


Using Business Ontology to Integrate Business Architecture and Business Process Management for Healthcare Modeling

Bonnie S Urquhart, Northern Health, Prince George, Canada

Waqar Haque, University of Northern British Columbia, Prince George, Canada

 <https://orcid.org/0000-0002-6921-8097>

ABSTRACT

Patient safety and quality of health care services continue to be an issue within healthcare organizations. Quality improvement of healthcare processes at a systems level requires a shared language so the system is well understood across and between business areas. Business ontology provides the ability to create a shared language which can be used to integrate business process management (BPM) and business architecture (BA) concepts to identify, prioritize, and plan system wide improvement. The effective application of this comprehensive management approach has been demonstrated using medication management services within a publicly funded Canadian healthcare organization. This article illustrates how the foundational ontology developed by the Global University Alliance and the related Business Process Management Ontology (BPMO) can be used to facilitate the integration of BA and BPM concepts to improve quality of medication management. The development of business artefacts resulted in a prioritized list of improvement initiatives and an action plan to implement and monitor the initiatives. The integration of BPM and BA using an ontology in a healthcare setting yields improved services at the systems level.

KEYWORDS

Business Architecture, Business Ontology, Business Process Management, Enterprise Ontology, Global University Alliance (GUA) Ontology, Medication Management

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INTRODUCTION

Managers and care providers in the health sector are expected to deliver safe, efficient and effective services within a resource constrained, complex system. Services are provided through the execution of multiple processes. Healthcare organizations tend to be structured in functional based silos with process improvement efforts often focused on individual processes within the discrete silos. This improvement approach fails to take into account upstream and downstream processes executed and managed in various silos such as those inherent in a patient's journey. Improvement efforts need to focus on end-to-end processes if the goal is to deliver a truly positive patient experience. The proposed framework emphasizes development of an integrated management approach to identify and prioritize quality improvement opportunities within services that span organizational silos. It is proposed that Business/Enterprise Ontology, and specifically the one developed by the Global University Alliance (coined GUA Enterprise Ontology) can be used to create a comprehensive management approach combining the concepts from Business Architecture (BA) and Business Process Management (BPM). BA and BPM are two separate but closely related disciplines. This study shows that an integrated approach using concepts from both BA and BPM can be used to design, redesign, evaluate, improve and monitor the safety, efficiency and effectiveness of medication management processes in a multi-site healthcare organization.

Healthcare organizations are facing increasing demands for services, increased complexity due to introduction of technology and continued pressure to improve both the safety and quality of services. Proponents of BPM and BA describe benefits that would enable management to better understand and effectively deal with these challenges (Becker, Fischer, & Janiesch, 2007; Brown, 2004). For instance, resource allocation is a significant challenge and publicly funded healthcare organizations strive to achieve the greatest benefits from constrained resources (Urquhart, Mitton, & Peacock, 2008). BPM provides excellent information for measuring the benefits realized from the services provided whereas BA provides information that enables identification of duplicate and redundant processes. Armed with this information management has the opportunity to eliminate or standardize processes resulting in reduction in variation in outcomes thereby reducing errors and producing cost-effective solutions. Improving cost and reducing errors. Studies have shown that many errors in healthcare occur during 'hand-offs' (transfer of patients between individual clinicians or between business units). This is due to the fact that either the information required to appropriately treat the patient is not available to the receiving clinician or the information is not fully understood. The increased understanding achieved through the development and documentation of the end-to-end processes as prescribed by BPM could reduce the knowledge gap between business units and clinicians thereby reducing errors associated with 'hand-offs' (Chircu, Gogan, Boss, & Baxter, 2013). Healthcare is made up of dynamic, flexible, knowledge intensive processes which has led to the slow adoption of BPM (Mertens, Gailly, & Poels, 2015). The approach proposed in this study and the benefits realized could promote not just the adoption of BPM but also the comprehensive approach that combines both BPM and BA.

REVIEW OF RELEVANT LITERATURE

The need to improve delivery of health care services has been a widely discussed topic in the public forum. Patient safety and specifically adverse events related to medication errors continue to be a major concern in the health care sector. Adverse events are defined as "adverse events are unintended injuries or complications resulting in death, disability or prolonged hospital stay that arise from health care management" (Baker et al., 2004, p. 1678). Medication errors are one of the most common reported adverse events and the problems with medication management are well documented in the literature (Baker, et al., 2004; Keers, Williams, Cooke, & Ashcroft, 2013). Adverse events result in extended length of stay or readmission to acute care facilities resulting in significant cost to the healthcare system. Several healthcare organizations have successfully transformed their organizations by focusing

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