Chapter 16

Conducting Performance Evaluation of an e-Health Platform

Owen Lo  
Edinburgh Napier University, UK

Lu Fan  
Edinburgh Napier University, UK

William J Buchanan  
Edinburgh Napier University, UK

Christoph Thuemmler  
Edinburgh Napier University, UK

ABSTRACT

For increased awareness and adoption of e-Health implementations, results from evaluation must be catered towards three primary perspectives: organizational, end-user and technical perspective. This chapter addresses the issue of conducting performance evaluation of e-Health for the technical perspective. The authors present the design of metrics that enable them to evaluate the scalability, functionality and reliability of e-Health implementations. Using simulated patient data, experiments are conducted on an existing e-Health platform using their defined metrics. Results show that 100 simulated patient’s data may interact with the e-Health platform under evaluation with a maximum round-trip time latency value of 6.6 seconds. By building upon the techniques the authors have used to conduct performance evaluation of e-Health implementations, along with the design of methodologies to enable evaluation to take place for the two other perspectives, i.e. end-user and organizational perspectives, the authors hope to see greater support for this technology in the near future.

DOI: 10.4018/978-1-4666-4062-7.ch016
INTRODUCTION

e-Health is the use of digital technologies for the provision of health care (Haeyrinen et al., 2008). A prime example of one such technology is Electronic Health Records (EHR). EHRs remove the need for large areas of physical storage space along with enabling medical staff to look up patient’s medical records in a quick and efficient manner. Other examples of digital technologies which e-Health can use include the Internet, which enables prompt communication of medical data (Bland et al., 2007) and smartphones, which enable clinical staff to have real-time access to patient and medical data in a mobile manner (Wyatt & Krauskopf, 2012).

Clear advantages exist in the usage of e-Health for the provision of health care to patients. However, there has been much discussion in recent literature in regards to the lack of adoption of this technology (Mair et al., 2012; Wilson et al., 2010; Fitzgerald et al., 2008; Rodrigues, 2008). The background section of this chapter focuses on the key challenges in terms of e-Health adoption along with providing an overview on the fundamental concepts of e-Health including history, definition and categories of implementation. In reviewing existing literature, we find that the key challenges in adoption of e-Health may be grouped into three primary perspectives: organizational, end-user and technical perspective.

We propose that in order to see wider adoption and support of e-Health solutions from these three perspectives, concise evaluation data on existing and future e-Health implementations must take place. A concise evaluation of each e-Health implementation enables the three primary perspectives to gain better knowledge on the capabilities and limitations of offered each solution. In making evaluation results available publicly, the three perspectives may then make an informed choice on which implementation is best suited to their needs thus, we may see increased adoption of this technology in the near future.

In the scope of this chapter, our key objective is to address the issue of conducting performance evaluation of e-Health for the technical perspective. Performance evaluation includes assessing the scalability, functionality and reliability of an e-Health implementation. The main body of this chapter presents the design of evaluation metrics along with defining a methodology for the gathering of such metrics. Using simulated patient data, experiments conducted on an existing e-Health platform, within a sandbox environment, shows the viability of our proposed evaluation approach in providing meaningful results for the technical perspective.

From experimentation, we find that conducting performance evaluation on an existing e-Health platform using our defined metrics provides meaningful results for the technical perspective. However, our methodology does have some shortcomings especially in regards to the lack of realism due to the use of simulated patient data along with conducting evaluation within a sandbox environment rather than a live clinical trial. To address such limitation, and to highlight key areas of work which must still be carried out in regards to evaluation of e-Health implementations, suggestions on the future directions which must be taken within this field of research is provided. The chapter concludes with a summary of research and work conducted for this chapter.

BACKGROUND

E-Health History and Definition

In the early 1970s, the concept of applying computer-based systems for the provision of health care services was termed Medical and Nursing Informatics (Hovenga et al., 2010). With the advancements in technology and communication networks, healthcare environments started replacing traditional paper-based systems with digital technologies such as EHRs.