A Novel Tool for Configurable Process Evolution and Service Derivation

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ABSTRACT

In recent years, variability management in business processes is considered a key of reuse. Research works in this field focused mainly on variability modeling and resolution; whereas, evolution has been somehow neglected. In fact, new business requirements may occur, and business processes must evolve in order to meet the new needs. Furthermore, the evolution at business layer represented by configurable processes impact the IT layer represented by services. In this case, it is necessary to synchronize the changes between these two layers. In other words, the alignment of configurable processes and configurable services must occur to maintain an integrated view of an organization. This can be reached by the concept of service-based configurable processes. The study of existing tools in this domain shows the lack of solutions integrating both the evolution management, and the change propagation with respect to the variability. This article aims to represent the CPMEv, a novel tool for evolution management of service-based configurable processes.

KEYWORDS

Alignment, Change Propagation, Configurable Services, Evolution, Variability

INTRODUCTION

In the last few years, with the wide adoption of PAIS (Process Aware Information Systems) such as ERP (Enterprise Resource Planning), companies are left with directories containing several variants of the same business processes. These variants differ according to their application context. For instance, in the e-healthcare domain, 90 variants of “medical examination process” could be distinguished in a hospital (Ayora et al., 2012). Consequently, in order to choose or combine variants, the designer has to compare and adapt them manually, which could be a complex and an error prone operation. In this context, many research studies have focused on managing the variability of business processes by developing configurable processes (La Rosa, 2009; Hallerbach et al., 2010; Reinhartz-Berger et al., 2009; Kumar et al., 2012; Ayora et al., 2013; Nguyen et al., 2014; La Rosa et al., 2017). The variability management is about three main phases: modeling, resolution and evolution. In terms of modeling, many approaches for business process variability representation have been proposed

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(Schnieders et al., 2007; La Rosa, 2009; Hallerbach et al., 2010). Regarding the resolution, there are several solutions enabling the generation of variants (Gottschalk et al., 2009; Hallerbach et al.,
2010; Arriagada-Benitez et al., 2017). Whereas the evolution still presents many limitations, the main contribution in this domain is the work of (Ayora et al., 2016) which is an extension of the change patterns of (Weber et al., 2008) to support changes of process families. However, this proposal is limited to the processes represented in structural blocks and does not assist the designer during the evolution. In this context, we have proposed a pattern-based approach offering model and process solutions (Sbai et al., 2015).

Along with the improvement of business process reuse by the introduction of the variability management, the proposed approaches lack of business-IT alignment support. Our study shows that these approaches do not allow the generation of configurable services emanating from configurable processes, in this context a new concept related to business processes has been introduced, which is the “service-based process model” (Sbai et al., 2014). This has led us to study the alignment between the configurable processes and the enterprise applications, in particular services, with the aim of building PAIS that support service orientation. The emergence of variability management in business processes and services conduct the PAIS today to adopt the configurable processes at the business layer and the configurable services at the IT layer. In this perspective, we proposed an MDA (Model Driven Architecture) approach for the configurable services generation (Wang et al., 2010).

In this paper, we focus on the implementation of the proposed approach in configurable processes’ evolution and their alignment with the IT layer via a web tool named CPMEv. In fact, the business process variability management tools focus on the resolution of EPC (Event Process Chain) and YAWL (Yet Another Workflow Language) models La Rosa et al., 2009) and do not provide an evolution management nor an automatic generation of configurable services from these processes. Furthermore, existing tools on business-IT alignment, and in particular on service generation, focus on mapping BPMN (Business Process Model and Notation) process models to SOAML (Service Oriented Architecture Modeling Language) Service models (OMG, 2008), without any support of variability concept. We argue that it’s necessary to dispose of a tool which combines processes evolution and their alignment with services regarding to variability management.

The paper is structured as follows: Section 2 reviews related work about the business process change management tools. Section 3 elaborates the requirements of our tool. In Section 4, the tool is described using an applicability study. Finally, Section 5 presents some discussion about what has been achieved, and Section 6 concludes the paper with some pointers for further work.

STATE OF THE ART OF BUSINESS PROCESS MANAGEMENT TOOLS

Current business process management tools can be put under three main categories: business process change, business process variability management and service generation tools. In this section, we analyze existing solutions in each category, evaluating how suitable for our purposes they are. This analysis also provides valuable input regarding the requirements of our proposal.

Business Process Change Tools

The evolution is the ability of an implemented process (a process instance) in a PAIS to change when its correspondent business process (also called process type) changes. Historically, (Weber et al., 2008) classifies the business process evolution in term of the process life cycle. Two changes types can be identified:

- **Process Type Level**: Concerns the change during the business process design;
- **Process Instance Level**: Concerns the change during the business process execution.
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