

Structuring of Business Rules in Information System Design and Architecture

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Abstract: The approach to business rules introduces a new layer of business rules to the Information System design and architecture. As the rules are separated from the data and presentation aspects of the system, numerous changes have to be applied to the traditional process of information system development. Proper structuring of business rules becomes crucial.

Keywords: Business rule, structuring, information system.

1 Introduction

MOST of the currently used information systems consist of two basic layers - data management and presentation (end-user). During the development of those systems, business rules are not treated differently - they are used in various process data and models. The rules are not presented as separate entities during the development phase or their presentation is not sufficient for efficient evaluation of the results of a certain designing phase. Finally, the rules become spread to several locations. The expenses of accepting such systems in variable business conditions are usually very high, while the changing process is very slow. There are currently a few techniques and tools which are available and used for partial process automatization of the presentation of new integrity limits in the function system, but in terms of system development, such techniques are useless. Nevertheless, development of the traditional information system is very well-examined, there is a good choice of methodologies and tools for all phases of the development, especially implementation.

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The approach to business rules offers a solution to the adaptation of the information system problem. Business rules based on limitations of the information systems, as well as other business rules in the declarative form, are forwarded to a specialized system for rule interpretation - rules engine. Rules engine takes full responsibility in rule estimation and in providing the accuracy of the state, final facts, etc. Changes in rules are fast and effective because each rule is presented only once in the specialized "storage". Since business rules based on information systems consist of three layers (data, business rules and presentation), a new independent aspect of business rules in the development process is presented.

The approach to business rules can be viewed as an evolution of the traditional approaches. However, whenever there is a new ideology, there are problems. Information systems based on business rules are very flexible, but the making of such systems can be too expensive, while the operation speed can become an issue. These are the main reasons why an acceptable solution needs to be taken into account. The approach to business rules should be applied during the design of the information system phase, while the system should be implemented by the use of traditional tools and DBMS.

2 Basics of the Approach to Business Rules

The approach to business rules presents a new layer of the information system and that is the layer of **Business rules**. This new layer consists of information about all the things that can be ascribed to the term "rule" or business rule. Business rules themselves are not only about testing for maintenance of data accuracy, but also about terms and facts necessary for understanding and defining business.

Most analysts and researchers accept the classification presented in the GUIDE [1] project. The basic types of business rules which presented this model are:

1. Derivation. Expressing knowledge derived from entrepreneurship knowledge. It can be mathematical calculation or conclusion.
2. Structural proving. This expresses the aspects of entrepreneurship structure. It can be a fact or a term.
3. Action proving. This limits or controls the actions of entrepreneurship.

It can be authorisation, state or integral state.

The most famous model for analyzing the action types of rules is the Ross Method [2, 3] which, in combination with GUIDE, creates the broadest view of business rules.

3 Structuring of Business Rules During the Development of the Information System Based on Rules

Some of the most famous business rules based on the approaches of designing IS, such as the von Halle approach [4], take into account three aspects of the information systems which are included at the same time during the whole development process (for example, data, business rules and processes). Business rules start during the project planning and end in an independent section of the final system.

Gathering of all rules in the field of business is strongly recommended, despite them being realized or not, or even familiar to the computer system. Analysts should not be bothered by design problems and system coding. Nevertheless, the set of rules given to the data system developer should be smaller than the ones documented by the analyst.

The process of structuring of business rules can be viewed as a set of five rules:

Documenting characteristics of the business domain. Problem: which methodology should be used?

The development of data model which will be used during the specification of business rules. Problem: which data model should be created?

Forming conclusions of business rules. Problem: which methodology should be used for discovering and expressing rules in the form of informal conclusions?

Formal expression of business rules conclusions. The data model must be used in this step. Problem: which classification, methodology and formalisation of business rules should be used?

Establishing business rules storage. Problems: which metamodel of rules should be used and how should it be implemented?

The first step has many similarities to the traditional approaches even though shifting to business rules demands the adoption of some new techniques [4,5]. The rest of the steps are connected to business rules even though a lot of non-traditional approaches for solving the developed problems are needed. Based on research, the following techniques are presented (figure 1):

- (a) Data model is an extended connected diagram (EER)
- (b) Suggestions presented in the Ross method are specially taken into account when making conclusions about business rules.
- (c) The Ross Method is used for formal expression of rules conclusions.
- (d,e) The parameter-led approach is accepted for storage of business rules, which is developed for applying special characteristics of the Ross Method.

Although the Ross Method is dominant in the presented process model, analysts also need to take into account the application of GUIDE.

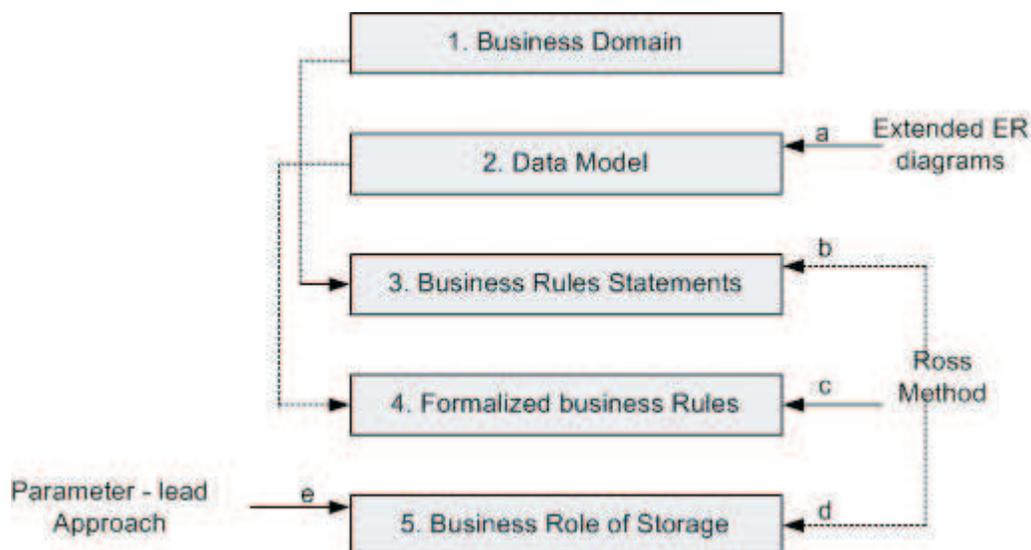


Fig. 1. Model for the structuring of business rules process.

The diagram of extended relations of entities is chosen as a recommendable system of noting for the logical data model because of its flexibility and readiness for information expression, which is not visible in other logical models. The main advantages of this system include more detailed entity state representation and precise relationships. It is also possible to use an alternative class diagram, as a part of UML notation.

The presented methodology of structuring rules is tested through the usage of a specially developed rule, which enables any rule formulated by the Ross method to be saved in the data basis. The conceptual architecture of the information system based on the presented “storage” is defined, but the development of an appropriate rules engine rule is not possible.

4 Combined Approach

According to the business rules Manifesto, composed by the Business Rules Group, the first principle of the independence rule is that first-class citizens in the world are a need [6]. In the combined approach to rules, the only need are world citizens.

The necessity of the approach is the combining of ideas in the background of

both business rules which are based on traditional design in one process. If in the case of business rules based on development methodologies of information systems all business rules develop during the whole process of creation and in the end change into some type of a system for rule interpretation, where in the case of the combined approach the demands of the users are seen as a set of business rules, which are later distributed among relevant parts of the system design, the finished implementation is in no other sense different from the traditional information system. There are numerous advantages of that development aspect in comparison to the traditional approaches:

1. All users' demands can be collected and saved in the form of declarative business rules, where each of them can later on give some type of a connection to the elements of the process mode and the data model.
2. Changing of any demand during the design process becomes easier while the data and process model develops in a more consistent sense due to the direct effect of business rules.
3. Business rules have conclusions in the natural language which is apparently much easier to understand, especially for non-IT professionals, than diagrams and formal models. Furthermore, these conclusions can be limited to certain documents etc. Therefore, validation and verification of such demands from the interested is relatively easy, even in later steps of the design process.

Basic advantages of the combined approach in comparison to the business rules approach are:

1. The design can be implemented by using tools without the need for investment into additional expertise or into insecure business rules.
2. A complicated storage of business rules for implementation level rules is not needed.
3. There is potentially less confusion in the design phase because the designers are focused only on the data and process aspects of the information system.

4.1 Transition of business rules to data and processes

In the combined approach, the ignored data and process axes in the early phases of the users' demands, as well as the beginning of the data and process model development only during the analysis phase (Figure 2) are presented. The implementation techniques of information systems are taken from the traditional approaches

of development, so the axis of business rules disappears during the phase of system design. Having documented demands of users in the form of business rules enables a more efficient evaluation of the demand's specification. Moreover, the adoption of specifications in variable users' demands is also facilitated. After the acceptance of the model and the approval by the entrepreneurship community, forwarding to designers is possible. Designers will use that specification as a basis for designing. The same applies for demands - only well-defined demands can be forwarded into the analysis phase, during which the data and process model should be developed.

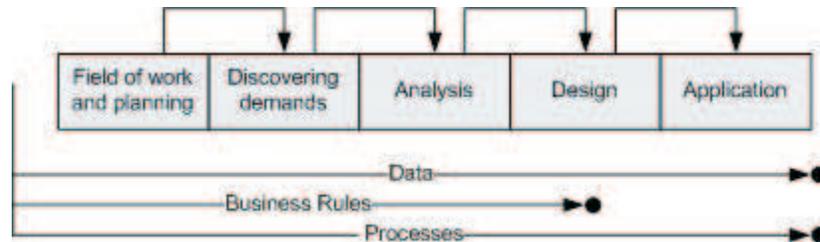


Fig. 2. Information system design by using the combined approach.

The creation of a diagram with functional hierarchy, which will present a nucleus of the process model, is suggested in the combined approach. This diagram is easy for development and for verification, although there are not many details in every function. This inefficiency of information is compensated for by bonding business rules, which are collected in the previous phases of the IS development, with functions that can be influenced by these rules. This process can be partially mechanized. Have in mind that other diagrams can provide the process model. Such solutions result in a model which is relatively easy for understanding and converting into a physical design during later phases of development.

More difficult problems occur in attempts to create data models (data base architecture). Rules must always be based on facts and terms. The same applies for the data model. Therefore, analysts can use structured business rules collected during the previous phases of IS development on the account of creating a consistent data model. This is redundant because data models can be created automatically or with a little help of analysts through usage of the collected rules. This is the point where the structure of rules becomes important.

Basic ideas of the combined approach for design are shown in Figure 3. The business rule model is supported by the initial phases of design. In that way, demand specification is easier to control and modifications can be presented more freely because all analysts need to change the rules. The data model can be regenerated at any time, while the process model can be updated automatically with changes in relevant rules.

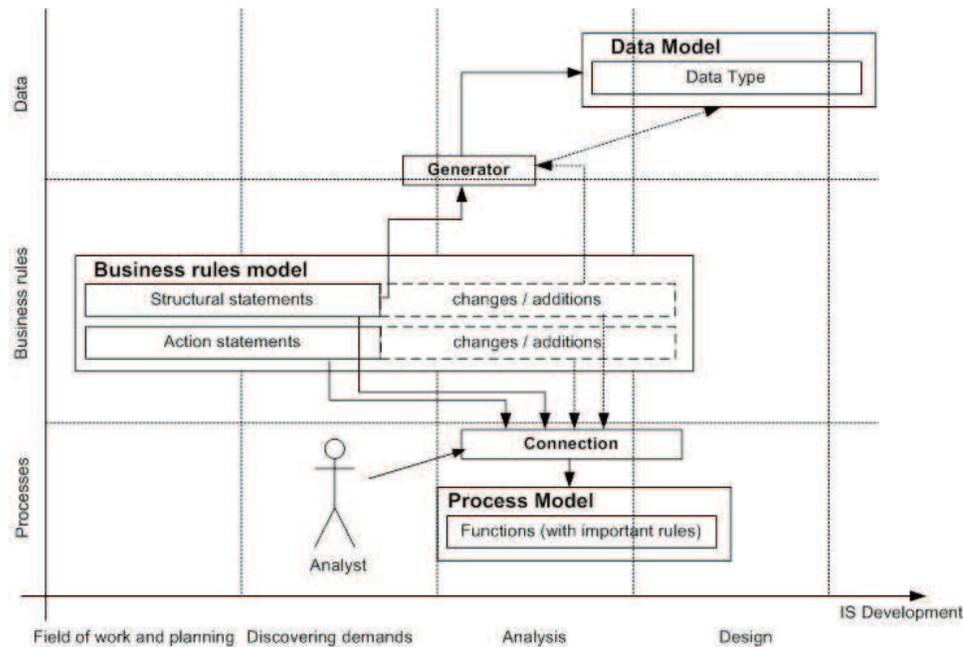


Fig. 3. Rules in relation to the processes and data.

5 Conclusion

The separation of rules from processes and data results in better demand specifications and more acceptable information system. However, the ideas of business rules approaches can be incorporated in the traditional information system development. Early research show that by treating users' demands as a part of business rules can help in a more precise demand specifications, which are easier for business people to understand than the traditional specifications. In addition to this, it is shown that a good flow of business rules to data and process models during the phase of analysis of information system development can be accomplished.

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