# Realizing the Objective Values of Customer in Enterprise IT Solution Services -Service Oriented Requirement Development Method "MUSE"-

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**ABSTRACT**

In current enterprise IT solution services, many customers cannot utilize IT systems effectively nor reap any benefit from their services due to problems encountered and failures. To rectify this situation, we analyze these issues using reverse engineering method in this paper. First, we discuss the current situation of this field in Japan. Second, the IT solution service that we have developed is introduced as a case study. In this case study, we discuss the concept of two service “values”, i.e., "objective value", which is the customer's end goal to be achieved by the IT systems and services, and "functional value", which is actually provided by those systems and services. Third, a service model is presented, which shows the relations among the agents who provide and receive services in the case study. To model the service, we discuss the important role of "design office" as a facilitator and a producer. Finally, our developed MUSE method is demonstrated as a practical and reasonable way to reveal and clarify a customer's objective value. It has become harder than before for customers to optimize and balance the overall system goals by themselves; collaborative work among service agents becomes a crucial factor to realizing effective services. Significant activities of the design office and effective use of the MUSE method are valuable and indispensable for achieving the customer's end goal.

***Keywords***: IT service, objective value, functional value, service oriented requirement development method, MUSE

## 1. PROBLEMS IN IT SOLUTION SERVICES

### 1.1 Failures in IT solution services

Nowadays, IT (Information Technology) is essential and a key to success in business activities, so IT solution services become very important. The effectiveness of each service can be measured from the ROI (Return on Investment) point of view. However, as there are so many failures in this domain, especially in the IT system development phase, QCD (Quality, Cost and Delivery) of the IT system cannot be achieved; therefore the customers could not even reach the stage of service evaluation. Two reports [1], [2] give us a below average success rate around 30% for large-scale IT system development projects in Japan.

It is not a customer's objective to solve problems occurred during the IT service construction phase and to get flawless service. Rather, customers want to solve their business problems by using IT solution services through available IT systems. In view of these facts, it is very important for IT service providers to take customer's viewpoint and provide the services which can achieve the customer's end goal value. Therefore, extracting and expressing a customer's needs in an early stage becomes a starting point for subsequent stages.

Typically a customer provides his/her IT system requirements to an IT development company, and then the development company or developer, reviews the given requirements and transforms them into formal specifications. However, it has become harder than before for customers to describe their requirements clearly and precisely by themselves; even if this can be done, there are usually still many changes in the development phase. The main reasons for this difficulty in requirements engineering are: (1) the ever increasing size and complexity of enterprise businesses; (2) the rapidly changing market needs, business models, and varieties of required services; and (3) the difficulty in optimizing and balancing the entire system in advance.

On the developer side, it is hard to develop IT systems "on time, on spec, and on budget". This is due to the following reasons: (1) difficulty in communicating with the customers; (2) lack of architects for large and complex system, whom possess the necessary engineering and technical skill as well as management skill; (3) unreliable new technologies and components; (4) quality assurance or responsibility problems, which are often caused by the multiple-subcontract business scheme; (5) imprecise terms and conditions of the contract which do not reflect actual situations. Those are the leading factors of failures in IT solution services.

### 1.2 Appling Service Engineering for analysis

Recently, scientific and engineering approaches have been employed to increase the customer's satisfaction, and to improve the effectiveness and productivity of services. Since 2006, we have joined SEFORUM [3] (Service Engineering Forum) and have applied Service Engineering (SE) methodologies to analyze the problems in this field through reverse engineering of existing services that we have developed [4-6].

In SE, a service is defined as an activity between a service provider and a service receiver, that changes the state of the receiver, where this state is named RSP

(Receiver State Parameter) [7]. RSPs are changed by "service contents" and "service channels", as shown in Figure 1-1. For example, the objective of a person who uses a vehicle is not to own the vehicle but to move from one place to another. In this case, the service contents are to transfer persons, and service channels are the related artifacts, such as vehicle, roads, traffic systems, rules, and so on.

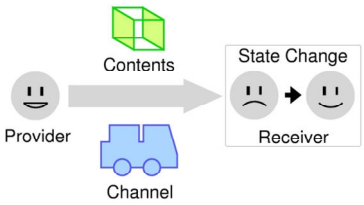


Figure 1-1 Definition of service in SE.

In this paper, we are focusing on business to business (B to B) IT solution services with enterprise management system. Those services are usually accompanied by business process reengineering (BPR). In such cases, it is often observed that the present work tasks and processes (AsIs) are ambiguous, and no one knows what to be changed and where to go (ToBe). Under such situations, requirements are often vague, and therefore it is imperative that the requirement development phase should be taken in the very beginning.

As a case of successful IT solution service, a large-scale enterprise management system realization project and related services are given in section 2. Through the reverse engineering method based on SE for this success case, we demonstrate that there exist two values, "objective value" and "functional value", in the IT solution service, and those values are correlated.

Furthermore, we present the service model for this case study, which shows the relationship among the agents who receive and provide services. For this service modeling, we discuss the important role of "design office" as a facilitator and a producer to promote agents throughout the service.

Finally, we introduce the MUSE [8] method, and show that how it can be applied to reveal and clarify customer's objective value and to get consensus and commitments of the stakeholders. This methodology was originally developed by the authors in 1990s as data and system modeling tools, and then enhanced as a service oriented requirement development methodology.

In conclusion, we identify two key factors of success for resolving business problems utilizing IT solution services: (1) consensus for the objective value among the stakeholders, and (2) co-sharing of the values among service agents. We demonstrate that for these crucial factors, significant activities of the design office and effective use of the MUSE method are valuable and indispensable.

## 2. CASE STUDY

### 2.1 IT solution service for a utility company

As a case study of IT solution service, we discuss the case of a utility company. The IT system for the facility management division of the company was developed and completed in a short time and has been successfully operating since 2003[9]. The objective of the system is to realize PDCA (Plan, Do, Check and Action) cycle for managing lifecycle of facilities, through reengineering and improving work processes. Figure 2.1 illustrates an overview of the system.

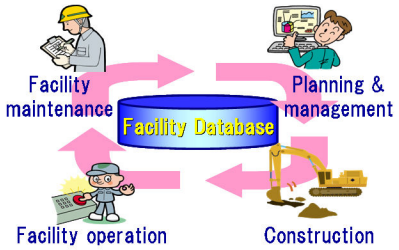


Figure 2-1 Overview of facility management system.

This IT system is used by more than 2,000 workers of the company, and has been continuously enhanced since the beginning of operation. Because of such successful deployment in the above division, the system has been extended in large to other 3 divisions and fully contributed to improvement and restructuring of the business activities of the company. As a result, the whole system saved financially one half of the investment cost as compared with that of traditional approach. Due to such a meaningful contribution, this project won the 2005 Shibusawa Award and the 2006 Ohm Award (prestigious Japanese awards in the filed).

### 2.2 Two values in the service

There are two different service domains in IT solution service. One domain consists of customer's activities and the other consists of IT service activities.

It is an unprecedented experiment to analyze customer's activities from the view point of service. If we regard each work as a service, then there are service chains from internal work tasks to the end customer. To discuss whether the state of the end customer can be changed through their services is effective to clarify the purpose and functions of its enterprise activities.

The same can be said for IT solution services. By analyzing multiple service chains to realize the customer's end goal through the services, the role of each IT service provider and its functions in the services become clear and properly defined.

We first investigate customer's activities. In the above success case, there are various stakeholders as follows.

As the related organizations inside the same division, we have the head office, branches, and field maintenance offices. As those inside the company, we find, for instance, other facility management, purchasing, accounting, and planning and strategic divisions. Furthermore, there are contractors outside the company, such as construction and maintenance firms, manufacturers and venders, and end customers who finally receive utility services.

In the process of analyzing AsIs of activities in the facility management division, we realized that so many tasks were overlapped and complexly related, and their definition and responsibility were vague, and furthermore rules among them were often unwritten. Therefore no one was able to describe the overall activities of managing facilities. Then we thought that our developed modeling methodology MUSE would be useful to overview those work tasks and their complex relationships.

In addition to AsIs analysis, the vision of the facility management division and its core concept were discussed among stakeholders. Those vision and concept were redefined as a ToBe model, i.e., future work model of the division. Through the discussion, a catchphrase, "From Construction to Maintenance" was adopted. This means that the period of high economic growth has been ceased, and we should change the facility management style. That is, it is more important to focus on maintaining currently available facilities rather than to construct new facilities.

According to this concept, the objective of IT solution service was discussed and specified as "To realize PDCA cycle for managing lifecycle of facilities through IT services". To satisfy this objective, the requirements of IT system and related services were discussed.

Here we define two values in the service, i.e., "objective value", which is the customer's end goal achieved by utilizing services including IT system, and "functional value", which is actually provided by IT system and related services.

### 2.3 Relationship of two values

When we introduce IT systems, we have usually two phases; grand design phase and IT service realization phase. Figure 2-2 illustrates a view of the relationship of two values. In the figure, the upper part is the grand design phase where customer's objective value is extracted and committed by the customer. The lower part is the IT service realization phase where the above objective value is translated into functional values which are breakdown into a detailed functional structure.

In the above case, the objective value was translated into the functional values. Those values are to realize a centralized facility database and applications for PDCA cycle for managing lifecycle of facilities, i.e., to plan facility management (P), to do daily operation and maintenance (D), to check and analyze actual state of facilities (C), and to repair or construct facilities (A).

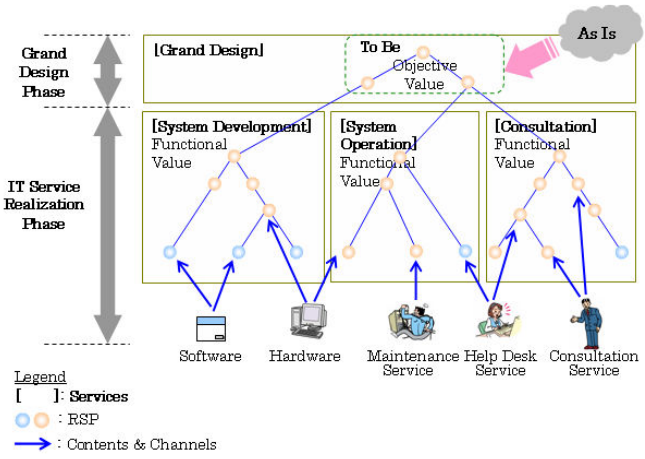


Figure 2-2 View of the relationship of two values.

Those functional values are then converted into system architecture as a foundation of the IT system, and then breakdown into subsystems and applications. When designing a screen layout and data to be handled, the usability, response time, security level are specified according to the user preference, timing, place or other conditions. Through these steps, service contents are clarified. Finally, application software to be developed, database product and hardware systems such as PCs (personal computers) as well as server machines to be installed are specified as service channels.

In the IT services realization phase, after channels and contents are developed and integrated into services, the customer can use those services with functional values. Utilization of services and those interactions finally realize the objective value.

Now we can see the values are correlated. Although two values are chained, they still remain separated in many cases. Consultants are devoted to extracting objective values, while developers concentrate to accomplish the IT system, and operators mostly concern about regular operations. Those persons of the above businesses do not care much about whether the objective value has been achieved or not, and sometimes so does the customer who is appropriately satisfied with available services.

It is indispensable to watch the whole services from the bird's eye, with consistent view point, throughout the service lifecycle. Without any strong will for execution and collaboration works among stakeholders, those services become stagnant and stacked, and it is hard to go up to the stage of achieving objective value.

## 3. SERVICE MODEL

In this section, we introduce the service model in IT solution service which is extracted from the above case study. Figure 3-1 illustrates the model, where we note that enhanced SE's notations, such as value flow, and information and products flow, are used in this figure.

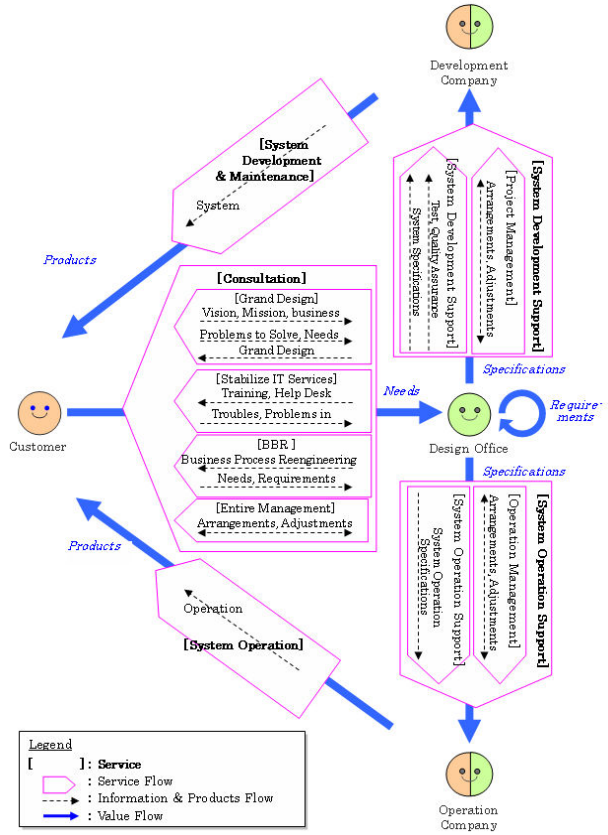


Figure 3-1 Service model in the case.

4 service agents appear in the model, i.e., the customer (the facility management division in this case) as a receiver, and the design office, the development company, and the operation company as providers. Other vendors who provide products or services are not explicitly modeled but included implicitly in consultation, system and operation services.

The design office was introduced in our case study. The main role of this office is for realizing the customer's objective value. In the grand design phase, its roles are value co-creation with the customer and substantiating his/her knowledge and needs into the grand design of entire services, and those needs are described into requirements, translated into specifications for both development and operation companies. In the service realization phase, it provides project management service, follow up services, such as training, helpdesk support, and BPR consultation service as well.

The name of agents in the model normally presents its role, and it does not matter whether the role is played by company or division. Any part or all of the roles of the design office can to be carried out by the customer (i.e., the information division or the user division), the consultant firm, the system integrator, or other firms. As the reason why we present the design office as a single agent in the model, we think that its role is very important for overseeing the entire services from consistent view throughout the service lifecycle. Furthermore, it is an important role for the design office is to manage and adjust all agents taken part in for pursuing customer level up to the objective value.

## 4. THE MUSE APPROACH

### 4.1 Our approach in the grand design phase

In this section, we discuss our approach taken in the grand design phase as a design office. As is shown in Figure 4-1, we divided this phase into 6 steps.

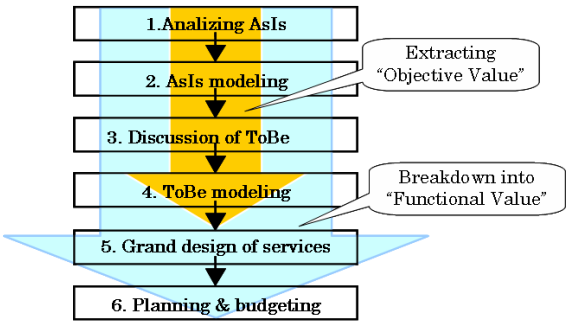


Figure 4.1 6 steps in the grand design process.

The purpose of step 1 and step 2 is to understand AsIs and to share the common perception with stakeholders. In these steps, we mutually recognize the customer's problems to be solved, and describe the structure and dynamics of the enterprise as a service model. Next, in step 3 and step 4, ToBe is discussed, where we make clear the vision and end goal of the division, and the image of structure as well as dynamics in the future.

Through these steps, the objective value of IT solution services becomes obvious and specific. Then, in step 5, the objective value is translated into functional values, where we can overview the entire IT solution services. Finally, step 6 is for planning and budgeting.

### 4.2 The MUSE method as a communication tool

Our developed MUSE method has two roles. One is a communication tool and the other is a modeling tool.

We used the MUSE as a communication tool in step 1 and step 3,. The design office proposed the organization of working teams to the executives, and the teams were formed with members who represent work tasks of facility management cycle. AsIs problems and the ToBe end goal were repeatedly discussed in a brain storming style by each team in three levels, i.e., executives, middle managers, and workers.

Brain storming is an effective discussion methodology for gathering and classifying a wide range of opinions intensively in a short time. The MUSE communication method is very effective in leading brain storming in an anonymous manner. IT consists of the following steps.
(1) Participants are seated in a round table. Figure 4-2 shows a snapshot of a session performing the MUSE method.
(2) According to the theme of the session, participants write down their opinions in post-it cards. Then all cards are gathered and shuffled, and distributed back to each participant.
(3) A session consists of the following steps.
(a) First a chairperson, selected from participants, chooses one of his/her allocated cards. He/She reads aloud the opinion written on the card, and puts it on the MUSE sheet on the table.
(b) Then the chairperson forces other participants who have the same or similar opinions on their cards to read the opinions on the cards and express the points of similarity.
(c) Through such a manner, all cards with the same or similar opinions as that of the chairperson's card are presented and posted in a near place on the sheet, and then one session is over.
(d) In the next session, the chairperson is changed to another participant, and then the session starts.
(4) Sessions are continued until all cards are posted on the sheet. In such a way, the participants' opinions are categorized in the form of island of cards with the same or similar opinions.
(5) After the above sessions, appropriate title of each category is discussed and written on the labels, another type of cards, and put on top of each island.
(6) Configure the relation map in tree styles according to title names, where relations are established considering several important axes such as cause and effect, principle and practice, and so on.

Figure 4-2 A snapshot of a session performing the MUSE method.

The characteristics of the MUSE method are: (1) democratic, (2) game sense, (3) rapid analysis, and (4) breakthrough, which is due to the following facts.

In a session, the chairperson in charge has the rights to accept or reject the proposal of participants with the same or similar opinion cards, while those who have such cards try to persuade the chairperson to accept their proposals through various points. Other participants can also join like as a debate. Through this anonymous manner of discussion without constraints of age, sex, experiences, power or loud voices, participants can think deeply and understand others' opinions which are shared among them by the end of the discussion.

Furthermore, even if the participants have never met before, the total time for all sessions of a given theme usually takes only 2 to 3 hours. Importance and concerns felt by the participants can be evaluated by the number of cards put in each category, and then be overviewed in the relation map. In addition, through intensive discussions among participants from different points of view, the consciousness level of the participants is improved, and as a result unexpected breakthrough is often achieved.

### 4.3 The MUSE method as a modeling tool

The MUSE method is used as a modeling tool in the step 2 and step 4 in the grand design phase. Second role of MUSE method is to extract problems and values from the overall viewpoint and to do walkthrough in the model of enterprise activities.

The AsIs modeling of the MUSE method consists of the following steps.
(1) Extract data sets from existing documents which are related to the customer's business activities.
(2) Find agents who use the above data sets.
(3) Extract the functions of the agents, and describe them as the actions of the agents.
(4) Find artifacts associated with the business, such as facilities, manufacturers, end customers, and so on.
(5) Describe those agents, data sets, and artifacts in post-it cards, using MUSE notation. Figure 4-3 shows the MUSE notation for modeling.
(6) Draw the overall image of work tasks, through overlooking a set of agents and data on the MUSE sheet.
(7) Place artifacts at the proper position and mark boundary lines on the MUSE sheet for making clear the region of each section. Figure 4.4 illustrates an example of AsIs modeling.

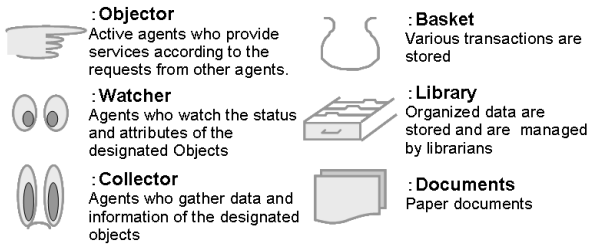


Figure 4-3 MUSE notation for modeling.

In this AsIs modeling, work tasks and work flow dynamics are verified afterward by the walkthrough procedure together with the customer, which means to walk virtually along work flows in the model. Problems such as loss, complexity, inconsistency, overlaps of work tasks are investigated through such overviewing and walk-through processes. This is a different style of

service modeling in MUSE methodology.

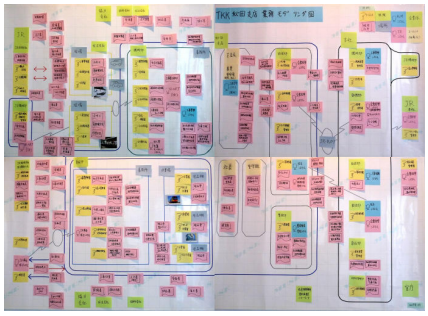

Figure 4-4 An example of the MUSE modeling

As the next step, we draw the ToBe model on the MUSE sheet. First, we analyze and decompose the work tasks and into function level. Then, we recompose ToBe functions and agents who serve those functions. For drawing ToBe model, we arrange agents in the optimal positions with proper data in the MUSE sheet. Following three aspects are important points to determine where to place the agents on the sheet: (1) to follow up the vision of the division, (2) to be free from the current rules and organization, and the conventional manner, constraints and customs, (3) to define the measures for evaluation of the overall system.

The structure and dynamics of the future division described in ToBe model is surely achieved by the capabilities of IT and BPR. IT significantly contributes to overcome time and space differences, and volume and accuracy constraints, and BPR also contributes very much to remove organizational, rules, and other environmental constraints.

The characteristics of the MUSE modeling are; (1) overall enterprise activities are visualized and (2) properly analyzed, and (3) the structure and dynamics are overviewed in a short time by small group of people.

Those activities are conducted by design office co-work with customer. As was discussed earlier, the objective value is vague and unclear at the beginning, it is important to recognize inconsistent and conflicted present situation, which is mirrored in an explicit way on the overall picture of the MUSE sheet.

Through such mutual understanding phase, the customer recognizes that the third party participants understand and share the real problems, which gives the customer a strong incentive to do collaborative works all through the resolution process. The above procedure is a step to establish the partnership to overcome the troublesome roads of IT realization phase. Furthermore, we think that such step is the first step to achieve the end goal of the customer, and finally to realize the objective value.

## 5. CONCLUSIONS

Through applying the reverse engineering method on existing instance of IT solution service, we investigated in this paper the two values of services, i.e., objective value and functional value. We have discussed two crucial points to realize the objective value. First, it is important to reveal and clarify customer's objective value and promote a mutual understanding regarding this objective value as a consensus among the stakeholders in an early stage. This objective value gives the end goal of the whole services. Second, it is valuable and indispensable to share these two values among service agents, thus providing a proper direction for executing the service realization phase.

According to the discussion in this paper, we can easily imagine that as size and complexity of the IT solution services increase, collaborative work among service agents become more indispensable than ever. To promote such collaboration, the role of the design office becomes more important for consistent service throughout the IT solution lifecycle. Furthermore, to execute such collaborative work under the design office, we need an environment "ba" for value co-creation activities among the participants, as well as a sophisticated tool for explicitly viewing the overall enterprise solution services. The MUSE method satisfies these two requirements and can serve as a practical and effective method to promoting IT solution services.

## REFERENCES


[1]"The Success Rate of Large Projects are in 26.7%", *Nikkei computer*, No.587, pp.50-71, 2003 (in Japanese).

[2]http://itpro.nikkeibp.co.jp/article/COLUMN/20090128/323664/

[3]http://www.service-eng.org/

[4]Y. Nishioka and N. Koike, "A Prospect on IT Business from a View Point of the Service Engineering", *Journal of the 16th System Design and Dynamics, JSME*, No.06-33, pp.84-87, 2006 (in Japanese).

[5]Y. Nishioka, "Effectiveness of MUSE Methodology in Grand Design Process of IT System Construction Projects", *The 30th Workshop on IEEJ-Information Systems,* 2007 (in Japanese).

[6]Y. Nishioka, "Success Factors in IT Services for Realizing Objective Values of Enterprise IT Systems", *The 3rd Conference on Transdisciplinary Federation of Science and Technology*, CD-ROM, 2C3-2, 2009 (in Japanese).

[7]T. Arai and Y. Shimomura, "Proposal of Service CAD System -A Tool for Service Engineering-", *Annals of the CIRP*, Vol.53, No.1, pp.397-400, 2004.

[8]Y. Nishioka, "MUSE Concept for System Construction", Handouts for *Special Lecture, Dept. of Multimedia Engineering, Osaka University*, 2005-2007 (in Japanese).

[9]T. Uemura, T. Oiki, M. Oka, and Y. Nishioka, "Kyushu Electric's ERP System Development and Operation for Overhead Lines System", *CIGRE,* CD-ROM, B2/D2-105, pp.1-8, 2006.