Chapter 17
Information Architecture for Pervasive Healthcare Information Provision with Technological Implementation

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ABSTRACT

The Pervasive Healthcare Information Provision (PHIP) is a concept that ensures patients are covered with healthcare services with the appropriate information provision together with the technical infrastructure when needed. Clinicians can obtain the real-time information by accessing the electronic patient record that supports decision-making in providing health services. PHIP aims to provide comprehensive healthcare services to its stakeholders covering the social and technical aspect. Information architecture is a high-level map of information requirements of an organisation that possesses business processes and information flows. Organisational semiotics, a fundamental theory for information and communication, helps in understanding the nature of information. It deals with information and information systems in a balanced way, taking account of both the physical space (when physical actions take place) and the information space (which are mainly characterised by information and communication using signs, symbols, and data). Information sharing among multi-stakeholders in decision-making is essential for pervasive healthcare. The information architecture can be reflected in information systems implementation such as Electronic Patient Record (EPR) and other forms. The aim of this chapter is to derive a conceptual model of information architecture for PHIP, including technological implementation via wireless technology. The information architecture serves as requirement engine that covers social and technical needs from both patients and clinicians. The contribution of this research is two fold: 1) establishing the theoretical perspective of information architecture, which serves as backbone to support PHIP, and 2) implementing PHIP via wireless technology and agent-based system.

1. INTRODUCTION

Information has played an important role in an organisation. However, information is still not managed well in many organisations (Martin, Dmitriev, & Akeroyd, 2010). This will cost a great deal to an organisation in terms of errors and inefficiencies, and to its client in terms of quality of service. Information architecture would be able to help organisations to deal with the increasing volumes of information to be disseminated, digested and managed effectively. Same applies for a pervasive healthcare environment. Hospitals are always being perceived as a 'data rich, information poor' (Rector, 2001), moreover in pervasive healthcare environment. The concept of pervasive healthcare has emerged in the early twenty first century that aims to provide healthcare to anyone, at any time and everywhere by removing restraints of time and location while increasing both the coverage and the quality of healthcare (Varshney, 2009). Information is vital within a hospital in order to reduce medical errors and increase patient safety (IOM, 2011), hence leading to a better decision making. Hence, information architecture is needed for provisioning information in a pervasive healthcare environment.

Information architecture is defined as a high level map of information requirements of an organisation (Brancheau & Wetherbe, 1986). Same applies for pervasive healthcare. The existing information architecture literature is mostly from the empirical viewpoint. Hence, it opens a new chapter in research to deriving information architecture by adding a theoretical dimension where organisational semiotics is discussed in this paper. Information is a core element in information architecture and yet there are many ways in viewing information. Information can be seen as a sign from a humanistic perspective rather than the bits and bytes from a computer science perspective.

Technology based pervasive healthcare information provision has been proposed for promoting wellness, prevention, disease management, compliance, and reduced incidences of hospitalizations and corresponding expenses (Dishman, 2004; IOM, 2000; Mcgee, 2004). However, the focus so far has been on the development of artefacts with limited attentions given to articulate the process of pervasive patient monitoring and define clear guidelines that can be applied to developing effective, efficient pervasive healthcare solutions. The vision of pervasive healthcare information provision is to improve healthcare delivery by timely and reliable detection of anomalies and enhance the efficiency of the clinicians by assisting them in providing pertinent medical attention as and when needed. In this chapter, a list of requirements, which are the key factors leading to a successful pervasive healthcare solution will be articulated. Wireless network architecture for pervasive healthcare environment, which characterises the processes that can be applied for pervasive patient monitoring will be developed and illustrated with an example. Besides, a detail description and functionality of the various intelligent agents that are tasked with analysing the monitored parameters and the protocols will be given.

This chapter is structured as follow: Section 2 discusses the notion of information provision in the pervasive healthcare environment. Section 3 illustrates information architecture from both empirical and theoretical perspective. As a result, the conceptual design of information architecture is proposed. Section 4 narrates the concept of implementing pervasive healthcare information provision through wireless technology. An example of implementation will be provided. Section 5 draws the conclusion and suggestions for future work.

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