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RESEARCH OF INTEGRATED ENTERPRISE MODELING TOOL SYSTEMS

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ABSTRACT

The research on enterprise modeling methodology plays an important role in promoting rapid implementation of CIMS. In this paper, an integrated modeling method is put forward. Extended to the three-phase life cycle, a four- phase modeling method is used. Cored with the workflow model, the different models of an enterprise can be contacted tightly. At last, the implementation method of COBRA based integrated modeling and simulation system is discussed.

1. INTRODUCTION

The enterprise is a complicated social, economical, and physical system. In order to implement CIMS successfully, the guidance of advanced CIMS implementation methodology and powerful support tools are also needed. Researchers have put forward many modeling methods, such as CIMOSA, GRAI-GIM, IDEF, PERA, ARIS, DEM, etc. Each methodology has its own features and fields and can guide the implementation of CIMS at some aspects. But some problems still existed in these methods which can be concluded as follows:

1) The three-phase life-cycle in existing method can not fulfil the requirements of enterprises' continuous development;

2) Existing enterprise modeling methods have large deficiency in integration;

3) Existing enterprise modeling tools have large deficiencies in adaptability and flexibility;

4) Existing modeling methods don't have an effective performance evaluation system, and are quite deficient in simulation and optimization of the model.

In this paper, an integrated enterprise modeling method is put forward. The system architecture and the process modeling method based workflow technology are presented. The implementation method of the integrated modeling and simulation system based on CORBA is also given.

2. INTEGRATE ENTERPRISE MODELING SYSTEM ARCHITECTURE

Although benefiting from the CIMOSA[1], the integrated modeling method in this paper is very different with the CIMOSA. Great innovation has been made to compensate for the limitations of CIMOSA. The combination of the four-phase modeling method with the workflow techniques can promote rapidly and effectively the implementation of CIMS

On the basis of the traditional three-phase life cycle, a four-phase (requirement analysis, system design, implementation and run-time maintenance) modeling method is put forward. By introducing the run-time maintenance phase, the one-time, open loop, from modeling to

implementation mode is extended to a circle, closed loop, from modeling to implementation and back to modeling process. So the designed enterprise model, whose original main function was the guidance of system implementation in theory and method, is extended into a major component of the enabling system supporting enterprises to realize agile manufacture strategy and rapid re-engineering. The extension from the three-phase life cycle to the four-phase life cycle makes the entire enterprise modeling and CIMS implementation a spiral upward process. The documents and results of the run-time maintenance phase will be the basis and inputs of the requirements and implementation of a newer system in the next cycle. Figure 1 presents the unwrapped life cycle dimension structure and the mapping relations between the models in different phases.

Fig.1 shows that the entire life cycle of the enterprise model forms a closed loop cycle. The results (outputs) of each phase is the inputs of the next phase, and the results (outputs) of the run-time maintenance phase in the earlier life cycle are the inputs of requirements analysis phase in the next life cycle. This incessant circular life cycle reflects the incessant innovating and extending process in CIMS.

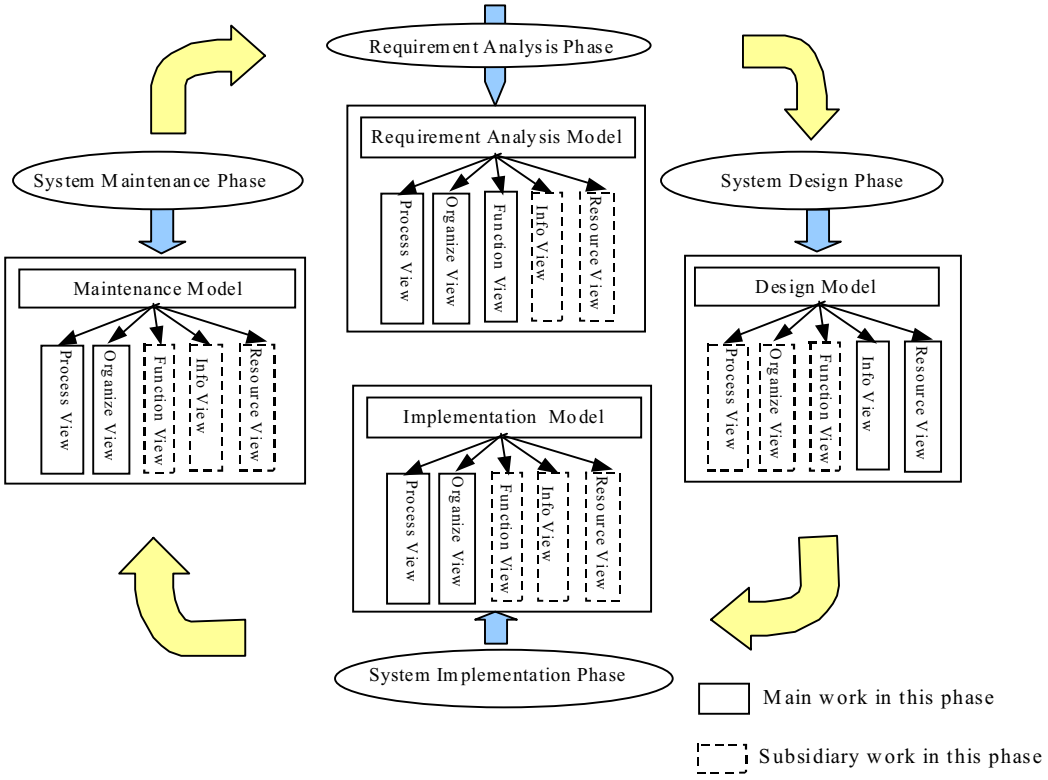

Fig. 1 Life-cycle dimension structure

Using the method of the four-phase modeling, an integrated enterprise modeling architecture cored with the workflow model can be presented. The integrated enterprise model takes workflow model (process view) as its core model and other models (function, information, organization, and resource view) as accessories, and there are association and quotation relationships between different view models. Each model is established and consummated step by step, and the workflow model was taken as the key control to secure the consistency of different models[2]. The integrated modeling system is developed in software component mode to form a flexible dynamic enterprise model.

3. THE STRUCTURE OF INTEGRATED MODELING SYSTEM BASED ON CORBA

In the distributed environment, Integrated cooperative modeling, simulation, analysis and optimization will be supported with the establishment of a cooperative modeling environment based on CORBA. The associations between different view models are designed using object-orientated method, and the dynamic connections between different view models are realized using request/service method.

The key support technology in this distributed cooperative modeling environment is CORBA and its common object services. With the support of ORB bus and relative distributed object service, transparent object services in distributed environment can be favorably realized. The architecture of an integrated enterprise modeling, simulation and analyzing system is presented in Fig.2. This system uses the software bus of Orbix for web and its services as support environment, and the application system is mainly composed of modeling tool, modeling optimization tool and model implementation tool.

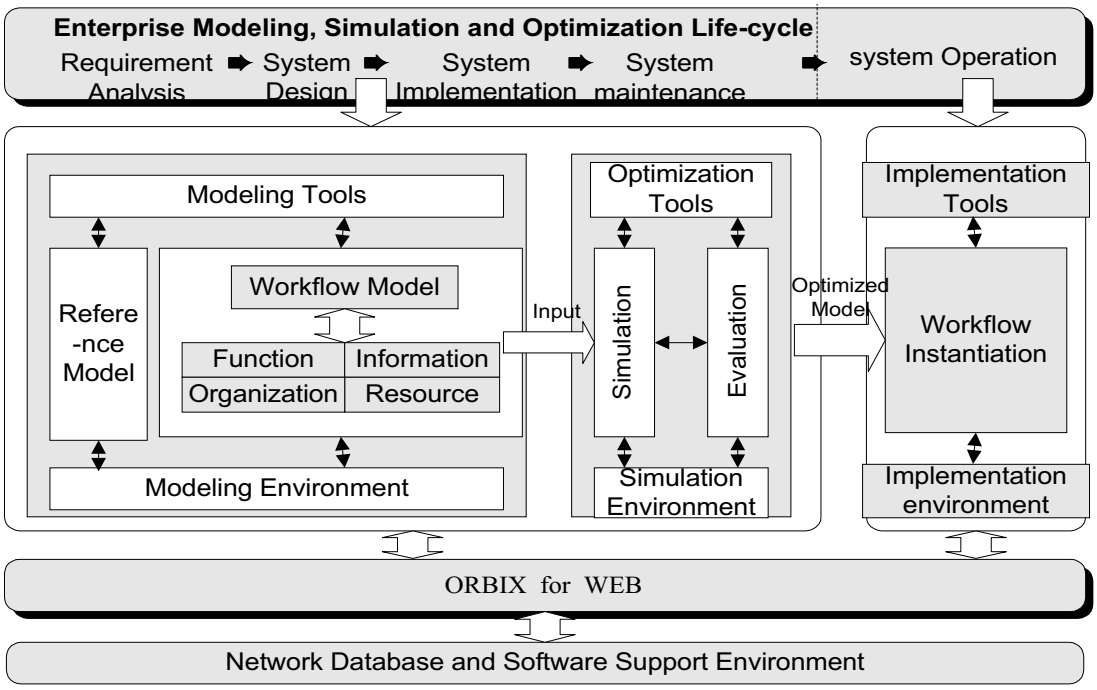

Fig. 2 Architecture of integrated modeling, simulation and optimization system

Optimization tool, which is composed integrated simulation tool, simulation environment and performance evaluation system, is also supported by ORB service. Integrated simulation adopts the strategy of using workflow model as its core, Petri net technology as its background support and ORB service as its bottom support technology. It simulates the executing process of workflow model by running Petri net model, on this basis, it completes the simulation of enterprise model, and provides reliable results to analyze and evaluate the system. The structure of simulation system based on workflow is presented in Fig. 3.

After simulation and optimization, appropriate enterprise model is achieved. Then the transition from enterprise model to implementation system comes to be the next emphases. As indicated above, this transformation is a main research topic in integrated modeling. Two practicable accesses can be presented to realize this transformation. The first one is to integrate the application system through the instantiation of workflow models and execution service. This access

especially suits office automation and the business systems that need process integration and process control. The second access is to map enterprise models into existed application software systems. For example, enterprise models can be mapped into ERP (Enterprise Resource Plan) or PDM (Product Data Management) system. The software component technology is needed by both of the two methods because of the requirements of re-organized in function, information and process, according to the dynastic enterprise environment[3].

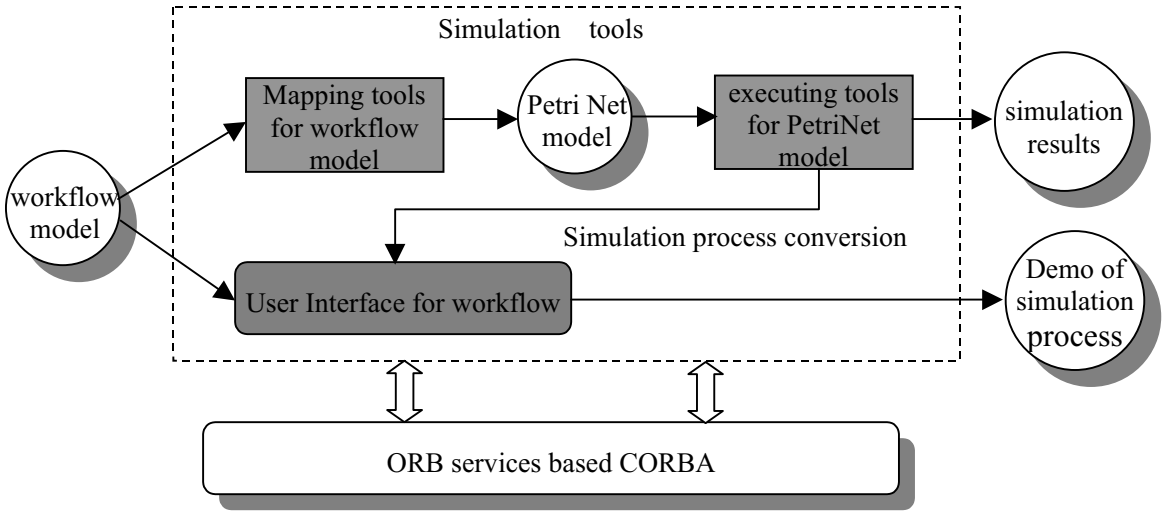

Fig. 3 Structure of simulation system

4. CONCLUSION

In this paper, the main problems existed in current enterprise modeling methods are pointed out. An integrated modeling system is put forward, and its architecture and modeling method based on workflow are also presented. With the support environment of CORBA, the implementation method for the integrated modeling and the structure of simulation system and the software system is given. These systems will be developed in object-oriented method. On the basis of this integrated tool system and the experiences of CIMS implementation in different industries, after understanding and standardizing enterprise business process, the basic components of enterprise model, and then the enterprise reference model can be built. With the support of modeling tool and enterprise reference model, the model of a specific enterprise model can be established.

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