

Chapter I

Designing a M-Health Framework for Conceptualizing Mobile Health Systems

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Abstract

The reference model presented in this chapter encourages the breakdown of m-health systems into the following five key dimensions: communication infrastructure: this is a description of the mobile telecommunication technologies and networks; device type: this relates to the type of device being used such as PDA, sensor, or tablet PC; data display: describes how the data will be displayed to the user and transmitted such as images, e-mail and textual data; application purpose: identification of the objective for the m-health system; application domain: definition of the area that the system will be implemented. Healthcare stakeholders and system implementer can use the reference model presented in this chapter to understand the security implications of the proposed system, identify the technological infrastructure, business requirements and operational needs of the m-health systems being implemented. A reference model to encapsulate the emerging m-health field is needed for cumulative progress in this field. Currently, the m-health field is disjointed and it is often

unclear what constitutes an m-health system. In the future, m-health applications will take advantage of technological advances such as device miniaturizations, device convergence, high-speed mobile networks, and improved medical sensors. This will lead to the increased diffusion of clinical m-health systems requiring better understanding of the components, which constitute the m-health system.

Introduction

M-health is defined as “mobile computing, medical sensor, and communications technologies for healthcare” (Istepanian & Zhang, 2004). The first occurrence of the terminology ‘M-Health’ in the literature was in the “Unwired e-med” special issue on wireless telemedicine systems (Istepanian & Laxminaryan, 2000). Since then, there has been an increase use of the term, encapsulating various types of healthcare systems. The use of the m-health terminology relates to applications and systems such as telemedicine (Istepanian & Wang, 2003), telehealth (Istepanian & Lacal, 2003) and biomedical sensing system (Budinger, 2003). Until now, there has been considerable confusion and overlap with the use of these terms are (Tulu & Chatterjee, 2005).

The rapid advances in information communication technology (ICT) (Godoe, 2000), nanotechnology, bio monitoring (Budinger, 2003) mobile networks (Olla, 2005a), pervasive computing (Akyildiz & Rudin, 2001), wearable systems, and drug delivery approaches (Grayson, et al., 2004) are transforming the healthcare sector. The insurgence of innovative technology into the healthcare practice is not only blurring the boundaries of the various technologies and fields, but is also causing a paradigm shift that is blurring the boundaries between public health, acute care, and preventative health (Hatcher & Heetebry, 2004). These developments have not only had a significant impact on current e-health and telemedical systems (Istepanian & Zhang, 2004), but they are also leading to the creation of a new generation of m-health systems with convergence of devices, technologies and networks at the forefront of the innovation.

This chapter proposes the use of a five dimensional reference models to assist system implementers and business stakeholders in understanding the various components of an m-health system. The approach used in this chapter focuses on identifying different dimensions of a mobile healthcare delivery system (MHDS) (Wickramasinghe & Misra, 2005) which can then be used to identify user security requirements for different categories in an organized manner. These dimensions were driven from our literature review (Field, 1996; Bashshur, et al., 2000; Bashshur, 2002; Moore, 2002; Olla & Patel, 2003; Raskovic, Martin, & Jovanov, 2004; Istepanian, et al., 2005; Jovanov, et al., 2005) and the model reflects a combination of various

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