

TOWARDS A META MODEL FOR BUSINESS PROCESS CONCEPTS

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Abstract: Information systems involved in automating parts of a business process need to be process-aware, in order to become an integral part of it. Before automation is achieved, the part of the business process to be automated needs to be made explicit and then operationalized. Business process models could be used to make the process explicit. Domain standards could be used to make it operational. However, there is no approach available to evaluate to what extent both the chosen modelling technique and standard are able to cover the actual requirements of the business process. A meta model for business process concepts can help for such an evaluation. Although there have been attempts to identify business process concepts and to create a meta model of business process concepts, the current studies do not include an explicit approach on how to identify these concepts. Further, how to construct such a meta model and how to include new elements to it remains implicit. This paper presents an approach on how to construct a meta model for business process concepts. The approach defines how to capture and define business process concepts, how to construct a meta model using these concepts and how to extend the meta model. The paper also illustrates how to apply the approach. The actual construction of the meta model for business process concepts is a subject of further research.

1 INTRODUCTION

When two or more computerized information systems are involved in automating parts of a business process, they need to be process-aware in order to handle complex communication. If we want to use computer systems to support part of a business process, this requires the disparate information systems to be able to express, and especially interpret a broader range of meanings. Thus, the applications that support the business processes, not only have to be able to express what needs to be said, but also to interpret it, and act upon this interpretation in an intelligent manner. Thus the context of the business process needs to be captured and made operational. One possibility to make this context operational and embed it in the system is by using domain standards.

EDI standards promised significant advantages in facilitating the exchange between business partners, reducing errors, increasing speed, cutting cost, and building in competitive advantage (Sokol, 1995; Damsgaardn, 2000). However, the EDI standards failed to support the complex business communication. Furthermore, the focus of many IS

professionals on EDI was how to provide technical tools, rather than to support the way people do business (Huang, 1998). New standards, which strive to allow for interoperability between disparate systems, are currently developed. These standards try to capture the context of a business process, in order to allow for meaningful communication (for example, in the healthcare domain two such standards are HL7 standard for clinical data interchange and DICOM for digital images). Standard development organizations or consortia of companies develop such standards, based on their specific interpretation of the domain. However, in order to have value for a particular business process, a standard needs to be linked to a particular situation, which might be different from what the standard developers had in mind. Thus, the standard needs to be evaluated (for a specific business process) whether it can cover the context (of the particular business process), which needs to be embedded in the system.

The context of a business process might be to a large extent implicit. Thus, before making it operational (by using standards), it first needs to be made explicit. Models could be used to capture and

to make this communication context explicit. A commonly accepted way of modelling does not exist (Wand, 1989). However, the modelling power of various methodologies, their weaknesses and strengths, can be analysed in terms of ontologically based common set of constructs (Wand et al, 1989; Söderström et al., 2002). As it is well known (Brinkkemper, 1989), a meta model can help to make such evaluation. Further, it has been argued that meta models based on ontological constructs can be very valuable in such evaluation (Rosemann & Green, 2002). As the specific business situation, the modelling technique and the standard have in common that they all address some elements of a business process, a meta model for business process concepts can be a common ground for comparison. However, to our knowledge, a complete meta model which can capture key business process concepts is currently not available.

Although we need a meta model for business process concepts, due to the complex nature of business processes, such a meta model will be difficult to construct without following a well-defined method. Thus, within this paper we focus on developing a method how to construct such a meta model. For illustration purpose, we will show how the method can be used.

The remaining part of the paper is structured as follows. In Part two, we discuss the possible approaches for the method construction. In part three, we describe the method concerning the construction of the meta model. We illustrate the use of the method in part four and we end this paper with conclusions.

2 APPROACH

We have identified three different strategies that can be followed to arrive at a meta model. The first one is to take an existing ontology as a starting point, build a meta model based on this ontology and use the meta model to evaluate the capabilities of existing methods, tools, techniques (MTTs) for business process modeling. The benefit of this approach is that the concepts are formally defined within the ontology. Although some work is done in that direction (see Rosemann & Green, 2002), a complete meta model for business process concepts is not provided. Furthermore, some of the limitations of starting from an ontology are that the robustness

of the ontology and its practical usefulness can be questionable (Green & Rosemann, 2000; Wand & Weber, 2002).

The second strategy is to start by identifying the essential elements of business processes. This can be done using two types of sources: 1) existing business process definitions (e.g. Davenport, 1993) and 2) MTTs for business process modeling (e.g. IDEF0, REAL). After such elements are identified, they can be linked within a meta model. The advantage of such an approach is that the elements identified in this way are specific to business processes. There is existing research in that direction (see Lin et al., 2002; Mayer et al., 2000). This approach can lead to ambiguities and misinterpretations, since usually the business process elements are not formally defined.

A third strategy for constructing the meta model is to follow a hybrid approach- using both an ontology and MTTs. The advantage of such an approach is that the business process definitions and the MTTs will provide essential business process elements and the ontology can provide formal definition of these elements. This is the strategy that we will follow as well. In literature there is an attempt to provide a meta model for business process concepts following the hybrid strategy (see Söderström et al, 2002). However the authors did not provide clear definitions of the concepts used, what steps they followed to arrive at that meta model and how to add new concepts to the meta model. To overcome such limitations, we use the hybrid approach in combination with well-defined procedure to arrive at the meta model. This is further described in the section below.

3 METHOD

The method to construct a meta model for business process concepts is schematically represented in Figure 1. The first step in the approach is the identification of business process elements from existing business process definitions. The second step is to take an existing ontology and to check whether it is possible to express the business process elements using concepts from that ontology. If yes, we include those concepts from the ontology, which we use to express the business process elements in what we call "ontology business process concept base or (OBPCB)". In this way we include only the relevant concepts from the ontology.

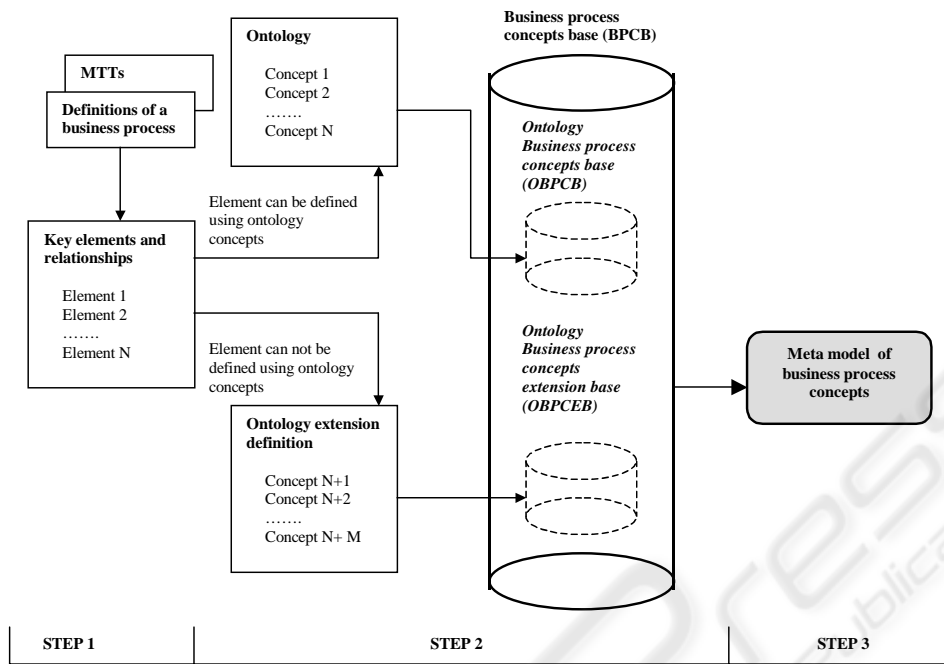


Figure 1: Method for construction of a meta model for business process concepts.

If a business process element cannot be expressed using concepts from the ontology, then new concepts are defined in what we call “ontology extension definition”. After that the newly defined concepts are included in the “ontology business process concept extension base (OBPCEB)”. The “business process concept base (BPCB)” includes all the concepts from the “ontology business process concept base” and “ontology business process concept extension base”. Finally in step three, the “business process concept base” is used as a basis for the meta model construction. The whole process is then repeated for a number of MTTs.

4 ILLUSTRATION OF THE USE OF THE METHOD

For the identification of business process elements, we have used a number of business process definitions, as well as one MTT (ARIS). We have chosen to use the FRISCO ontology (see Falkenberg et al., 1998) for defining the business process concepts. The choice of FRISCO is pragmatic, due to the familiarity of the authors with that ontology. Bunge-Wand-Weber ontology can be an alternative. Within this paper we will not provide the definitions

of the FRISCO concepts. They can be found in the FRISCO report.

We apply the method described in the previous section to the definitions, as well as to ARIS. Some examples of business process definitions that we will use for the illustration are presented below.

Examples of business process definitions

- 1) A business process is “a specific *ordering of work activities*, across *time* and *place*, with a *beginning*, an *end* and clearly identified *inputs* and *outputs*” (Davenport 1993)
- 2) A business process consists of *activities ordered in a structured way* with the *purpose* to provide *valuable results* to the *customer* (Ågerfalk, Goldkuhl et al., 1999)
- 3) A business process can be viewed as a *structure of activities* designed for *action* with focus on the *end customer* (Stock and Lambert 2001)

Figure 2: Examples of definitions.

The outcome of the application of the method is schematically represented in the figure below. The figure illustrates that based on the business process definitions, a number of business process elements were identified. After that, by looking at the FRISCO concepts and how they are defined, we have selected those elements that seemed to be able to cover the elements presented in the definitions.

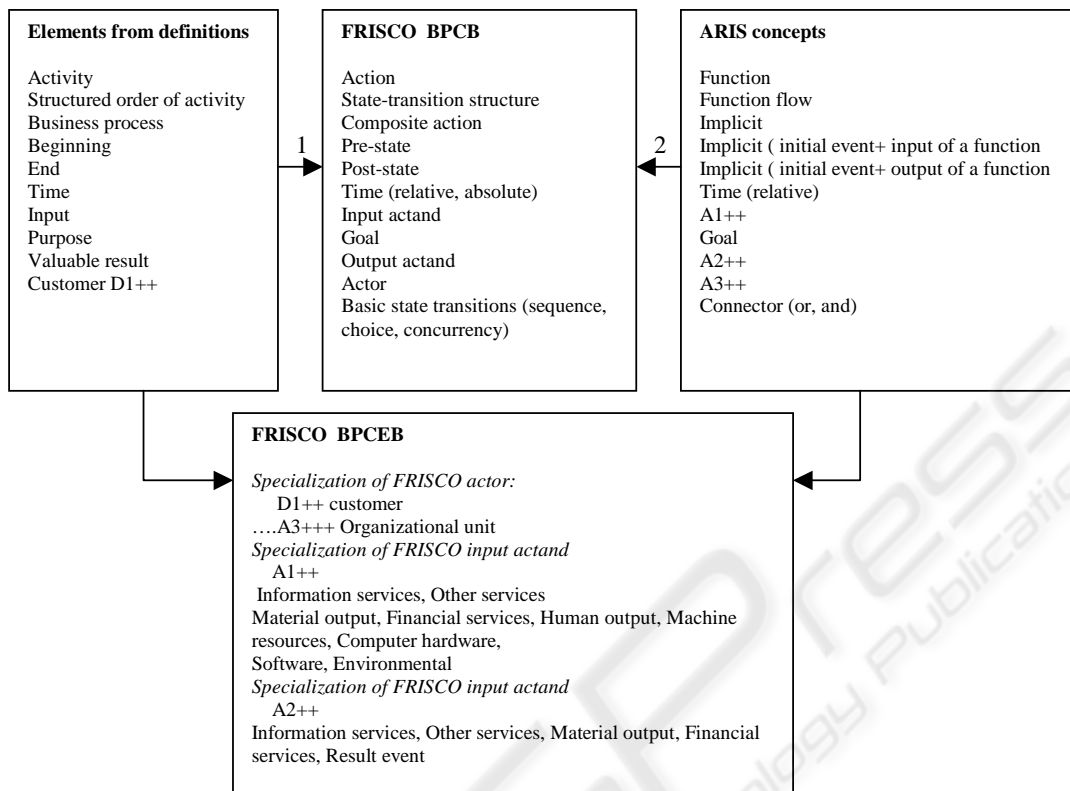


Figure 3: Illustration of the use of the method.

When reviewing the ARIS concepts, we have identified that there is a concept connector (or, and), which seems closely related to what FRISCO refers to as “basic state-transition structure”. As a result, we have included that concept in the OBPCB.

If we look at the elements from definition box, we will see that there is an element D1++ and when we look at the ARIS concepts box we will see elements A (number)++. This means that the concept defined in the definitions or in ARIS can fall under a general category of FRISCO, however it can also be included in the BPCEB as a specialization of the general concept. This would provide for richness of the business process concepts. That is why, we have included all the element that were marked with ++ in the BPCEB. Within this paper we will not formally define these new concepts, however they can be defined as specializations of already defined FRISCO concepts.

5 CONCLUSIONS

We started this paper with the problem, that we need to identify to what extent a modelling technique and a standard are capable to capture the business

process requirements of given situation. We have further argued that a meta model for business process concepts can be useful for such an evaluation.

Within this paper, we have outlined a method how to construct such a meta model, we have provided an illustration of how to use the method and we have arrived at initial set of business process concepts.

Although the further elaboration of the business process concepts and the construction of the meta model will be subject of further research, we consider that the method described in this paper is a necessary step towards achieving the final goal.

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