Measuring the Compliance of Processes with Reference Models

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Abstract. Reference models provide a set of generally accepted best practices to create efficient processes to be deployed inside organizations. However, a central challenge is to determine how these best practices are implemented in practice. One limitation of existing approaches for measuring compliance is the assumption that the compliance can be determined using the notion of process equivalence. Nonetheless, the use of equivalence algorithms is not adequate since two models can have different structures but one process can still be compliant with the other. This paper presents a new approach and algorithm which allow to measure the compliance of process models with reference models. We evaluate our approach by measuring the compliance of a model currently used by a German passenger airline with the IT Infrastructure Library (ITIL) reference model and by comparing our results with existing approaches.

1 Introduction

Reference models have gained increasing attention, because they make a substantial contribution to design and execute processes efficiently. Obviously, reference models are useful, but to which extent are these best practices adopted and implemented in a specific business context? Process mining algorithms [1,17] have shown a considerable potential for assessing the compliance of instances with reference models. The instances are typically recorded by process-aware IS and serve as a starting point for reconstructing an as-is process model. The derived model can be compared with other models (e.g. reference models) using existing algorithms to determine the equivalence of processes. Nevertheless, the results of a former compliance analysis using process mining and equivalence algorithms are not sufficient [11]. Our previous studies have evaluated the compliance of an as-is process model of a passenger airline with a reference model, which had incorporated the fundamentals of ITIL [15]. We found that the techniques available yield low values of compliance which could not be confirmed by the passenger airline. This difference was mainly due to: (1) different levels of details, (2) partial view of process mining, and (3) overemphasis of the order of activities. First, the level of detail characterizing a process differs widely when comparing a reference model with an as-is or to-be process model. Second, the derived as-is model only partially represents the processes of the airline. The execution of the processes

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does not only result in log files but it also results in written record files, manual activities as well as human knowledge. Information outside the reach of process mining algorithms may compromise the results of compliance. Finally, reference models typically do not state whether dependencies between activities are compulsory. During our former studies [11] on compliance using existing equivalence algorithms, we have changed the order of activities in a reference model. While the compliance should remain the same since the reference model did not enforce a specific order for the execution of the activities, the compliance yielded different results.

This paper motivates the reader for the importance of measuring the compliance of process models with reference models. We also discuss the differences between process equivalence and process compliance and argue for the need of specific algorithms to measure the compliance between processes. We show that two models can have different structures but one process can still be compliant with the other. Furthermore, we develop a new approach and algorithm to overcome the drawbacks identified. We measure the compliance of an as-is process model of a German passenger airline with a reference model. To validate our methodology, we compare our compliance results with two existing approaches and explain why current algorithms are not suitable to evaluate the compliance.

The remainder of our paper is organized as follows. Section 2 introduces the fundamentals of reference models. Section 3 explains our methodology to measure compliance. The following section investigates the requirements for determining compliance. Sect. 5 presents and evaluates our rational and concept to develop a new algorithm. Sect. 6 describes the main related work. Finally, Sect. 7 formulates our conclusions based on our findings.

2 The Importance of Reference Models

Reference models offer a set of generally accepted processes which are sound and efficient. Their adoption is generally motivated by the following reasons. First, they significantly speed up the design of process models by providing reusable and high quality content. Second, they optimize the design as they have been developed over a long period and usually capture the business insight of experts [25]. Third, they ease the compliance with industry regulations and requirements and, thus, mitigate risk. Fourth, they are an essential mean to create a link between the business needs and IT implementations [25].

Reference models can be differentiated along their scope, their granularity, and the views, which are depicted in the model [25]. We distinguish (1) reference models focusing on capturing domain-specific best practices like ITIL, COBIT, and SCOR, and (2) configurable reference models, such as SAP Solution Manager [18], which aim at capturing the functionalities of a software system. Although the focus of this paper is on the first class of models, we explain both classes shortly with respect to their characteristics and their contribution to compliance.

The Information Technology Infrastructure Library (ITIL) is a set of guidance published as a series of books by the Office of Government Commerce. These