

# Conceptual Method for Flexible Business Process Modeling

Adla Bentellis, and Zizette Boufaïda

**Abstract**—Nowadays, the pace of business change is such that, increasingly, new functionality has to be realized and reliably installed in a matter of days, or even hours. Consequently, more and more business processes are prone to a continuous change. The objective of the research in progress is to use the MAP model, in a conceptual modeling method for flexible and adaptive business process. This method can be used to capture the flexibility dimensions of a business process; it takes inspiration from modularity concept in the object oriented paradigm to establish a hierarchical construction of the BP modeling. Its intent is to provide a flexible modeling that allows companies to quickly adapt their business processes.

**Keywords**—Business Process, Business process modeling, flexibility, MAP Model.

## I. INTRODUCTION

**D**URING the twenty last years, the fast changes of the market led to a constant evolution of business environment. In all the management challenges, the information systems must constantly be adapted to new practices and changing management needs. The objectives of the organization are achieved by implementing the enterprise processes whose are themselves supported by the enterprise information systems. These are called process centric solutions.

Yet the organization requires extending its functionality periodically. But nowadays, the pace of business change is such that, increasingly, new functionality has to be realized and reliably installed in a matter of days, or even hours [6]. Companies have, to bring new ideas and concepts to their products and services always in a growing rate. Distributed in space and time, these must provide together the products and the solutions for which it can exist at least a need in the global market. Consequently, more and more business processes are prone to a continuous change [4].

**Business Process (BP)** describes the way the organization acts on it self and on its environment. The Business Process

Management (BPM) paradigm stresses the importance of integrating whole process rather than simply integrate data or applications [5] [10].

Traditionally, BPM systems were used to support static BPs, in sense of, processes which do not change frequently. This has limited the scope of this management. Business process modeling management systems and languages that are able to describe and unroll dynamically changing processes are today necessary.

Allowing the BP to evolve in an agile manner require flexibility in the process definition. Flexibility is the adaptation to a changing environment. Flexibility exists under different forms. It can appear at built time or run time. It can be selective or adaptive. All that depends on, at what level we need flexibility [12].

In our research in progress, we attempt to reach flexible BP upon the business objectives characteristic of a BP. A business objective is reached by executing a BP that comprises many activities [1].

The intentional view of the business represents the process from the point of view of its objectives disregarding the considerations of the operational level. The Map model is intention-oriented; the BP model is described in term of intentions to be achieved and strategies to be followed. A business map constitutes a strategic business plan: it expresses the missions with regard to the business intentions or objectives they should achieve and the possible strategies.

The objective of the research in progress is to use the MAP model, in a conceptual modeling method for flexible and adaptive BP. This method can be used to capture the flexibility dimensions of a BP; it takes inspiration from modularity concept in the object oriented paradigm to establish a hierarchical construction of the BP modeling. Its intent is to provide a flexible modeling that allows companies to quickly adapt their BPs.

This Method is a top-down method that starts on a global description of the BP and then refines it in order to maintain modularity in the BP model construction. The business policy is individually described and not dilute in the modeling. The proposed approach would need to be supported suitably by modeling technology and the system developed.

The paper is organized as follows: Section 2 presents the flexibility characteristic of a BP and its different forms. Section 3 presents the MAP model for BP modeling. Section 4 proposes the conceptual method for constructing flexible BP modeling based on the Map intentional modeling that expresses the BPs objectives. Section 5 presents related works

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and conclusion will be in the 6<sup>th</sup> section.

## II. FLEXIBILITY

Flexibility is the capacity of making compromise between, first, satisfying rapidly and easily the business requirements in terms of adaptability when organizational, functional and/or operational changes occur; and second, keeping effectiveness [11].

The flexibility can be ensured by various manners in the definition of the BP. It can appear at built time or run time: (i) Flexibility at built time, aims to offer a BP modeling easy to change for analysts, (ii) Flexibility at run time, adds ease of change automatically at run time. The two great classes are:

### A. Flexibility by Selection (A Priori)

It is based on formalisms of modelling which offer the capacity of taking into account the environmental changes without changing the definition of the BP. It ensures the existence of a number of alternatives of execution in the BP description at design time. Points of decision are perfectly represented. It is recommended in the case of process for which we can know in advance all the possible execution cases [9]-[5]. Nevertheless, users note that there are processes for which, they cannot always anticipate all the possibilities of execution at the design time.

### B. Flexibility by Adaptation (A Posteriori)

It adapts the definition of the BP without anticipating the capacity of change of the process at its design time. It does not treat only an assumption of emerging events along an execution way, it ensures also the change of parameters at an activity level, the change of the execution way, or the addition of new participants. Flexibility by adaptation is divided into two kinds [5]:

i/ the instance adaptation: Also called dynamic adaptation, this adaptation is «just in time» and relates to the instantiation of part of the process.

ii/ The type adaptation: affect the definition of the process, so that all future instantiation of the process after adaptation will be at the base of the new version of the process.

Flexibility can be classified on the following dimensions [2]

- Flexibility in the process sequence: Ease of change in the sequence of activities
- Flexibility of the applicable business rules: Ease of change in the business rules and regulations, adaptation of new policies
- Flexible practices: Ability to incorporate new practices evolved based on the improved knowledge of the members in the organization
- Flexibility in handling process exceptions

## III. MAP MODEL

The Map model is described in details by Nurcan in [8]. Key concepts are presented in this section. The Map model is an intentional representation model. It consists in a declarative and flexible orchestration of intentions and strategies. The intentional view of the business represents the process from

the point of view of its objectives disregarding the considerations of the operational level. The Map model is intention-oriented; the BP model is described in term of intentions to be achieved and strategies to be followed. A business map constitutes a strategic business plan: it expresses the missions with regard to the business intentions or objectives they should achieve and the possible strategies.

The Map meta-model is a process model, in which non deterministic ordering of intentions and strategies has been included [10]. Map consists of sections. A section is an aggregation of two types of intention, a source intention and a target intention, and of a strategy. Every section corresponds to a strategy which can be used to realize a target intention, when the source intention is reached.

The Map is represented by a directed and labeled graph. The intentions are nodes and the strategies are edges. The directed aspect of the Map translates the stream from the source intention to the target intention via the strategy. A section is so represented by two nodes connected by an oriented edge. Fig. 1 represents the Map Meta model.

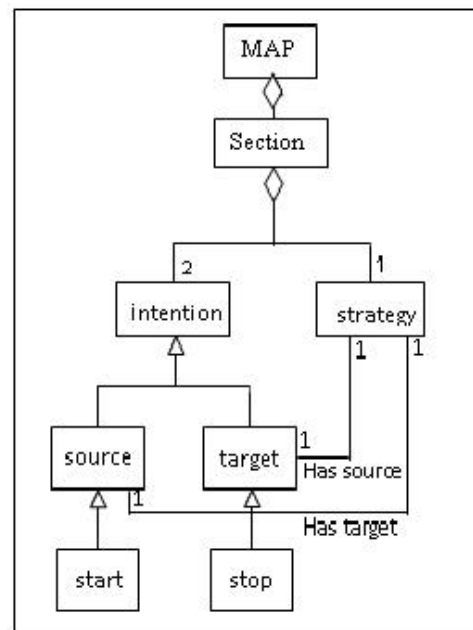


Fig. 1 Map Meta-model

An intention is an objective which one can be achieved by the execution of one or more process. We add at each Map has two particular goals, start, to begin and stop, to finish the execution of the chart. A strategy is an approach, a manner or a means to carry out an intention.

A section is a triplet made up of a source intention, a target intention and a strategy <Source intention  $I_i$ , target intention  $I_j$ , strategy  $S_{ij}$ >. A section expresses the realization of the goal target by using the strategy once that the goal source was carried out.

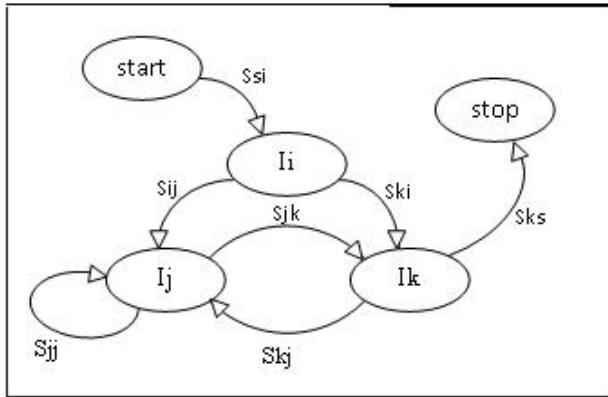


Fig. 2 Example of a Map representation

In the example of Fig. 2, the Map comprises a set of 5 intentions {start,  $I_i$ ,  $I_j$ ,  $I_k$ , stop}, a set of 7 strategies { $S_{si}$ ,  $S_{ij}$ ,  $S_{ik}$ ,  $S_{jk}$ ,  $S_{jj}$ ,  $S_{ks}$ } these compose 7 sections given below.

Sections present in the MAP
Section1: <Start, $I_i$ , $S_{si}$ >
Section2: < $I_i$ , $I_j$ , $S_{ij}$ >
Section3: < $I_i$ , $I_k$ , $S_{ik}$ >
Section4: < $I_j$ , $I_j$ , $S_{jj}$ >
Section 5: < $I_j$ , $I_k$ , $S_{jk}$ >
Section6: < $I_k$ , $I_j$ , $S_{kj}$ >
Section7: < $I_k$ , Stop, $S_{ks}$ >

#### IV. CONCEPTUAL METHOD FOR FLEXIBLE BP MODELING

The business objective which is the aim of a BP is stable, but the procedures and mechanisms to reach it changes from time to time and from an execution to another. Hence, designing and modeling flexibility introduces a degree of freedom in the progress of BP constructed upon existing Bps. This degree of freedom traduces a form of interesting flexibility.

The experience of BP Modeling and BP Re engineering and the design of the supporting systems led to the following findings [8]:

1. The amount of detail to be handled in analyzing and improving BPs makes it difficult to master.
2. Approaches and models offering the ability to describe, initially, the invariants of the BPs in terms of objectives and strategies before specifying the manner of making them operational, in a particular organizational context, facilitate to mastering these difficulties.
3. A clear representation of the business objectives simplifies also the comprehension of the

organizational change and the evolution of the business model.

4. BPs can be roughly classified into two categories depending on their nature. The first concerns well-defined and -often- repetitive processes having important coordination and automation needs. The second category concerns ill-defined processes.
5. The importance of establishing and preserving the 'best fit' between BP models and IS specifications is commonly accepted by stakeholders.

These points are the key motivations of our proposal, which is a conceptual modeling method offering at one hand the rigor necessary for modeling well-defined BPs, and at the other hand, the flexibility and adaptability required for ill-defined BPs.

It is an established fact, from object oriented paradigm, that modularity is the key for managing complexity and providing flexibility [2]. Modularity reduces interdependencies, facilitates easy maintenance and updates without impacting the entire system.

The concept of modularity can be applied to BP modeling to address the need of flexibility at built time. Also, business rules can be modeled separately from the process logic at different levels of abstraction.

Thus, in addition to the flexibility by selection insured by the MAP model, the BP modeling will be easy to maintain and to change. Changes can be applied to parts of the BP modeling without affecting the entire model. This will help in designing a flexible business support system and assist in analysis of the BP during process redesign and arranging.

For achieving that, the BP will operationalize a business map section < $I_i$ ,  $I_j$ ,  $S_{ij}$ > and its business objective will operationalize the target intention of the section. Accordingly, we have to describe the roles, which will act in order to achieve the business intention according to the strategy associated to the section; the actors holding these roles; the activities they will perform. A BP is triggered by an event and its execution generates events, as shown in Fig. 3.

The map model has to be hierarchized, and modeling task has to be spread on steps. The first step gives a global Map modeling of a BP as a set of sections. Other steps refine sections by new maps that model sub-processes of the constructed BP.

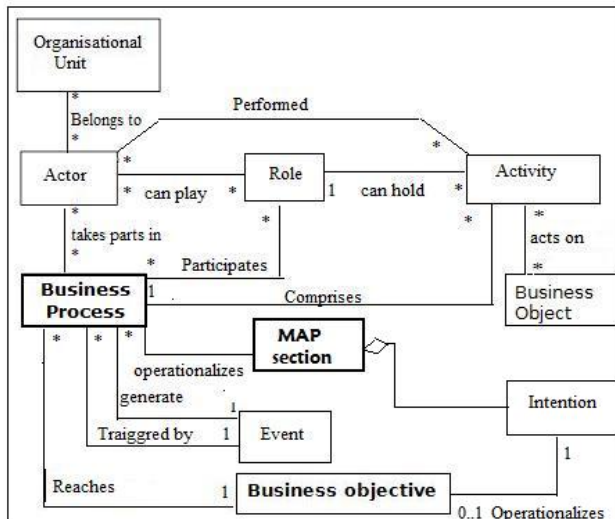


Fig. 3 Business Process Meta-model

The processes to achieve the business objective of the new BP are modeled at the first step. These are further modeled as sub processes at the next steps.

In the flexibility dimensions, this method insure: (i) Flexibility in the process sequence: because The Map is a process model, in which non deterministic ordering of intentions and strategies has been included; (ii) flexibility of the applicable business rules: by the use of Map guidelines that make available all choices open to handle a given situation. The map associate one Intention Selection Guideline (ISG) per node I, except for start and stop; and one Strategy Selection Guideline (SSG) per strategy S. These guidelines will support all possible business rules and maintain them independently from the BP logic. Fig. 04 presents the Map meta-model that can support the proposal method.

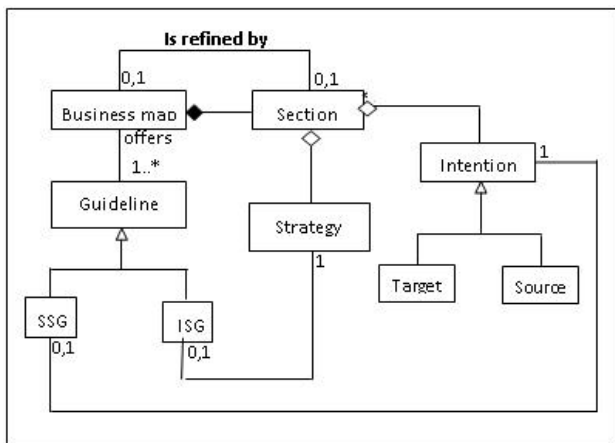


Fig. 4 Map meta-model for the proposal method

Process repositories must be built and stored for easy retrieval and modification, thus requiring rich support of business logic that will extend BPM systems to support more

capabilities to deploy and manage BPs.

## V. RELATED WORKS

The conceptual methods for flexible BP proposed in the literature have been researched by various groups to address different requirements in BP modeling as in [2][13]. J. M. Bhat in [2] has studied these methods for modeling flexibility in Business Process and proposed a consensus of them. He was also interested by the modularity aspect in these methods. The Map model is largely used nowadays for modeling flexible Bps [3], [8], [9] and [10] and seemed to be adapted to the flexible modeling of BP. The Map is also used for organization modeling into enterprise [8].

## VI. CONCLUSION

*How can companies establish the flexibility needed to continually adapt their BPs, to maintain competitive differentiation and collaborate with trading partners?*

The intent of the proposal method is to provide a flexible modeling to allow companies to quickly adapt their BPs. The objective was to use the MAP model, in a conceptual modeling method for flexible and adaptive BP. This method uses to capture the flexibility dimensions of a BP, it takes inspiration from modularity concept in the object oriented paradigm to establish a hierarchical construction of the BP modeling. Its intent is to provide a flexible modeling that allows companies to quickly adapt their BPs.

Flexibility can be considered at two levels, at built time or at execution time. We have focused in this proposal on flexibility by selection at the built time. The second level that let the process continue execution despite changes will be considered in future works.

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