Business process modelling in the context of SOA – an empirical study of the acceptance between EPC and BPMN

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Abstract: The successful introduction and use of service oriented architecture (SOA) is based on its symbiosis with the business process management (BPM). A precisely targeted usage of process modelling is an integral part of BPM. Event-driven process chains (EPC) and the business process modelling notation (BPMN) are the first choice for the process-oriented modelling. Business process execution language (BPEL) processes can be generated from both these models. They orchestrate the services of the SOA platform, thus, leading to the new IT applications without much expensive programming. The following contribution will introduce the results of an empirical survey on the acceptance comparison of EPC and BPMN.

Keywords: business process modelling notation; BPMN; business process modelling; event-driven process chains; EPC; service oriented architecture; SOA.

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1 Introduction

Gartner predicts that in the year 2010 at least 65% of the major enterprises worldwide will have switched more than 35% of their application portfolios over to service oriented architecture (SOA). With that, a savings of up to 53 billion US dollars should be achieved (Pezzini, 2006). However, this prognosis is only realistic if business process management (BPM) and SOA interfuse and push each other forward. In this context, it is imperative to use the most efficient methods of process modelling for SOA. As early as 2003, the term ‘service oriented business applications’ (SOBA) was coined by Charles Abrams, Gartner’s research director.
2 Process modelling and SOA

In the SOA context, business processes will be implemented on the basis of composite applications. According to Woods (2003), it is possible to increase the flexibility of this configuration by the help of process modelling. Process modelling enables to change the functionality of an application in a simple way without the necessity of difficult and expensive programming (Woods, 2003). However, the different modelling possibilities bring with them a transformation problem between the specialists of the business and IT departments, which can be rightly referred to as an ‘engineering gap’. The main cause of this gap is that the business economists model after a business process oriented paradigm while the IT specialists prefer for their modelling the object oriented paradigm, mostly in form of unified modelling language (UML). Apart from this gap, there is an additional problem which should be in the centre of this paper. If the enterprise chooses the process oriented modelling, one has to decide if event-driven process chains (EPC) or business process modelling notation (BPMN) is the better model. It mostly depends on which model type is more accepted by the users.

Figure 1 From a business process to an application via SOA (see online version for colours)

Notes: BPEL, business process execution language
BPMN, business process modelling notation
EPC, event-driven process chain
UML, unified modelling language.
Figure 1 shows that it is possible to transform the process models via SOA-based platform into functionality applications both with the help of the process and object-based oriented models as they are both based on Petri Nets (Weske, 2007). The field marked by ◊ on the illustration draws attention to the problem of this study – business specialists would normally model the processes in EPC or in BPMN. Adding to these process models the IT logics elements connected to the services of the SOA platform, it is possible to create the basis to the functioning application with the elements of EPC or BPMN via business process execution language (BPEL). BPEL is an orchestration language with the help of which the services contained in the SOA platform can be organised into business applications (van der Aalst et al., 2003a; Barchewitz et al., 2007; Eichhorst, 2007). But the question remains which to prefer in the process-oriented modelling in preparation to SOA, EPC or BPMN?

3 EPC vs. BPMN

Different semi-formal process-oriented model types are derived from Petri Nets, based on the self-contained formal theory. EPC and BPMN have become the most important of these and should be briefly introduced here.

3.1 Event-driven process chains

The EPC method was developed in 1992 by the team of August-Wilhelm Scheer at the Saarbrücken University in a joint research project with SAP AG. The EPC is now widespread in the practical use especially in the German-speaking environment. A big part of it is due to the ARIS Toolset of IDS Scheer AG, which is one of the leading software products, alongside Gartner, in the field of BPM worldwide. EPC is integrated in ARIS Toolset in the so-called control view. The basic idea of EPC is that events trigger functions, or the executed functions cause events. Using connectors, we can model the logical relations within the process. Alongside the classical (‘slim’) EPC, which makes do with a few symbols, an extended form of it exists (eEPC), in which the functions can be described in detail with the resources of other views (organisations, data, functions). This version was developed mainly for the process documentation. Its features are its intuitive nature and simplicity of modelling as well as its comprehensibility and easy interpretation.

3.2 Business process modelling notation

The BPMN was developed in 2002 by Stephen A. White, an IBM employee, and made public by business process management initiative (BPMI). In 2005, BPMN was transferred from BPMI to Object Management Group (OMG) and was declared a standard there in 2006. As EPC, BPMN is considered easy to understand and apply. Thus, it is not surprising that the most central symbols have a counterpart in EPC (see Figure 2). A contrast to EPC is that organisation structures are modelled in the manageable pools or swim-lanes. Thus, a good optical representation of the B2B and B2C sectors can be achieved. In addition, the BPMN standard supports the transformation of business models in execution languages, like BPEL. In 2008, OMG is
planning the introduction of the 2.0 Version of BPMN. Thus, the graphic notation will be completed by a modelling language.

As it was seen in Figure 1, both EPC and BPMN models have to be transformed into BPEL to achieve the orchestration of the SOA platform services. As it can be followed from the fundamental papers of van der Aalst and Hofstede about the workflow patterns, BPMN has a higher number of the common workflow patterns with BPEL than EPC (van der Aalst et al., 2003b). There are 12 common BPMN-BPEL patterns and only eight patterns common to EPC and BPEL. The higher degree of similarities between BPMN and BPEL is a definite advantage for BPMN, which does not significantly affect EPC. It is the transformation tool used which makes up the quality of the BPEL processes.

**Figure 2** The comparison of the basic building blocks of EPC and BPMN (see online version for colours)
4 Two simple process examples

The following process description should be modelled as EPC and in BPMN:

*An employee applies for a business trip. He first fills out a form, which he sends to the manager. The manager processes the application which he received, either accepting or rejecting it. Then, he sends the processed application back to the employee. After the employee has received the processed application, the action is completed.*

You can see the solutions on Figures 3 and 4.

**Figure 3** EPC ‘business trip application’ (fragment) (see online version for colours)
Even though EPC prefers the vertical and BPMN, the horizontal presentation of the process symbols, without a doubt, both process presentations can be clearly read. As the intermediate events are left out in EPC, which is a usual practice today, the process presentation is brief and concentrated. It closely resembles the BPMN activity-dominated presentation. The pools make it possible to assign the activities to the two active parts, ‘employee’ and ‘manager’, thus, permitting to stress who is responsible for the process. This raises the efficiency of the process control.

5 Evaluation of the model presentation with an empiric assessment test

‘Which to prefer, EPC or BPMN?’ was our initial question. To give the conclusive answer, the Queensland University of Technology Brisbane started the series of extensive questionnaires (QUT and UQ, 2008). If we proceed on the notion that BPEL processes can be produced both from EPC or BPMN and that the transformation procedure between both model types already exists, the question in our test is reduced to ‘Which modelling types does the volunteer prefer?’

To find the guideline for the answer, in November 2007, 90 third semester bachelor students of the Department of Business Administration of the Leipzig University of Applied Sciences were taken into one test group. Eighteen students volunteered to participate in the model test. ‘Theory and practice of process modelling’ is planned for the fifth semester. That is why the volunteers were not biased in relation to EPC and BPMN. A condensed lecture informed them about the basics of the process modelling and case studies were used for explanation. For consolidation, they were given the task of an extensive process scenario, which they had to model in EPC and BPMN. The individual solutions were checked and discussed in detail, without any reference to the model types.

The aim of the modelling test that followed was to present the process scenario ‘business trip application’ both in EPC and in BPMN and assess its properties on the scale from 1 (very good) to 6 (very bad) on the basis of the two following questions that they were asked after the modelling:
1. How can you cope with the conversion of the process scenario into the model?

2. In which quality the process reality is reflected in the business model?

The results of the assessment were better for the EPC. In the average marks for the first question, it was 2.39 (EPC) vs. 2.83 (BPMN) and for the second question 2.11 (EPC) vs. 2.56 (BPMN). In possible additional remarks, it was stressed that EPC has a clearer layout (5x), is more logical (5x), more comprehensible (3x) and easier to implement (3x) than BPMN.

Considering the modelling results achieved on the basis of the scale of max 20 points each model, without any time limit, the result was just the opposite (see Table 1).

<table>
<thead>
<tr>
<th>Model</th>
<th>Average points</th>
<th>Average time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPC</td>
<td>13.69</td>
<td>10.39</td>
</tr>
<tr>
<td>BPMN</td>
<td>15.89</td>
<td>7.88</td>
</tr>
</tbody>
</table>

The participants had a higher number of points with the BPMN model and needed less time for it than for the solution with the EPC model. At first sight, this test result is surprising in comparison with the results of the questionnaire. The deeper analysis shows that BPMN, in spite of its subjective perception, leads to a more stringent modelling, which diminishes the number of the modelling errors. The reasons for this more stringent modelling are the provided pools or lanes and the general absence of intermediate events.

6. The conclusions for the modelling in SOA context

As far as the decision between EPC and BPMN in SOA-context is concerned, the empiric analysis brought no conclusive result for one or the other alternative. Thus, in the next few years, the parallel application of both EPC and BPMN is to be expected. Nevertheless, it can be stated that BPMN has the following advantages over the classical EPC:

- BPMN was developed ten years later than EPC and could base on the existing experience of the EPC usage, taking into consideration its drawbacks.
- EPC was originally focussed on process documentation, but the aim of BPMN from the very beginning was the transformation of the process model into BPEL.
- The three following aims are achieved with the introduction of the pools and lanes in the BPMN notation:
  - the structuring of the process according to participants with the clear distinguishing for their responsibilities
  - retaining the clear layout, even in case of complex process structures
  - correspondence to UML.
The EPC was not frozen, though. There are practicable suggestions of Ziemann et al. (2007) with regard to cross-organisational business processes, which improve the organisation modelling of complex processes. Finally, one should remember that, if necessary, the transformation from EPC into BPMN is possible.

For the enterprises, it has at least three consequences:

1. Process modelling in SOA context is indispensable.
2. The enterprises, which in the past have chosen to use EPC and use it for their process modelling, can stick to this decision. Nevertheless, it is recommendable to actively follow the further BPMN development.

The enterprises which intend to introduce SOA and have not yet modelled their processes should tend to BPMN, the SOA platform permitting.

References


