

# THE RESEARCH ON ARCHITECTURE OF ENTERPRISE MODELLING AND MODELLING METHOD \*

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## ABSTRACT

The market is changing and can't be forecasted accurately in this information time. The enterprises often need reengineer their own business processes. It is necessary to management an enterprise using process-based method for the requirement of enhancing work efficiency and the ability of competition in the market. An architecture of enterprise modeling is presented in this paper. This architecture is composed of four views and supporting the whole lifecycle of enterprise model. The implement method of this model was thoroughly described meanwhile the workflow software supporting the building and running the model was given.

## KEYWORDS

Process Model, Workflow, Enterprise Modelling, View, BPR

## 1. INTRODUCTION

Through the implementation of information technology the enterprises can improve the work efficiency and accordingly enhance the ability of competition in the market. But it is needed that an enterprise should be reasonably modeled before the implementation of any software. With the increasing severe competition of market and the diversification of users need, many enterprises have to change their production style, from former large batch production transform into many variety production and small batch production. So the enterprises have to develop new product and

redesign their production process. Thus, we can see, the enterprise is in a dynamic environment. The enterprises have to change some process, namely, implement business process reengineering. In this situation, the traditional function based modelling method can't satisfy the need while the process based modelling method exhibits its advantage.

To manage an enterprise according to appropriate process can improve the work efficiency. Through manage and monitor the execute processes we can control the TQCS (time, quality, cost, service) of enterprise in time. Thus provides more accurate information for the enterprise decision. Accordingly the ability of competition in the market is enhanced. Meanwhile, we can analyze the process when it is running so that to provide warranty for business process reengineering (BPR).

Process modeling is nature and legible and can be understood easily. An architecture of enterprise process modelling is presented in this paper. This architecture is composed of four views and supporting the whole lifecycle of enterprise model. The implement method of this model was thoroughly described meanwhile the workflow software supporting the building and running the model was given.

## 2. WHAT IS PROCESS MODELLING

At present there are many kind of enterprise modelling methods, such as CIMOSA [ESPRIT Consortium AMICE, 1993], IDEF [J.M.DORADOR, 2000], PERU, and ARIS [August-Wilhelm sheer, 1999]. In these methods, ARIS and IDEF3 can realize process modelling. But, at present, all the process modelling method have the disadvantage that they can't integrate the

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processes and other views such as organization view, resource view and information view. Thereby these two methods can't embody the advantage of process modelling. Whereas the workflow technology that derived from computer supported collaboration work (CSCW) has the great capability of describe and management processes [Markus Dickerhof, Milena M.Didic, Ulrich Mampel, 1997]. So we try to develop an enterprise process modelling architecture based on workflow technology.

We need to develop the model according to the business process when modeling an enterprise using process modelling method. Only in this way can we explicitly describe the process in an enterprise. The process is managed when running in the workflow management system. Meanwhile the performance index such as TQCS is supervised. So that more exact data is gained and then the data can contribute to the enterprise decision.

In this section some concepts was given and the following sections is based on these concepts.

**Activity** A description of a piece of work that forms one logical step within a process.

**Process** A set of one or more linked procedures or activities which collectively realize a business objective or policy goal, normally within the context of an organizational structure defining functional roles and relationships.

**Process model** The model for description of all kind of processes in an enterprise is called process model.

**Process modelling** The process of building an process model is called process modelling.

**Enterprise process modelling** The enterprise modelling method based on process modelling is called enterprise process modelling.

When building an enterprise model, we have to ask the question like how does the model is constructed? And how to use this model? What kind of software can support this model? We try to answer these questions in the following sections.

### 3. THE ARCHITECTURE OF ENTERPRISE PROCESS MODELLING

The architecture is composed of three dimensions to meet the need of modeling of an enterprise.

- **The dimension of life cycle** the dimension concerned with the life cycle of the model starting from the statement of requirements to running maintenance of model.
- **The dimension of views** the dimension concerned with the structure and behaviour of a model that considers appropriate aspects of an enterprise.
- **The dimension of genericity** the dimension concerned with the degree of particularization that identified the set of possible models.

The architecture is shown in Fig. 1.

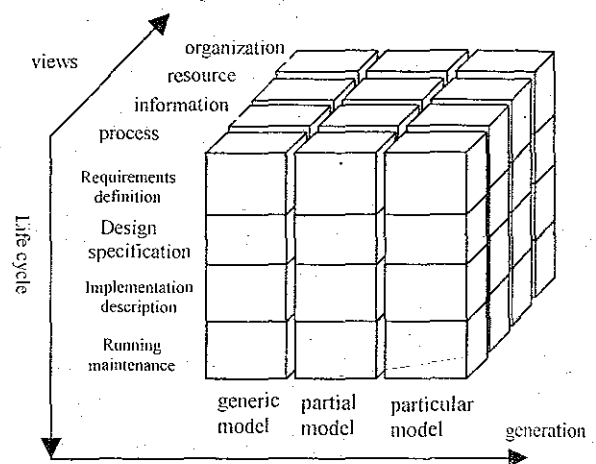


Fig. 1 the architecture of process modelling

#### 3.1 The dimension of views and the relationship between views

In the architecture presented above, the process view is the main view that is in charge of the describing all kinds of process in an enterprise. The other three views are obtained step by step during the building the process view according to the process in the enterprise. When build the process view every activity in the process will be assigned some resource, organization and the input/output date. Therefore the four views are obtained and the relationship between them is determined. So, we can see that all the four views are built together harmonious other than respectively. The relationship between process view and the other three views are shown in Fig. 2. In all the process, every activity needs some participant or executant, and the participant must belong to one organization. The execution of an activity will use some resources, in turn the resources make up of resource view. The data input into an activity

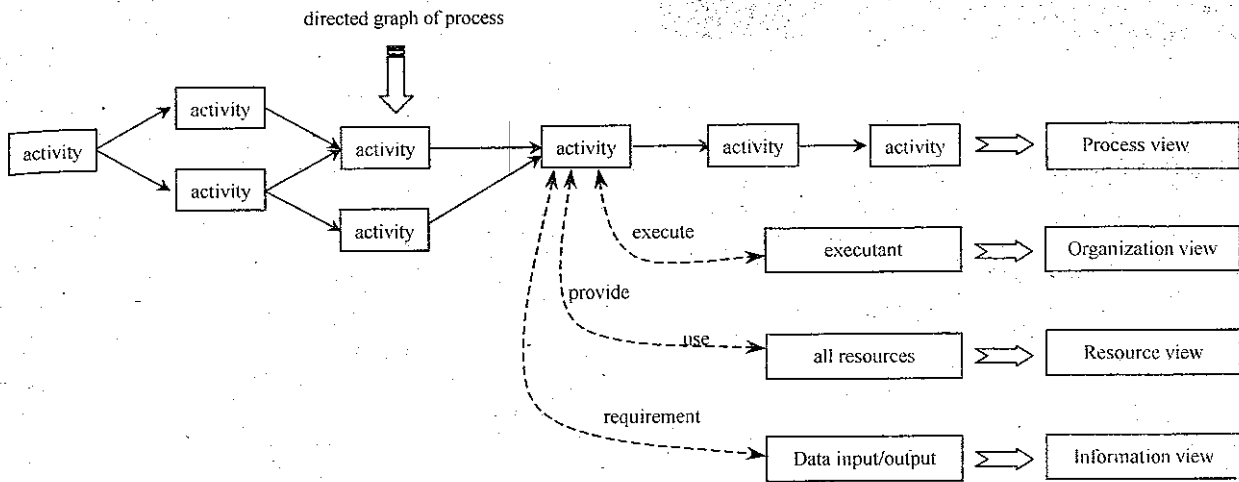


Fig. 2 the relationship between views

before its implement and the output data after the implement of the activity make up of information view. Thus, for every activity in all the processes there are resource, organization and information. And when the model is built stage by stage the four views are obtained respectively.

The four views are described in different method. The process view is described in directed graph. The architecture is based on workflow management system and the process model in workflow management system is called workflow model, so we also call process model as workflow model. The information view is described using IDEF1x method. The organization view is described in organization tree and the resource view is described in resource tree. The information, organization and resource views are built during the build of process view. If the process view needs some change, the other three views have to be changed accordingly. However, the information, organization and resource view can be adjusted respectively. For example, another resource will be assigned to an activity after some optimization.

### 3.2 The life cycle of model

There are four stages in the life cycle of process model, namely, requirements definition, design specification, implementation description and running maintenance. At present, there are three stages in CIMOSA and ARIS. We add running maintenance stage to the life cycle. In the running maintenance stage the enterprise

process model can be maintained dynamically and peoples can actualize BPR (Business Process Reengineering).

In the stage of requirement definition, the enterprise has to investigate the process and build the requirement definition model. Every view will be built in this stage, i.e., process view, organization view, resource view and information view.

In the stage of design specification, the model gained in requirement definition will be analyzed and optimized. The organization and resource will be reassigned if necessary. In the same way, information model will be perfected too.

In the stage of implementation description, the process model will be instantiated, namely, the person or unit is assigned, the machine or equipment will be allocated and the database will be built. Thus, the process can be put into use.

In the stage of running maintenance the enterprise information system will be under management and monitor. In the workflow management system the implementation of every process will be monitored and controlled. The TQCS performance will be analyzed. The running memorize provide reference for dynamic BPR and next modeling process. The traditional function based modelling method can't change the model when system is running. Whereas using process-based modelling method we can do the change conveniently and easily. Because the workflow management system supports the dynamic change of model

we can change the model in every stage of its life cycle. Especially in the stage of running maintenance the model can be changed in time [Manfred Reichert, Peter Dadam, 1998].

### 3.3 The dimension of genericity

There are three levels of genericity: generic, partial and particular.

Generic level – a collection of constructs that are basic architectural building blocks that can be re-used in various architectural configurations.

Partial level – an incomplete skeletons of model for particular enterprises and are applicable generally to a wide range of industrial enterprises.

Application level – the model can be used directly in information system which embodies all necessary knowledge of the enterprise.

The model in Fig. 1 is generic level model. the partial level can be derived from the generic model according the characteristic of every industry. When building the application model of an enterprise a reference model can be selected from the partial level model as the “template”.

## 4. THE APPLICATION OF ENTERPRISE PROCESS MODELLING

In the condition of many variety production and small batch production the enterprises are faced a dynamic environment. The purpose of enterprise modelling is to realize the integration of processes in the enterprise. On the basis of process integration the process can be monitored and the performance can also be real time analyzed. Then the result of monitor and performance analyse can provide warrant for BPR and enterprise decision support. The architecture presented in this paper can be realized by extended workflow management system. The model can realize two kinds of function, one is static function, the other is dynamic function.

### 1 Static application

Enterprise modelling

Static performance analyze

### 2 Dynamic application

Simulation running

Model running

Resource management

Organization management

The structure of extended workflow management system is presented in next section.

## 5. MODELLING SOFTWARE – EXTENDED WORKFLOW MANAGEMENT SYSTEM

In order to supporting the process modelling of enterprise we add the function blocks to workflow management system which can describe the organization, resource and information model. The extend workflow management system is shown in Fig. 3. This software system can describe and management the process view and the other three views in a compositive way. As a modelling tool this extended workflow management system can provide enterprise model that can be used in develop information system such as ERP, SCM, CRM. As workflow management system it can also realize the normal function that other workflow systems can achieve.

The extended workflow management system is composed of six components, namely, reference model management, model develop, model simulation running and optimization, model running, workflow engine and communication interface. Reference model management is in charge of providing appropriate model before develop an enterprise model and build new reference model by extract the distillation from existing model. Model development supports the whole process of building a process model including the development of process model, organization model, resource model and information model. Model running simulation and optimization can help analyze the performance of process model and try to find the default of the model and finally, put forward some advice and methods to improve the model. Thus the model can be optimized before it is put into running. Model running can run the model built by the model development block and manage the running process by workflow engine. When monitor the process workflow management will know the whole situation. We will know how many resources are deployed and who is busy in doing what job and the cost and time the process have consumed. Because the performance can be dynamic monitored so that we will know the accurate information when make enterprise

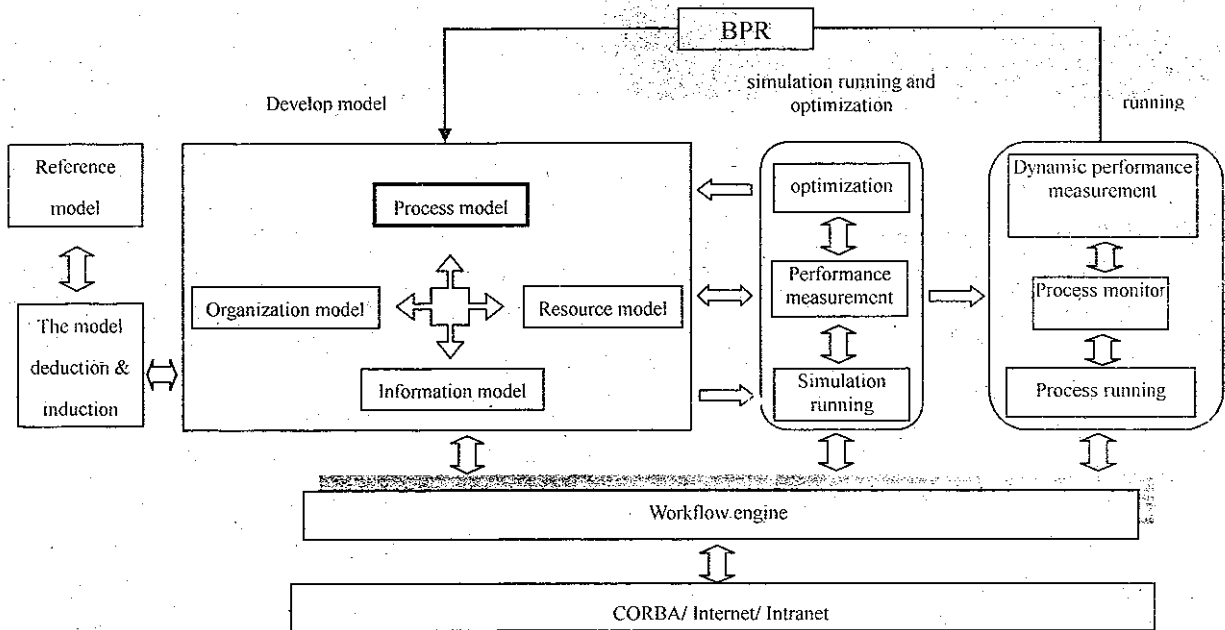


Fig. 3 workflow management system supporting process modelling

decision or implement BPR. Workflow engine is the core of whole system. All the processes are running and scheduled under the control of workflow engine. Communication interface is realized by CORBA middle-ware technology. It is transparent on the network using CORBA and the communication can be realized easily.

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#### BIOGRAPHY

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