

Context-Aware Business Process Versions Management

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ABSTRACT

This work deals with a very active and promising research area that is the Business Process (BP) flexibility. One possible way to deal with this flexibility is the conjoint use of versioning and contextualization techniques. Versioning permits BP evolution by supporting the alternative use of BP versions. Contextualization ensures the definition of use conditions of BP versions to help the designer choosing a version among several ones. In a previous work, BP flexibility had been addressed using only versioning technique by considering the informational, organizational and process perspectives. In this work, the authors show how they conjointly use both versioning and contextualization techniques to address the BP flexibility. More precisely, they propose an extension of the VBP2M meta-model (Versioned Business Process Meta Model), introduced in their previous work, by adding a contextual perspective that offers two levels of contexts granularity (local and global). This perspective is illustrated using a well-known case study «automatic production process of mineral water bottle ». An extension of the VBPQL language (Versioned Business Process Query Language) is also introduced to allow the definition, manipulating and querying of BP versions' contexts. Furthermore, the authors propose an ontology-based method to select the appropriate BP version. Finally, they present our tool that represents the implementation of the proposed solution.

KEYWORDS

Business Processes, Contextual Perspective, Flexibility, Ontology, Versions

1. INTRODUCTION

To remain competitive, organizations must act quickly and efficiently to meet the new market requirements which become more open, dynamic and competitive. Organizations must constantly adapt their BP to make them more flexible. This flexibility issue had been widely addressed in the literature and several definitions of the flexibility concept had been proposed. The definition given by (Ben Said, Chaâbane, & Andonoff, 2010) is the most complete one and it was inspired by Nurcan (2008). It defines flexibility as “the ability of a business process to take into account changes (predictable and unpredictable) that occur following a modification in its execution schema, invoked actors and/or manipulated informational resources”. According to this definition, flexibility affects the BP informational, organizational and process perspectives. Van der Aalst et al. (2003) noted that the process perspective can be structured around three sub-perspectives:

- The functional perspective: what does a BP do, i.e., the activities that compose it;
- The operational perspective: that details the implementation of activities in BP by specifying the basic operations to be executed and
- The process perspective: how these activities are coordinated.

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In the literature, the versioning technique is widely used (Bouaziz & Brahmia, 2009; Cellary & Jomier, 1990; Kimball & Larson, 1991; Turki, Jedidi, & Bouaziz, 2012) since it keeps track of previous versions of an entity in order to ensure their reusability. Moreover, the versioning assigns multiple versions for the same entity and consequently, these versions can be used whenever they are needed. The workflow area has also benefited from this technique to define multiple versions for the same BP schema. The versioning provides means to enable BP evolution and anticipate future changes. Among several works that have adopted the versioning technique, we can mention the contribution of Zhao and Liu (2007) who proposed the versioning of a BP schema through a directed graph where the nodes denote activities and arcs represent coordination between them. This graph only considers two perspectives: the functional and the process. Regarding the other perspectives, they are not taken into account. Kradolfer and Geppert (1999) provided a meta-model to support process versioning. They also defined a set of operations to modify the process schemas and have a migration strategy of process instances. This work focused on changes in BP schema (activities and their coordination) and did not address changes that may affect the other perspectives in the process. The proposed versioning technique by Weber et al. (2008) is applied only on the process and functional perspectives. It permits the support of corrective change, evolution of the process schema besides instance change. The process model weaknesses are identified in (Ardito, Barchetti, Capodici, Guido, & Mainetti, 2014; Bessai, Claudepierre, Saidani, & Nurcan, 2008). Both works presented a set of business patterns that must be included for its improvement. Ardito et al. (2014) suggested that the patterns are useful in resolving organizational issues. On the other hand, Bessai et al. (2008) defined patterns summarizing all changes that can be made to a process schema. These propositions need to be revisited since they addressed the issue of BP versioning considering only the organizational and process perspectives. Finally, Chaâbane et al. (2010) had proposed a meta-model called VBP2M (Versioned Business Process Meta Model), to design BP versions. Although this solution, proposed in our previous work, is the most complete insofar as it considers all the workflow perspectives, it unfortunately has a major limitation regarding the limitation to define the use conditions of a BP version for a given situation or context. More precisely, we think that it is very interesting that the designer specifies, when defining a version, the BP context of use (in terms of version objectives, functional parameters, non-functional parameters, etc.) in order to help the users to select the appropriate BP version among others. The use of context notion is not new. It was adopted in various research fields such as Web Services (Mrissa et al., 2007; Qiu, Chang, Lin, & Shi, 2007), information retrieval (Chaker, Chevalier, Soulé-Dupuy, & Tricot, 2011; Monticolo & Gomes, 2011) and workflow (Wieland, Nicklas, & Leymann, 2011), where a state of the art is both recent and rich (in terms of models, definitions and taxonomies).

In this work, we show how we conjointly use the context and version notions to deal with BP flexibility issue. More precisely, this paper proposes a model and a language for modeling and manipulating the context of BP versions. The proposed model extends the VBP2M meta-model by adding a sixth perspective: the contextual perspective. It is organized around two levels (global context and local context) to describe the context of use of a process version and the context of use of workflow component version (atomic activity, role or information resource) respectively. This granularity eases the matching process of process versions contexts. Regarding the proposed language, it extends the VBPQL language, proposed in our previous work, to handle contexts of process versions.

Moreover, a matching method of process versions contexts and an industrial case study are addressed. The method compares the contexts (global and local) of process versions based on an ontology of contexts. The use of this ontology enables the implementation of filtering mechanisms (comparison) that are based on several criteria and not just the simple equality. The proposed case study illustrates the instantiation of the contextual perspective. A ContextEd tool (editor handling contexts of process versions), developed under the Eclipse platform, serves as an implementation of the proposed solution.

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