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Title	Enterprise modeling for the customer focused company
Author(s)	Cormican, Kathryn; Shang, Yue
Publication Date	2002
Publication Information	Cormican, K. and Shang Y. (2002) Enterprise modeling for the customer focused company 1st International Conference for Information Management Systems Xian, China, 2002-05-27-2002-05-31
Item record	http://hdl.handle.net/10379/4091

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Cormican, K. and Shang Y. (2002) Enterprise modelling for the customer focused company. Published in proceedings of 1st International Conference for Information Management Systems, 27th-31st May, Xi'an, China.

Enterprise Modeling for the Customer Focused Enterprise

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Abstract

The business environment is changing at an accelerated pace. Consequently, continuous systemic changes within companies are imperative. We are witnessing a shift in the way organizations are designed, structured and organized. Contemporary business systems are becoming more customer focused. They are reorganizing their processes and systems to be more responsive to the ever-changing needs of the customer. This move towards the customer focused enterprise can be facilitated by the use of enterprise modeling methodologies to ensure that the proposed system will operate as planned. Enterprise modeling methodologies can help analysts and decision makers to describe and understand complex enterprise systems. Such methodologies also enable the analysis, design and re-engineering of these complicated systems. A carefully selected enterprise modeling methodology can help improve every stage of this process i.e. from auditing the existing enterprise system to determining its strengths (to be exploited) and weaknesses (to be improved), through to requirement specification, systems analysis, systems development and on to acceptance and implementation of the new enterprise system. This paper examines the concept of the customer focused enterprise. Specifically, it considers how enterprise modeling methodologies and techniques can be used to create a more customer focused enterprise. It draws on methodologies developed during the modeling phase of a European Union funded project called EUROShoE (Extended UseR Oriented Shoe Enterprise). This project aims to redesign the traditional European shoe enterprise to create a customer focused model. There are four major sections in this paper. First, a discussion of the customer focused enterprise is provided. Then an overview of enterprise modeling methodologies is outlined. The requirements for modeling the customer focused enterprise are then identified and discussed. The remainder of the paper focuses on a case study and presents a six stage

implementation methodology that was specifically designed to facilitate the modeling of the customer focused enterprise.

Key Words

Customer Focused Enterprise, Implementation Methodology, Enterprise Modeling, Case Study Analysis.

1. Introduction

In recent years, globalization coupled with rapid developments in information communication technologies have created a highly competitive and dynamic business environment in which customers are becoming more and more discerning [1]. Organizations are paying more attention to the concept of capturing customers needs, wants and expectations and leveraging these requirements into their business strategies, development plans and activities. In order to survive in this new environment, companies can no longer compete based on their traditional business models and structures, they need to redesign their structures to optimize market and collaboration opportunities, be more responsive to their customers and more efficient in their operations [2]. They must change the way they operate in order to improve their capabilities, reduce lead time and provide more personalized products and services [3]. In this view, successful organizations are moving towards a more customer oriented business model.

Many new business models and enabling technologies have been introduced in recent years. These include online procurement management, collaborative product development, customer relationship management techniques and strategies to support mass customization. By re-engineering their structures and business processes to introduce these strategies the traditional enterprise can evolve

into a new model that is more suitable for the requirements of the new business environment. Many different terms are used in the literature to describe the characteristics of such an enterprise model. These include “adopting a customer-centric strategy” [4], “providing customized and personalized products and services” [5], “having the ability to be responsive and agile” [6], “having interactive and modifiable production processes” [7]. In this paper, this new enterprise model is referred to as “the customer focused enterprise”.

The customer focused enterprise uses flexible organizational structures and processes to produce varied and often individually personalized products and services in direct response to customer desires, with very short cycle times. This definition does not promise complete tailor made products and services but rather products and services delivered under this business model are only partially tailor made or differentiated to a predetermined degree of variety. The goal is to ascertain, from the customer’s perspective, the range within which a given product or service can be meaningfully customized (i.e. differentiated) for that customer, and then to facilitate the customer’s choice of options within that range.

There are many factors that affect the successful implementation of a customer focused strategy. These factors can be categorized in terms of (a) the market environment, (b) the nature of the product and (c) the cohesiveness of the supply chain. In other words, some factors depend on the market environment while others depend on the capability of the organization and its supply chain partners to effectively integrate their processes and technologies to meet customer requirements. These critical success factors include:

- **Sufficient Customer Demand:** The success of selling personalized products depends on the whether customers are prepared to pay the additional costs and wait for the delivery of personalized products and services as well as the company’s ability to produce and deliver these products and services within an acceptable time frame and pricing structure [8, 9].
- **Appropriate Market Conditions:** Substantial advantage can be gained over competitors by being first to deliver personalized products and services. In this view, an organization that is first to market with personalized products is seen by people as innovative and customer-driven market leaders [10].
- **Effective Supply Chain:** Success depends on the willingness, readiness and ability of supply chain partners such as suppliers, distributors, and retailers to deliver raw material and integrate information systems [8, 11].

- **Available Technology:** The effective implementation of flexible processes and advanced manufacturing technologies across the entire supply chain is imperative to successfully design, develop and deploy personalized products and services [8, 12].
- **Customizable Products:** Products must be adaptable and versatile. Furthermore, the organization must have sufficient innovation capabilities as well as effective product development processes [11, 12].
- **Shared Knowledge:** The ability to deliver personalized products depends on the ability to capture the voice of the customer and translate those requirements into new products and services. To do this, companies must promote knowledge creation and distribution across the entire value chain.

There are many reasons why the customer focused enterprise has emerged. For example, new flexible manufacturing and information technologies enable production systems to deliver higher variety products and services at lower costs. In addition, product life cycles have become shorter and shorter and mounting industrial competition has led to the breakdown of many mass industries, increasing the need for production strategies focused on individual customers. Consequently, there is an increasing demand for product variety and customization. The fragmentation of the mass market is a continuing, inevitable phenomenon. Not only are customers becoming more sophisticated and harder to generalize, but the individual needs, wants and expectations of customers are continually changing and shifting.

Compared with the traditional enterprise, the customer focused enterprise has many unique characteristics [13, 14, 15, 16]. These are illustrated in Table 1-1.

	Traditional Enterprise	Customer Focused Enterprise
Products and services	Mass production of products and services	Diversified, personalized products and services
Major motivator for production	Production Push	Customer demand pull
Focus	Internal system of the organization	Entire supply chain
Internal structure	Static structure with simple input/output relationships with supply chain partners	Complex, dynamic structure with many relationships with the external environment

External structure	Loose cooperation with supply chain partners	Diversified, dynamic and tight cooperation More flexibility and wider scope for choosing business partners
	Traditional Enterprise	Customer Focused Enterprise
Relationship with customer	Temporary relationships with an emphasis on maintaining relationships in sales transactions and after sales service	Lifetime relationships with emphasis placed on attracting, cultivating and retaining relationships in all business processes
Means of reducing lead time	Focuses on improving internal efficiency	Focuses on improving internal efficiency and streamlining the entire supply chain

Table 1-1 Traditional versus Customer Focused Enterprise

Taking the above characteristics into consideration, the customer focused enterprise can be considered to be a new enterprise model, which adopts a “customer demand pull” strategy to direct its operations and business processes so that customers are provided with more personalized or tailor made products and services. This model requires cooperation between the enterprise and its supply chain partners. In this view supply chain partners must be more cohesive, flexible and dynamic. The structure of the customer focused enterprise can also be illustrated in terms of a “hub model” (see figure 1-1).

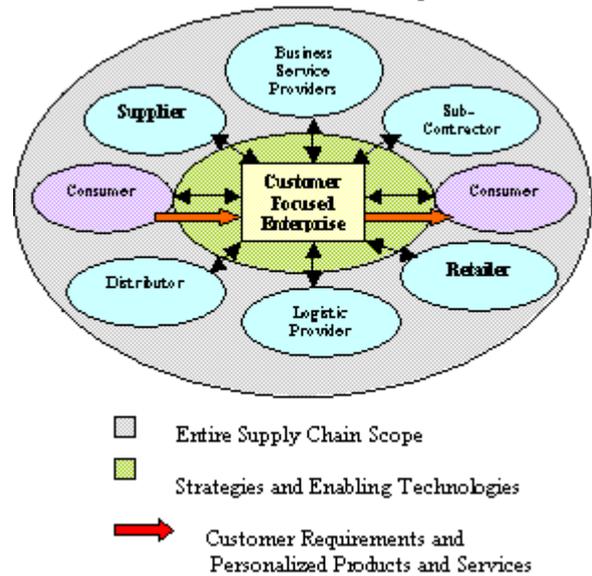


Figure 1-1 Customer Focused Enterprise

The move towards the customer focused enterprise can be facilitated by the use of enterprise modeling techniques to ensure that the proposed system will work as planned.

2. Enterprise Modeling

Enterprise Modeling methodologies have been developed to facilitate the identification of planned change in an organization prior to the implementation of such changes. It is the first and most important phase when analyzing, designing or implementing a complicated enterprise system. Information from the organization is captured and represented in the form of pictures or models. From these models strengths and weaknesses are determined and analyzed. An optimized system can then be designed by comparing this diagnosis to the strategic objectives of the system. Based on the research of Yu [17], Tam [18] and Petrie [19], enterprise modeling can be defined as a step-by-step procedure supported by a suite of tools to provide a visual understanding of an enterprise or system. In other words, enterprise modeling methodologies provide a structured approach to help visualize, understand and evaluate activities and complex processes as well as business component interdependencies. Essentially, these methodologies support the user by building models representing an organization’s existing system (as is) and the proposed system (to be). They also promote good communication between the analyst and the customer. Consequently, enterprise modeling methodologies can help the decision maker to:

- Analyze the business from a holistic perspective
- Identify constraints and bottlenecks within the system
- Forecast the effects of planned changes

- Reduce interdepartmental complexities
- Enhance communication and decision making capability
- Increase efficiency and effectiveness and reduce cost

Systems are composed of interfacing or interdependent parts that work together to perform a useful function. System parts can be any combination of things, including people, information, software, processes, equipment, products, or raw materials. Enterprise models describes what a system does, what controls it, what things it works on, what means it uses to perform its functions, and what it produces. A complete enterprise model can capture the entire enterprise from various business perspectives. Table 2-1 identifies certain aspects or domains in an enterprise that can be modeled.

Aspect	Description
Functional	Identify and represent actions and activities in an organization or system. Identify what functions are performed, what is needed to perform those functions, what the current system does right, and what the current system does wrong.
Process	Capture knowledge about the ordering and sequence of work activities across time and place focusing on the inputs and outputs of each activity.
Physical	Determine and capture the material flows in the organization and the relationship between those flows.
Informational	Identify and represent the information managed by the enterprise and the rules that govern the management of that information. Examine the logical relationships within the enterprise reflected in the information.
Resource	Determine and represent the organizations' resources in terms of available competence, capability, technology and equipment.
Decisional	Identify and represent the key organizational decisions at all levels in the organization i.e. strategic, tactical and operational.
Organizational	Determine, modify and maintain enterprise

ontologies and structures.

Table 2-1 Enterprise Domains

During the past decades, many methodologies for enterprise modeling have been developed and used. These include the IDEF family (Integration DEFinition methods [20], GRAI-GIM (GRAI Integrated Methodology) [21], ARIS (Architecture of Integrated Information Systems) [22], PERA (Purdue Enterprise Reference Architecture) [23] and GERRAM (Generalized Enterprise Reference Architecture and Methodology) [19]). This list is by no means exhaustive but provides an indication of some of the available methodologies on offer to researchers and practitioners. Generally speaking, most modeling methodologies are composed of three important parts:

- A holistic reference architecture, which gives an overview of particular organizational aspects and their interrelationship. This is used as a framework for the entire modeling process.
- A set of relevant representation mechanisms and tools, which are used to build a set of models according to the reference architecture.
- An implementation approach, which is used as a roadmap to facilitate the successful implementation of the change processes

The relationship between these three parts is illustrated in figure 2-1.

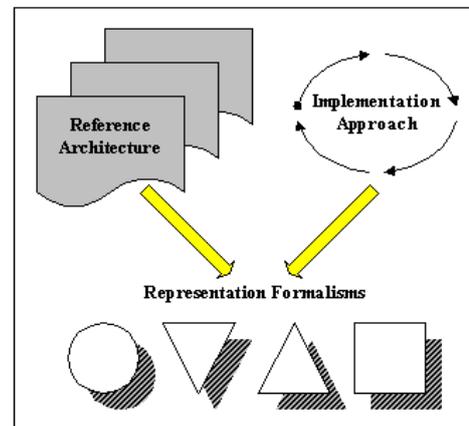


Figure 2-1 Components of an Enterprise Modeling Methodology

By selecting a suitable reference architecture, following the implementation approach and using the mechanisms and tools to build the models, the enterprise structure and its business processes can be analyzed, refined and eventually optimized. This approach has been used in many organizations over the years and has helped to improve and

transform their processes and systems.

3. Modeling the Customer Focused Enterprise

When analyzing the customer focused enterprise it is important to consider three key elements:

- The enterprise’s internal structure. This includes the organizations systems and business processes.
- The interface between the enterprise and the consumer. Particular attention should be placed on the processes that capture customer requirements and complaints.
- The interface between the customer focused enterprise and its various supply chain or network partners.

Compared with traditional enterprise, the customer focused enterprise extends outwards towards the external environment. Therefore, the requirements for modeling the customer focused enterprise are different from that of the traditional organization. These requirements are identified below.

- **First**, the customer focused enterprise includes most traditional business transactions and functions, such as product development, order fulfillment and management and technical support.
- **Second**, because the customer focused enterprise model expands the scope of the organization’s internal system to the entire supply chain or network of partners [24], the reference architecture and representation procedures should also be extended to the entire supply chain or business network. Only then can the enterprise’s structure and business processes be analyzed.
- **Finally**, the production processes of the customer focused enterprise is lead by various customer demands. This means that the structure and organization of a customer focused enterprise must be flexible and agile.

After mapping these requirements to the capabilities of traditional modeling methodologies as showed in table 3-1, certain shortfalls of traditional modeling methodologies emerge.

Enterprise Process View	Yes
Enterprise Decisional System	Yes
Enterprise Informational System	Yes
Dynamic operation and business process across supply chain	No
Supply chain structure and interrelationship	No

Table 3-1 Mapping New Requirements to Traditional Modeling Methodologies

Since none of traditional architectures supports the supply chain structure and its related business processes, a reference architecture that designed for represent supply chain process is indispensable for this solution. The Supply Chain Operations Reference (SCOR) model is a de facto standardized reference model used to describe the detailed supply chain structure and process [25]. SCOR is a process oriented reference model. It has three hierarchies and is used to analyze and design the structure, basic business process and the component elements of every process of the concerned supply chain [26], such as purchasing, producing, delivering, customer order fulfillment and feedback from supply chain partners. Figure 3-1 shows the basic structure of SCOR model.

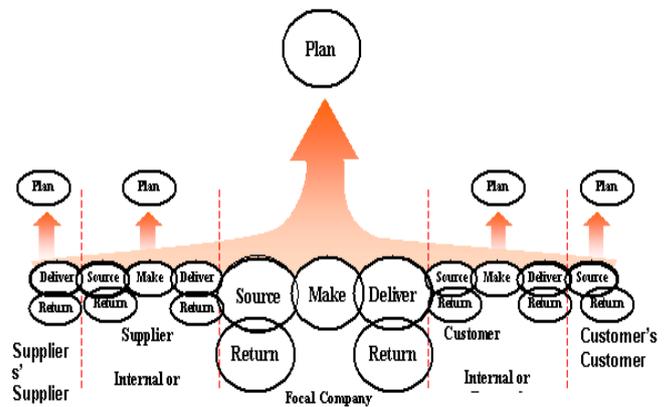


Figure 3-1 Structure of SCOR Model [25]

Using this approach in conjunction with traditional modeling methodologies effective models of the customer focused enterprise can be developed.

4. Case Study Analysis

Requirements for modeling the Customer Focused Enterprise	Supported by Traditional Modeling Methodologies
Enterprise Functional View	Yes
Enterprise Physical System	Yes

EUROShoE (Extended User Oriented Shoe Enterprise) is a European Union funded research and development project aimed at a dramatic transformation of the European shoe industry. It is an ambitious project comprising thirty three partners including research institutes, shoe companies as well as machine and software providers from nine European countries. The aim of the project is to develop processes and implement management tools to create a customer focused shoe enterprise. The challenge of the EUROShoE project is to manufacture customized shoes at a price that is affordable for the great majority of customers. In other words, the project focuses on moving from producing mass produced shoes to a mass customized shoes. The resulting output is an agile enterprise capable of handling the challenges deriving from the direct involvement of the customer in the design and manufacturing process.

In order to develop a customer focused enterprise it is imperative to (a) gain detailed knowledge of the operative environment in the footwear industry and (b) understand the structures, processes, mechanisms and operational logic of the organization. From this, a complete reference model of the business and operational processes can be developed. To do this we must develop models of the mechanisms of the extended shoe enterprise. These models will examine the participating companies operations from many viewpoints or perspectives e.g. the organizations' functions, processes, information flows, resources, decisions and finally management and organization. This activity will enable us to compare the current structure of the organization (as-is model) to the proposed customer focused enterprise (to-be model). The results from this process will influence the remaining tasks of the project. More specifically, it will guide the development and implementation of configuration tools such as Enterprise Resource Planning (ERP), Product Data Management (PDM), Computer Aided Design (CAD), Computer Aided Manufacturing (CAD) to shape the customer focused enterprise.

By following a structured approach to organizational development, an organization increases the likelihood of success. If an organization has a clear understanding of what it is doing and why, and if it has an established mechanism in place to initiate and undertake change, development can happen quickly and predictably. Where such infrastructure is not in place, it has to be put in place for each initiative. This slows down the reaction time of individuals and organizations, and may limit the success of the project, as there is no pattern to follow and the process has to be re-invented each time, thereby the results are not always predictable. The goal of the implementation methodology is to identify and integrate the most valuable and successful ways to define, model and implement the development process. It ensures that an organization is focused on where it wants to be in the future. The implementation methodology used in this project synthesizes best practice

and brings together a number of modeling and analysis tools. Each of the steps has specific tools and techniques to support it. The methodology is constructed to allow links to a number of critical factors into the modeling process including controls and constraints, feedback, key deliverables, key inputs and outputs and management tools that can be used during each stage. The six stages in the methodology are briefly outlined in figure 4-1. These are briefly discussed below:

Define Scope, Strategy and Goals

This stage of the methodology ensures that the organization has a clear view, image or vision of where it would like to be in a future state. In other words, it encourages the decision maker to create a clear picture of the customer focused enterprise and communicate this vision to all relevant parties. A strategy is a coherent or consistent stream of actions, which an organization takes to move towards this vision. The organization's goals should be linked to its strategy. They should be specific, well defined and measurable so that people know exactly what to accomplish. This stage also prompts the decision maker to establish the scope of the of the project in question. In this example, the boundaries of the problem are not restricted to the activities within the company but rather they extend to the entire network or supply chain. All relevant information needed to clearly specify the workings of the following activities are captured:

- Strategy and Organization
- Engineering and design
- Production systems
- Purchasing
- Supply Chain Management
- Sales, Marketing and Distribution
- Technology and Information Technology

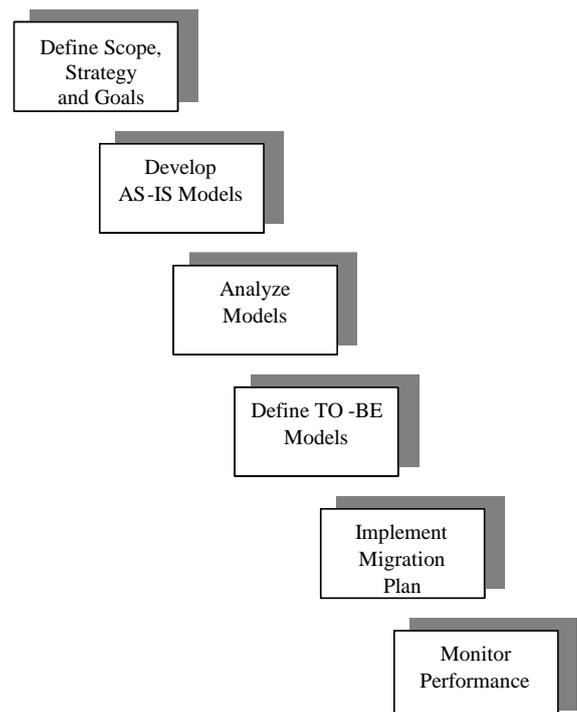


Figure 4-1 Implementation Methodology

Develop AS IS Models

Having defined the project, the analyst prepares for and conducts data collection activities. It is important to employ various sources of evidence to improve the accuracy and comprehensiveness of the models being developed. Data collection methods can be quantitative and qualitative in nature and they include activities such as; (a) participant observation, (b) interviews, (c) observation, (d) documentary materials and (e) questionnaires. A combination of these data collection methods should be used to elicit information in this analysis. By adopting this approach, the strengths of one data collection method compensates for the weaknesses of the other. In addition, the subject can be examined from different angles and a more complete picture of the situation is provided.

Analyze Models

During this stage of the methodology, the structure of the models are evaluated to confirm that it communicates the expert's knowledge about the scenario. The correctness of the models and the elaborations will be confirmed in this process. The review may indicate that some changes need to be made to the captured description. This can take the form of additional objects, activities, facts, and constraints or modifications and deletions to the original lists. This process helps to identify the relative strengths (to be exploited) and weakness (to be improved) in the organization. Furthermore, bottlenecks and potential problems can be brought to the fore. This stage in the process enables managers and decision makers to get an overview of their company's strengths and weaknesses with regard to customer responsiveness, highlighting those areas that require attention.

Define TO BE Models

This step of the methodology requires the analyst and decision maker to examine best practices and industry trends in order to produce ideas and concepts for change. They must also understand the processes and in the general terms the behaviors of the customer focused enterprise. It is also important to master the complexity of the new operations by determining adequate planning and management tools. Critical technologies related to the main product life cycle processes must also be identified. Finally, the analyst must attempt to test the validity of the new concept against a set of predetermined criteria.

Implement Migration Plan

In this stage detailed plans are designed which take into consideration constraints such as the organization's strategy, budget and resources available. All proposed initiatives are implemented as individual projects, in accordance with the traditional processes of project management and the internal

procedures of the organization. This phase of the activity is the most visible, time consuming and labor intensive part of the methodology. Specific teams are assigned responsibility and accountability for implementing individual projects. Support systems should also be aligned to reinforce the new design and continuous learning. For example, feedback and on-going training should be provided for all employees affected by the change in order to sustain their energy and enthusiasm.

Monitor Performance

The performance of the new scenario must be continuously monitored to help the user to alter actions in order to keep more in line with goals developed from the outset. This stage involves recognizing true symptoms, identifying their cause and then applying the appropriate treatment or remedies. Therefore, the implementation of the customer focused enterprise can best be viewed as a journey (i.e. continuing process improvement) rather than as a destination.

5. Conclusion

We are witnessing dramatic changes in the business environment. Customers are becoming increasingly judicious and astute. They are demanding high quality products and services, produced in short time frames and charged at competitive prices that meet their specific needs. In order to gain and maintain competitive advantage in such dynamic markets, organizations must continuously adapt and change their business model. The customer focused enterprise is a business models that enables organizations to be agile and responsive to the needs of their customers. This paper examines the concept of the customer focused enterprise. Specifically, it consider enterprise modeling techniques that facilitate the shift towards the customer focused enterprise. It details the key stages in an implementation methodology that was developed to facilitate the modeling of participating companies in the EUROShoE project.

Acknowledgement

The authors would like to thank the Chinese European Network on the NET (CENNET IST-2000-28739) for their support in writing this paper. CENNET is a European Union sponsored project that seeks to encourage co-operation between China and the European Union.

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