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Automated Analysis of the Co-evolution of Software Systems and Business Processes

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Abstract: Software systems are an essential part of business processes. As business processes and the corresponding software systems mutually affect each other, they co-evolve during their life cycle. Thus, to adequately predict the impact of a change, their mutual dependencies have to be considered. However, existing approaches to change propagation analysis consider one domain in isolation and neglect the mutual dependencies between the domains. In this paper, we propose the Karlsruhe Architectural Maintainability Prediction for Business Processes (KAMP4BP) to analyze the change propagation in business processes and the corresponding software systems.

This is an extended abstract of the paper *Architecture-based Change Impact Analysis in Information Systems and Business Processes* published in *ICSA'17* proceedings [Ro17].

Keywords: Software System; Business Process; Evolution; Change Impact

1 Karlsruhe Architectural Maintainability Prediction for Business Processes (KAMP4BP)

Software systems are increasingly used in organisations to support their business processes. The business process can be considered as a set of actor steps (i.e., performed totally by humans involved in the business process) and system steps (i.e., performed totally by the software system) [He15]. Thus, there are mutual dependencies between business processes and the corresponding software systems, which result in co-evolution of both domains. Therefore, we cannot consider only one domain in isolation when analyzing the effects of a change. However, the mutual dependencies between both domains are one of the main challenges during the change propagation analysis, as a change in one of the domains can propagate to the other domain.

KAMP4BP [Ro17] calculates the change propagation in the business process or the corresponding software system based on an initial change request. It is a scenario-based approach with focus on mutual dependencies between both domains. Fig. 1 gives an overview of KAMP4BP: i) In the preparation phase, the architecture of the software system and the corresponding business process design have to be modeled. In order to model the software architecture, the software architect uses the Palladio Component Model (PCM) [Re16]

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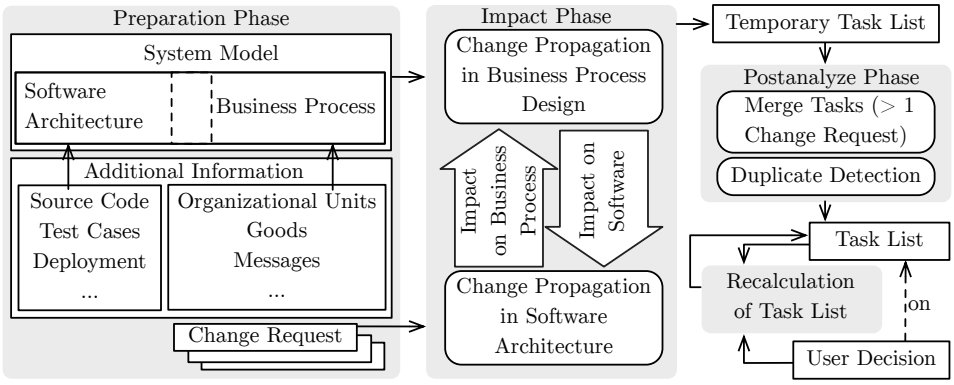

Fig. 1: Overview of the approach [Ro17]

which is a metamodel describing the software architecture with focus on software quality attributes. The business process designer models the business process using the extensions of the usage profile of PCM metamodels which allows modelling the business process as a set of actor steps and system steps [He15]. Further, the model of the software architecture and the business process design can be annotated with additional information such as test cases in software systems or organizational units in business processes. Annotating further information allows more realistic change impact analysis, as KAMP4BP can calculate the change impact on these artifacts as well. Additionally, the initial change requests have to be marked using the corresponding metamodels. ii) In the impact phase, KAMP4BP automatically calculates the change propagation in business processes, software systems, and between business processes and software systems. To this end, the analysis is based on predefined change propagation rules. The output of this step is a temporary task list. Each task references a changing element in the model of the software architecture or the business process design. iii) If more than one initial change request were marked in the preparation phase, KAMP4BP merges the corresponding task lists of the change requests and eliminates the duplicates. Further, the user of KAMP4BP may need to manually exclude some tasks referring to model elements that cannot be affected by the change. As changing these model elements could lead to further changes in other model elements, KAMP4BP considers the users' decisions and recalculates the task list.

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