Modeling of Business Processes Consistent with Business Rules

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Abstract: Business Process Modeling Notation constitute a powerful and widely accepted visual language for modeling business processes. Such processes can help organizations to manage with complex tasks and control the workflow. Practical implementation of such processes is a challenging task. Business Rules constitute one of the promising solutions for this issue. They can provide declarative specification of domain knowledge encoded into a BPMN model as well as describe the lower level business logic, coherent with business processes. Moreover, tools supporting Business Rules can provide a flexible runtime environment. This paper presents overview of our results for the research concerning modeling Business Processes that are consistent with Business Rules. It briefly describes the possibilities for such integration and the outlook for the future works.

Keywords: Business Process Modeling Notation (BPMN), Business Rules, XTT2, HeKatE

The business process approach aims at capturing the process of an organization to achieve some business objectives. Visual business process representation languages, such as BPMN (*Business Process Model and Notation*), are useful tools for specification of such processes.

Practical implementation of business processes requires additional specification of the business logic. The application of business rules for this task is a promising solution which can help an organization to manage the way it works and increase the business competitivity [1]. This also reduces the risk of creating a system which could not satisfy the requirements. Thus, such a methodology of designing rule-based systems [2] constitute an intelligent approach [3].

Although business processes constitute one of the emerging technologies [4], there is a gap between a model and its implementation. New advanced methods and tools remain open issues, especially methodologies which fill the semantic gap [5].

Modeling in BPMN can take several levels of abstraction into account, which enables hierarchical approach. However, because the workflow is of purely operational nature, formal analysis is problematic. One of the promising solutions for this is integrating business processes with business rules [6]. A BPMN model can be used for specification of the high-level behavior, and rules can provide a description of low-level business logic.

Business rules and business processes are to certain degree complementary. However, they can play different roles in the system. Rules provide declarative specification of domain knowledge, which can be encoded into a BPMN model. It is possible to extract some rules from a BPMN diagram. Our approach for this can be found in [7].

On the other hand, there is a need to manage low-level rules, which are not expressed in BPMN. This can be done by grouping and hierarchization as well as to address the contextual nature of the rule base. Visual representation of rules can help in resolving this issue. In [8], we analyzed some of visual inference specification methods for a modularized rule bases.

As rule-based systems constitute a mature and well established technology, they often provide verification, validation and testing capabilities [9]. XTT2 (EXtended Tabular Trees version 2) [10, 11] is a hybrid knowledge representation and design method aimed at combining decision trees and decision tables. It has been developed in the HeKatE research project, and its goal is to provide a new software development methodology, which tries to incorporate some well-established knowledge engineering tools and paradigms into the domain of software engineering, such as declarative knowledge representation, knowledge transformation based on existing inference strategies as well as verification, validation and refinement [12, 13].

Although the semantics of each BPMN element is well defined, the implementation of some particular task is not defined at all. XTT2, in turn, provides a formal language definition and therefore enables automatic verification and execution. Thus, BPMN and XTT2 operate on different abstraction levels. However, the solution described in [7] allows for translating selected BPMN models to the XTT2 business rules. This opens up the possibility of using the existing environment for rules. Thanks to this, it will be possible to analyzed such rules in the HalVA (*HeKatE Verification and Analysis*) framework [14] and execute them using the HeaRT (*HeKatE Runtime*) rule engine.

Future work will be focused on practical integration of the solutions. The plan involves the in-depth analysis of the BPMN notation for the purpose of rule-based systems. In more distant future, the plan involves running selected BPMN models in the environment composed of the rule and BPEL4WS (*Business Process Execution Language for Web Services*) engine.

The main issue in this integrated approach is the quality of the system. High-quality systems can help organizations to increase the productivity as well as the adaptation possibility to changes in business environment. Such solution can be used in different areas, where the quality is of the main importance, e.g. in security systems design [15].

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Modelowanie procesów biznesowych spójnych z regułami biznesowymi

Streszczenie: Notacja BPMN stanowi istotne narzędzie w dziedzinie wizualnego modelowania procesów biznesowych. Procesy biznesowe mogą pomóc organizacji w zarządzaniu zadaniami i kontroli przepływu pracy. W praktyce jednak implementacja takich procesów jest skomplikowanym zadaniem. Jednym z obiecujących rozwiązań w tym zakresie są reguły biznesowe. Mogą one stanowić deklaratywną specyfikację warstwy logiki biznesowej i opisywać zarówno logikę zakodową na diagramie BPMN, jak i dodatkową specyfikację reguł. Narzędzia związane z regułami biznesowymi są wspierane przez środowiska do ich uruchamiania. W artykule zaprezentowano przegląd wybranych rezultatów badań nad modelowaniem procesów biznesowych spójnych z regułami biznesowymi. Pokrótce zostały opisane możliwości integracji oraz perspektywy dalszych prac.

Słowa kluczowe: BPMN, procesy biznesowe, reguły biznesowe, XTT2, HeKatE

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