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An Integrated Approach to Information Systems Development for Supporting Customer-Centric Business Process

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Abstract. The issue of customer-centric enterprise focusing on realizing customer needs has recently received considerable attention in the corporate world. However, little research has yet been reported on developing Information Systems (IS) supporting the customer-centric enterprises. This research proposes an integrated approach of IS development that supports organizations aiming to become customer-centric enterprises using various customer profiles. In this paper, we propose an integrated approach unifying goal modeling, business process modeling, and information systems modeling. The approach is expected to be seamlessly linked with the object-oriented systems development approach. Finally, we apply this approach to the real case of a securities company in Japan.

Keywords: Customer-centric, Integrated Approach, Customer Profile, Business Process, Information System.

1. INTRODUCTION

Recently, the issue of customer-centric enterprise has received considerable attention in the business environments. The increasing complexity of technology and products requires a corresponding increase in awareness of customer needs and in the way humans interact with systems (Karl and Matthew, 2001).

In fact, many companies claim that their business to be customer-centric, customer-oriented or customer-focused. However, in these many cases, they have only implemented CRM (Customer Relationship Management) systems or call centers to hear the customer's voice and to address its problems acting as a help desk. The focus of CRM is to forge closer and deeper relationships with customers, "being willing and able to change your behavior toward an individual customer based on what the customer tells you and what else you know about the customer" (Peppers *et al.*, 1999). Nevertheless, at this time, CRM simply remains a marketing tool to analyze customer information for business decisions. It does not show how to realize the customer's needs using organizational resources.

Concerning the definition of *customer-centric*, we strongly believe that in order to become customer-centric, organizations need to rebuild business processes to eventually realize customer needs. Customer-centric organizations focus on understanding and transforming their customer's activities with internal business processes. They derive the prioritized requirements for their own internal initiatives and projects by redesigning their customers' most critical processes. Then they redesign

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and adapt their own internal systems and business processes to support customers' optimized activities.

However, although an increasing amount of research has appeared on customer-centric organizations, little of it shows how customers interact with internal business processes, how to model their activities, and how to develop information systems to support these business activities.

Therefore, in this research, we propose an integrated approach of IS development that supports organizations aiming to become customer-centric enterprises by using object-oriented modeling and customer profile analysis.

The approach starts from the identification of customer needs by using customer profiles. Generally, customers themselves are not able to easily express what they need. The approach we propose here focuses on finding out what these needs are. Observations on all aspects of customers' experiences are a crucial part of empirical studies that aim to make business processes more customer-centric. A conceptual and empirical method is thus needed to better model the characteristics and behaviors of prospective customers.

In this paper, we apply the customer activity tracking method coming from the information design field, and the concept of *Personas* to develop an approach for the profiling of customers. In the field of information design, there is a design method based on customer perspective to develop information structure and track customer activities.

This paper is organized as follows. Firstly, we discuss related research on business process modeling and IS development. Secondly, we propose a new approach of IS development for supporting business processes. Thirdly, we analyze an actual case using the proposed approach, and consider how business processes were affected. Finally, the results of this research and the direction for further work are presented.

2. RELATED WORK AND LITERATURE REVIEW

In this chapter, we first explain the goal-oriented business process modeling on which our proposed approach is based. Then, we discuss some techniques and tools for implementing our integrated approach.

2.1 Goal Oriented Business Process Modeling

Davenport and Short (1990) define business process as a set of logically related tasks performed to achieve a defined business outcome. It implies a strong emphasis on how work is done within an organization (Davenport, 1993). In their perspectives, processes have two important characteristics: (1) they have customers (internal or external), (2) they cross organizational boundaries, in that they occur across or between organizational subunits. One technique for identifying business processes in an organization is the value chain method proposed by Porter and Millar (1985). Processes are generally identified in terms of start and end points, interfaces, and organization units involved, particularly the customer units. Processes may be defined based on three dimensions (Davenport and Short, 1990):

(1) Entities: Processes take place between organizational entities. They can be interorganizational, interfunctional or interpersonal.
(2) Objects: Processes result in the manipulation of objects. These objects can be physical or informational.
(3) Activities: Processes can involve two types of activities: managerial (e.g. develop a budget) or operational (e.g. fill a customer order).

Process modeling is arguably one of the most important aspects of any organization in terms of management and control of all organizational activities. These activities will range from the high-level business activities, including mission statements, business processes and requirements, right down to very detailed technical processes that may be executed on a daily basis within the organization (Holt, 2005).

Business process models are usually defined in a graphical modeling language. There is a number of modeling languages, used in modeling business processes. However, very few process modeling representations tell process designers how to use those representations creatively to discover problems with the existing process, question assumptions, or generate and evaluate new solutions (Katzenstein and Lerch, 2000).

In this section, we particularly focus on a *Goal-oriented business process modeling*, because the concept of goal is very important, in the sense that it is the target that either the overall process or individuals in the process strive to achieve (Katzenstein and Lerch, 2000). Goals are also the primary means of understanding people's and department's motivations (Simon, 1964).

Katzenstein and Lerch (2000) suggested Goal-Exception-Dependency (GED) framework, which was developed to capture more information about social context and culture than other available models. The GED Framework gathers information from the organization about roles, goals, exceptions, and dependencies and analyzes the relationships among these elements using two different graphical models: *Goal/Exception Diagram, Dependency Diagram*.

The Goal/Exception Diagram provides the redesigner with an organizational and social context for a process and its logistic operations. This diagram shows the relationship among roles, goals, and exceptions in an organization. The Dependency Diagram shows the interdependencies that exist among the individuals and objects that carry out the process. This model shows the relationship among roles and dependencies in an organi-

zation.

The GED framework is an exploratory conceptual framework (Katzenstein and Lerch, 2000), not a fully developed process redesign method, so more detailed procedures or concrete methods are needed for goal-oriented business process modeling.

Proposed approach on goal-oriented business process modeling by Iijima *et al*. (2002) incorporates the concept of goal in modeling the business. They propose a link between the goal model and the business process in the same diagram. They argue that it is necessary to model the business process in a goal-oriented manner if the evaluation of the business processes in the context of its goals is desired. Additionally, they also claim that the relationships among goals should be clearly specified in the model.

Their basic standpoint about the goal model is similar to the one in Eriksson and Penker (2000), for example, using the concept of *completeness and incompleteness*. If a goal can be completely broken down into sub-goals, it is represented as complete. If not, it is represented as incomplete. Iijima *et al*.'s view differs from Eriksson and Penker's in two ways: first, the business goals are decomposed until the business process goals are achieved; second, the business process goals, as defined earlier, are the goals that can be achieved by a business process. Based on their discussion, the evaluation of the business process scenario, in the context of its goals, becomes possible by connecting the business process goal to the business process.

Figure 1 explains how goal-oriented business process modeling fulfills business needs. These steps consist of (a) business needs, (b) business goals modeling, (c) business process modeling, and (d) IS development. First, we need to define business goals associated with specific business needs, and list all business processes needed to fulfill each goal. Then, we consider the implementation of IS to support these business processes.

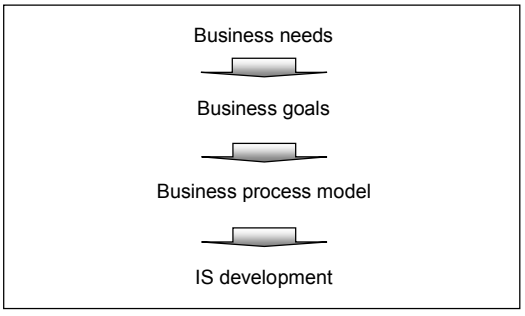

Figure 1. 4 proposed steps to realize business needs

2.2 Zachman Framework and Personas

In this research, we have focused on (1) architectural frameworks that visualize the entire scope of projects, and on (2) methods that create customer profiles, in an integrated approach. Many architectural frameworks have been used to comprehensively describe the architecture of enterprises' IS, for example, the Zachman Framework, RM-ODP (Reference Model of Open Distributed Processing) (Putman, 2001), TOGAF (The Open Group Architecture Framework) (The Open Group, 2003), and so on. Among these tools, the Zachman Framework differs from other architectural framework tools in its independent, holistic view of the enterprise, because it is neutral with respect to methodology, process and technology, including the breadth of scope to handle all areas of the enterprise (O'Rourke *et al.*, 2003). This is why we adopt it in this research. Meanwhile, we utilize personas to create customer profiles, for personas provide us with insight into how the organization needs to work for customers and how it is best designed. Market segmentation is an invaluable tool for identifying the types of customers to profile. However, it rarely provides the richness required to write personas.

First, we review the characteristics of the Zachman Framework, including origins, descriptions and relationships with the object-oriented modeling.

The Zachman Framework (Zachman, 1987) for Enterprise Architecture was formally published in 1987. Zachman used a construction industry analogy to describe the roles of individuals within an organization when sponsoring, designing, building, and using an information system. The framework proposes a logical structure for classifying and organizing the descriptive representations of an enterprise, indifferent aspects, and each aspect can be perceived in different perspectives. The Zachman Framework helps govern the architectural process with the dependency, coherence, and traceability needed for an enterprise to manage change, and to ensure that the alignment is achieved.

In this framework, the architecture is described across two independent dimensions, the rows represent the different perspectives, and the columns represent the different aspects. The Zachman Framework was developed taking into consideration all the participants involved in the planning, conception, building, usage and maintenance activities of an organization's information systems.

From the viewpoint of object-oriented modeling (Wang, 1997), descriptions of *what* (data), *how* (process), and *when* (time) in the Zachman Framework can be integrated into one fundamental type of description of business processes. It is useful to abstract the concept of actors (*who*) from the real-world enterprise because of the significance of the organizational structure and relationships in the enterprise (Sowa and Zachman, 1992). Describing the motivation (*why*) of the enterprise characterizes the goals and strategies of the organization relating to its IS. The goal model is motivating and driving processes of enterprise reengineering. In the Zachman Framework, network (*where*) is like IT infrastructure, so we do not consider it for describing the static conceptual data model. We describe it in Figure 2.

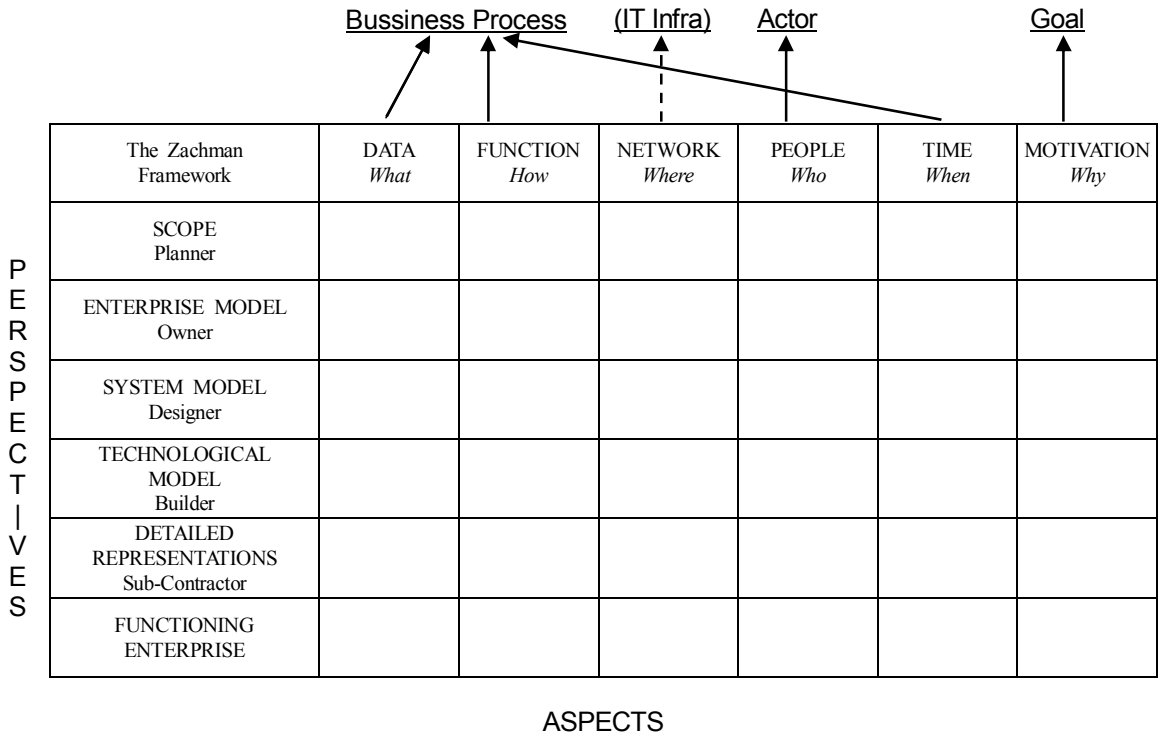

Figure 2. The Zachman Framework

Next, we look at personas for creating the customer profiles. The use of personas, fictional people, in product design is widely heralded as in Alan Cooper's book "The Inmates are Running the Asylum" (Cooper, 1999), on-line resources (Freydenson, 2002), and research papers (Grudin and Pruitt, 2002). Allan Cooper proposed the use of personas as a tool that could aid development of a user interface for a computer application (Polson *et al.*, 1992).

Although the use of abstract representations of users originated in marketing (Mikkelson and Lee, 2000), Copper's use of personas, with their goals and activity scenarios, is focused on design. He notes that designers often have a vague or contradictory sense of their intended users and may base scenarios on people similar to themselves. His goal-directed design provides focus through the creation of fictional personas whose goals form the basis for scenario creation. Cooper's earlier personas were rough sketches, but over time his method evolved to include interviews or ethnography to create more detailed characters.

Prior to Cooper, others promoted the use of abstract representations of users to guide design: user profiles and scenarios derived from contextual inquiry (Hackos and Redish, 1988) and user classes fleshed out into user archetypes. These representations were also used as a basis for scenario construction.

Personas used alone can aid design, but they can be more powerful if used to complement, not replace, a full range of quantitative and qualitative methods. They can amplify the effectiveness of other methods. Personas might help a designer focus. However, their greatest value is in providing a shared basis for communication. Cooper emphasizes communicating the design and its rationale among designers and their clients.

In this paper, we use it to identify the focal customer and create the customer profiles.

3. INTEGRATED APPROACH FOR IS DEVELOPMENT

Conventional business process modeling techniques have been focusing on perceiving and describing business processes, from the viewpoint of business function of the organization (Hou *et al.*, 2003). However, business processes must be viewed from the perspective of the customer in a customer-centric enterprise. Although most business processes cross functional lines, the process is a single and continuous activity from the customer's perspective. Therefore, procedures need to be developed with the customer's perspective in mind.

In this research, selecting a key customer group is a key decision. In order to identify who the key customer is and what her/his needs are, we exploit persona, for it is an interaction design technique with considerable potential for software product development. Customer needs are broken down into business goals by asking how these needs should be achieved. Business goals are divided into units, which are called Business Process

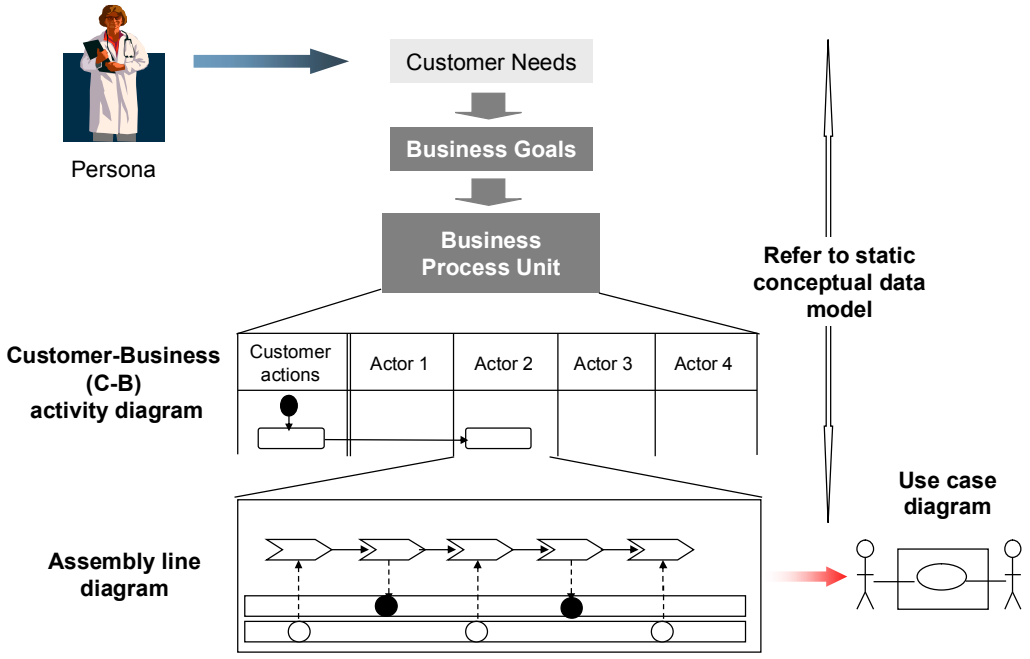

Figure 3. Overall view

Unit (BPU). The customer profile describes the typical customer image and attributes which affect the relation with the business. On the basis of such customer profile, the customer action scenario is designed. The customer action scenario consists of stories rich in context that focus more on what the customer will do than on how he will do it.

Figure 3 depicts the overall view of the detailed approach proposed in this paper. Our approach involves seven main steps.

3.1 Identify the customer profiles

We use personas to guide our creation of the customer profiles. Each persona should have a name, an image, an occupation, behavioral patterns and specific needs related to the project. Giving the persona a name is one of the most important parts of successfully defining one (Cooper, 1999). Cooper insists that a persona will never be a concrete individual in anyone's mind without a name. Cooper has mostly used it in the software design field, but in this research we applied it to customer identification in order to make customer profiles in IS development. A customer profile that we proposed in the paper describes the typical customer image, attributes and goals which affect the relation with the business.

Identifying the focal customer (primary persona) is a vital step in these processes. A primary persona has needs so unique that it calls for a very distinct form. In contrast, a secondary persona has needs that can be fulfilled by the primary user needs with only relatively minor modification.

3.2 Describe a static conceptual data model

It is valuable to describe a static conceptual data model, for we need something to recognize the entire image and clarify circumstances and scope. In this paper, we define the "Static conceptual data model" as a model that describes representations of interested objects and represents the static interrelationships between these objects in a real-world domain.

We categorized the related part according to three aspects: goal, business process, and actor. As we have described in section 2.2, these aspects are taken from the Zachman Framework.

The modeling notation used in this step refers to the Entity-Relationship (E-R) modeling (Chen, 1976) which makes use of three main constructs: data entities, relationships, and their associated attributes. The E-R model notation has subsequently been extended to include additional constructs by Chen and others (Teorey *et al*., 1986; Storey, 1991). For simplicity purposes, we have adopted a common notation for this paper, the so-called crow's foot notation.

3.3 Define BPU related to the business goals

Based on identified profiles, we define the business goals in order to fulfill the defined customer needs. Selecting two or three primary goals is the most appropriate. Selected goals are divided into Business Process Unit (BPU). A BPU that relates directly to the cus-

tomer's needs is selected. If BPU that is the smallest unit in our approach appears, stop subdividing goals.

Once the business goals have been defined, we should determine which BPUs need to be changed in order to implement the aforementioned business goals. If specific processes call for a different or expanded communication or computer infrastructure then these processes should be redesigned not only in relation with other departments but also with the customer.

3.4 Create the customer action scenario

On the basis of such customer profile and business goals, design the customer action scenario within the BPU. Carroll (1995) says that scenarios can play a wide variety of roles throughout the development process. Thus, we make use of the scenario in order to describe a particular situation between business organizations and customers not only showing the main course of action but also including variations or possible alternative cases. So as to clarify outputs of the process improvement, we describe the customer action scenario using two types: As-IS and To-Be.

These scenarios are described by the notation of activity diagram in UML. Activity diagrams allow analysts to model a process as a collection of activities and transitions between those activities (Arlow and Neustadt, 2002). In order to describe the As-Is scenario, it is necessary to start by identifying and designing the customers' core processes by considering which behaveioral patterns they have. After that, redesigning the As-Is scenario follows referring to the customer needs and requirements.

3.5 Design the Customer-Business (C-B) activity diagram

We consider how the enterprise deals with To-Be customer action using the *Swim lanes* in the activity diagram. The C-B activity diagram shows activities of the business organizations based on the behaviors of the customers inside the BPU.

Thus, a C-B activity diagram, as we will use the term, is a workflow diagram with swim lanes. This approach to process diagramming originated from Rummler and Brache (1995), and since then has since been adopted by a wide variety of business process modelers and by the UML software modeling language. Rummler and Brache have made up function lists actors including the customer. However, we separate the customer from function lists in order to clarify the relationships of actors with customers, because we focus on the behaviors of the customers inside the BPU.

The actors we originally identified on the static conceptual data model have become the swim lane labels on the upper side of the C-B activity diagram. By using this diagram, we can show the functional or organizational actors responsible for the performance of each activity.

The swim lanes represent the actions and activities carried out, so the number of swim lanes matches the number of relevant business organizations (Eriksson and Penker, 2000). We use vertical swim lanes to emphasize the top-down flow of processes from customer to business organizations and an overall pattern that matches the organization diagram locating business organizations and customers in a similar manner.

3.6 Create the assembly line diagram

The completed assembly line diagram of one business function is obtained from all scenarios using the *assembly line diagram*, a Unified Modeling Language (UML) extension developed by Eriksson and Penker (2000).

In this diagram, we put a process diagram at the top of the assembly line diagram. An assembly line package is a UML package that is drawn as a long horizontal rectangle. Each package can represent an entire information system, a subsystem in an information system, or a specific type or group of resources. The purpose of this diagram is to indicate how the processes in the upper part of the diagram refer to objects in the assembly line. A reference from a process to an assembly line package is indicated with a dashed line between the process and an object within the assembly line package.

3.7 Identify use-cases

The assembly line diagram shows how the process interacts with the information system. The references to the assembly line packages consist of information flow to and from the information system and show the interface between the business process and the information system. This interface is described through use-cases in object oriented modeling. And a set of references in an assembly line diagram typically becomes a use-case that the information system has to provide. It maps the business process to use-cases that describe the functional requirements of an information system. And, it also identifies the proper actors of the use-cases.

Use-cases should have a (1) clear initiation, a (2) sequence of communication between actor and system, and a (3) well-defined end that brings value to the actor (Eriksson and Penker, 2000). If we randomly refer from the process to the assembly line packages in order to identify use-cases, the result will be undesirable use-cases. As we just described, the assembly line diagram provides analysts with answers to the common question regarding how to define the use-cases relevant to the business.

Our main concern is about the upper process in the implementation of information system. So, we limit the scope of this paper that covers from the creation of customer profiles to identification of use-cases, which is the first step of information system modeling using UML.

4. CASE STUDY

4.1 Case Background

Much has been done to realize customer needs using IT in the corporate world; one outstanding example is the development of a new integrated operational systems at Kokusai Securities Co., Ltd. (now known as Mitsubishi UFJ Securities Co., Ltd. since the merger), which won the 6th Grand Prize for Information Systems awarded by Nikkei Computer magazine (Kokusai Securities, 2002).

Kokusai Securities launched an online trading system (Internet) in October 1999 and a telephone trading service (call center) in September 2000. However, at that time, customer data was not shared among the 3 channels (sales office, Internet and call center), because each channel network was not completely connected with the others. Therefore, a customer who wanted to use the 3 options needed to open separate accounts.

In October 2001, Kokusai Securities started a 24 hour/365 trading support service that enabled customers to freely use all 3 channels with a single account to better fit their lifestyle. The goal of the new 24 hour/365 day service was to greatly improve customers' convenience by providing a renovated trading system. The new 24 hour/365 day trading support system provides convenience to customers by integrating the three data bases of legacy systems, and the new data base is on the side of back office. However, we do not mention the back office here, because we focus on the benefit from the customer's perspective.

In the Kokusai Securities' project, we analyzed the business process modeling process and the system modeling of customer-centric aspects.

4.2 Application of the Proposed Seven Steps

We apply here the seven steps of our proposed approach in Chapter 3 to the Kokusai Securities' project.

Step 1 – Identify the customer profiles

Every cast of characters has at least one primary persona (Cooper, 1999). Personas can be primary or secondary. The primary persona is the individual who is the main focus of the design. In this paper, we assume that there are three personas as customers of the Kokusai Securities (See Figure 4). The first one is a rich senior (James), the second one is a business man (Brent), and the third one is a day trader (Molly).

Brent's needs are twofold: 1) he wants to trade during his free time because he is working during the daytime; 2) he wants to trade stocks by using multiple channels, but does not like to have separate accounts. Brent's needs are not satisfied by other personas' needs; therefore, we take Brent as the primary persona and fo-

			
Name	James	Brent	Molly
Age	62	45	32
Occupation	Old-age pensioner	Project manager in a small company	Day-trader
Behavioral patterns	He has enough money and enough time. So, he often discusses with sales persons before trading.	He rarely asks for investment advice. He likes stable fund management. He can not trade stocks during the daytime.	She is trading stocks professionally.
Needs	He wants integrated accounts.	He wants to trade during his free time. He wants to trade stocks by using multiple channels, but does not like to have separate accounts.	She wants a cheaper trading system.
Business goals for the firm	Provide single account.	Provide circumstance that enable to trade stocks with a single account any time, anywhere.	Construct e-trading system providing low cost trading.

Figure 4. Customer profiles

cus in this paper on Brent's profile. In the next step, we describe a static conceptual data model considering these needs.

Step 2 – Describe a static conceptual data model

In the static conceptual data model (Figure 5), we identify entities, which include Customer Needs, Business Goals, Trade, Stock, Information, Sales Person, Call Center, Online Service, and Back Office using an Entity-Relationship (E-R) Diagram. For example, the relationship between Trade and Stock implies that 'each Trade sells or buys one-to-many Stocks' and 'each Stock is assigned to only one Trade.' The diagram also reflects the fact that Sales Person, Call Center, and Online Service may conduct one-to-many Trade and that Back Office supports their operations.

Step 3 – Define BPU related to the business goals

In step 1, we could obtain the customer profiles using the persona. Figure 4 shows each persona's business goals, including 'provide single account,' 'construct e-trading system providing low cost trading,' and 'provide circumstance that enable to trade stocks with a single account any time, anywhere.' Based on these business goals, we can identify the 'Trading Stocks' BPU in order to fulfill the customer needs.

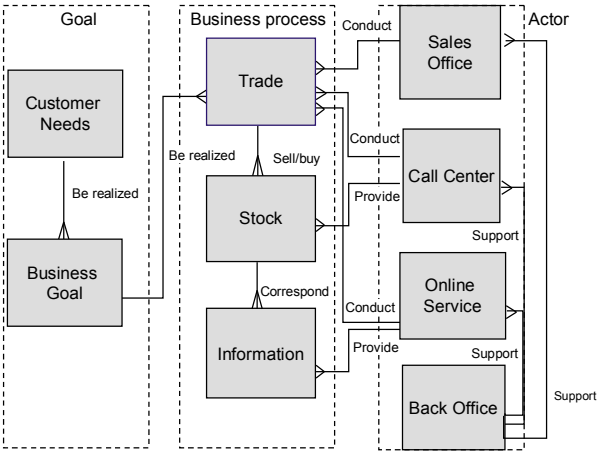

Figure 5. Static conceptual data model

Step 4 – Create the customer action scenario

In Figure 6, we design Brent's behavioral scenarios based on his behavioral patterns. Brent is interested in trading stocks. But, he rarely asks sales people for investment advice in the daytime because this is the time he is working. He likes stable fund management, as he does not have enough money for further investment.

In Figure 7, we design ideal behaviors based on

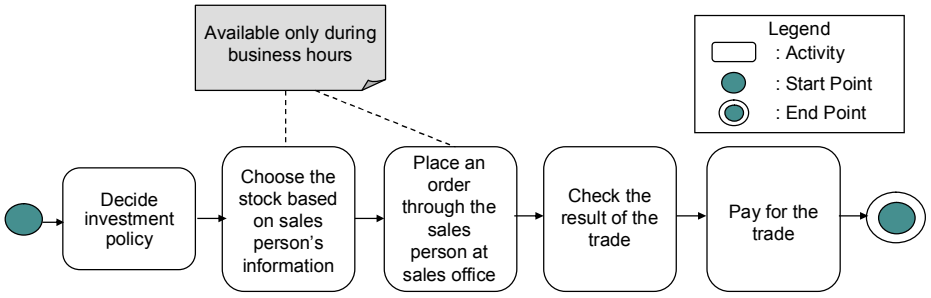

Figure 6. Customer action scenarios (As-Is)

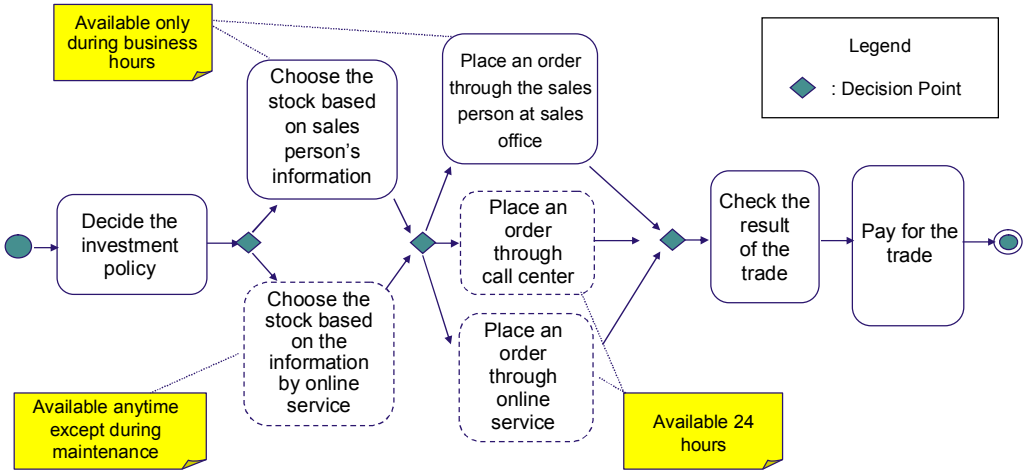

Figure 7. Customer action scenarios (To-Be)

Brent's needs by considering the business environment using multiple channels. Added to Figure 7 are dotted diagrams, which show that Brent can decide the investment policy through consultation at sales office, and place orders anytime.

Step 5 – Design the C-B activity diagram

In the next step, we create an activity diagram that presents how such behaviors proceed interactively to fulfill the needs of these customers by utilizing activity diagrams with swim lanes. In Figure 8, we label the activities of the business organization as Sales Office, Call Center, Online Service, and Back Office, in order to clarify each actor's activities.

We insert a customer swim lane on the left of the diagram to emphasize the interactions between the customer and the different business activities. Swim lanes are used to model actors and to clarify the responsibilities of each actor. The activities are placed in the swim lanes of the actors responsible for their completion.

In Figure 9, we focus on the relationship between activities of a customer and those of a call center. The C-B activity diagram (call center) in Figure 9 is used in the next step as a horizontal activity flow.

Step 6 – Create the assembly line diagram

In this step, we create a diagram that specifies how such objects and data collaborate to support related business processes. Figure 10 shows an assembly line diagram and its references to different information systems. In this figure, the business process of call center corresponds to Brent's activities (see Figure 8), and the assembly lines include related objects like 'Customer Information System,' 'Accounting System,' 'Ordering System,' and 'Stock Exchange System.'

These Assembly line diagrams provide the connection between business modeling and information system requirements modeling with use-cases (Eriksson and Penker, 2000). Although there are several use-cases in Figure 10, they are actually not part of the business process model but an illustration for Step 7.

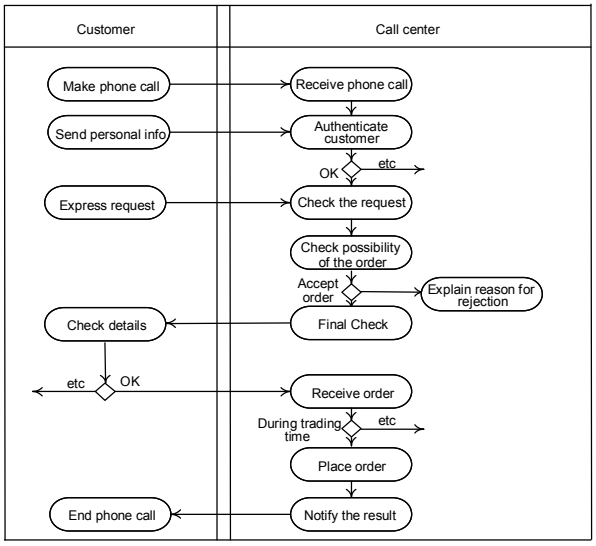

Figure 9. C-B activity diagram (call center)

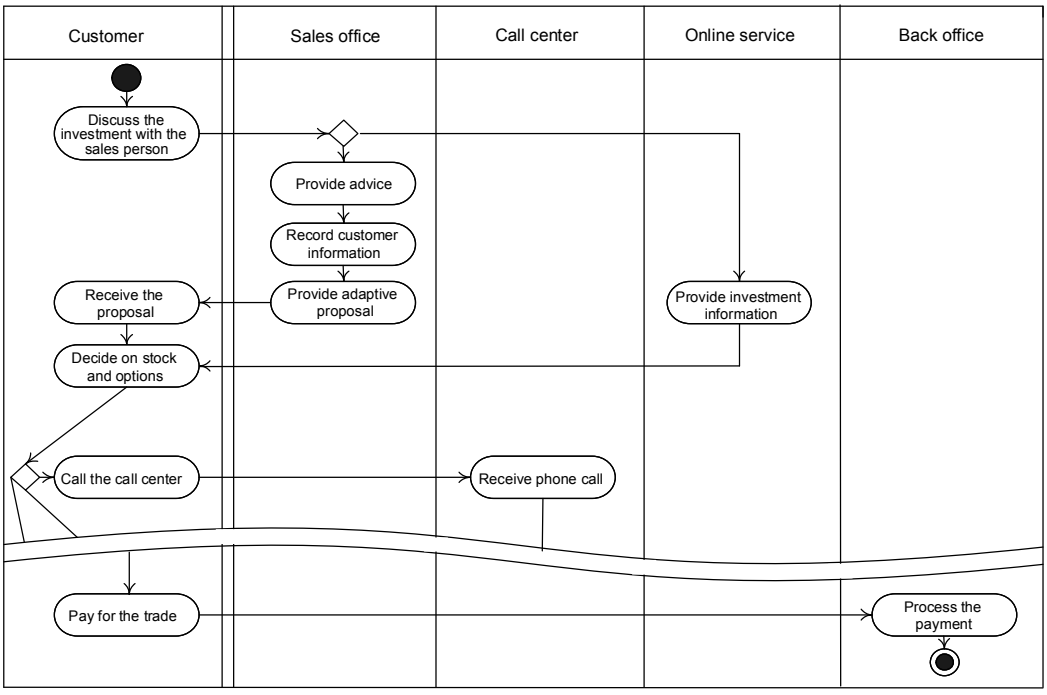

Figure 8. C - B activity diagram

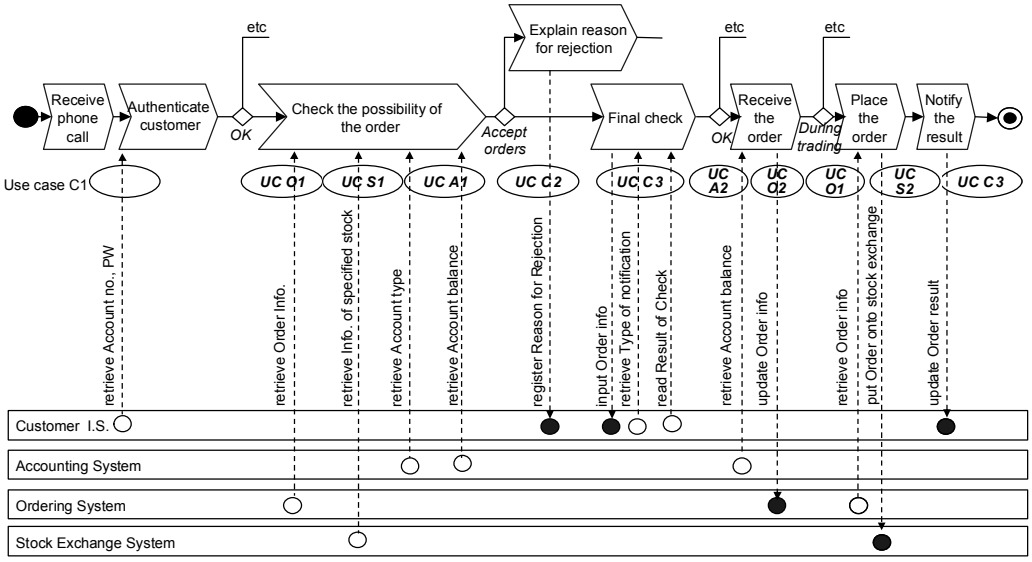

Figure 10. Assembly line diagram (call center)

Step 7 – Identify use-cases

Finally, we identify use-cases that describe the functional requirements of an IS between business process and assembly lines. In Figure 10, there are some use-cases identified for implementing IS. For example, 'Use-case O1' means that it is the first use-case of 'Ordering System.' Figure 11 indicates that a use-case model can be created for each of the information systems, which defines the use-cases in more detail. Several actors and processes interact with the ordering system, but there are only two ways of using the system (two use-cases): to retrieve order information and to update order information. For example, the stock exchange retrieves the order information from the ordering system as part of placing the order. In this case, the reference in Figure 10 from 'Place the order' process should go to the stock exchange system. The stock exchange system then becomes an actor to the ordering system in Figure 11.

Like this, the assembly line diagram is a powerful tool for identifying the required use-cases for the system. It illustrates the necessary references form activities in a process to packages in an information system.

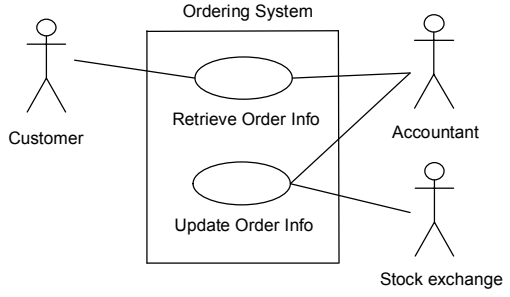

Figure 11. A use case diagram describing the ordering system model (call center)

Figure 12 sums up how to apply the proposed approach in the case of Kokusai Securities. First, describe a static conceptual data model for recognizing the entire image. Second, identify the primary customer need trading securities anytime at its convenience using the telephone or the Internet. Third, define BPU related to the business goals. Fourth, create the customer action scenario, related business process, and the relationships. In this case, call center, sales office, online trade, and the relationships among those were described. Fifth, design the C-B activity diagram that shows activities of the business organizations based on the behaviors of the customers. Sixth, clarify the relationship between each business process and resources in the assembly line diagram. Seventh and last, identify use-cases so as to implement IS that can support the business process.

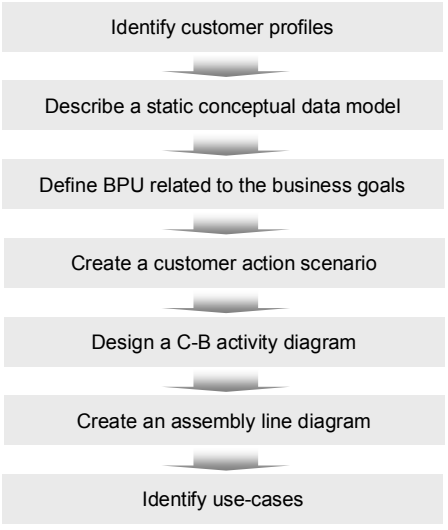

Figure 12. Detailed process of the approach

5. CONCLUSIONS AND FUTURE WORK

Many companies have discovered that highly focused customer relationship management can create loyalty that results in increased sales (Jeffrey, 2004). Thus, many businesses are implementing CRM solutions that enable customer self-service via the Internet. The theme of all CRM solutions is a focus on the 'customer.' But, these solutions do not show what customer needs are and how their needs can be realized.

In this paper, we showed how to model business processes for realizing customer needs based on various customer profiles. In chapter 3, we proposed an integrated approach unifying goal, business process and information systems modeling. Finally, we illustrated how to apply this approach using a real case.

Basically, we have proposed an integrated approach that unifies goal modeling, business process modeling, and information systems modeling. Although many methodologies exist for each modeling, there is little or no research trying to seamlessly link them together. In order to overcome these problems, we focused on customers, their perspectives, and their activities. In this respect, relations (1) between step 1 and step 3 (from customer needs to business process unit) and (2) between step 5 and step 6 (from C-B activity diagram to assembly line diagram) are the most important among the seven steps.

The proposed approach has three features different from those of the existing methodologies. First, it includes a step "Identify the customer profiles" for identifying customers and their needs. This step provides the starting point to help the analyst capture the primary customer's needs. Second, the Zachman Framework is used as an architectural framework for visualizing the entire scope of projects. It will support the description process of conceptual static data model. Third, it seamlessly integrates customer needs, business process, and information system. In fact, we propose how to link them in a seamless approach and investigate which methods are appropriate so as to integrate them.

By using our approach, organizations aiming to become customer-centric enterprises are more likely to capture the context in which customers interact with their business processes.

The proposed approach has its limitations. First, the 3rd step 'Define BPU related to the business goals' is not perfectly linked in a systematic way. To decide BPU from the business goals, brainstorming by cross-functional teams is required. Second, effectiveness and efficiency of the proposed approach are not empirically validated. By using measurable evaluation criteria, empirical validation is required in order to clearly demonstrate the superiority of the proposed approach. Third, it is necessary to apply this approach to many other examples, in order to recognize actual difficulties in applying it as general analysts.

Although our approach has some limitations, it can clarify related business resources to meet customer needs and identify the underlying business and IT services that are required to enable the customer's ideal scenarios by applying it to a real case.

In the future, this proposed new approach will be applied to several cases, and will be evaluated to ensure that the result of its application satisfy the customer needs.

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