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COMPARISON OF BUSINESS PROCESS MODELING STANDARDS

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ABSTRACT

The article emphasizes the important role of business process modeling in business management and explores the standards used for modeling of business processes. It presents trends for the use of these standards over the years. The main building elements of EPC and BPMN standards are presented and their main advantages and disadvantages are discussed. A comparative analysis of the two standards on six major indicators is made. The results of the analysis show that none of the standards is superior to the other in all cases and that the most appropriate is to choose standard for modeling for each specific subject area.

I. INTRODUCTION

Modeling of business processes (BP) is becoming a bigger part of the factors influencing the methods of business management. The first business processes appeared before more than two centuries and over the years, the definition of BP, and ways to their modeling, change and develop. At present, the representation of business logic by BP modeling is one of the most effective solutions to increase competitiveness, reduce costs and improve the efficiency of any enterprise.

There are many methods and standards allowing interpretation of the business logic in a given BP. The variety of different modeling techniques implies the shaping of different styles in the presentation and operation with information. Currently there is no universal standard for creating BP, which is applicable in all areas defined by business needs. One of the objectives assigned to this article is to analyze and compare the most popular standards for business modeling, and to conclude, which standard is most appropriate to solve a specific business problem.

II. ANALYSIS OF BUSINESS PROCESS MODELING METHODS

The need for unification and integration of different business architectures requires the establishment of standards that accurately define logical components of an business model and the relationships between them. In the last decades in practice are clearly distinguishable a number of standards that are imposed as preferred in BP modeling. Currently the most popular standards are the BPMN, EPC and BPEL.

The diagram in Fig. 1 shows how the trends in choosing of different standards for modeling business logic have been changing over the time. The image clearly demonstrates that by far the most common is BPMN, which for a short time when it is implemented, succeeded to take dominance. This advantage is mainly due to the larger number of notations which enables a more detailed BP. The diagram shows that two standards - BPMN and EPC are relatively stable over the time and have similar performance, whilst the interest in BPEL has been dramatically declined. This is primarily due to the way BPEL is used. Over the time, this standard has been

established as an adjunct to the execution of BP in the process servers, rather than for creating models. Over time, this standard has been established as an aid to the performance of BP on the process servers, rather than for creating models. Taking into account the fact that the majority of BP are used for design and planning and most of them have never run on a server, that explains the falling interest in BPEL.

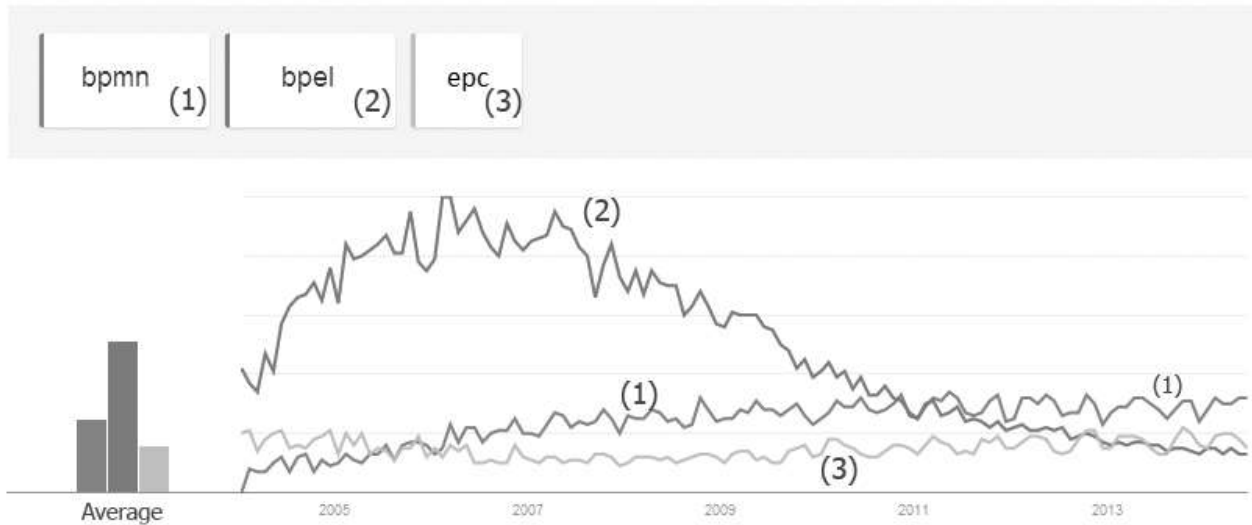


Fig. 1 Trends in methods for BP modeling.

As a conclusion of the analysis of the business process modeling methods, the standards BPMN and EPC, as widespread and imposed in practice, will be reviewed and compared.

III. BUSINESS PROCESS MODELING USING EVENT-DRIVEN PRCESS CHAINS (EPC)

The method of BP description EPC was created by Prof. August-Wilhelm Scheer in the nineties of the last century, and is included in the ARIS Toolset system, as the primary method for BP modeling [1], [2]. The standard set of elements in EPC is composed of: event, function, connectors and control flow (Fig. 2). These basic notations complemented by additional and modified elements allow to differentiate separate data objects, organizational structures or other objects that do not have suitable modeling analogue.

BP modeling with EPC is characterized by the construction of the sequence of events that interpret a particular business function. With the help of Boolean operators ("and", "or" and "xor") it is can easy to create flow that controls the sequence of events and represents specific business decisions.

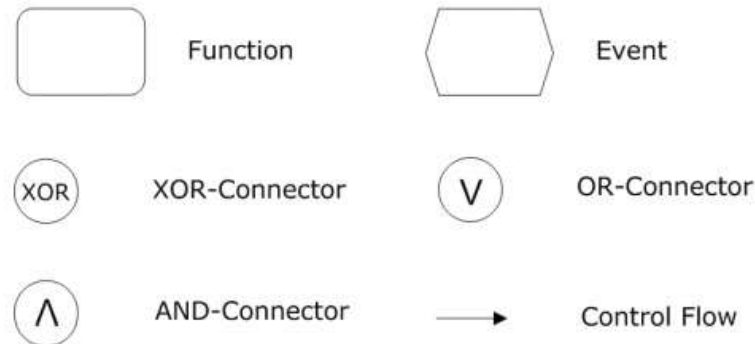


Fig. 2 Basic EPC elements

IV. BUSINESS PROCESS MODELING USING BUSINESS PROCESS MODELING AND NOTATION (BPMN)

BPMN is a method and standard for graphical representation of BP in the form of charts. The standard was developed by the Business Process Modeling Initiative (BPMI) and aims at the creation of a commonly understood notation for describing business logic. The latest version of BPMN - BPMN 2.0 is represented by BPMI in 2011 [3].

The basic building blocks of BPMN are divided into four main groups (Fig. 3). The first group includes objects, organizing the flow of BP. These are notations that contain and represent a specific business logic.

In the second group of the main BPMN elements the **linking objects** are included. This is a set of graphical notations defining dependencies between different components of BP.

The third group of BPMN notation is composed of so called **swimlanes**. These elements are used for the formation of different domains within BP. They are suitable for interpreting different logical or hierarchical structures.

To the fourth group of BPMN components belong so called **artifacts**. These are objects that have auxiliary character and help for more accurate description of the business logic within BP. Examples of artifacts are information that comes with the implementation of BP or group bringing together logically related objects.

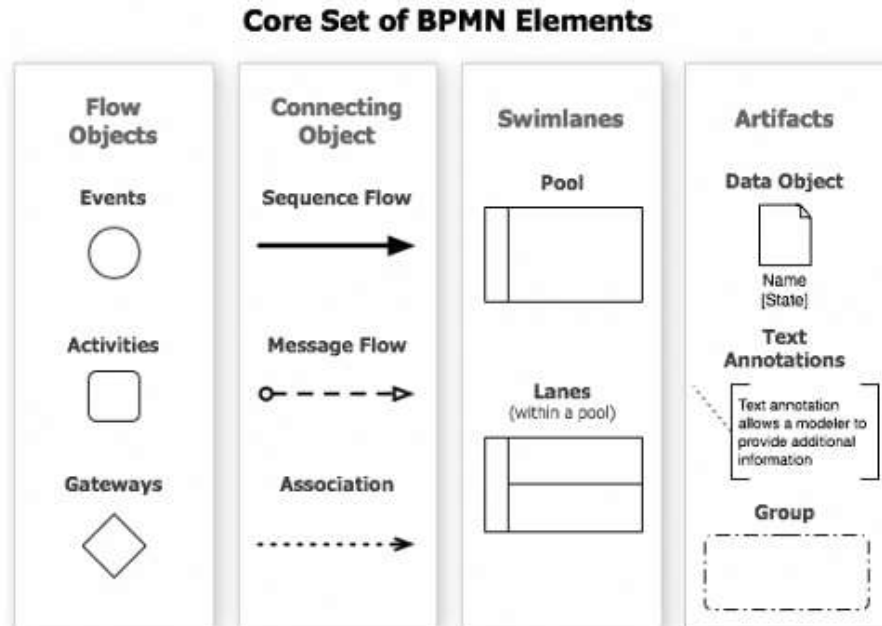


Fig. 3 Basic BPMN elements

V. COMPARATIVE ANALYSIS OF EPC AND BPMN

The analysis of both standards aims to present the advantages and disadvantages of EPC and BPMN, and to identify in what cases it is appropriate to use one or the other notation for BP modeling. The analysis covers the following six areas of both standards: "Degree of expression", "Connectivity at different levels", "Readability and efficiency", "Integration with ERP systems", "Maintenance of semi-structured processes" and "Maintenance of cycling."

Selected areas of analysis characterize the internal organization of the two standards, comparing their key aspects, and determine the level of flexibility and opportunities for integration with third parties.

5.1 DEGREE OF EXPRESSION

BPMN as well as EPC use a set of graphical notations for describing business logic in a BP. Both standards have the basic elements called core and additional ones - extended. The degree of expression characterizes the variety of situations (Workflow Patterns), which each standard is able to interpret by its graphic notations.

In BPMN there is significantly larger number of graphic objects used to describe a given BP but nevertheless, it does not make lower the EPC level of expression. To determine more expressive of the two standards it is necessary to compare them in the context of different logical situations - Workflow Patterns. Fig. 4 presents the result of the comparison.

In Fig. 4, with "+" situations that can be realized by standard are marked, similarly with "-" is indicated, those that cannot be interpreted by a graphical notation. With the sign "+/-" is used to mark the situation (pattern) that can be described with number of logical notations.

From Fig. 4 it is clear that BPMN is quite ahead in terms of expression of the business logic.

No.	Pattern	BPMN	EPC
1	Sequence	+	+
2	Parallel Split	+	+
3	Synchronisation	+	+
4	Exclusive Choice	+	+
5	Simple Merge	+	+
6	Multiple Choice	+	+/-
7	Synchronising Merge	+/-	+/-
8	Multiple Merge	+	+
9	Discriminator	+/-	-
10	Arbitrary Cycles	+	+
11	Implicit Termination	+	+
12	Multi Instances without Synchronisation	+	-
13	Multi Instances with a priori Design Time Knowledge	+	-
14	Multi Instances with a priori Runtime Knowledge	+	-
15	Multi Instances without a priori Runtime Knowledge	-	-
16	Deferred Choice	+	-
17	Interleaved Parallel Routing	+/-	-
18	Milestone	-	-
19	Cancel Activity	+	-
20	Cancel Case	+	-

Fig. 4 Comparison of EPC and BPMN according to Workflow Patterns

5.2 CONNECTIVITY AT DIFFERENT LEVELS

Another, also an important aspect for the comparison between EPC and BPMN is connectivity between different levels of BP - organization, data, process, function and product. Fig. 5 presents the result of comparison between the connectivity options of both standards.

From Fig. 5 it is clear that EPC is much more expressive regarding the connection with other elements. In EPC there are more than ten possible links between process and organizational component [4], while in BPMN that is not possible.

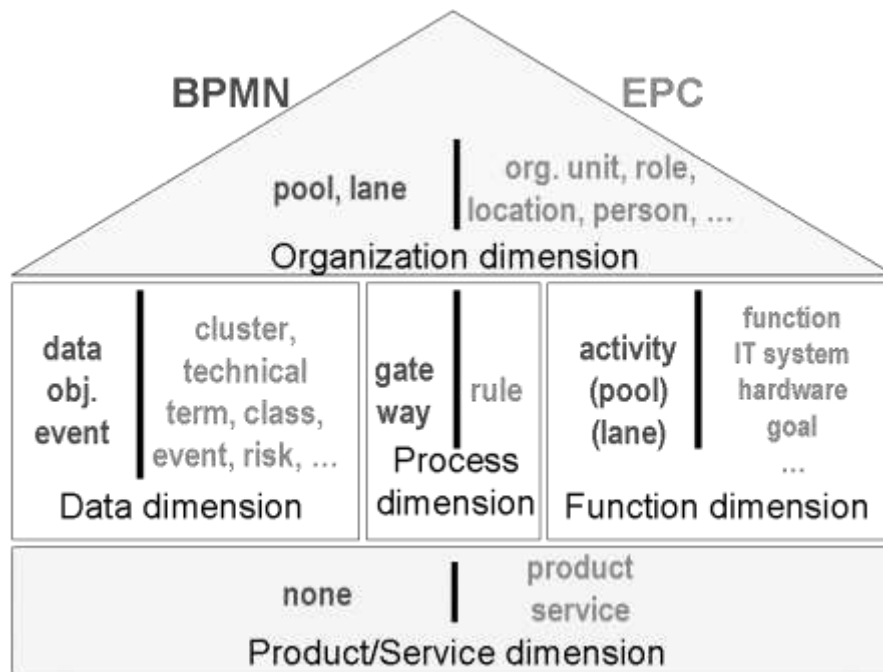


Fig. 5 Comparison of linking features of EPC and BPMN

All this makes EPC a better choice when composing BP using different data, resources and their connections within the system or outside.

5.3 READABILITY AND EFFICIENCY

Readability and efficiency help to determine how a chart is actually applicable and easy to comprehend. Although there is no standard notation classifying readability, there are some characteristics that may determine the readability of any graphic notation. For this, the



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following five principles are important: representational clarity, perceptual discriminability, perceptual immediacy, visual expressiveness, and graphic parsimony [5]

In accordance with these five principles the EPC can be determined as more easily readable than BPMN standard and the main reason for this is the smaller number of graphic elements.

From the viewpoint of efficiency, a BP created by BPMN is more compact than that represented by the EPC. The main reason for this is the smaller number of notations for events and more compact transmission of information via the connections between elements.

5.4 INTEGRATION WITH ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS

The use of BP in ERP systems is one of the main ways to automate (as much as possible) the process of managing an enterprise. BPMN models as well as EPC models can be used as an input BP in most ERP systems. However, BP modeled by EPC are preferred for use with ERP systems as most of them are adjusted for use with this standard. There are two reasons for this. First, the EPC model of BP are preferred for planning on a higher level, which makes them more suitable for integration with the ERP system. The second reason is the joint historical development of SAP R/3 and the use of EPC as the main graphic standard. All this makes the EPC more appropriate when working with ERP systems.

5.5 MAINTENANCE OF SEMI-STRUCTURED PROCESSES

Most BP aim to provide structure and a model of behavior that are unambiguous and could easily be interpreted. However, often in practice it is required the creation of BP, for which the included actions are known, but their sequence or number of executions are not known. Such a process is called a semi-structured or more ad-hoc. In BPMN this can be represented by Ad-hoc subprocess, whilst in the EPC is not possible. This makes BPMN logical and only choice for handling semi-structured processes.

5.6 MAINTENANCE OF CYCLING

Maintenance of cycles is an important notation for BP and allows a process or sub-process to be executed as many times as necessary. BPMN and EPC enable implementation of cyclical processes, but in BPMN it becomes much easier. BPMN allows declaring cycles without adding additional links between the elements of BP. In EPC is needed to define a function or rule for monitoring the performance of cyclicity, which does not make it impossible to implement, but it is much more difficult than in BPMN. In addition, BPMN offers 11 different attributes, which may cover different levels of cyclicity. All this makes the BPMN standard preferred when working with cyclic BP.

VI. CONCLUSION



It is hard to compare two standard of BP modeling, especially if they differ in most aspects. In such cases, it can be said that the disadvantages of one standard represent the advantages of the other. The analysis results give a slight advantage in favor of BPMN in comparison with EPC.

However, it is possible to determine which standard is better for work in a particular subject area. Choosing the EPC or BPMN is primarily based on the purposes for which the modeled BP will be used, the experience with any of the standards, and at last but not least - the experience with modeling tools.

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