

## Methodological approaches based on business rules

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*Business rules and business processes are essential artifacts in defining the requirements of a software system. Business processes capture business behavior, while rules connect processes and thus control processes and business behavior. Traditionally, rules are scattered inside application code. This approach makes it very difficult to change rules and shorten the life cycle of the software system. Because rules change more quickly than the application itself, it is desirable to externalize the rules and move them outside the application. This paper analyzes and evaluates three well-known business rules approaches. It also outlines some critical factors that have to be taken into account in the decision to introduce business rules facilities in a software system. Based on the concept of explicit manipulation of business rules in a software system, the need for a general approach based on business rules is discussed.*

**Keywords:** methodology, business rules.

### 1 Introduction

A Business Rules Approach is a development methodology where rules are in a form that is used by, but does not have to be embedded in business process management systems [5]. Such an approach formalizes business rules that are critical within an organization and specify them in a language that can be easily understood by all the stakeholders. In this case, the formal specifications will become information for the rules and process engines.

It is obvious that, for software technologies, the adoption of a business rules approach is a natural step forward in increasing productivity. It is also known that, in many situations, automated business processes include business logic, making changes highly time consuming and error prone. From an economical point of view, the increasing competition significantly shortened the life cycle of business models and forced organizations to be able to face changes. Promoters of the business rules approach advocate that the above presented problems could be solved using such an approach and some of them assert the advantages of using commercial rule based software products. The following paragraphs briefly present three representative business rules approaches promoted by: Barbara Von Halle, Tony Morgan and, finally, Marko Bajec and Marjan Krisper.

### 2. Von Halle Methodology: rules discovery

Known as a pioneer in data architectures and business rules areas, Barbara Von Halle proposes in [4] a business rules approach based on a complete methodology for rules identification, documentation and implementation. Her approach is built upon four basic principles, which became a general framework for business rules approaches: **1) Separate** assumes the separation of rules from any other requirements aspects, but also from the system itself. The main objective is rules reuse. **2) Trace** means that from every rule, we must have a two-way connection. First connection aims to rule origins, identified by business missions, scopes, objectives, strategies, tactics or policies. In the same time, metrics must be created and traced in order to measure rules efficiency compared to organization's results. The second connection aims to rule implementation and the evaluation of the impact of rule changes. **3) Externalize** means that a rule must be specified in a way that is accessible to a non-technical audience, formed by business stakeholders and assure that this audience has access to the rule. This way, we know what rules are implemented in the system and where to find them. **4) Position for change** reflects the general principle of a continually evolving economy: it is expected that a rule will change, as a natural consequence of the way of doing business. An indicator for measuring business adaptability to changes coming from all possible sources can be defined by the possibility to

easily and quickly modify the rules that govern the business.

Depending on the system’s characteristics and for sufficient reason, developers can take the liberty to make compromises regarding any of these principles.

Figure 1 depicts a peculiar element of this me-

thodology: the proposal of four processes that will execute in parallel with the conceptual phases of the rule-based software development life cycle. These processes trace four important artifacts in software development: technology, business process, business rule and data.

Scope	Plan	Discover	Analyze	Design	Deliver
<b>Technology Track</b>					
<b>Process Track</b>					
<b>Rule Track</b>					
<b>Data Track</b>					

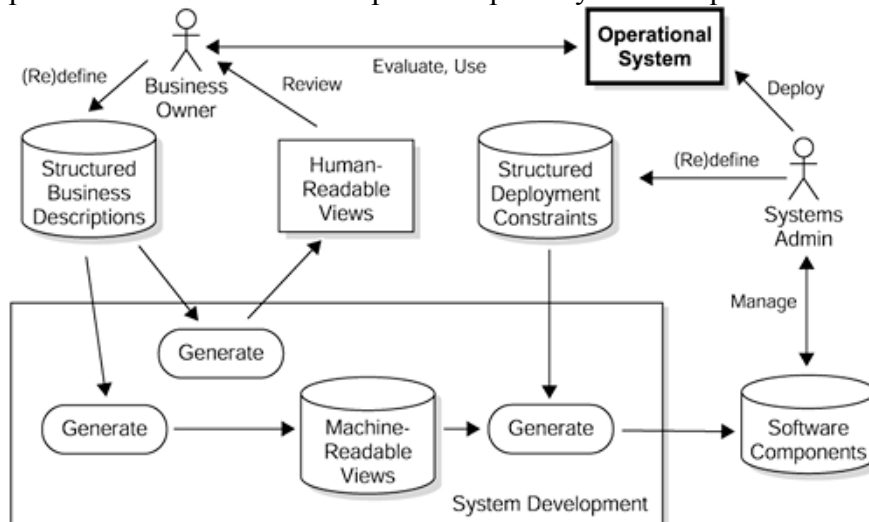
**Fig.1.** Business rules system methodology phases

Von Halle considers that, ideally, positioning a rule for change implies rule implementation using a commercial rule based software product.

**3. Morgan Approach: rules translation in the software system**

Based on a long experience in the field of the Artificial Intelligence, Tony Morgan gives in [3] one of the most comprehensive definition found in literature to the concept of business rule:“...a compact statement about an aspect

of a business. The rule can be expressed in terms that can be directly related to the business, using simple, unambiguous language that's accessible to all interested parties: business owner, business analyst, technical architect, and so on.” In his “ideal” vision about the rule based software development process, Morgan anticipates the adoption of a high level of automation in this process. A direct consequence will be the reduction of the number of persons who will interact with the system, especially when requirements are modified.



**Fig.2.** Rule-based software development process

In figure 2, we can observe that, besides the Business Owner, who has the possibility to define his business rules by himself, and the Administrator who will manage and deploy the system, no other human actors will interact with the system. Even if, so far, such a completely automated rule-based system has not

been developed, there is a continuous research in the linguistic area to find a proper solution for the translation of natural language in logic specifications.

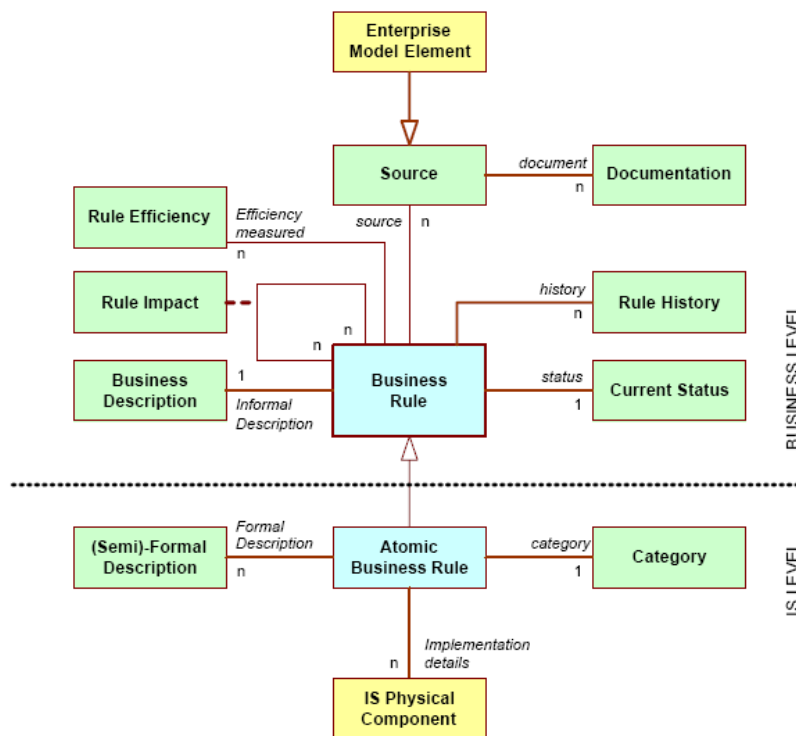
Morgan proposed a more pragmatic approach for the development of rule-based systems, building his theory around the well-known

Zachman’s framework and offering implementation solutions for all the framework’s columns: what, how, where, who, when and why [6]. Despite its business orientation, this approach is more technical and more proper for conceptual modeling. Compared to Von Halle, Morgan is more focused on translating business rules into software systems, and less on rules discovery.

**4. Bajec and Krisper methodology – defining a business rules model**

Marko Bajec and Marjan Krisper from the University of Liubliana has made in [1] an exhaustive analysis of the implications that business rules management brings in an organiza-

tion. Actually, the authors propose a methodology presented in the form of a scenario, which contains the necessary activities and roles for managing business rules within an organization. Characteristic to this approach is the development, in the business modeling phase, of a meta-model that contains essential information for a correct rule management (Figure 3). The meta-model is divided into two sections: the first contains elements from the Business Level (like rule efficiency, impact, history or documentation) and the second elements from the Information System Level (rule (semi)-formal description, category and implementation component).



**Fig.3.** Business rules model

Besides the activities dedicated to rules management at the previous mentioned levels, the proposed scenario also identifies the activities responsible for rules maintenance and monitoring, respectively change control, version control and impact control. At the same time, a prototype for a tool support is provided for this methodology.

**5. Business Rules Approaches Evaluation**

The wide offer of rule-based commercial products and business rules approaches might

cumber the decision of an organization to introduce business rules management. It is clearly that we need a set of criteria as guidance through this decision process. A very well funded method for evaluating Business Rules Management Systems (BRMS) can be found in [2], as an multi-attribute decision making analysis. As for evaluating a Business Rules Approach, we propose a general set of “Yes or No” criteria presented in Table 1. We have been applied these criteria on the three approaches presented above. Note that in Table

1, the symbols A, B and C represent Von Halle's, Morgan's and respectively Bajec and Krisper's approaches. Also the symbol "Y" represent the answer "Yes" and the symbol "-" "the answer "No".

**Table 1.** Criteria for evaluating Business Rules Approaches

Criteria	A	B	C
Propose a business rules classification scheme	Y	Y	-
Cover all the stages of the development cycle	Y	Y	Y
Advocate the use of commercial products	Y	-	-
Provide tool support	-	-	Y
Provide rule syntax and style	-	Y	-
Rule syntax is in compliance with commercial products	-	Y	-
Provide a model for rules repository	-	Y	Y
Is business oriented	Y	-	Y
Is technological oriented	-	Y	-

## 6. Underlying the decision to introduce business rules facilities in a software system

Even there are many software companies, consultants and research institutions that provide business rules solutions, business rules are usually only gathered when dictated by law or as the first step in the automation process.

From the analysis of various business rules approaches, it is clearly that introducing facilities for business rules management in a software system implies considerable effort, especially during business modeling phase. This could extent the software development life cycle and also increases the cost of development. For these reasons only, the decision to follow up a complete business rules approach must be very well founded and could be based on the answer to questions like those proposed in [4]:

- Does your organization change itself, from time to time? Might such a change be as small as a change in one rule at a time?
- When the organization wants to change a rule, how does the IT function respond? Does the IT function know where the rule is enforced?
- How long does it take to make such a change? How much does it cost?
- Are there rules that cannot realistically be

traced to all of their automated components or that are too expensive to change?

We must specify that, by *complete business rules approach* we designate the use of a specific methodology for business rules identification, specification and modeling, but also the implementation of the rules using BRMS products or business rules or workflow engines.

Though it is an important software development strategy in the context of the new challenges brought in by the on-going extension of electronic businesses, a complete business rules approach properly fits a rather narrow area of applications, with characteristics like the following:

- have many decisions;
- have interrelated decisions;
- would like to have individual services for every customer;
- frequently introduce new products and new service offerings for customers;
- need to support business rules that change frequently;
- changes are time sensitive;
- business logic is shared across systems;
- rules affect customer interaction or core business processes;
- have to solve problems that are beyond any obvious algorithm based solution
- need to understand how results are being determined;
- domain experts (or business analysts) must be involved in the development and maintenance, but are non-technical.

Currently, there is a variety of business domains that use BRMS solutions, like:

- *Mobile communications*: billing rules are customer oriented and are frequently updated;
- *Banking and Insurance*: new products appear constantly, customers are processed individually;
- *Finance*: services highly depend on state regulations;
- *Electronic commerce*: computer-aided selling, personalized services.
- *E-government*: legislation, regulations, department policies, procedures, handbooks, manuals, circulars, memos, interpretations.

## 7. Final considerations regarding the design of a General Business Rules Approach

Starting from the obvious advantages of the business rules approaches, we have to consider the possibility to apply their underlying prin-

ciples, at some extent, for the kind of systems that do not fit the categories mentioned above. In this context, we introduce the concept of explicit *manipulation of business rules* in a software system, designating any attempt to treat business rules as independent assets in any stage of the development cycle. The design of a general development process, capable to integrate a set of necessary activities for the explicit manipulation of business rules, will have to consider at least the following aspects:

- choose a flexible and well-established development process, capable to adapt to the system characteristics and, eventually, to the implementation technology;
- choose a type of software development cycle;
- introduce specific elements and activities from one or more business rules approaches.

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