Monitoring and Maintenance of Web Service Processes in Health Units

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ABSTRACT

The delivery of quality health care is a demanding information technology challenge. The last years have witnessed profound changes in healthcare institutions to improve patient experience. Those changes focus on the needs of the health professionals that directly contact with the patients. However, it is equally important to aid the professionals that work in the background of the health units. This study proposes the monitoring and maintenance of web service processes that occur in the Centro Hospitalar do Porto (CHP) through an intuitive and user-friendly platform developed in ReactJS. These processes are responsible for critical tasks within the hospital and thus, the daily control of its activities ensure that there are no unnecessary failures, supporting an efficient health care delivery. The development of the application followed the Design Science Research (DSR) methodology and was submitted to a Strengths Weaknesses Opportunities and Threats (SWOT) analysis which results were considered optimistic.

KEYWORDS

Centro Hospitalar do Porto, Control, Design Science Research, Healthcare, Information Technology, ReactJS, Web Application, Web Service Activities

INTRODUCTION

In the last years, the acceleration of the scientific and technological progress in the information domain has been critical for the foundation of a new world-wide era. In a global context of growing dynamism and variability, the “Information Era” promotes a strong revolution of knowledge and perceptions in practically all areas of human knowledge.

A decisive factor in the survival of any organization is the information. An information system is a socio-technical subsystem of an organization that collects, stores, processes, transmits and displays data, information, and knowledge relevant to it (Avison & Wood-Harper, 1986; Buckingham, Hirschheim, Land, & Tully, 1986; Laudon & Laudon, 2017). “Socio” corresponds to the persons involved in information processing as healthcare professionals and computer scientists, whereas “technical” refers to information processing tools like computers, telephones and patient records (Ammenwerth, Winter, & Brigl, 2004). This meets Davis and Olson’s (1985) vision of an information system, which is an integrated man/machine system that provides information to support operations and decision-making in organizations. Information places a high value in the organizations because it enables the continuous adaptation to the ever-changing markets and also allows to monitor

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the results of its activities. Therefore, it is especially decisive to the health organizations, either for its action, i.e., its decision-making process, or for its reaction, i.e., the control and correction of deviations from its action.

Over the years, patients have been experiencing increased awareness regarding the need for better and faster health care delivery. A set of economic, technological and social factors, as well as the constant and increasing pressure to respond to the patient’s needs, impel health institutions, as co-responsible for the practice of medicine, to find new ways to perfect the quality of the services provided. Faced with this reality, health organizations should be as prepared as possible to make better, faster, more informed and less intuitive decisions. Consequently, to meet these requirements, in recent years, health institutions have been increasingly adopting health information systems (Miranda, Pontes, Abelha, Neves, & Machado, 2012; Miranda et al., 2010).

The information technologies applied in the health sector have the potential to ensure the efficient delivery of health care and improve the quality of services provided by health professionals as they provide comprehensive and credible information and support the decision-making process, both clinically and administratively, thereby reducing the incidence of adverse events and clinical errors (Bonney, 2013; Buntin, Burke, Hoaglin, & Blumenthal, 2011; Lee, McCullough, & Town, 2013). Health information systems are support tools that comprise all information processing functions and the human or technical actors in their information processing role. These complex socio-technical subsystems processing data, information, and knowledge were designed to ease the management of clinical and administrative information and the planning, refinement and decision-making process of the different professionals of the health system (Chen & Hsiao, 2012; Haux et al., 2004).

Since the primordial focus of a hospital are the patients and the assurance of their care, most health systems are dedicated to the diagnosis, treatment, and follow-up of patients. On the other hand, it is equally important to make decisions related to the computer processes performed at the background of the hospital, such as web services, which also, indirectly, influence the quality of care provided to the patient. The use of health information systems to control such processes will improve the quality of hospital management. Consequently, these improvements grant more investment opportunities like, for example, the acquisition of new equipment and provision of training actions to health professionals, which, in turn, will boost the patient confidence and preference. Based on this necessity, the present study focuses on the development of an innovative and interactive web platform for the daily monitoring of the web services activities of the CHP.

The paper is organized as follows: first an initial contextualization including a brief literature review is presented; the next section depicts the different stages of the DSR methodology that led to the development of the web platform; then, the discussion of the results is presented; finally, the last section discloses the main conclusions outlined with this work.

BACKGROUND

Reliability can be defined as “failure-free operation over time” (Vincent, Burnett, & Carthey, 2014). The concept of reliability can be meaningfully applied to the health area which includes procedures that health professionals and other staff within the health unit need to carry out reliably. This includes the timely administration of antibiotics, the compliance with hand hygiene procedures, the timely ordering of diagnostic tests and other fundamental procedures (Vincent et al., 2014). In addition, it covers the clinical systems supporting the health care delivery, as many healthcare information systems can have poor reliability affecting the overall performance of the hospital procedures and the quality and efficiency of the services provided. Accordingly, monitoring in healthcare, from the surveillance of the patients’ health status to the control of the execution of the clinical applications, is of paramount importance.

Monitoring means “supervise and evaluation”, “control by follow-up” and “looking closely, observing or controlling for a special purpose” (Waldman, 1998). In other words, monitoring means overseeing ongoing activities to ensure that they meet the standards and purposes established in