a more knowledge-based culture (Giustini, 2006), health sector is not an exception in this immersion and people have modified their behaviour patterns and culture towards the health. All these changes and its consequences are important to be documented, mainly as reference for future implementations in medical and health solutions. In this paper we summarise both the pHealth systems requirements providing end-user applications and the necessary pervasive computing support to interconnect in secure and reliable forms device-based health care applications and distributed information data systems, highlighting the role pervasive computing plays in this processes, secure in terms of privacy of the health data record and reliable in terms of technological support to interconnects health applications offering privacy.

The rest of the paper is organized as follow: Section 2 describes related work offering a guided transition from traditional health programs to pHealth systems. Section 3 discusses the personal healthcare systems, and then introduces some research challenges. Section 4 describes the Role of Pervasive Computing Supporting Personalised Healthcare Schemes to identify both the importance of services personalisation in healthcare applications and the necessary pervasive computing support for processing data and interconnects health applications. Section 5 introduces our vision for a generic personalized health care scheme as tool to promote standard health programs based on pervasive computing services support as well as integrated information exchange models. Section 6 introduces our vision for generic implementations as practical tools following the proposed personalised health scheme describing and ECG data scenario as an example. Section 7 summarizes the research advances and concludes this paper.
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