Towards Situational Business Process Meta-Modelling

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Abstract. Business Process (BP) meta-models allow partial views of the processes. There may be adequate for some processes but not others. Situational engineering has proved its effectiveness in many engineering domains such as software and information system development. Reasoning on a situational approach for BP meta-modelling is a challenging research issue which can contribute to increase flexibility of meta-models and their adaptability to different organisation settings.

Keywords: Business Process meta-modelling, Flexibility, Adaptability.

1 Introduction

Current researches on business process (BP) modelling stress the importance of the flexibility and the adaptability of BP [2], [5] [7]. Reasoning on variability in modelling artifacts can meet the flexibility and context-awareness requirements by offering alternative solutions depending on the context and on the point-of-views of the decision-makers. A BP model is often formalized, at the type level, using a meta-model which captures the concepts supported by this model. We promote the idea that a single BP meta-model is still insufficient. A promising idea is to propose an approach for adapting and configuring existing meta-models according the organisation settings and users' objectives, rather than to advice for a single model which can be too complex for some requirements and simple for others. Accordingly, we focus on the flexibility at the type (meta-model) level of the BP which corresponds to the level 2 of the OMG four-level-architecture for the processes [1].

BPs are of various kinds and are defined in different levels of abstraction using various artifacts depending on the organisation settings and the purpose of the modelling. For instance, in mechanistic or production organisations, they are often prescribed in a detailed level since they shall be executed. On contrary, in adhocracies organisation, more freedom can be left to business actors for choosing how to perform the underlying business objectives. Therefore, the meta-models can be different and capture only some aspects of processes, however, sometimes their interrelationships could or should be taken into consideration and their complimentarily needs to be expressed. That is, in some situations, activity-oriented and product-oriented ones may need to be matched in order to determine which activity influences on which product and on which moment of the process. Also, strategy-oriented process meta-models require to be made operational using activity-oriented meta-models [3]. As well, [8] combines intention-oriented and state-based process modelling. Therefore, mechanisms for adapting existing models to specific requirements need to be developed. Our aim in this paper is to propose such mechanisms. Our motivation behind this proposal is that: (i) a BP meta-model which is designed for a specific organisation setting is not necessarily adequate for others; (ii) since several meta-models have proved their effectiveness in many business areas, it does not seem required to create new models.

In the information systems development (ISD) community, method engineering (ME) has been introduced as a response to the need for methods adapted to specific ISD project situations, and to the failure of the methods known as "universal" [9]. One area of ME is Situational Method Engineering (SME). SME is based on four principles: meta-modelling, flexibility, reuse and modularity [10]. We can highlight that the ISD requirements on flexibility and adaptability that are behind the ME emergence in the ISD field were similar to those currently observed in the BPM field, we thus base our reasoning on SME mechanisms. The paper is structured as follows. Section 2 introduces an overview of the proposed approach with illustrative examples. Section 3 concludes the paper.

2 Overview of the proposed approach with examples

Building the adequate meta-model can be done following several manners, for instance, by assembling relevant concepts, by constructing a core meta-model and enhancing it with required concepts, etc. With analogy to the *method* in the ISD field, we introduce the concept of *business method* which consists of a set of reusable components that we identify as *BP meta-model chunks*. In the remainder of the paper, we simply denote them by *BPM-chunk*. BPM-chunks are independent and stored in a chunk repository. They can be reused in order to build new meta-models or to enhance existing ones. The can be simple (e.g. a concept) or compound (e.g. a set of concepts, properties and relationships between them). In the reminder, we introduce some examples of BPM-chunks that constitute a partial vision of the repository. We underline the use of some operators for managing them. We are inspired from operators defined in [4]. Fig. 1 shows an example of meta-model (M_0) which can be

extended, according to the situation, by independent chunks (C_0, C_1, C_2) resulting on the meta-models shown in Fig. 1 (right).

PM0 and PM1. PM_0 (Fig. 1 (left)) keeps a minimal set of features. It may be suitable for some organisation settings, e.g. stable organisations with minor changes and few operations. Otherwise, defining operations in a finer granularity, and in frequently changing organisations, may involve a cumbersome work. In such situation, PM_0 can be extended with C_0 (Fig. 2) in order to construct PM_1. C_0 serves, in PM_1, as a link between roles and operations, BPs are relied to functions rather than operations. PM_1 is discussed in detail in [5]. Extending PM_0 requires updating the relationships *can-hold* and *comprises* and defining a new one: *satisfies*. Let *CONCEPTS* the set of concepts of the chunk repository. A relationship can associate many concepts. Formula (1) represents the mapping of a relationship *r* onto a set of concepts. Let *create-relationships*, *update-relationships* and *delete-relationships* three operators allowing respectively creating, updating and deleting relationships between entities. These operators can be applied so that the relationship *can-hold* between the entities *Role* and *Operation* -in PM_0- is removed, and the same is created in PM_1. As well the relationship *Comprises* between the entities *Business-Process* and *Operation*, in PM_0, are removed and those between *Business-Process* and *Function* are created in PM_1. Finally, the relationship *Satisfies* between *Operational-Goa*l and *Operation* is created.

$$relationship-concept(r:RS) \rightarrow 2^{CONCEPTS},\ relationship-concept(r_i) \subseteq CONCEPTS \quad (1)$$

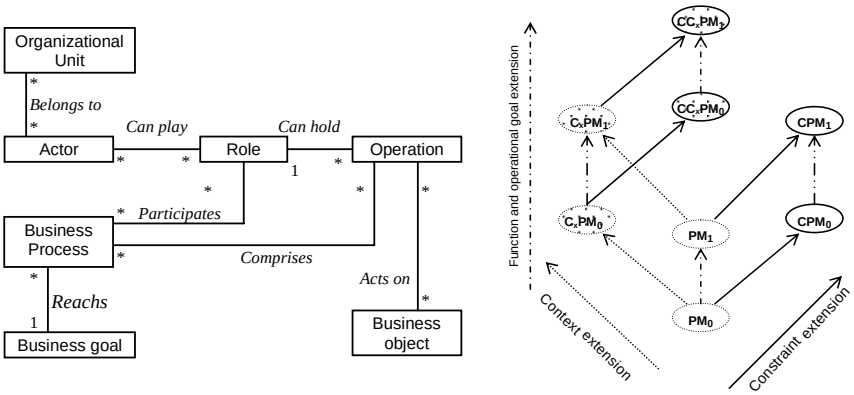

Fig.1 The Meta-model of PM_0 (left) and a set of BP meta-models and their relationships (right)

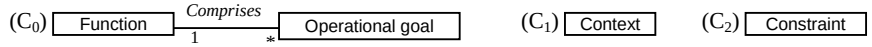

Fig.2 Examples of BPM-chunks representing respectively C_0, C_1 and C_2.

C_xPM. C_xPM_0 and C_xPM_1 extend PM_0 and PM_1 with chunk C_1 (*Context*) (Fig. 2). C_1 can be added to an existing meta-model for capturing context knowledge which can impact the assignments relationships of a process model (e.g. the ability of actors for playing roles according to a given context [6]. C_xPM_0 is constructed by extending

PM_0 with C_1. The integration of PM_0 and C_1 requires the use of the operator *update-relationships* so that the relationships *can-play*, *can-hold*, *implies* and *comprises* defined in PM_0 are related also to C_1. The same logic can be applied for C_xPM_1.

CPM. In some situations, organisation policies need to be enforced impacting assignments decisions, for instance, separation of duties (see [5] for more details about constraints). Building CPM_0 (resp. CPM_1) requires extending PM_0 (resp. PM_1) with C_2 (Fig. 2). This practice needs using the operator *update-relationships* so that the constrained binary relationships assignment (e.g., *can-play*) in PM_0 (resp. in PM_1) are related to C_2 in CPM_0 (resp. CPM_1). The same reasoning can be applied for C_xPM_1.

4 Conclusion and Future Work

This paper provides a start points for the definition of a methodology allowing the design of adaptive and flexible BP meta-models according to the situation at hand. We have introduced the concepts of BPM-chunk and business method as well as example of chunks and meta-models in order to illustrate our proposal. We promote the fact that the final business process model has to be created from the set of proposed chunks in order to suit to a particular situation. This approach aims to make easier the definition of flexible and customised meta-models. Dealing with situation-awareness raises many issues which need further research such as: the context influencing the selection of adequate chunks and the adaptation process.

References

1. BPMI.org, OMG: Business Process Modelling Notation Specification. Final Adopted Specification. Object Management Group (2006)
2. Nurcan, S.: A survey on the flexibility requirements related to business processes and modelling artifacts. Proc. HICSS'08, Big Island, Hawaii, USA, 7-10 January (2008)
3. Nurcan, S., Etien, A., Kaabi, R., Zoukar, I. and Rolland, C.: A strategy driven Business Process Modelling Approach. Business Process Management Journal, Vol. 11, N° 6 (2005)
4. Ralyté, J.: Ingéniérie des méthodes à base de composants. PhD thesis, University of Paris 1-Sorbonne (2001)
5. Saidani, O. and Nurcan, S.: A Role-Based Approach for Modelling Flexible Business Processes. In proceedings of BPMDS'06 (2006)
6. Saidani, O., Nurcan, N.: Towards Context Aware Business Process Modelling, BPMDS'07, Held in conjunction with CAiSE'07, Trondheim, Norway (2007)
7. Snowdon, R. A., Warboys, R. M. Greenwood, C. P. Holland, P. J. Kawalek, D. R.: On the architecture and form of flexible process support. SPIP Journal, Vol. 12, N° 1 (2007)
8. Soffer, P., Rolland, R.: Combining Intention-Oriented and State-Based Process Modelling. ER (2005) p. 47-62
9. Rolland, C.: L'ingénierie des méthodes : une visite guidée, e-TI - la revue électronique des technologies d'information, Premier Numéro, 25 octobre 2005 (2005)
10. Rolland, C.: Method Engineering: Trends and Challenges. In IFIP International Federation for Information Processing, Vol. 244, Situational Method Engineering: Fundamentals and Experiences, eds, Ralyté, J., Brinkemper, S., Henderson-Sellers, B., (Boston Springer) (2007)