# Chapter 21
# Ontology-Based Framework for Quality in Configurable Process Models

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## ABSTRACT

*In recent years, business process modeling has increasingly drawn the attention of enterprises. As a result of the wide use of business processes, redundancy problems have arisen and researchers introduced the variability management, in order to enhance the business process reuse. The most approach used in this context is the Configurable Process Model solution, which consists in representing the variable and the fixed parts together in a unique model. Due to the increasing number of variants, the configurable models become complex and incomprehensible, and their quality is therefore impacted. Most of research work is limited to the syntactic quality of process variants. The approach presented in this paper aims at providing a novel method towards syntactic verification and semantic validation of configurable process models based on ontology languages. We define validation rules for assessing the quality of configurable process models. An example in the e-healthcare domain illustrates the main steps of our approach.*

## INTRODUCTION

In the last decade, business process modeling has become a primordial and critical task for enterprises, since business process models capture the practices of a given organization, reflect their real business, and enable them to achieve their business goals. Models are used to describe all the key elements of business processes, namely: tasks, data, resources and actors (Curtis et al., 1992). They are also used for documenting, analyzing and redesigning business operations (Mendling et al., 2014), as well as to provide a communication support within and inter enterprises.

Due to the core role that business processes play in organizations; their use has become a commonly shared practice. Yet, being involved in creating models that meet their business requirements, companies have faced a problematic issue related to model's redundancy. In fact, each organization has its own process repositories which may contain many variants for the same business process models. Moreover, new business processes are created from scratch instead of adapting existent processes to meet new business requirements (Schnieders & Puhlmann, 2006). This has motivated the need to manage the variability of business processes.

The concept of variability management has been first introduced in business processes in (Schnieders & Puhlmann, 2006). It aims at enhancing the reuse of business processes and cope with the redundancy problems. In the literature, two approaches are used to represent the variability of business processes: single model approach which consists of representing the model and its variants in one single model (Gottschalk, 2009) and multiple models approach which separates the model and its variants (Hallerbach et al., 2009). The approaches based on a separated formalism pose the problem of managing dependencies between reference models and variants models. In this case, the evolution of variants is somewhat difficult. Thereby, the most widely used approach for managing variability in process engineering domain is the single model representation, also called Configurable Process Model (CPM).

Despite the benefits of the CPM solution, researches have shown that with the increasing number of process variants represented in one single model, the configurable process model may become complex and incomprehensible. Therefore, the quality of configurable process models is impacted. In general, most of the research work in business process variability mainly tackles three domains: i) variability modeling (La Rosa, 2009; Gottschalk, 2009; Schnieders & Puhlmann, 2006; Nguyen et al., 2014), ii) variability resolution (also called configuration) (Hallerbach et al., 2009; Van der Aalst et al., 2010), and iii) CPM evolution (Ayora et al., 2013). While much attention has been directed towards modeling and configuration, little effort has been given to the quality of CPM. The main contributions in this domain focus on the correctness and the soundness of variants obtained after the configuration phase (Hallerbach et al., 2009; Van der Aalst et al., 2010; Asadi, 2014).

On the other hand, an increasing attention has been paid to the quality of business processes over the last few years (Nelson et al., 2012; Lohrmann & Reichert, 2013; Hammer, 2014; De Oca et al., 2015). According to this latter research work, "The quality of a business process model has a significant impact on the development of any enterprise and IT support for that process". Producing high quality business models still represent a concern for business designers, since high quality of models is a key success factor for their implementation and execution (Reijers et al., 2011). Moreover, it can reduce the performance difficulties resulted from defects in execution (Hammer, 2014).

The issue of business processes quality is mainly related to the designers' mastery of modeling tools and their involvement in the design task, as to their knowledge of the domain being captured. In (Reijers et al., 2011), two factors can influence the understandability of process models: personal factors and model factors. The first one is related to the background of the process reader; whereas the model factors concern the model itself such as its size and its structuredness. According to (Reijers et al., 2014), the error rate in business process collections could reach 10 to 20%. Consequently, the usage of business process models in later phases, namely implementation and execution, is affected.

In the literature, business process quality is being addressed through two main dimensions (also called types): syntactic quality (also named verification) which consists in verifying that all statements in the model are in conformity with the syntax and vocabulary of the modeling language, and semantic

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