Change Propagation between Business Rules and Process Models

Seminar on Enterprise Software

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Abstract

In due time, considering mainly real IT projects it frequently takes a place that the business process models have to obey some constraints (regulations, standards, legislations, etc.). In this case, whenever the business rules evolve, the change must be propagated on business processes. On the other hand, if some change happens in process modelling aspects the rules becomes outdated. Thus, propagation have to be executed accordingly in both cases for required compliance preservation.

The organization regularly carry out documentation of their compliance according to true business demands. Consequently, they have to precisely document their operating procedures to maintain their compliance management efforts. To this end, both declarative and procedural modelling languages are suitable for the documenting inner business policies and procedures.
1. Introduction

During the last decade, diverse methodologies for ensuring the compliance of business processes have been considered. Majority of them in the center of interest regarding syntactical correctness and the lack of deadlocks and life-locks in process models. Meanwhile, business processes have to comply with declarative rules that originate from domain-specific demands, such as legal regulations and standards.

The main subject of this literature review is to identify resources and extract corresponding information for the purpose of discern the ways of propagation changes from business processes to business rules or vice versa. There is a related technique that describe the initial approach for business structure development, where the separation of business rules and procedures modelling given as alternative way for compliance insurance of the models to each other.

Nevertheless, that methods, which should be followed in business construction have to be documented to illustrate the whole business process suitability with regulations and standards. In this case, different modelling languages are presented and described to some extend to inform the readers about their existence.

Thereby, the related work section in this review is divided in three sub-sections and covers three main questions that reveal the given problem in the subject context. Firstly, the difference between general concepts about business rules and procedures explained, the connection and dependence of them from each other is described. Secondly, the fundamental methodology for compliance preservation between rules and processes, in case of changes in them, is observed. Finally, the documentation possibilities of declarative and procedural rules is given in the form of modelling languages.
2. Data Collection Approach

I have decided to choose the systematic way to approach this research, therefore I continue on the guidelines for fulfilling a research, which is called Systematic Literature Reviews in the area of Software Engineering (Kitchenham, 2007).

The review process consists of three main steps: plan, conduct and report the review. This processes contains several implementation steps themselves, whereas most of them are not relevant for my researching purposes. Thus, I proceeded with defining research questions, then composing the appropriate queries for analyzing the data resources on internet and their extraction, eventually, reporting all the collected data in correct form.

2.1. Research questions

Definition of research questions is the crucial part of systematic review approach. These questions proceed all the steps of systematical reviewing. The search results must identify the main concepts of the research questions. The resources that are found and consequent analysis of the content must answer the exact given question. For these purposes I have designed the following questions:

RQ1) What are the relationships and differences between declarative and procedural rules?
RQ2) What are the methodologies and approaches to preserve the compliance between business processes and rules?
RQ3) What kind of automated frameworks or programming tools do exist for checking and modeling compliant business process.

The RQ1 in this context is the first question that should be answered in order to find the point, which connects or differentiate the concepts between business rules and business process models. Thus, the result of RQ1 identifies the changes in business rules or process models, which might affect each other. Then the compliance preservation protocols are distinguished from RQ2 outcomes. Consequently, RQ3 determines which modeling languages do exist in business environment that model the semantic rules for business processes.
2.2. Searching query generation strategy

Initially, I have tried to execute simple search in regular searching engines, but the results were not relevant to the defined questions. Then I have decided to do the advanced search through special digital libraries.

There are several digital libraries with diverse papers, books, articles, etc., such as “Scopus”, “Web of Science”, “Google Scholar”, “IEEEExplore”, “ACM Digital Library”, “SpringLink”. I did a search through all of them with primarily developed searching string. The most resultative was “Google Scholar”. The generation of the relevant query consists of definition of searching key words and their alternatives. For example, “Business Processes” and “Business Rules” might be given as procedural and declarative business rules respectively, on the other hand the word “change” is represented as evolution or development in several resources. The final query is the combination of key words with the Boolean operands:

\[
(business\ process^* \ OR \ procedural\ rule^*) \ AND \ (business\ rule^*
\ OR \ declarative\ rule^*) \ OR \ (business\ structure \ OR \ business\ design) \ AND \ (change^* \ OR \ evolve) \ AND \ ((obey \ OR \ comply \ OR \ compliance) \ AND \ (propagate \ OR \ propagation \ OR \ suite^*))
\]

2.3. Study selection

This phase is intended to define the important studies that directly provide with the answer about research questions. In this case, I have applied the inclusion and exclusion criteria.

IN1) The study is focused on business process management, organizational structure and design of the business in terms of business processes and rules. This criterion gives the whole concept regarding process models and semantic rules in business, at the same time it answers RQ1.

IN2) The study is based on real business project experiences. The problems, which arose during those projects and the solutions that tackle them are written in context with the provided real-life examples. The methodologies that are described here fulfill RQ2 requirements.

IN3) The studies that relates to the last two decades. This point is devoted for only RQ3, because the automated tools which relevant to compliance issues must be up-to-date.

IN4) The study must be written in English.
During the study selection diverse of contents were found with the provided query. Those data were relevant to IN1, IN3 and IN4. The main selection process was committed on reading of the abstracts and partially introductions to the studies. Finally, this report is based on six papers, which express the general concept of all given questions.

3. Related Work

I want to present the collected information from different papers regarding the questions in three sub-titles. Each paragraph relates to explanation of the problem and its solution in terms of writer approach. The content contains of knowledge about business processes and rules, their suitability with each other in terms of regulations, law, etc., also possibilities to reach that compliance by means of modern technologies.

3.1. The difference between business rules and business processes (RQ1)

The majority of business management teams get confused between business processes and rules, therefore they have a tendency to put them together. Consequently, the whole business structure suffers lately because of frequent change in business rules (Arora, 2005).

The problem comes from the reason that the separation of the business rules from business process happened a couple years before, regardless the term “Business Rule” appeared since 1984 (Leonardo, 2015).

According to Business Process Manifesto\(^1\) a business process involves the activities fulfilled by resources for the purpose of creation outcomes of value for customers.

The change in the business process behavior is done by business rules\(^2\). For instance, the pricing policy in retail shops regarding the discount and promotion arrangement also tax calculation are parts of the business rules. “Rules are not process and not procedure. Rules address across procedures and processes.”

\(\text{\(1\)} \text{ http://www.brcommunity.com/b672.php}\)

\(\text{\(2\)} \text{ http://www.businessrulesgroup.org/brmanifesto.htm}\)
Being a part of the application domain, the business processes are subject to compliance rules and policies, that might be expressed in form of standardization or legal regulation. To be ensured that the business processes are compliant becomes crucial for enterprise nowadays, in case of auditing and certification challenges.

Business process becomes fragile when the business rules are embedded in it. This relates especially to highly changeable and controlled industries (wireless companies and banks), where rules develop frequently. The process model has to be propagated, whenever the rules are changed.

There is another term “Business requirements”, they are not the same. The major difference is requirements develop before deployment of a system, whereas business rules continue to evolve after creation of the system.

### 3.2. Business process and business rules compliance preservation (RQ2)

If we know the main problem in business structure is the tight connection of business rules and business processes, then the separation and restructuring of the business design might be the solution. Here I am going to describe the methodology, which aims to handle the given issue.

We can create the sustainable process if the rules are formed as a unit apart, because the drastic change happens in rules, not business process. Thus, the purpose is to *Separate the ‘Know’ from the ‘Flow’* (Roger Burlton, 1999). Conditional flows are significant parts of a business process model. In other words, the conditionals could be the gateways in process models, which give a path if the condition is satisfied. The secret here is to avoid inclusion of the criteria to check the conditional in the conditional itself. These criteria should be expressed separately as rules. The implementation of separation fortunately is not so hard (Ronald & Gladys, 2015).

The separation of business rules from business requirements is the main step in creation of compliant business process. So far, there were several techniques that focused on assessing *process-specific* compliance rules that correspond to particular process models. The difference between business rules and business requirements is more explicit in example (Tab. 1, Fig. 1). In this example the rule $C_1$ over process $P$ refers to process define goals (1) and start of development phase (3). In practice, the compliance rules should be defined in more general way. On the other hand, rule $C_2$ address to test activity and not to functional test (7) as
shown in development process model. Therefore, the verification of C2 over
development process is need for quality assurance (Linh, Rinderle-Ma, & Dadam,
2010).

**Table 1.** Examples of compliance rules of software development

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Goals must be determined before the development is commenced</td>
</tr>
<tr>
<td>C2</td>
<td>Tests activities must be properly documented</td>
</tr>
<tr>
<td>C3</td>
<td>No further development would happen, if development got stuck</td>
</tr>
<tr>
<td>C4</td>
<td>It is important to implement a check of the first usability test, before carrying out the second usability test.</td>
</tr>
<tr>
<td>C5</td>
<td>The test must be continued with approval and integration. No changes carried out between integration and approval.</td>
</tr>
</tbody>
</table>

**Figure 1.** BPMN model of software development process
Thus, we have to verify both, process-specific and process-independent compliance rules. If the process-independent compliance rules are distinguished in process model, then different design levels could be introduced for user level with intuitive, high-level representation of compliant rules and system level with verification of processes against process models. For this, the instantiation of compliant rules is necessary over the process models, additionally, facilitating them with semantics for further verification.

The consequent process-independent compliance rule instances could be verified separately from each other. This makes easier to make individual reports or propose individual solutions in case of compliance violations of these instances.

The representation of these instances performed on each level differently. On one hand visualization based on graph structures for user level. On the other hand, compliance rule graphs with semantics and execution traces at system level.

3.3. Rules and Procedural modeling languages (RQ3)

In order to depict the business process, the diagrams are drawn to model the process. There are two types of them to produce rule-based or procedure-based diagrams.

Business rule modelling languages more flexible in comparison with procedural languages, but less manageable. There are several of them, but most used ones are Simple Rule Markup Language (SRML) – it has transparent definition of its constructs being unique vocabulary; The Semantic of Business Vocabulary and Business Rules (SBVR) – it has the vocabulary of 2006 rule standards, which might be considered as outdated being not executable language (Michael, Marta, & Gerrit, 2007); DECLARE and DCR graphs, both based on template approach with the links between activities and they provide with the modern vocabulary in business rule modelling.

There are more procedural modelling languages in contrast of declarative languages, such as Event-driven Process Chains (EPC), YAWL, Petri Nets, Integrated Definition Methodology and Business Process Modeling Notation (BPMN). The BPMN has become as the standard of contemporary industry for business process modeling. It consists of activity and event nodes that are connected by means of association arrows, additionally, for conditional process requirements the gateways are supported (Arne, 2017).

As was mentioned in QR2 section the separation of both languages is important for business analysis, but there are hybrid approaches that combines both
concepts of declarative and procedural languages in one vocabulary, as an example might be BPMN-D.

4. Conclusion

This paper presents the modern approaches in business processes and rules creation. It depicts three main aspects of modelling correct business process models. There is a technique to develop compliance business structure by separating declarative and procedural rules from each other. Apart from the business modeling theory, the modelling languages are described considering the procedural, declarative and hybrid vocabularies.

4.1. Future work

The gaps that exist in this paper is the shortage of information regarding hybrid business process and rules modelling languages. Their usage in real-life software development processes is rare, because of theoretical constraints regarding the separation business structure concepts.

My future research might be devoted in researching the other unpopular hybrid modelling languages, which could help in development of so-called “bridge” between BPMN and DCR graphs to maintain the complex modelling structures by combining process-specific and process-independent compliance rules in one business model.

5. References


