

Business Rule Based Extension of a Semantic Process Modeling Language for Managing Business Process Compliance in the Financial Sector

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Abstract: Managing business process compliance is an important topic in the financial sector. Various scandals and the financial crisis have caused many new constraints and legal regulations that banks and financial institutions have to face. Based on a domain-specific semantic business process modeling notation we propose generic process compliance business rules that serve as a first step towards the identification of individual compliance business rule patterns in banks. These rules can be seen as a basis for the automatic identification of compliance issues in existing processes (process models) and hence for managing business process compliance in the financial sector.

1 Introduction to Business Process Compliance as an Application Area for Business Rules Modeling and Analysis

Compliance can generally be understood as conforming to a rule such as a specification, a policy, or a standardized procedure. As a relatively new field of research, “Business Process Compliance” (BPC) management addresses the coordination of business process management (BPM) and compliance [RLD08]. Especially in the financial sector many regulations and laws force service companies such as banks and insurances to ensure compliant business processes [Ba04].

However, the automatic identification and analysis of financial sector processes with regard to their alignment with new compliance requirements is still an unsolved problem. High efforts are being spent on the actual modeling of business processes, but there are hardly equivalent benefits in the analysis and usage of process models [BWW10b]. Especially, the complete automatic analysis of process models is hardly possible when applying standard business process modeling languages.

This paper aims at formalizing compliance based business rules in the banking sector in a semantic way that is easily understood by business process compliance experts. The resulting businesses rules can then be linked to semantic business process models and thus provide a basis for an automatic analysis of business process compliance. To do this a business rule based extension of SBPML, a semantic business process modeling notation that was developed specifically for the financial sector and represents an intuitive modeling approach for non-BPM experts, is proposed, since it allows for the automated analysis of process models [BWW09, BB+10, BWW10a, BT+10].

2 State of the Art regarding Approaches to Modelling and Analysing Business Process Compliance Using Business Rules

In IS research business rules are considered as self-contained scientific objects [HK95, p. 158]. According to [SW06, p. 52] business rules are „[...] guidelines or business practices [...], that affect or guide the behaviour of companies. Behaviour means [...], with which processes (how) and with which resources (whereby), which goods are produced.” Business rules can be of internal as well as external origin (e.g. laws). In this context, business rules shall be regarded as normative instructional statements that are distinguished by their specifying character related to their process execution [HH00, pp. 15]. The fundamental purpose of business rules lies in securing conformity of business processes within legal and other guidelines as well as verification of conformity.

According to [EA+08] successful business process compliance implementation is based on four aspects: i) it requires an integrated approach that reflects the entire BPM lifecycle, ii) BPC should support compliance verification that goes beyond simple control flow aspects, iii) an intuitive graphical notation is necessary to make compliance requirements also comprehensible to non-experts, iv) BPC should support the application of semantic technologies to support the definition, implementation and execution of automatic compliance verification. Hence, for the purpose of business process compliance management, we propose to develop a semantic approach to business rules management that enables an intuitive approach to modelling and analysis of business process compliance. Since especially iii) and iv) target at an easy to use semantic modelling and analysis language and our focus is on the financial sector, we suggest to build upon the SBPML notation [BWW09, BWW10a, BT+10].

3 SBPML as an Approach to Semantic Business Process Modelling and Analysis

Based on the requirement to develop an intuitive graphical notation for business process compliance modeling that also makes use of semantic technologies, we have identified the Semantic Business Process Modeling Language (SBPML) for banks. It was originally developed when researchers found an inefficiency of generic process modeling languages in terms of modeling and analyzing business processes in the financial sector [BWW10]. As a result, it focuses on an economic domain-specific and

thus semantic modeling approach, based on reusable process building blocks that are designed specifically for modeling and analyzing activities and processes in banks [BW09]. The modeling notation consists of four views, comprising a *process view* (“how is a service delivered?”), a *business object view* (“what is processed or produced?”), an *organizational view* (“who is involved in the modeling process?”) and a *resource view* (“what resources are used?”).

The core constructs of this language are domain-specific process building blocks (PBB), which have an integrating role by connecting all views. A PBB represents a certain set of activities within an administrative process and applies a domain-specific vocabulary. PBBs are atomic, have a well-defined level of abstraction and are semantically specified by a domain concept. Examples for PBBs are “Document / Information Comes In”, “Perform a Formal Verification”, “Enter Data into IT”, or “Archive Document”. PBBs belong to the process view and represent the lowest abstraction level of a process model. In the modeling notation, processes are represented as a sequential flow of PBBs. They are contained within different variants of subprocesses. The subprocesses, representing the activities of just one organizational unit, are in turn part of a larger process, which usually involves multiple organizational units and thus multiple subprocesses. Additional facts about the processes can be collected with the help of attributes, which specify the properties of the PBBs in detail. A possible attribute for the PBB “Enter Data into IT” is “Duration”. Attributes provide the core information for a subsequent process analysis and also establish a connection to the business object, organizational, and resource view.

4 Developing Artefacts for Modeling Compliance-Related Business Rules in SBPML

With the goal of constructing an intuitive and semantic graphical notation for business process compliance modeling and analysis, we propose to extend the SBPML notation for banks from a business rule-oriented compliance perspective. Through a literature review we identified four different types of business rules that are frequently used in the context of business process compliance in banks. According to [SGN07] compliance-related business rules can be subdivided into the following four types: i) flow tags, which represent rules regarding the business process control flow and thus the execution of certain activities in a process (e.g. order of activities, existence of certain activities etc.), ii) time tags, which represent rules that depict temporal conditions or restraints within process flows (e.g. maximum time that may be needed to respond to a customer request), iii) resource tags, which represent rules regarding the used resources when executing a certain activity (e.g. authorization rules for IT systems or restrictions separations of duties within a process flow), and iv) data tags, which represent rules regarding the (business object) data used throughout a process (e.g. certain necessary data like the name of the credit applicant that must be contained in a credit application). Since control flow rules represent the most frequently referred to compliance rules in the literature and also relate best to business process modeling, we will focus on business rules concerning the control flow of business processes in this paper.

Process (Control Flow) Compliance Business Rules

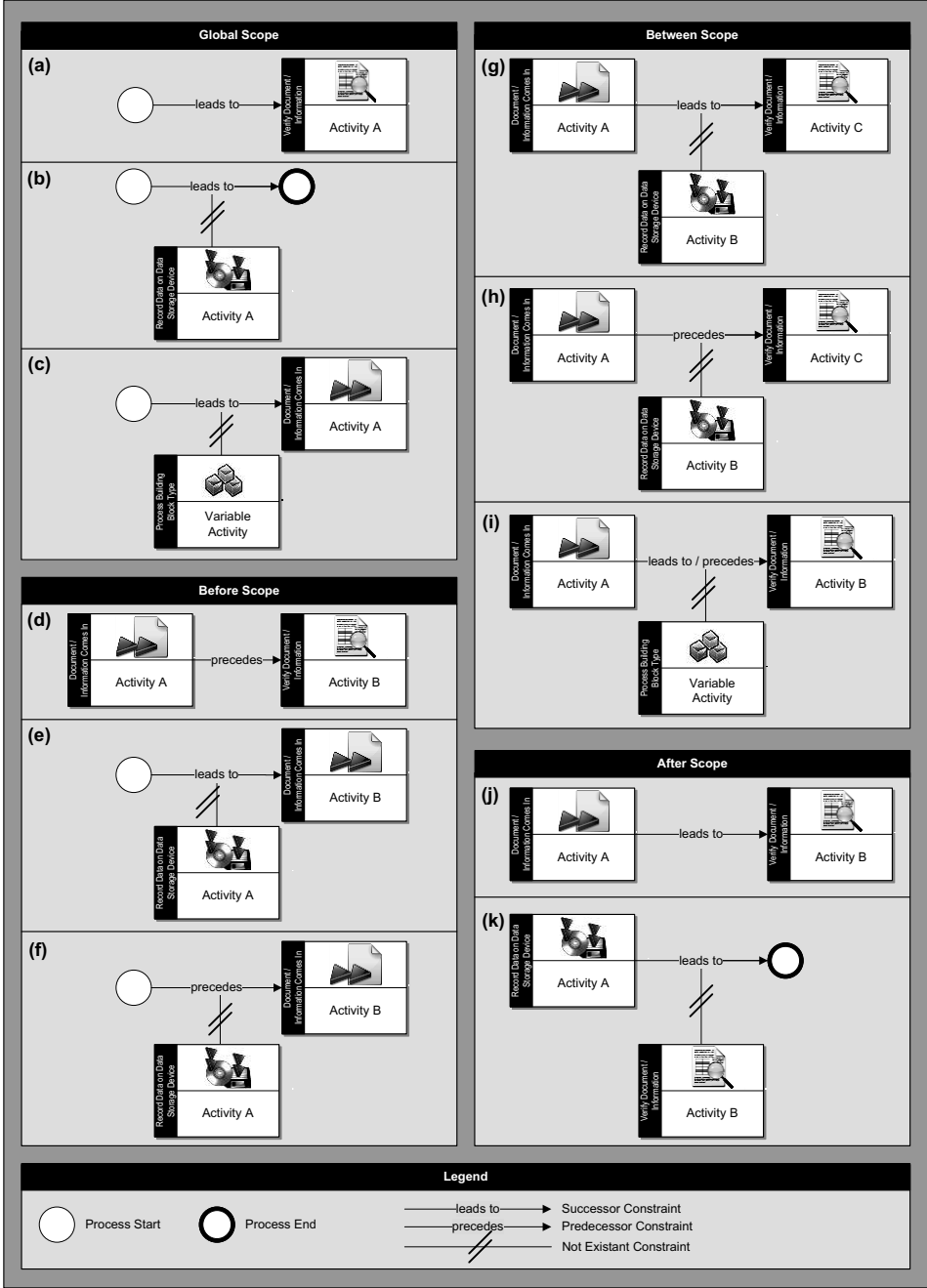


Figure 1: Basic Compliance Related Control Flow Tags on the Level of Activities (PBBs)

According to [AW09] control flow business rules define the sequence in which activities can or should be performed. Generally, predecessor relations (Activity A “leads to” Activity B) and successor relations (Activity A “precedes” Activity B) are established, but also existence (inclusion) or non-existence constraints should be depicted. In addition, depending upon the activities position within a process or sequence of activities, different scopes can be defined. The sequence as well as the existence or non-existence of activities is defined within a certain “scope” of an entire process. The scope of a constraint can either be “global”, or with respect to other activities “before”, “after” or “between” activities. In Figure 1 (a) Activity A must be part of a process; in (b) Activity A may not be part of the entire process. (d) describes the classical successor constraint; (j) describes the predecessor constraint. In (e) Activity A may not be executed before Activity B is finished; in (k) Activity B may not be executed after Activity A is finished. (g) and (h) describe the non-existence constraint of Activity B between Activity A and Activity C, with the difference that Activity A and Activity C in (g) are in a successor relationship, whereas they are in a predecessor relationship in (h). In (f), in contrast to (e), Activity B does not need to be part of a process in all cases. However, if Activity B is used in a process, Activity A may not be executed before Activity B is finished. In (c) and (i) we suggest the use of a “variable activity” PBB to define direct sequences. In (i) Activity A must be a direct predecessor of Activity B or vice versa Activity B must be a direct successor of Activity A. In (c), through the use of the global scope, we are able to define that Activity A must be the first activity within an entire process. Similarly, one could also predefine the last activity that must be at the end of a process. In addition, these rules may not only be applied to activities in the SBPML notation, but also to processes, subprocesses and subprocess variants. Through the combination of these simple patterns more complex patterns can also be derived.

The rules defined above can all be applied automatically to SBPML models as the notation only uses predefined patterns / activities that can also be used for instantiating the business rules based on our theoretic definition. Since all compliance related business rules will usually be maintained by a compliance officer, with expertise in the area of compliance management on an enterprise level, as opposed to a process modeler, with expertise in business process management and especially process modeling, we propose to add a compliance view to the four original SBPML views. This new view should be linked to all existing views and should give the compliance officer the ability to model, maintain and analyze the compliance business rules with respect to the available elements used in all other existing views.

5 Contribution, Limitations, Conclusion and Outlook with Regard to Business Rule Modeling and Analysis in the Context of BPC

Undoubtedly, compliance and the automatic enforcement of compliance and compliant business processes is a very important topic in the finance sector. This is especially due to the different scandals, financial crisis and the ongoing regulation debate that will lead to new rules and laws on national and international finance levels. Therefore, an automatic analysis of existing processes (respectively process models) in banks is a

necessary prerequisite for ensuring business process compliance. With our approach of identifying relevant business rule design patterns, we provide a basis for instantiations based on the SBPML for banks notation, but also for other notations. The instantiation of the generic rules will allow for an automatic identification of design patterns in process models in banks and hence for the revealing of compliant critical issues. However, in this article we do not provide concrete instantiations but rather abstract concepts. At this stage of research, we believe these results to be quite valid for most purposes in banks and justified for a first publication on this topic. However, in a next step we are going to further evaluate our findings with the help of various SBPML process models from different banks. Furthermore, by testing the theoretical concepts in practical depth, we may also add new process compliance business rules to our extensive library.

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