

Acquiring Reusable Business Models Based on Enterprise Modeling

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Abstract. This paper proposed a framework for acquiring reusable business models by borrowing the ideas of multiple perspectives from extant enterprise modeling frameworks. The proposed framework consisted of three dimensions, i.e., business views, instantiations, and reuse lifecycle. A roadmap for acquiring reusable business models based on our framework was explained.

Introduction

Enterprise information systems are complex which pose great challenges to software vendors during software development, implementation and evolution [1]. In order to control complexity, one feasible way for software vendors is to reuse assets of many kinds [2], such as business model [3], software architecture [4] [5], design patterns, etc., within software lifecycle. The precondition for reuse of intellectual assets which are usually embedded in various business models is to acquire reusable intellectual assets with high quality [6]. However, how to acquire high-quality business models for reuse in a systematic way is still immature [7].

What incarnated within an enterprise information system is a “virtual enterprise” [8], within which the knowledge about enterprise organization, business process, resources, information types and structures, etc., is systematically organized and incarnated into software codes and supporting documents. Therefore, exploration on acquisition of high-quality reusable business models systematically is of importance to develop, deploy and evolve information systems.

In this paper, we analyzed typical ways to model an enterprise and identified four kinds of business layers during modeling an enterprise and presented a framework for acquisition of reusable business models.

Enterprise Modeling and Business Model Reuse

Enterprise modeling aims to get a set of enterprise models which depict different aspects of businesses systematically [9]. We think it could be of help to reuse business models by borrowing best practices from extant enterprise modeling frameworks. There are three main benefits from enterprise modeling. The first is to promote reuse scope and granularity. The outcomes of modeling enterprises are a set of business models, whose granularity is usually larger than that from traditional software engineering. Meanwhile, the scope of enterprise modeling could be expanded to cover multiple business domains whereas the scope of reuse was much narrower in traditional software reuse practices. The second is to promote traceability among business models. Extant modeling frameworks provided mechanisms to trace linkages among business models at different stages. Additionally, frameworks like ARIS provide central views to orchestra business models of different types. The third is to promote continuity of evolving business models. Extant modeling frameworks (e.g. CIMOSA) provide instantiation dimension for building blocks, thus support evolutionary modeling by enabling building blocks to move upwards or downwards within levels.

Business Layers within an Enterprise

An enterprise is composed of a set of business processes, each of which can be further decomposed into a set of business tasks. Each task may involve business resources such as

machines and human [6]. Therefore, we divided a business process into four layers below.

Layer one is introduced to model enterprise objectives, which deals with aspects of “what to do” for an enterprise. Typical issues are such as selection of business scopes, identification of business objectives and designation of priority levels among business objectives.

Layer two is introduced to model business processes, which deals with aspects of “how to do” for an enterprise. Typical issues include identification of primary and supporting business processes, design and (or) redesign task combinations within processes for achieving desirable outcomes.

Layer three is to model business object types, which deals aspect of business resources involved for executing tasks within processes. Typical issues include the identification of resource types and capabilities, and the way these resources participate in specific business processes.

Layer four is to model organization , which deals with aspects of responsibilities and authorization structures of an organizational. At this layer, the specifications of roles taken by employees at different management levels are to be paid more attention to.

An Enterprise Modeling-based Framework for Business Component Reuse

Based on above analysis, we advanced an enterprise modeling based framework for business model reuse in Figure 1. There are three dimensions in this framework, namely, business views, instantiation, and reuse lifecycle. Each dimension is explained briefly below.

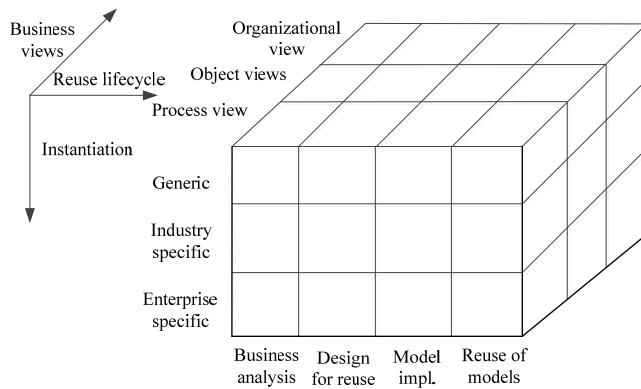


Fig.1. An enterprise modeling based framework for business model reuse

The dimension of business views is used to model reusable business knowledge from different business layer. Here we identified three types of views. The first is process view used to model business processes within an enterprise. The second is organizational view used to model organization structure, which put emphasis on roles, responsibilities and obligations aspects in an enterprise. The third is object views used to model business entity types involved during execution of business processes. Business entities could be concrete, for instance machines, job shops, etc., or abstract, for instance capability, work calendar, etc. Among the three views, the process view acts as natural hubs for integrating with other two. On the one hand, the execution of a task could invoke one or more methods of a business object. On the other hand, it is users who participate in processes, and organizational view provides detailed information about users' responsibilities and obligations.

The dimension of instantiation is used to group reusable business assets into proper abstract levels so as to prompt reuse practice in reuse based software development projects. There are three layers in this dimension. The first is generic layer, which consists of modeling elements such as business objects, terminologies, business roles, constraints, etc. The second is partial asset layer, which consists of industry specific modeling elements and business knowledge assets. The third is particular layer which consists of enterprise specific business knowledge assets.

The dimension of reuse lifecycle is used to manage reuse process of business knowledge. Four stages are identified, i.e. business analysis, design for reuse, business model implementation and reuse. Among the four stages, the first focuses on identification of business domains and business requirements; the second focuses on elaboration of business requirements, acquisition of business models and refactoring for reusability improvements; the third focuses on realization of business

requirements which further provides specification and related documents about business models; the fourth focuses on matters such as maximization of reuse extant business models.

Enterprise Modeling-based Acquisition of Reusable Business Models

Based on above discussion, we further proposed a roadmap for acquiring and evolving reusable business models based on enterprise modeling, which included six steps below.

(1) Business domain analysis

Based on analysis on decomposition of strategic objectives for target enterprise(s), this step identifies a set of business domains and documents them properly for further reuse. When necessary, these business domains may be further decomposed into a set of sub-domains for decreasing analysis complexity. Take for instance a steel enterprise, typically includes business domains of sales and distribution, manufacturing, purchasing, finance, human resource management, etc. As to purchasing, it may further consist of sub-domains of purchasing materials of large volume fuels, iron ores and adjuvant, etc.

(2) Business process analysis

For every business domain and sub-domain identified at step one, this step analyses aims of its business processes, structures of and relationships among tasks, roles involved within tasks, entity types and properties, etc. When necessary, some complex tasks need to be further decomposed into smaller tasks until the outcome tasks can be easily understood or described properly.

(3) Business object analysis

Based on the artifacts produced at step two, this step focuses mainly on business resources. By identifying various candidate business objects, object properties and methods, structures among business objects, etc., this step comes up with business object models. Based on our knowledge about enterprise systems, business objects can be grouped into six categories, namely, material related (e.g., raw material, artifacts), method related (e.g., routing), finance related (e.g., general ledger), capacity related (e.g., production capacity), time related (e.g., calendar), business information related (e.g., invoice).

Three aspects are involved at this step. First, business object identification, which means that all kinds of business documents (e.g., orders, invoices) can be treated as candidate business objects, and the related business objects (e.g., product, supplier, work centre, etc.) can be recognized based on the careful examination on these candidate business objects. Meanwhile, business objects can be recognized during elaboration of each task within a business process. Second, business object structure formulation, which means to organize business objects into proper structures. From the perspective of object orientation, there are two types of basic structures. One is generalization-specification structure, which is used to model the ‘is-a-type-of’ association between two classes. The other is composition structure, which is used to model the ‘is -a-part-of’ association between two objects. Third, themes of classes categorization, which means to introduce theme mechanism to organize related classes. Organization of classes by themes is often helpful especially on occasions that there are large quantities of classes.

(4) Organizational roles analysis

From the perspective of development and implementation of enterprise information systems, this step focuses on management roles specification. The reason behind is that it is the people who play corresponding roles with specific authorities fulfills business functionality by executing software modules using the rights granted by software administrator. By formulating role structure for organizations, we can accelerate, for instance, software deployment by reusing role assignment knowledge.

Generally speaking, there are many similarities among different enterprises. Thus, it is usually viable to build organizational roles based on customization of extant organizational reference models. Besides, an organizational role structure for specific enterprise may be affected by enterprise strategy and business processes structure, therefore, organizational role analysis process is often interwoven with other analysis processes.

(5) Business componentization and reusability improvement

At this step, all artifacts produced during previous steps are encapsulated and documented for future reuse. We name this process as business componentization, which produce different categories of business components. Based on business views to which a business component belongs, a business component can be one of the four categories, i.e., process component, task component, business object (BO) component, and organization component.

(6) Management of reusable business assets evolution

This step is about management of reusable business models both for and with reuse. As to the 'for reuse' perspective, typical activities are, for instance, categorization and indexation of business models for retrieve. As to the 'with reuse' perspective, typical activities are, for instance, customization of extant reusable business models for specific projects and, when necessary, evolving out-dated business models to meet the need of reuse in new environment.

Conclusion

By borrowing the ideas of multiple generation of views, instantiation of building blocks and deviation of models within extant enterprise modeling frameworks, this paper proposed a framework for acquiring reusable business models, further presented a roadmap for acquiring and evolving reusable business models. Our work may contribute to researches on software reuse by providing an enterprise modeling based acquisition of reusable business models which presented a new roadmap for acquiring reusable blocks in a systematic way. Further work could be on model specification, transformation, evolution and supporting platform development.

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