Meta-model tailoring for Situation aware BP Modelling

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Outline

1. BP modelling
2. Requirements on BP flexibility
3. Situational method engineering
4. The proposed approach
5. Conclusion and future work
1. Process modelling

Definitions

- **BP** is a set of one or more linked procedures or activities that collectively realise a business objective or policy goal, normally within the context of an organisational structure defining functional roles and relationships. [Workflow Management Coalition, 95]

- **BP modelling** consists on capturing the organisational knowledge according to various perspectives with respect to the modeling purpose and the situation.

Modelling Perspectives [BPMDS’06 workshop], [Daoudi et al., 07], [Nurcan, 08], [van der Aalst, 03]

- **Functional**: «what» process must do?
- **Organisational**: «where», «by whom» and «under the responsibility of whom» the activities are realised?
- **Behavioral**: «when» the activities are realised and how they are controlled by constraints
- **Informational**: the business objects used by the process, their structure and the relationships established between them
- **Operational**: the operations and the activities performed during the process
- **Intentional**: «why» the process is performed?
- **Decisional**: «how» the decisions are made? the rationality of the decisions
Process nature

- The a priori knowledge of the execution
  - Definition of the procedural rules in advance
  - In the literature, two types of processes are distinguished
    - Well structured processes (e.g. Production processes)
    - Ill structured / unstructured processes (e.g. ad-hoc processes)

- Stability / evolution of the process
  - Stable processes
  - Evolutive processes

Modelling formalisms

- **Activity-oriented and product-oriented formalisms**
  - Focus on executability and translatability into executable languages (e.g. BPEL4WS or ebXML)
  - Are suitable for representing situations in which execution conditions are well known in advance
  - Describe who performs WHAT and HOW in details
  - Provide a rigid scheduling of activities
  - **Examples**: role-activity diagrams [Ould, 1995], state-transition diagrams [MOF,02]
Modelling formalisms

- **Role / Actor oriented formalisms**
  - Highlight the responsibilities of actors in the organisation
    - Responsibility, right, obligation, …
  - Reflect the organisational structure
    - Communication, dependency, action, interaction between actors, responsibility distribution
  - Etc.
  - Examples: I* [Yu, Mylopoulos, 94], role interaction networks [Singh et al., 1992]

- **Goal, decision, strategy, intention oriented formalisms**
  - Focus on the objectives of the organisation, the decision making, the actors’ points of views, etc.
  - WHY ?
  - Examples:
    - I* [Yu, Mylopoulos, 94]
    - KAOS [Heaven, Finkelstein, 04]
    - Nature [Rolland, 95]
    - MAP [Rolland et al., 99]

  + / - Providing guidance for satisfying goals
  + / - Dealing with different levels of granularity
These modelling formalisms

- Allow to capture different perspectives of the process knowledge
- Are complementary and can be combined in order to satisfy various modelling purposes
  - Combination of activity-oriented and product-oriented formalisms in order to determine which activity acts on which product
  - Combination of goal-oriented and activity-oriented formalisms in order to specify the operationalisation of goals

> A unique modelling formalism can not be adequate for all situations

There is a need for mechanisms allowing:
- the adaptation and
- the configuration
  of existing formalisms according to the context

- **Internal context**
  - Process nature
  - Modelling purposes
  - Points of views, and/or preferences of actors
  - Etc.

- **External context**
  - Execution environment (instances performance)

- A process model can be flexible only if the formalism (meta-model) used to represent it integrates the capability to represent flexibility

> Creation of formalisms which are adapted to the current modelling needs (context)
Method engineering is the discipline of developing, customising, and/or configuring a situation-specific method from parts of existing methods [Brinkkemper, 96], [Leppanen, 2006]

**Principles of ME**: *meta modelling, flexibility, reuse and modularity* [Rolland, 2007]

SME promotes the construction of a method by assembling reusable method fragments stored in some method base [Brinkkemper, 98], [Ralyte et al., 2001]

SME:
- Construction of new methods or adaptation of existing ones in order to satisfy the requirements of a given ISD project
- Dealing with flexibility and adaptability needs

Thus, we will base our reasoning for situation aware BP modelling on SME techniques

**Strategies of methods composition**

*Emphasis on composition strategies* (classification by Ralyté & Rolland)

- **Assembly based**
  - [Diagram: Green + Blue = Green]

- **Extension based**
  - [Diagram: Green = Green]

- **Paradigm based**
  - [Diagram: Green + Blue = Blue]

*Motoshi Saeki talk in EMISE*

Source: Colette Rolland talk in ME’07
4. The proposed approach

Motivations

- One formalism is not sufficient even for a unique perspective
- There is a need for adaptation and configuration mechanisms
- A BP can be analysed according to multiple perspectives depending on the engineering and the execution contexts

→ Construction of modelling formalisms which are adapted to the context

Formalism

- Consists on a set of reusable components named chunks

Chunks

- Rather than defining a complete set of concepts in one meta-model, a taxonomy of concepts will be defined
- Grouping concepts according to various configurations in order to construct specific chunks
- Reuse of chunks in the construction of new chunks
  - Extension
  - Assembly
  - Etc..
- A chunk base supporting research and extraction operations

→ Thus, the process engineer can select or construct a meta-model which better fits with the project situation and the underlying modelling purpose
Construction operators

- ADD (Element, link, property)
- DELETE (Element, link, property)
- GENERALISE / SPECIALISE (Element)
- UNIFY (Element, link, property)
- MERGE (Element, link, property)
- Etc.

(example, link, property)

Example 1

Extension-based strategy
4. The proposed approach

Example 1
Extension-based strategy

Process Model (PM)

PM₀

PM₁

The meta-model of PM₀
4. The proposed approach

The meta-model of PM$_1$

The meta-model of CxPM$_0$
4. The proposed approach

The metamodel of CxPM

Example 2

Assembly-based strategy
4. The proposed approach

Example 2

Cadre conceptuel pour la modélisation des processus métier et de leur système de support

- Intentional view
- Operational and Organisational view
- Support system view
4. The proposed approach

Example

- **Strategic view**
  - **Belongs to**
  - **Acts on**

- **Business goal**
  - **Reaches**
  - **Comprises**
  - **Participates**

- **Business process**
  - **Includes**

- **Organizational unit**
  - **Belongs to**

- **Role**
  - **Can play**
  - **Can hold**

- **Actor**
  - **Participates**

- **Operation**
  - **Acts on**
  - **Comprises**

- **BP fragment**
  - **Makes operational**
  - **Includes**

**Assembly-based strategy**

- **Unify_elements**
- **Merge_elements**

**Chunk 1**

- **Guideline**
- **Section**
- **Business intention**

**Chunk 2**

- **Business map**
- **Strategy**

**Intentional view**
5. Conclusion and future work

- A starting point for defining an approach of configuration and adaptation of meta-models for BP modelling taking into consideration the purpose and the context of modelling

- Applying techniques and principles of SME
  - Proposing the concept of chunk in the definition of a meta-model (formalism)
  - Capturing different needs of representation in terms of method chunks
  - Constructing the resulting meta-model based on the set of chunks in order to fit with the context and the purpose of modelling
  - Allowing the meta-models to be configurable

- Future work
  - Capturing the context knowledge which impact the selection of the adequate chunk / meta-model
  - A complete taxonomy of operators of assembly, adaptation and extension
  - The process of construction of meta-models

Thank you for your attention

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