

Use of Business Modeling in Requirements Definition Phase

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For many enterprises, how to anticipate various changes in the business environment and promptly respond to those changes are important issues. However, in many cases, the IT systems that support the basis of business are extremely complicated and difficult to respond to changes. To address these problems, Fujitsu recently reviewed its SDAS system development methodology from the requirements definition phase by reconsidering its original concept. First, enterprise businesses and related IT systems can be correctly visualized and commonly understood by everyone by improving a few key modeling techniques for the requirements definition phase (e.g., business process modeling and business data modeling) based on our previous practical experience. Secondly, the total optimization of systems by taking new approaches such as Service-Oriented Architecture (SOA) becomes possible by providing the means to redesign complex IT systems into flexible, mutually separated ones. This paper describes the concept of modeling and then examines business process modeling and business data modeling. Lastly, this paper describes how these business modeling techniques are used to realize SOA systems.

1. Introduction

Is your company free from these problems?

- Although a business flow was created for a previous development project, it cannot be used because it has not been appropriately maintained.
- Specifications cannot be defined because the people who are familiar with the business are too busy.
- Only one person knows about the system (i.e., the system is personalized).
- Furthermore, the people who know a lot about the system are nearing retirement (the “baby-boomer generation” problem).
- Although your company has decided how to modify its business, little is known about where and how the system must be modified and what influences the modifications will have.

It is now clear, as suggested in the paper, “Toward Realization of Service-Oriented Architecture (SOA),”¹⁾ elsewhere in this special edition, that one of the most important issues for a company is to quickly identify and respond to changes in the business environment and that it is very important for IT systems to be able to flexibly respond to changes by using SOA concepts. As discussed in the SOA paper, the introduction of a service bus alone is insufficient to make a company capable of flexibly responding to changes. After all, the key points are to understand what is required to flexibly respond to changes and to design a system that can flexibly respond to changes. Changes occur not in a system, but in a business. To become capable of quickly responding to changes, it is necessary to visualize the fundamental structure and behavior of the business in which the changes occur, quickly identify

the changes, and quickly adapt the system to the changes. These objectives cannot be achieved without a business model that accurately maps the reality of the business. In addition, the model must be implemented in a system using a language the system understands. In other words, the system must closely represent the business world, and the relationship between the business world and the computer world must be carefully maintained. The SOA development project gave Fujitsu an opportunity to recognize again the importance of upper processes, and we therefore started reviewing them. We believe the following three points (**Figure 1**) are especially important in the requirements definition phase:

- Reach a consensus among the stakeholders.
- Visualize and model the business, and run plan-do-check-act (PDCA) cycles to improve the business (business process modeling).
- Construct the system so it closely reflects the real world (business data modeling) in an architecture that is responsive to changes (service architecture modeling).

Although these three points are all important in the requirements definition phase, this paper focuses on the last two business modeling points. It outlines the concept of business modeling and then discusses business process modeling and business data modeling. Lastly, this paper describes how these business modeling techniques

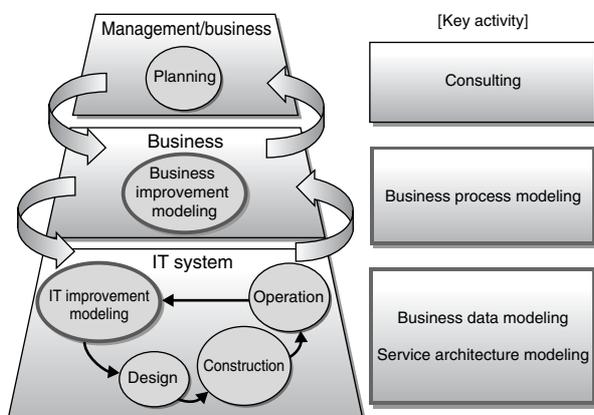


Figure 1
Three points in upper processes.

are used to realize SOA systems.

2. Concept of business modeling

A business consists of two elements: procedures (processes) and information (data). To reflect this in a system, business modeling requires the two perspectives of business process modeling and business data modeling.

Figure 2 outlines the concept of business modeling. The business process model in the figure shows that order acceptance starts when an order arrives and that shipment starts after order processing ends. An order has two sections (header and details), there are two types of ordering, and multiple products can be ordered together (details section).

The figure shows that the essence of business modeling is to clarify the business flow (procedures) and the structure of the information to be handled.

3. Business process modeling

Business process modeling is a technique that visualizes business in the real world, mainly using a business flow chart. Sharing existing business knowledge and information about future changes in a business helps to improve business.

3.1 Problems with conventional business process modeling

Although business process modeling depends mainly on a business flow chart, notations are not standardized. In fact, when we collected business flow chart examples, we found that their information was inconsistent. In addition, because the analysis items to be investigated and the steps to be taken were not defined, the modeling results tended to be personalized. This sometimes led to failure in reaching a consensus with the customer.

Another issue is that a business problem that is already known can be addressed at the time of modeling, whereas an unknown problem cannot be addressed if the problem handling method is

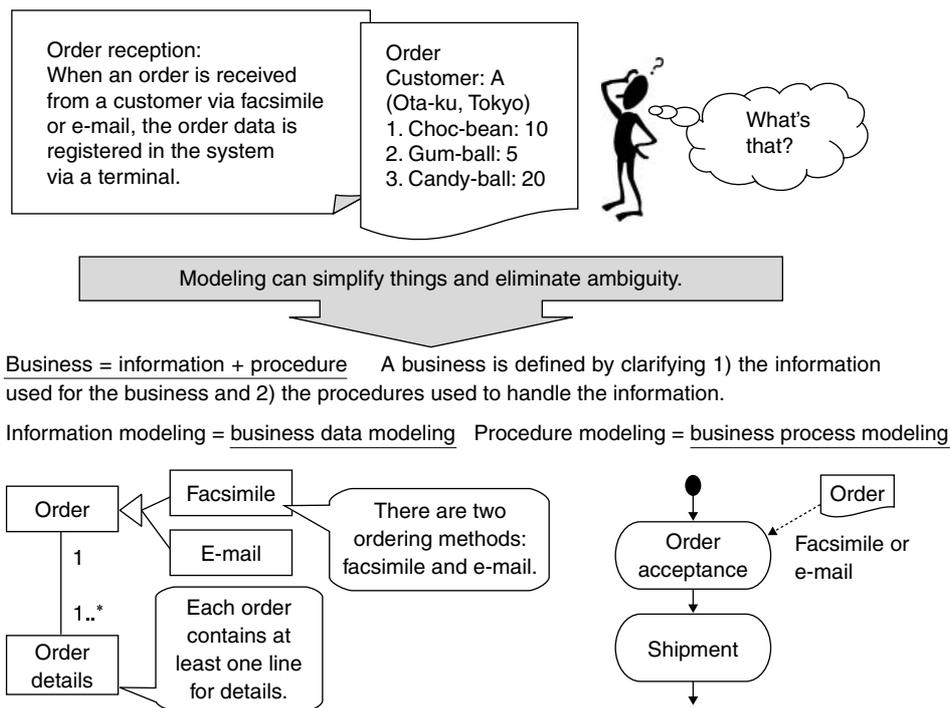


Figure 2
Concept of business modeling.

limited to modeling and does not include continued monitoring using PDCA cycles. Unknown problems are detected, for example, when there is a sudden workload increase.

3.2 Features of SDAS-provided business process modeling

To handle these issues, we developed a new business process modeling technique called Valuevision Modeling Methodology (VMM).

The features of this technique include the following:

- 1) It uses Unified Modeling Language (UML) so that notations can be standardized.
- 2) It uses UML profile extensions to improve the readability of chart symbols, the appearances of which are shown using extensions so business and information types can be intuitively distinguished.
- 3) It predefines the basic analysis items, for example, the time required to complete a process and the number of backlogged slips to

be processed.

- 4) Its modeling procedures are standardized.
- 5) It clarifies the points of modeling (e.g., business activities are hierarchically represented).
- 6) It provides a modeling tool (in-house use only).

These features allow us to construct a business process model that contains the information required to reach a shared recognition and minimize the level of personalization.

Figure 3 shows a model that was constructed using this business process modeling technique. This model was constructed by observing the predefined rules (e.g., the business must be represented in a hierarchical structure and the sections in charge of the business must be clarified).

We also note the importance of continued efforts to find potential business problems to promote non-stop improvement. For this purpose, we provide a middleware package that combines

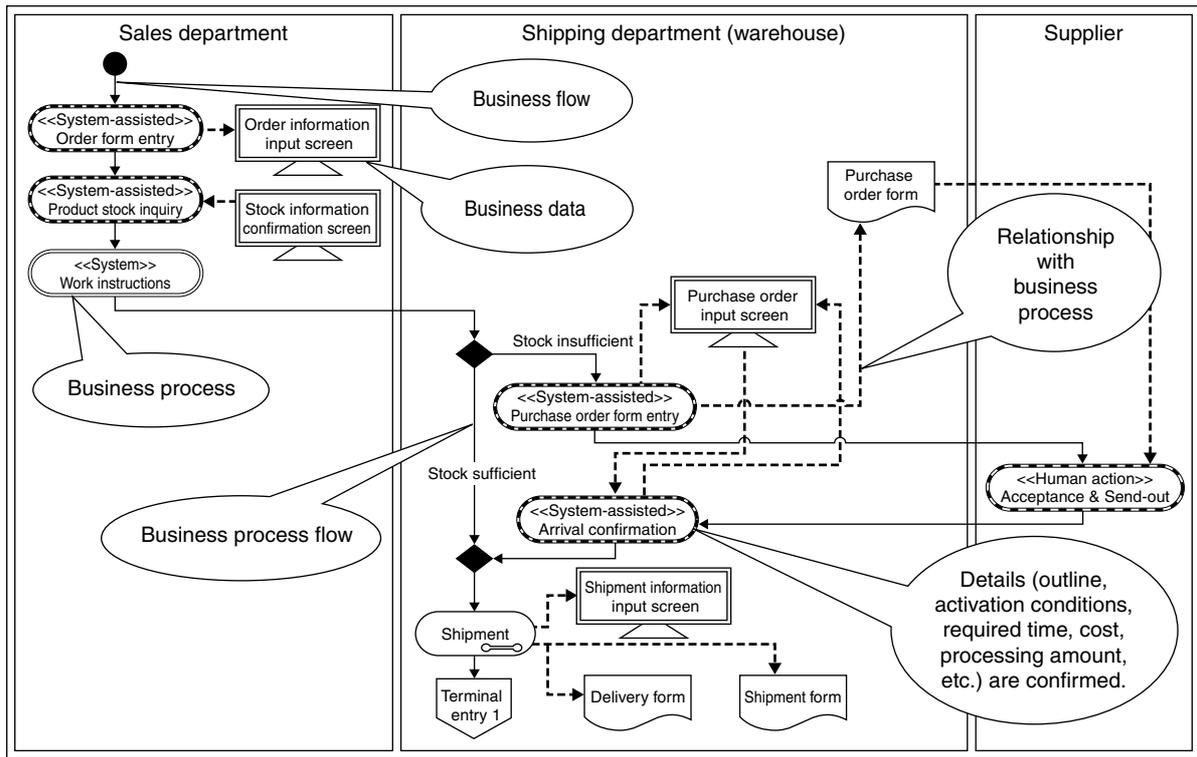


Figure 3 Image of business process modeling.

monitoring technology with modeling techniques. This package can measure rating factors such as the workload and time required for business activities and visualize them on a business flow chart (Figure 4). This function can visualize business problems in a more specific representation, allowing us to identify changes in the business environment in a timely manner and respond to them quickly. This package, therefore, provides important monitoring technologies for ensuring PDCA cycles work as required for business improvement. The area to which this monitoring technology belongs is called Business Process Management (BPM).²⁾ This area is attracting much attention in the industry because it is required for enterprise internal control.

4. Business data modeling

Business data modeling visualizes entities in the real world, mainly by using a class diagram. By focusing on these entities to identify the

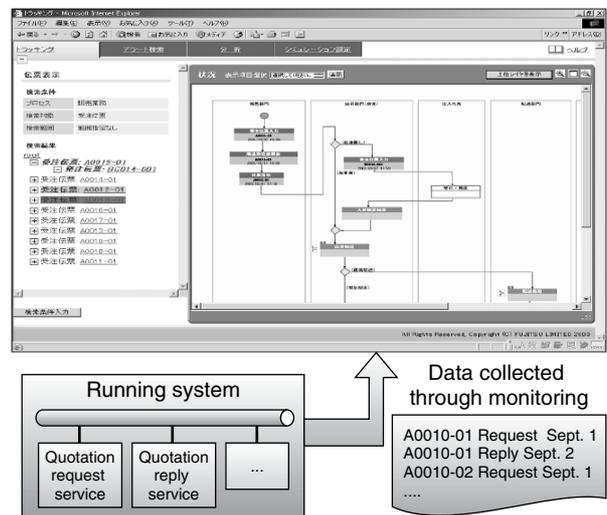


Figure 4 Visualization with monitor tool.

essential structure of a business, we can construct a change-responsive IT system in which essential and non-essential elements are clearly distinguished.

4.1 Problems involved in conventional data modeling

Data modeling lies at the heart of the Data Oriented Approach (DOA), which assumes that information is the essence of a company. Companies typically handle a huge amount of complex information. With DOA, a single attempt is made to faithfully map this complex world onto a model. Therefore, the IT systems constructed from these models tend to be as complex as the models.

Another problem with this conventional technique is that it is time-consuming and requires a large amount of human resources because it attempts to include all information (data) handled by the company in the model.

4.2 Features of SDAS-provided business data modeling

To overcome the problems mentioned in the previous section, we developed a new business data modeling technique that is based on the concepts of kaname entities and events.³⁾

One of the features of this technique is that data modeling is divided into two stages: the business analysis phase and the system design phase. The business analysis phase focuses on Kaname Analysis to grasp the essence of the business. In the system design phase, the business is modeled based on the results of Kaname Analysis using conventional DOA with an emphasis on comprehensiveness.

Kaname Analysis provides a simple model that enables the essence of real-world situations to be easily grasped. It does this by focusing on real-world kaname entities and events, which are defined below.

1) Kaname entities

Kaname entities are things of interest (e.g., people, goods, and money) that are connected with a company activity (business) and whose state can change.

2) Kaname events

Kaname events are activities that trigger a state transition of a kaname entity.

Because Kaname Analysis classifies all entities and all events as being essential or non-essential, the framework of an IT system can be well defined. This allows us to design a change-responsive IT system without spending much time or human resources.

Figure 5 indicates the differences between conventional DOA and Kaname Analysis.

Figure 6 shows the flow of Kaname Analysis.

In this new business data modeling technique, we first represent the structure of the information to be handled for the business as a data model using a UML class diagram or similar means. During the modeling, we focus only on the kaname entities at the core of the business. Next, we analyze the relationships among the entities to confirm they have been correctly extracted. Then, we represent the state changes that could occur for each entity as an event sequence model. These two models represent the essence of the business in the simplest way.

After completing the above steps, we can find the points where the relationships between kaname events and entities are the loosest. This enables us to identify the segmented units that compose an IT system and then make the system capable of flexibly responding to changes. The functions provided by the segmented system are called services in the SOA world (described later).

5. Relationship between business modeling and SOA

Fujitsu announced the establishment of its system of SOA technologies in July 2005 under the slogan of "Build a change-resistant IT system." In Japan, the system provides an SOA development technique called SDAS/Service Modeling. This technique combines business process modeling and business data modeling (described in other papers in this special issue) with the service modeling described in the SOA paper. Fujitsu provides industry-specific SOA development solutions in Japan that are based on

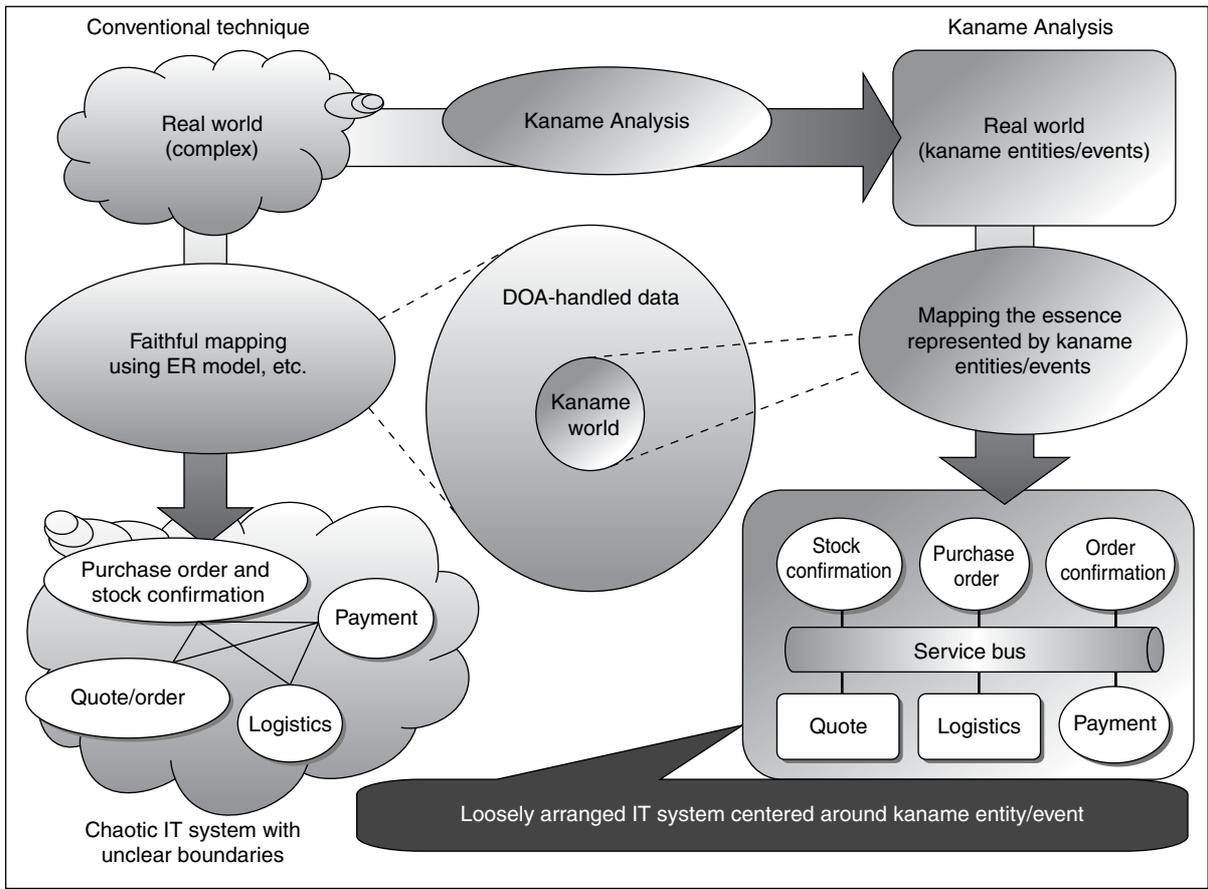


Figure 5
Difference between conventional DOA and Kaname Analysis.

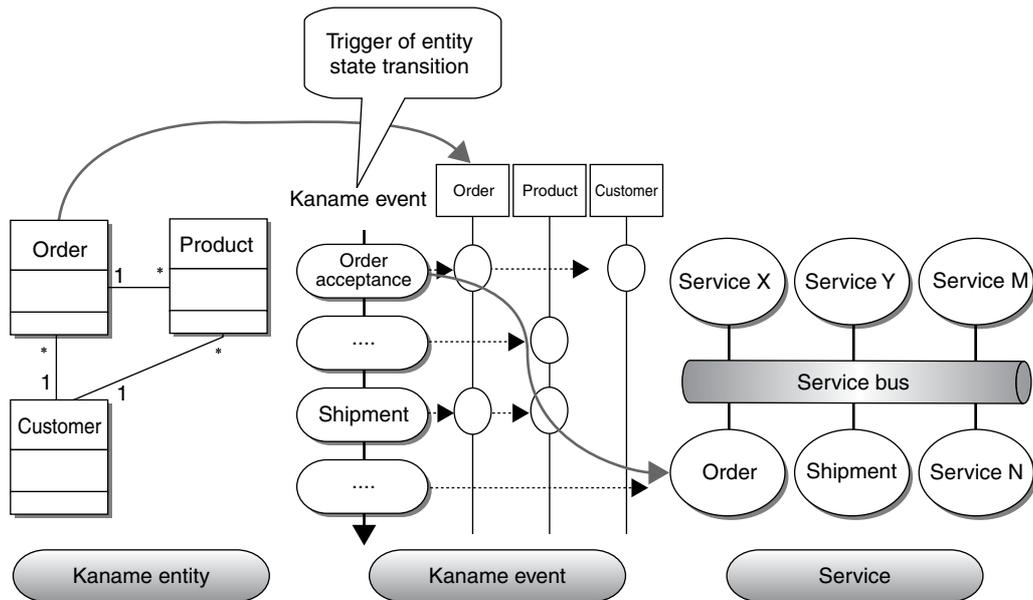


Figure 6
Image of Kaname Analysis.

this SOA development technique and include industry-specific know-how. More specifically, Fujitsu's SOA development solutions include Valuevision, a solution for industry and distribution focusing on business and process improvement; FUTURITY, a solution for social infrastructures based on reviewed images of how systems should be; and EVOLUO, a solution for financial institutions focusing on business tie-ups that satisfy needs related to industry reorganizations and increasingly diversified distribution channels.

The purpose of SOA is to construct an IT system architecture that allows IT systems to flexibly and quickly respond to changes in business. Before a flexible IT system can be constructed, business modeling is required. To conduct business modeling appropriately, it is necessary to recognize again the importance of upper processes. SOA truly provides an opportunity for this recognition.



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6. Conclusion

This paper described business modeling, which is an important technique used in phases where requirements are defined through discussions with the customer.

The need for business modeling is increasing year by year in many areas, for example, SOA and EA (total optimization planning). We will make further efforts to improve our techniques, educate and train modeling staff, and accumulate modeling results and make them available as reference information.

References

- 1) I. Morita: Toward Realization of Service-Oriented Architecture (SOA). *Fujitsu Sci. Tech. J.*, **42**, 3, p.306-315 (2006).
- 2) Excellences of "BPM Infrastructure." (in Japanese), *Fujitsu Journal*, June 2004. <http://jp.fujitsu.com/about/journal/272/newtechnology/02.html>
- 3) Z. Nakamura: A Planning Method of Successful Simple Work by Kaname Entity/Event Analysis. (in Japanese), The Nikkan Kogyo Shimbun, Ltd., 2003.



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