

Chapter 7.6

An Object–Oriented Abstraction Mechanism for Generic Enterprise Modeling

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ABSTRACT

A generic object-oriented enterprise modeling process (GOOEMP) is a set of partially ordered steps intended to reach the objective of building a fully integrated, dynamic, object-oriented model of the enterprise. An abstraction mechanism is proposed to enable this process. The process is generic because it applies to most types of enterprises. Enterprise models are the products developed from the process and these can be used by various stakeholders in an organization to: a) give them an understanding of the enterprise; b) design integrated information systems; c) respond to business changes by evolving their enterprise models and information systems in a coordinated and coherent manner; and d) enable the enterprise

models built within a particular industry to be reused and applied to many other industries.

INTRODUCTION

High level competition in a global market requires organizations to deliver high quality customized and short life span products and services at a low cost, low lead time, and provide full customer satisfaction at all times. This involves products and services being developed at a higher rate and in reduced time. Enterprises need to be agile, respond rapidly to changes and new ideas. This requires the enterprise to adopt an effective information systems strategy that maps the business needs accurately. The business processes, functions,

data, and systems must be fully understood, stored, made accessible, integrated, and supported by a well designed information infrastructure. At present, most of the information within an enterprise has been developed in a piecemeal manner. Information is stored in disorganized, dis-integrated, incomplete company wide databases. Also the information models that were developed separated out the processes, functions, data, and systems. It is very difficult to access accurate and useful information as and when required quickly and efficiently. Computer-aided modeling of the enterprise is a powerful tool for analyzing business structures and the associated information infrastructures. Enterprise wide computer models represent the business structure, process, functions, classes, resources, strategy, token, flow, and information of an enterprise and can be used to develop a suitable information systems infrastructure (Graefe & Chan, 1993; Hu, Harding, & Popplewell, 2000).

Enterprise models can be developed using object-orientation; a powerful concept that can be applied to almost all aspects of the lifecycle of a product from analysis, design, implementation, and maintenance. The main benefit gained from using one paradigm throughout the lifecycle is that the difficulties of conceptual transformation from one level to other levels of the lifecycle are reduced. Object-orientation modeling constructs help in understanding, abstracting, and representing different levels of knowledge within the enterprise and encapsulating that knowledge within object components. Componentizing the enterprise helps to: a) reduce and manage the complexity within an enterprise; b) provides better understanding of the enterprise; c) helps to develop and represent an enterprise in a model; and d) help in integration, reuse, and evolution of the enterprise model.

The authors have developed an object-oriented enterprise modeling process by synthesizing, adapting, and enhancing previous work in enterprise modeling. Such a modeling process is very useful as it provides steps for the business to follow

which will allow it to develop an integrated set of enterprise models. The object-oriented paradigm, and especially the concept of business objects, contains modeling constructs which allow for the knowledge within the enterprise to be fully captured and represented in a form that is meaningful both to the business and information systems people. The object-oriented paradigm also allows for the modeling of the data, functions, processes, and systems within the company. These can be encapsulated into different types of components, which can be effectively developed, stored, used, and reused. The enterprise models that are built are integrated and coordinated within the company in such a way that the models can easily respond to changes. This will allow companies, safe in the understanding that their information systems can cope and evolve with business changes, to concentrate on improving their business by responding positively to change.

The second section provides a brief survey on research approaches, methodologies, and frameworks in enterprise modeling. The third section provides an overall description of the generic object-oriented enterprise modeling process (GOOEMP). The fourth, fifth, and sixth sections explain each of the three levels, conceptual, representational, and instance level in detail and with examples. Finally, the sixth and seventh sections present case studies and some conclusions.

BACKGROUND

Enterprise models describe a business through the representation of its elements, such as structure, activities, processes, information, resources, people, behavior, goals, and constraints. Such models enable an understanding of the elements in terms of their relationships and dependencies. In the context of systems engineering, enterprise modeling facilitates the mapping and the strategic alignment of the business with the developed ap-

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