Chapter 48
A Demand-Driven Cloud-Based Business Intelligence for Healthcare Decision Making

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ABSTRACT

Technology development for process enhancement has been a topic to many health organizations and researchers over the past decades. In particular, on decision support aids of healthcare professional, studies suggest paramount interests for developing technological intervention to provide better decision-support options. This chapter introduces a combined requirement of developing intelligent decision-support approach through the application of business intelligence and cloud-based functionalities. Both technological approaches demonstrate their usage to meet growing end users' demands through their innovative features in healthcare. As such, the main emphasis in the chapter goes after outlining a conceptual approach of demand-driven cloud-based business intelligence for meeting the decision-support needs in a hypothetical problem domain in the healthcare industry, focusing on the decision-support system development within a non-clinical context for individual end-users or patients who need decision support for their well-being and independent everyday living.

INTRODUCTION

Health organizations have randomly been made substantial investments in improving their processes through assistance of new technology over the past decades. As their technological intervention, most of the cases they aim at developing ways to delivering timely and accurate health or medical information to the right people, at a right time, to enable and enhance various operational and strategic decision-making (Carte et al. 2005). In particular on decision support aids previous studies suggest two main emphasizes on developing technological intervention to provide better decision support mechanisms. First emphasis goes on such decision support system that helps various practitioners in a clinical environment in relation to information management perspective. On the other hand, second emphasis goes on decision support

system development within a non-clinical context for individual end-users or patients who need decision support for their well-being and independent every-day living.

Developing intelligent decision support systems within the medical domain for improving clinical activities is not a novel research area. Over the past decades many studies have identified different problems of intelligent solution developments for different purposes. Examples includes Zhuang, Wilkin & Ceglowski (2013) for pathology test ordering; Corchado, Bajo, Paz & Tapia (2008) for monitoring Alzheimer patients; Lin, Hu & Sheng (2006) for lower back pain diagnosis and Haghighi et al. (2013) for the improvement of emergency management systems. These studies employ various intelligent techniques to improve clinical practices for medical professionals. However, the intelligent systems design should not only focus on the problem analysis and relevant technology design for process improvement, but also focus to meet the client's domain-specific on-site information demands within the new technological provisioning platform that would provide better user-access and flexibility (Miah, 2012a). Other line of relevant studies highlight their interventions on non-clinical care domain, for example the study on home based care delivery (Barjis, Kolfschoten & Maritz, 2013), web-based patients intervention (Liang et al. 2006) and wireless patient monitoring (Varshney, 2008). These studies compliment the research done in the direction of telemedicine or telehealthcare domain for decision support (Karim & Bajwa, 2011). Drawing from this the key focus of this chapter goes on how an approach of demand-driven cloud-based Business Intelligence (BI) can be conceptualized to benefit of end users for their well-being and independent every-day living through the application of new technological provisioning platform such as cloud computing.

The importance of decision support systems (DSS) have increasingly identified as an enabler to the achievement of medical industry's strategic and operational objectives over the many decades. DSS promises to provide timely and relevant information in addition to analytical capabilities to assist effective decision-making (Turban & Aronson, 2001). Keen & Scott Morton (1978, p 1-2) identified four major characteristics of DSS:

- Impact on decision in which there is sufficient structure for computer and analytic aids to be of interest,
- Payoff is in extending the range and capability of decision process to help improve effectiveness,
- The relevance for users is in the creation of a supportive tool, under their own control, and
- Applications are no routine as needed.

As the demand of DSS to support effective decision making have increased, so have the terms used to describe them: data warehousing, knowledge management, data mining, collaborative systems, online analytical processing, with Business Intelligence tending to encompass all (Gibson et al, 2004). Business Intelligence (BI) can be considered as the combination of processes and technologies to assist in decision making for managers and end users. The BI systems have been well-recognized for enhancing the effectiveness of information management and decision making. It is suggested that BI provides comprehensive decision support mechanism to meet all levels of demands for decision makers through applications such as decision support systems, query and reporting, online analytical processing (OLAP), statistical analysis, forecasting, and data mining (Stasieńko, 2010).

The advantage of cloud computing is that it is capable to offer a cloud-based (e.g. Internet or web-based provisioning) decision support service to meet the health professionals and end users decision needs. Other known benefit is that it can bring access and service flexibility both for service users and

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