

Six Views on the Business Rule Management System

Workshop summary paper: Business Rule based Service Management (Business-Rule-basierte Servicesteuerung) at Informatik 2010 Service Science, 28th September 2010 in Leipzig/Germany

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Abstract

The term 'business rule management system' is often used by software vendors to name certain software products which support the management of business rules. In this article we take a broader approach to describe the business rule management system. A model that comprises of six views will be introduced and corresponding domains for further research and development will be identified. The article is based on the findings of the workshop Business Rule based Service Management.

Introduction

Obviously there are a lot of recent advancements in business rule management research and practice. Topics like SBVR, RuleML and various sophisticated applications of the Business Rule Approach indicate that the field of business rule management is currently promoting to a more mature stage. As welcome as this fact may be it brings along a strong separation and specialization of research efforts. Therefore the workshop Business Rule based Service Management – conducted at the Informatik 2010 Service Science in Leipzig/Germany at September 28th 2010 – brought together researchers and practitioners in the field of business rule management to determine the actual state of the topic.

Methodology

This workshop summary paper outlines the workshop contributions along with the accompanying discussions and concludes an actual model of the business rule management system based on these facts. The model will subsequently be used to determine open research issues.

Contributions

A short introduction and five full paper presentations contributed to the workshop:

- I. Business-Rule-basierte Servicesteuerung (Business Rule based Service Management):
Olaf Resch (Berlin School of Economics and Law)
1. Integrierte Unternehmensmodelle - SBVR in der Praxis anwenden (Integrated Enterprise models - the use of SBVR in Practice): Jürgen Pitschke (BCS - Dr. Jürgen Pitschke Dresden)
2. Extended Workflow Flexibility using Rule-Based Adaptation Patterns with Eventing Semantics: Markus Döhring, Birgit Zimmermann, Eicke Godehardt (SAP Research Darmstadt)
3. Business Rule Based Extension of a Semantic Process Modelling Language for Managing Business Process Compliance in the Financial Sector: Jörg Becker, Christoph Ahrendt, André Coners, Burkhard Weiß, Axel Winkelmann (European Research Center for Information Systems ERCIS Universität Münster)
4. Transparente und effiziente Prozesse im Erdbau durch ereignisgesteuertes Stoffstrommanagement auf Basis von Smart Objects und Business Rule Management (Transparent and Efficient Processes in Earthwork by Event based Mass flow management based on Smart Objects and Business Rule Management): Sebastian Lempert, Markus Harrer, Michael Krupp, Alexander Pflaum (Zentrum für Intelligente Objekte ZIO Fraunhofer-Arbeitsgruppe für Supply Chain Services SCS Fürth)
5. Wie strukturiere ich meine Business Rules für eine effektive Pflege und Steuerung von kritischen, komplexen und dynamischen Geschäftsprozessen (How do I structure my Business Rules for an effective Maintenance and Management of critical, complex and dynamic Business Processes): André Schäfer, Michael Kreher (SALT Solutions Dresden)

I. Business Rule based Service Management

The introduction outlined the complex nature of business rules in between business and IT. Figure 1 sketches an early model of the business rule management system which will be elaborated further as a result of the workshop. (Resch, O. 2010)

The model differentiates between the conceptual and the implementation layer. The conceptual layer is made up by the structural business rules which define the system and the operational business rules which must be enforced and which represent the actual aim of the business. Therefore the operational business rules are driven by competition, requirements and the need for constant change. A major part of business rule management research is about how structural and operational business rules should be constructed in order to respond accurately to these driving forces. The implementation layer addresses mainly how business rules are connected to IT-systems, e.g. by using business rule engines. However, there are other important research issues concerning the enforcement of business rules which have to be followed by people.

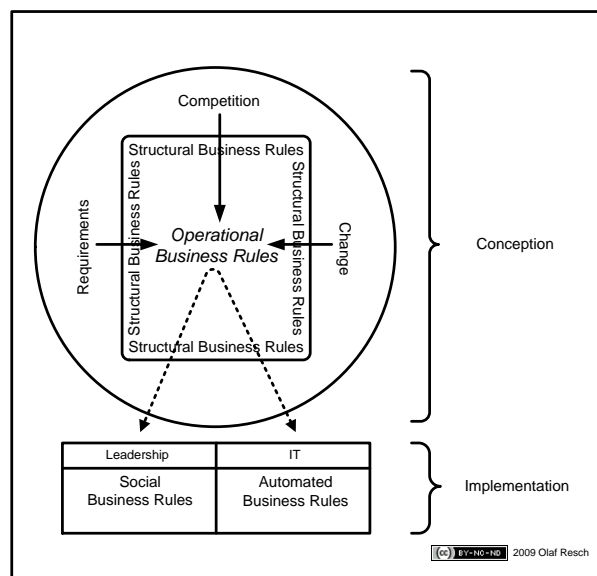


Figure 1 Business Rule Management System (1)

1. Integrated Enterprise models - the use of SBVR in Practice

Pitschkes article depicts SBVR (Semantics for Business Vocabulary and Business Rules) as one of the emerging OMG (Object Management Group) standards for the management of business rules. (Pitschke, J. 2010) SBVR has its focus on the business aspect and thus on the conceptual layer. As a meta model SBVR describes the definition of specific semantic models and not a certain model itself. The core of SBVR is the notion of concepts, fact-types and business rules. Concepts are clearly defined terms. Because every term used must be clear without ambiguity, the basic definition is normally taken from a generic dictionary, e.g. Merriam Webster. Specific terms can subsequently be overridden by specific definitions. Concepts are used by fact-types which can be instantiated as facts, e.g. the fact-type: *Country has currency* can be instantiated by *Germany has Euro*. SBVR knows two kinds of so called guidance elements: business rules and recommendations. A business rule constrains a certain aspect of the business, e.g. *an order must be attached to a customer*. In contrast a recommendation states only a desired behaviour, e.g. *a credit check is not necessary for a Gold*

Customer. SBVR knows certain keywords to indicate business rules and recommendations. One well known semantic model that implements SBVR is RuleSpeak®.

Later on in his presentation Pitschke explained the relationships between business rules and business processes. He outlined an exemplified business process model and showed how the model could be substantially reduced by extracting the implicit business rules out of the process.

There were some interesting side discussions according the logic that underpins RuleSpeak® and Pietschke made clear that the logic was informal and just meant to support communication.

2. Extended Workflow Flexibility using Rule-Based Adaptation Patterns with Eventing Semantics

The presentation held by Döhring introduced business rules in combination with an eventing mechanism as a means to enable more flexibility in work flows. (Döhring, M./Zimmermann, B./Godehardt, E. 2010) Döhring used the control of ship engines as an example and implemented his solution prototypically using JBoss Drools. The article puts strong emphasis on the *E* part of the common *ECA* (Event - Condition - Action) schema and introduces the connection of business rule management and complex event processing. Complex event processing generates complex events out of a large data stream which contains lower level events along with noisy data by filtering and correlating this data. In some contexts it is important that the system is capable to deal with such complex data situations in real time.

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

Ahrendt demonstrated how business rules could enrich a domain specific modelling language. (Becker, J. et al 2010) He first introduced SBPML (Semantic Business Process Modelling Language) as a tool to design business processes for the financial sector. He related the need for such a domain specific approach directly to the special regulatory requirements of the financial sector. The SBPML language consists of four views: the process view, the business object view, the organisational view and the resource view. All views must be presented via a graphical notation in order to make the model accessible for non-technical experts. Business rules are seen as an additional view that is used to model compliance requirements. They can be integrated into the whole picture as the controller of the activities that constitute the processes within the SBPML process view. Again, interesting discussions concerning logic which should be used to generate processes out of business rules came up during the presentation.

4. Transparent and Efficient Processes in Earthwork by Event based Mass flow management based on Smart Objects and Business Rule Management

Another domain specific application of the business rule approach was presented by Lempert. (Lempert, S. et al 2010) The domain of earthwork requires an exact flow control of the material *earth*. This control can be established via the control of the dredger, its operations and its change of position that can be traced using so called smart objects with transponders and GPS technology. The business rules define which actions are allowed for the dredger under a certain condition. The conditional state is determined by the events of the smart objects and additional information e.g. that of an area map.

5. How do I structure my Business Rules for an effective Maintenance and Management of critical, complex and dynamic Business Processes

This article discusses different architectural patterns to connect business rules with application systems. (Schäfer, A./Kreher, M. 2010) The presenters first introduced so called rule objects. Rule objects have to be derived out of business objects, e.g. an invoice. A *rule object* groups business rules that belong to a certain business context and that are meant to be changed dynamically. Rule objects are executed using a business rule engine.

Another aspect of implementation is how to represent business rules for the use by IT-systems. Different possibilities for this representation are e.g. If-then-texts, decision tables and graphical decision trees, all of them with their advantages and disadvantages. Business rules are predominantly formulated using a declarative language that makes the execution of one rule independent of the execution of another. However, it is also possible to use procedural logic for rule execution by means of prioritisation mechanisms or rule execution trees.

The presenters discussed two ways to supply the rule objects with the relevant data which is needed for decision making. The first way is to push all data to all rule objects, the second way is to make the rule objects pull the data they actually need. Also two basic strategies for further actions based on decisions were identified: to leave the execution of the decision up to the application system or to execute the decisions within the business rule engine. The contribution concluded that all possibilities have their place, but a certain combination is seen as especially promising for large business rule management scenarios: to derive rule objects directly from business objects, to keep the rules declarative, to push the data to the rule objects and to execute decisions within the application systems.

Conclusion

As a conclusion the early model of the business rule management system, see figure 1, will be further elaborated, see figure 2. The model comprises of six views on the business rule management system. It is as well descriptive as prescriptive and can be used to analyse a given situation and to determine a desired state.

The conceptual view can be seen as core of the business rule management system. Within the definitions of the structural business rules, the operational business rules must ensure compliance with the rationale of the business rule management system as well as responsiveness to change. The business rules are based on an unambiguous set of concepts. However, business rules can be underpinned by different logics, e.g. representing different levels of formalisation. Major topics like SBVR and the business rule mantra are placed within the conceptual view.

Different levels of formalisation are especially required for different ways of implementation within the implementation view. The implementation of automated business rules by means of IT-systems requires a strictly formal logic whereas the implementation within a social context does not need this strictness and could even benefit from a more informal logic.

The runtime view looks at the business rule management system while it is in action. Runtime is consisting of specific business situations, e.g. *a customer visits the desk of a sales representative* and the working memory which connects the business rules with the embedding application systems.

Business situations are only partly controllable by social business rules that e.g. *tell the sales representative what to do and how to behave*. Nevertheless, there are aspects that are beyond the control of the business rule management system, e.g. *what the customer actually wants*. The automated business rules run within the working memory. Rules are as long potential until they are fired by a certain event and then become executed rules, e.g. *a certain button of the order management software is pushed by the sale representative*.

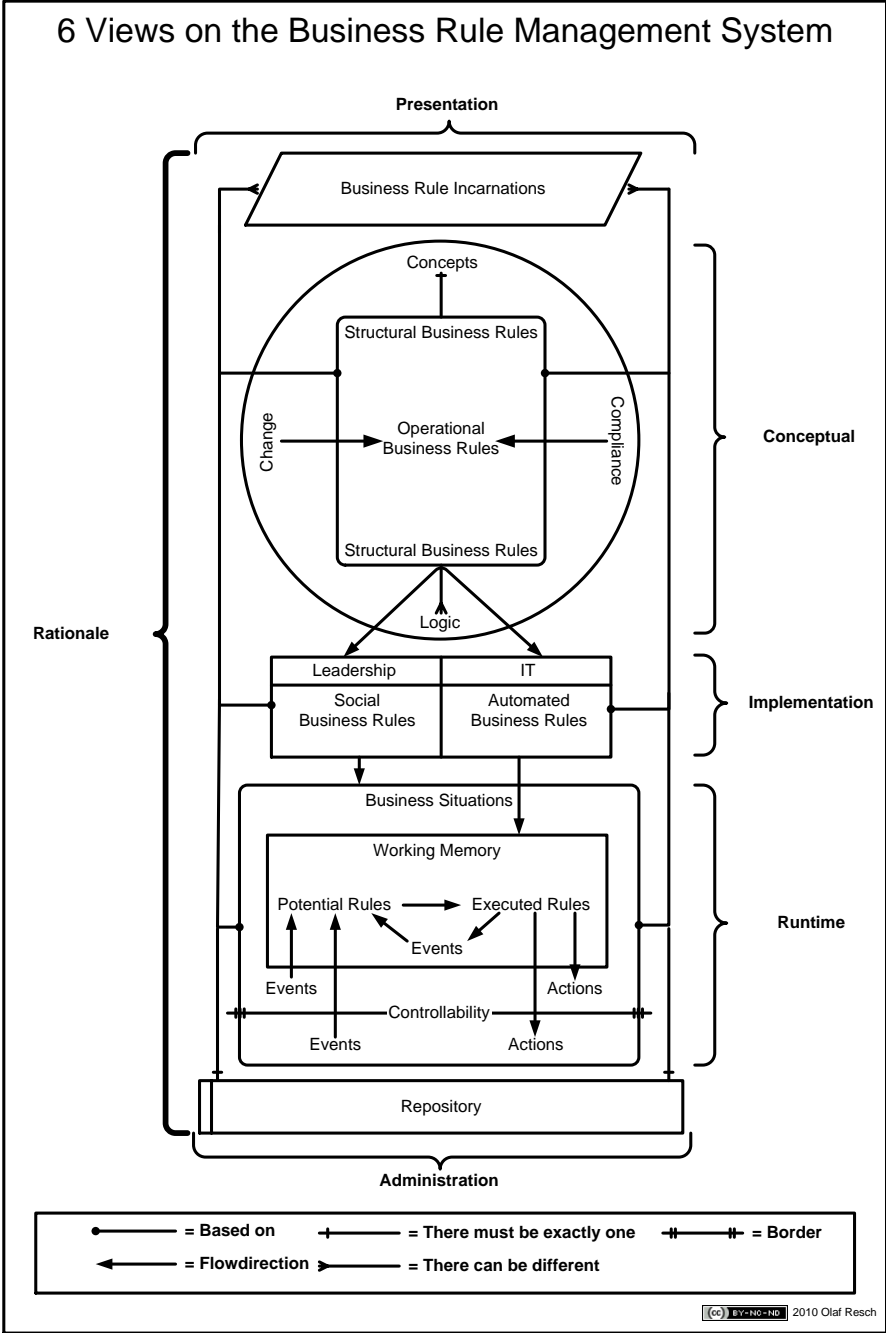


Figure 2 Business Rule Management System (2)

Events can occur inside the working memory as a result of rule execution or they can be triggered by other parts of the IT-system, e.g. a complex event processing engine and again, these parts might be outside the control of the business rule management system, e.g. *the event 'problem-customer' can be triggered by a business rule after the validation of credit history or this event can be triggered by*

the order management system or via an external credit check system that submits such events on its own behalf. The embedding application systems conduct certain actions as a result of rule execution within or beyond the control border of the business rule management system.

The business rules, the logic used as well as the form of implementation and the kind of representation must be stored in a consistent repository to enable an unambiguous Administration view on the business rule management system.

Business rule can have various incarnations. Very common are: if-then-syntax, decision tables or natural-language-like expressions like RuleSpeak®. However, there can also be less obvious incarnations. *The poster on the wall that tells people to clean up their work place after work* is such, *the setting of a certain rule priority within a business rule builder is actually an incarnation of a rule C that says rule A has a higher priority than rule B* and last but not least a process diagram is nothing else than a certain incarnation of a group of business rules. One business rule of the conceptual view can have different incarnations in the presentation view. The potential representations vary with the logical foundation of that business rule. Also the other views can incarnate in different manner – e.g. the organisation of the repository can be presented as an entity relationship model or as a tree diagram and the current state of the working memory can incarnate as load diagram or show the dynamics of events, fired rules and actions.

There must be a clear rationale for the business rule management system as a whole. The rationale view is particularly determined by the context, e.g. finance or earthwork but goes beyond that. Common business rationales are to be compliant to certain legislation, to be flexible or to respond timely to customer needs. But these are only contemporary examples and there can be totally different reasons. As a more classical rationale, rules can be seen as means of guidance in unclear situations where an entity is not capable to understand all the relevant determinants of a decision, such a rule might e.g. be: *do not make financial decisions under pressure.*

Domains requiring further Research and Development

Business rule management still didn't make it to a mainstream topic. This is somehow surprising because business rule management is not a new topic and because it is a very promising approach to establish a horizontal and vertical integration of business and IT as well as strategy and operation. Yet we need to know much more in order to unleash the full potential of business rule management systems and to develop the underlying IT. Research should start with the rationale view and this opens up many questions which must be answered by sound empirical and experimental research. Different incarnations and different forms of implementation of conceptual business rules using appropriate logic and transformations are also issues. Furthermore there are many questions that arise when people and IT are controlled by business rules simultaneously. The possibility to exercise at least some control over a system that is not fully determinable is another spot of interest. And even though these fields seem already quite advanced, the automation of business rules using business rule engines and the connection with the application systems are areas of ongoing research as is the nature of a consistent repository. More sophisticated research will bring along an even stronger separation; hence constant combining efforts are necessary in order to keep the vision of a business rule management system in sight.

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