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A Meta-Process Model for Process Management and Evolution[1]

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ABSTRACT

The work shown in this paper is part of the CEPEME project, which aims to provide a solution to inter-organizational and intra-organizational interconnection problems, encouraging at the semantic level information exchange, between organizations with heterogeneous technologies and structures. In particular, this paper describes some capabilities from the proposed workflow model, for process management and evolution in an intra-organizational environment, and the experience obtained from its implementation with commercial tools like Microsoft BizTalk.

1 INTRODUCTION

Nobody doubts that technological advance has increased in the last years. Most people, being enterprise organizations the most benefited, have assimilated the new technologies. The fact of being able to interchange information between different organizations, mainly through the network, facilitates the work of many companies. However, the main problem arises at the time of integrating different applications at intra-organizational and inter-organizational levels, especially in the second case. The definition of interchange formats and/or standards formats is not enough; organizations need tools to model and implement their business activities, where the interaction with both software and personnel are combined in an automatic way. To some extent, workflow tools cover those needs. However, most workflow tools are proprietary products, and that makes that inter-organizational integration continues being the main limitation.

Interoperability and communication among inter-organizational processes is a great challenge that needs to be solved. A way of achieving this inter-organizational communication is defining a high-level process, independent from the existing technology, from which one or more processes adapted to the technology and particular semantics can be generated. This high-level process receives the name of *meta-process*.

This work describes a possible structure of the meta-process. By means of it, not only business processes but also software development processes will be supported, where each software development process represents a software engineering lifecycle model, like RUP [9] or OPEN [5]. The CEPEME project aim is to give a solution to this, focusing on processes communication and evolution in multi-organizational environments. The basic idea is to develop an intermediate platform to control processes interaction. In this paper, our proposed model of workflow is shown. It is based on the OPEN specification and it is supported by the meta-process defined in []. Its implementation has been carried out using the Microsoft Biztalk commercial solution. Although this work deals basically with software processes, it can be extended to business processes.

This article is structured as follows. Section 2 analyzes the notion of meta-process and related works. Section 3 describes the proposed workflow process. Finally, section 4 shows some conclusions and possible extensions to this work.

2 RELATED WORKS

Both business process ([18],[16]) and software process ([4]) comprise a sequence of activities carried out by humans or systems in an organizational structure context in order to achieve "something". This "something" means either a business goal when it refers to business process or a software product when it refers to software process. When difference between them is the aim or goal pursued, then the software process can be considered a special type of business process, where the aim of the business is to produce a software product. Some authors ([3],[11],[10],[13]) have reached similar conclusions, describing the advantage of applying workflow technologies, typically associated with business processes, to software processes.

Once established the relationship between business process and software process, the next step is to define the concept of meta-process. In 1993, Conradi [2] defined meta-process and its subset of basic activities (or meta-activities). Since then, different studies on this subject have arisen ([17],[8],…) in order to handle and improve it.

2.1 Evolution Across Meta-modeling

The American Heritage Dictionary defines evolution a gradual process of changing [19]. In the area of software process, the software process evolution indicates changes in the process, most of them in an improving way. The relationship between meta-process and evolution is established in [2], identifying the meta-process as the way through which changes can be carried out inside the software process. Based on this idea, two main aspects are considered in a software production environment [17]:

- *Developing process (P):* Real-world production process.
- *Process model (PM):* Real-world model.

Figure 1 shows the relationship between P and PM:

Figure 1: Relationship between P and PM (P1, P2 y P3 are instances of PM). In an object-oriented environment, PM represents a more general class from which several objects are instantiated (P1, P2 and P3).

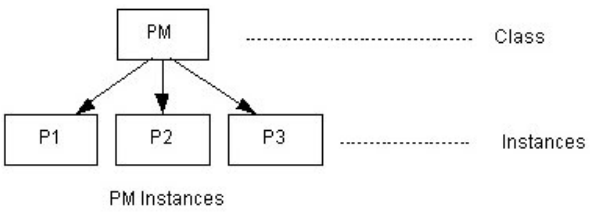
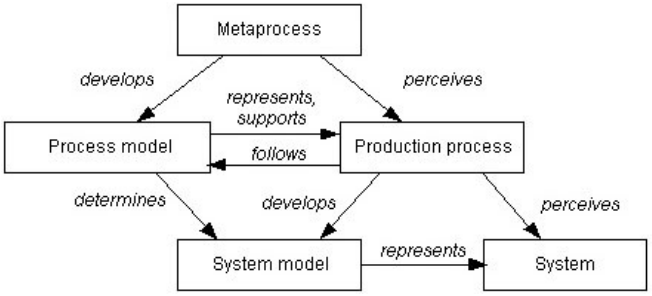


Figure 2: Meta-process and Production process [8].



The conjunction of a process model PM and an instance P_i makes up a *software development process.*

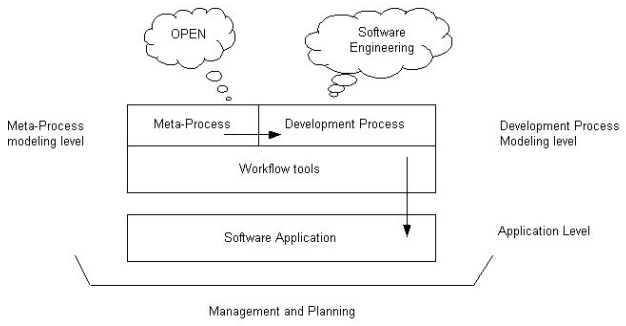
Development Process $_i$ = MP + P_i
Therefore, if we have several instances P_i then:
Development Process$_1$ = MP + P_1
Development Process $_2$ = MP + P_2

Once the structure of the software development process is set, the following question arises: is it possible to create a new model of representation from which different PMs could be generated? The answer to this question is a high-level process named *meta-process.* Different PMs will be produced by means of this meta-process, each of them with specific features. Once again, a new *class-object* relationship emerges, as it happened before with the instance P and the class PM: the meta-process represents the more general from which one or more objects PM are generated.

A way of dealing with evolution is defining layers or levels, as it will be see in section 3. Three abstraction levels can be distinguished (see Figure 3): *meta-process, software development processes, and applications*. The meta-process places at the top level of the hierarchy. Software development processes (or production processes [2]) place at the intermediate level. Finally, software applications, i.e. the final products, place at the low level of the hierarchy

The same relationship among meta-process and production process is described in [8] (see Figure 2). The meta-process is one abstraction level higher to a software production process. It develops process models that represent software production processes.

Figure 3: Levels, tools and tasks. The Meta-Process is based on OPEN and is modeled and performed with workflow tools. The Development Process represents a Software Engineering lifecycle model and can be modeled with workflow tools, too. A Software Application is the result, the final product, obtained at the end of the development process.



3 OUR PROPOSAL.

In other to implement a meta-process, its two main aspects must be covered: the *development framework* and *workflow tools* (see the previous Section). The development framework is used to set up the meta-process activities, whereas workflow tools are used to design, perform and manage the meta-process workflow. Figure 3 describes the way these two aspects operate, basing it on the three abstractions levels described in section 2.

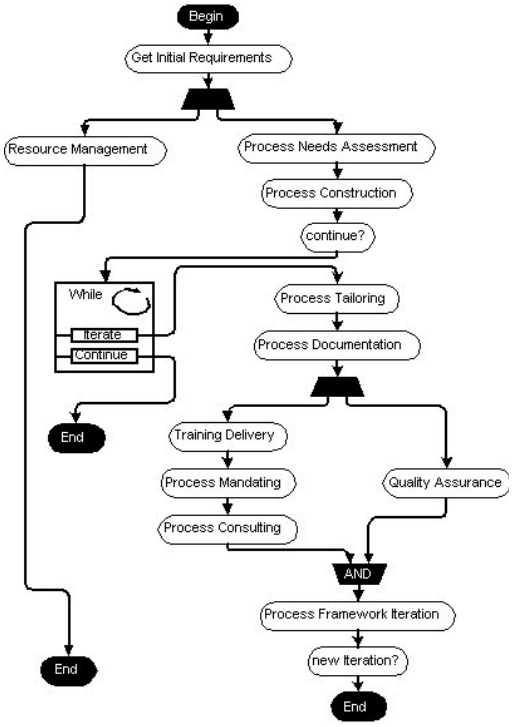
In the development framework, several methodological proposals, like RUP and OPEN, have been considered due to, firstly, their huge spread in a commercial level (RUP) and in academic level (OPEN) and, secondly, their process orientation. Finally, the development framework proposed by OPEN has been chosen to define the different activities for the meta-process. OPEN is an object-oriented, process focused methodological proposal that covers the whole lifecycle of a software development process [5]. It offers a set of elements (meta-classes) from which a specific process can be generated. A subset of these elements has been chosen in order to model the meta-process.

On the other hand, several different workflow tools have been considered in order to implement the meta-process. We have considered the following tools: Microsoft Exchange, Microsoft BizTalk, Oracle Workflow [12] and IBM MQSeries Workflow [7]. However, there are more workflow tools such as SAPWebFlow Engine [15], BEA WebLogic [1], ILOG products, … Mostly of them allow us to model the workflow and control his performance. In this article, we focused on the process server Microsoft BizTalk.

3.1 Meta-process Structure.

OPEN defines a set of guidelines that help us on the construction of a software process. These guidelines mention ten tasks that must be performed in an iterative and incremental way in order to produce the desired process. Mostly of these tasks are similar to the basic meta-activities that should be included in a meta-process, as proposed in [2]. We use these tasks to model the meta-process. Figure 4 shows meta-process implemented in BizTalk. The white rounded shapes represent the different meta-activities (OPEN tasks).

Figure 4: Meta-Process' structure.



The actions are classified into two categories: *main actions* and *auxiliary actions*. Main actions *(resource management, process needs assessment, process construction, process tailoring, process documentation, training delivery, process mandating, process consulting, quality assurance and process…)* are associated with the OPEN tasks previously mentioned. Auxiliary actions (*obtain initial requirements, continue with the project?, new project iteration?)* are used to control the workflow execution in BizTalk. In this way, evolution is managed in each new iteration. So again, each main action can be seen as a sequence of subtasks, as it happens with the meta-process. Thus, new submodels are modeled, all of them, attached to the main model (the meta-process).

4 CONCLUSIONES AND FUTURE WORKS

Our proposal of workflow model is not complete. More new activities can be added, such as those proposed in [8]. Besides, it would be interesting to redone the work made with RUP and OPEN now in business processes models. On the other hand, the implementation of the suggested meta-process in commercial tools like BizTalk is not straightforward. Nevertheless, it is important to go forward in this address, in order to achieve a solution integrated with commercial tools.

ENDNOTES

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