(Re)Designing Business Processes Using Markov Theory and Constrained State, Transition and Actor Role Spaces

Sérgio Guerreiro, Instituto Superior Técnico, Portugal / INESC-ID, Portugal

ABSTRACT

Decision-making processes are the utmost important to steer the organizational change whenever business process workarounds are attempted during operational times. However, to decide the non-compliant situations, e.g., bypasses, social resistance, or collusion; the business manager demands contextualized and correct interpretations of the existing business process redesign options to cope with workarounds. This article explores the need to aid the decision-making process with a full constructional perspective to optimize the business processes redesign. So, the Markov decision process is combined with the body of knowledge of business processes, in specific, the concepts of designing enterprise-wide business transactions. This methodology supports the management initiatives with more knowledge about the value of business processes redesign. A classical chain of Order-to-Cash business processes (the order, the production, the distribution and the selling of goods) illustrate the benefits of this quantitative approach. Results obtained for business processes redesign in reaction to workarounds are reported. The analysis results show that this approach can anticipate the sub-optimal solutions before taking actions and highlights the impact of discount factors in the final obtained value. The contribution of this novel conceptual integration to the business processes community is the forecast of value function of business transaction redesign options when facing non-compliant workarounds. From related literature, business processes compliance usually comprises offline computation and the redesign is only considered in the forthcoming business processes instances. This article is innovative in the sense that it anticipates the value impact of a redesign, allowing more effective decisions to be taken.

KEYWORDS

Business Rule, Business Transaction, Control Systems, DEMO, Markov Theory, State

INTRODUCTION

Decision-making is a core competence of organizational management (Laudon and Laudon, 2016) to formulate full-informed decisions. It encompasses the responsibility of optimizing the business processes and is traditionally supported on a PDCA cycle (Shewart, 1980): (1) the intelligence to discover the organizational problem, then (2) the design of potential solutions, afterward (3) choose the best solution, and finally, (4) implement the solution and check if it fulfills the desired goals.

DOI: 10.4018/IJKBO.2019040103

Copyright © 2019, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.
An informed decision-making process augments the capability of the organizational actors to understand their surroundings constraints and then to decide upon the best action to be enacted. Moreover, to execute decision-making processes, the information offered by business metrics (Jones & Bonsignour, 2012), e.g., turn-over or sales target, are not enough to decide.

Enterprise Ontology (EO) (Dietz, 2006) and the emerging field of Enterprise Engineering (EE) (Dietz, Hoogervorst, Albani, Babkin, & Barjis, 2013) are followed, in this paper, to support the understanding of the business processes dynamics and to understand workarounds.

In the core of the business process dynamics are the concepts of business transaction and business transaction compliance. On the one hand, a business transaction model is the result of designing the constraints that are desired for an organizational reality (Hoogervorst, 2009), that is valid within a well-defined timeframe, and including who is responsible for each part of the business transaction and the comprehensive definition of system’s state and transition (Guerreiro & Tribolet, 2013). On the other hand, business transaction compliance aims at verifying and correcting if the prescribed business transactions models are being respected throughout run-time operation (Sadiq, Governatori, & Namiri, 2007). Herein, a problem may occur, organizational actors perform workarounds while they perform their daily tasks, meaning that the a priori business transaction prescriptions do not assure that actors perform them accordingly. The theory of workarounds is about how agents with some degree of behavioral discretion decide whether to follow established practices and what to do when exceptions, anomalies and mishaps occur (Alter, 2014).

In this extent, an informed control cycle aids the managers to take informed steering actions at operational time, as previously presented by Guerreiro (2013). Figure 1 describes a steering cycle of observation, assessing the environment, designing the potential solutions and choosing the best solution. These steps recall to the management competences and are mainly human based. Nevertheless, this paper argues and shows how automatic tools deliver support to the managers, aiding at some point in their decision-making steps.

The business processes optimization issue relates with the following three approaches. Firstly, the Kaizen approach (Masaaki, 1986) allowing small incremental changes to actor’s

---

**Figure 1. The organizational steering cycle**
Preventative Actions for Enhancing Online Protection and Privacy
www.igi-global.com/chapter/preventative-actions-enhancing-online-protection/66926?camid=4v1a

Impacts from Using Knowledge: A Longitudinal Study from a Nuclear Power Plant
www.igi-global.com/article/impacts-using-knowledge/2721?camid=4v1a