

# Introducing SOMA-DEF : An IT Service Requirement Engineering Model

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## ABSTRACT

To provide IT services according to the needs of users, the services provided should ideally go through a mature design process. Several studies that have been done previously explain the life cycle of a service. But until now there has been no research that explains how to identify the needs of IT services in a company, especially those that offer a model for identifying information technology service needs in various customer needs approaches. The Service Oriented Modeling Architecture (SOMA) model released by IBM offers a model of identifying software needs with a service oriented architecture approach. The SOMA identification method was adopted to be applied in identifying service needs in an organization. The IT service requirement from several type of user are then poured into IDEF graphic notation as a conceptual model to increase understanding of existing IT service requirement. The collaboration of SOMA and IDEF modeling produced a model that not only capable to explain IT service needs but also to describe the differentiation service requirement of each user.

**Keywords:** *IT service, requirement engineering, modeling notation, SOMA, IDEF, SOMA-DEF*

## Introduction

One measure of the success of a system is how the system is able to meet the needs of its users. To provide IT services in accordance with the needs of users, the services provided should ideally go through a mature design process to avoid the main factors causing system failure, namely due to misidentification of needs[1]. Some research that has been done previously explains about the life cycle of a service, method of service identification and service specification documents. However, the service being modeled is a service package that is considered efficient and is suitable for all types of customer needs in general. Until now there has been no research that explains how to identify the needs of IT services in a company that specifically offers a model for identifying information technology service needs with different customer needs approaches.

The process of understanding the needs of system users which is realized by identifying what is involved in the system is called requirements engineering[1]. This technique will be adopted and collaborated with the existing service needs identification method in order to get the right IT service needs according to the needs of each service user. The SOMA model released by IBM in 2006 offers a software needs identification model that consists of six main phases that range from business analysis to service management[2]. The identification method used by SOMA is then modified to be applied in identifying the needs of information technology services in the

organization. The need for IT services from each user that has been identified is then poured into graphical notation as a conceptual model to increase understanding of existing IT service needs. IDEF notation was chosen because it is a functional modeling method designed to model the decisions, actions and activities of an organization or system. As an analytical tool, IDEF helps designers make identification of functions in such a way that they can improve understanding, communication and analysis of the system[3].

The proposed IT Service Requirement model is expected to not only be able to model IT services, but also be able to capture the different service needs of each user. It is also expected to be able to describe the steps that must be taken in modeling and providing IT services, the role involved in providing services into a notation of needs, and is expected to be a medium of communication between stakeholders as well as input for service providers and developers IT to improve resource efficiency in efforts to deliver information technology services

## Research Method

This section will describe the method to conduct the research. Broadly speaking, there are five steps taken as shown in the image below.

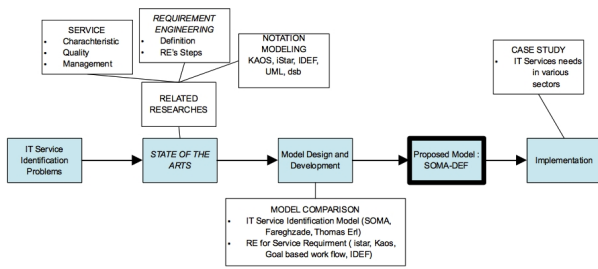


Figure 1. Research Method

**DISCUSSION**

*Preliminary Analysis*

In this sections, we will discuss three popular methods that are considered representative of the spectrum of current service identification methods, namely the SOMA[2], the Fareghzade[4] method, and method of

Thomas Erl[5]. Several methods of identifying service needs are mapped to several parameters. Mapping is done to pay attention to the weaknesses and strengths that are owned by each service identification method. Whereas the comparison parameters used adopted the parameters used by Birkmeier[6] with a number of additions that were deemed necessary to be carried out in accordance with the objectives of the identification model of IT service needs that have been explained in chapter I. The parameters to be used to compare are as follows:

- Parameter I: The method should supports systematic service identification of the model process as well as documenting (identification process, roles, information).
- Parameter II: The method has a procedure that has been implemented and is easy to use.
- Parameter III: The method can be easily understood by business analysis and used easily by business people.
- Parameter IV: The method should consider existing services in the identification process.
- Parameter V: The method should supports the identification of different service needs of various users.
- Parameter VI: The method supports the use of a notation model in order to increasing the understanding of service needs.

Table 1. Mapping Services Identification Method to Birkmeier Parameters

Parameter[6]	SOMA[2]	Fareghzade[4]	Thomas Erl[5]
I	Using engineering capability as an elaboration of what and how	abstraction of three layers in SOA	Does not explain about involved roles
II	three main processes are goal service modeling (GSM), domain decomposition, and analysis of existing assets	three stages are initial analysis, in depth analysis, and make a service taxonomy	The identification process is divided into twelve stages
III	Does not support	Does not support	Does not support
IV	Analysis of service candidates is based on modeling business processes and existing services	Analysis of service candidates is based on modeling business processes and existing services	Does not support
V	Does not support	Does not support	Does not support
VI	Does not support	Does not support	Does not support

SOMA identification method is the most suitable to meet the parameters used. However, the SOMA method still has drawbacks, which is that it does not yet support the identification of different types of needs from many types of users and also does not accommodate the use of notation as an effort to facilitate the maintenance of services.

Notation model is the use of diagramming techniques with names and symbols that represent concepts, as well as lines connecting symbols that represent relationships such as those designed to provide a standard for visualizing the design of a system. The use of notation has been proven to increase understanding of the material presented. Based on the study of literature there are countless models of needs depiction notation. Requirement engineering

modeling was chosen because it share the same objectives as this research. Then some of the selected models (KAOS[7], GORE[8], iStar[7] and IDEF[3]) were analyzed based on four basic material criteria that must be

considered when designing or building services[9], namely the depiction of goals / objectives, portrayal of roles, depiction of processes and quality, as well as the sequences of processes / procedures.

Table 2. Capabilty of Requirement Modeling Notation Method to Describe RE Component Explicitly.

Requirment Engineering Component	KAOS	iStar	Goal Based Work Flow	IDEF
Depiction of Goals	With the benefits of four models	<i>Softgoal</i> and <i>goals</i>	Using simpler goals	Using <i>output</i> notation from <i>function</i>
Potrayal of Roles	There is no actor's role in each process.	There is no actor's role in each process.	Actor relationship could not showed. There is no actor's role in each process.	Roles explained by <i>mechanism</i> that affected <i>Functions</i>
Depiction of Preece	Describe relationship between <i>event</i> and <i>task</i>	serial event is not available	<i>activity</i> , and this activity describe the sequential procedures to achieve <i>goals</i>	Relationship between <i>functions</i> , control, mechanism, input and output
Sequence of Procedures	Not available	Not available	explained through <i>Activity</i>	explained through <i>Function</i>

From the summary of Table 2, we can conclude that IDEF model is considered capable of helping in understanding the actions, activities, decisions, or informational relationships needed to support service delivery.

**Proposed Model**

The IT Service Requirement Engineering Model propped by this research is developed by modifying SOMA service life cycle[2]. Seven stages in SOMA[2] were simplified into three stages of modeling. Modifications are made by eliminating several steps that are irrelevant to the research objectives. The processes that remain adopted are the process that considered relevant and can be applied to the process of identifying IT services in an organization. Furthermore, simplified service life cycle is combined with the way of describing the rules from IDEF[3]. Figure 2 will explain more detail about proposed IT Service Requirement Engineering Model.

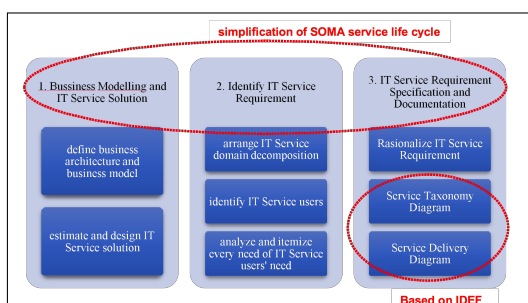


Figure 2. Proposed Model SOMA-DEF

**IT Service Taxonomy Diagram and IT Service Delivery Diagram**

In making IT Service Delivery Diagrams there are at least three imaging mechanisms, namely the depiction of the functions of providing IT services (input, output, mechanism and control), depicting existing IT services (as-is) and future services (to-be), and depictions of the parent-child relationship between services.

**A description of the process / function of providing IT services.**

In describing the process / function of providing IT services, the component described adopts IDEF0 components, namely input, output, control, and mechanism. In this case there is no significant difference between IDEF0 diagrams and IT Service Delivery Diagrams. Table 3 explains the notation used to create Digram IT Service Delivery. The symbols to be used in this notation explained through Table 3.

**Depiction of as-is and to-be services**

Services can be divided into two, namely existing services or as-is services and services that are as a proposal for future development as a follow-up of the needs of service users.

How to describe these two types of service is explained in Table 4.

Table 3. Symbols of IT Service Delivery Diagram.


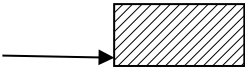
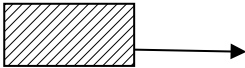
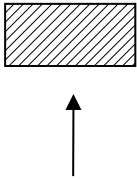
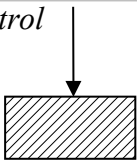


Symbol	Meaning
<p>Service</p> 	<p>Service symbolize through a box that consist of the ID number of service and service name to be provided.</p>
<p>Input</p> 	<p>Input is any resources to be processed, transformed or modified. Input is represented as an arrow to the left of the service box.</p>
<p>Output</p> 	<p>Output is any outcome expected as a result of a service provided. output is represent as an arrow coming out from the right side of the service box.</p>
<p>Mechanism</p> 	<p>Mechanism is every related aspect that needed and affected the occuring service. Mechanism represented as an arrow to the bottom of the service box.</p>
<p>Control</p> 	<p>Control is the constraint where service can be delivered. It gives limitations under what circumstances the service can be done. Control is represent as an arrow to the top of service box.</p>

Table 4 . Symbols of IT Service Delivery Diagram (as-is and to-be).

Symbol	Meaning
<p>As-is Service</p> 	<p>As-is service symbolize through a solid line square / box that consist by ID number and name of existing service.</p>
<p>To-Be Services</p> 	<p>To-be service symbolize through a broken line square / box that consist of ID number and service name to be provided in the future.</p>

**Depiction of parent-child relationship**

The depiction of the parent service (hereinafter referred to as level 1 diagram) and the service child (hereinafter referred to as level 2 diagram) is carried out by conditioning IT services into levels according to the specification table that has been created.

**IT Service Taxonomy Diagram**

The stage of making a service taxonomy diagram or IT Service Taxonomy Diagram is to use an area domain identification table that was done in the previous step. The entities in this table are then labeled, and poured into the IT Service Taxonomy Diagram notation.

**Example of use**

In this section we will demonstrate the example of use of SOMA-DEF IT Service Requirement Model take place in an Organization X (education service provider) in Indonesia. There are three phase to conduct the model will be explained below.

**Bussiness Modeling and IT Service Solution**

In general, IT services provided by Organization X are provided to the academic community, and special services are provided to support academic activities, and work units. Modeling IT services in Organization X should be done through an in-depth analysis to achieve service efficiency that will be provided as an effort to add value, IT delivery process, and resource aspects related to the process of procurement of IT services. So that the IT services provided are in line with the needs and main objectives of Organization X.

**Identify IT Service Requirement**

The identification of IT Service Needs in Organization X is done by analyzing the results of the questionnaire related to the level of IT service needs of each class of users grouped by domain. The Information Technology service domain in Organization X is obtained by grouping services that have functional similarities. IT Service domains that have been identified as six domains include Network and Wireless, Computer and Software Support, Telecommunications Services, Email and Messaging, Web Service, and Teaching and Learning, and thirty one IT service subdomains (IT Service candidate), among three types of IT service users (lecturer, student, and officer).

After the successful IT service candidates have been recorded, then the we needs to verify the IT services that will be provided. For this reason, a data collection was carried out using the questionnaire. The results of the questionnaire are expected to provide an overview of the IT service needs of each user. The level of needs is

measured using a Likert scale level includes five criteria of very do not need, do not need, less need, need, and really need. The questionnaire was distributed to three types of IT service users at Organization X, which were grouped as students, lecturers, and officer. The participating respondents consisted of 108 valid respondents who were 46 students, 32 lecturers, and 30 officer.

**IT Service Specification and Documentation**

Due to limitations of the length of this publication paper, we will only demonstrate IT service specification and documentation in only one of six domain, Email and Messaging. For the Email and Messaging domain, 87% of respondents said they needed electronic mail services. 77% of respondents stated the need for instant messaging services, 90% of respondents required large file transfer services, and a high enough number for the need for spam protection services, which was 83% of the total respondents. Online collaboration tool services between lectures and students show a high percentage of 81%. This shows that users of IT services, especially from student groups, expect the availability of this service.

Figure 3 describes an example of use of IT Service Taxonomy Diagram where the structure of IT Service in Email and Messaging shown in explanatory by distinguishing as-is and to-be services (pay attention to solid lines and the broken one) whereas Figure 4 and Figure 5 are the example of use of IT Service Delivery Diagram.

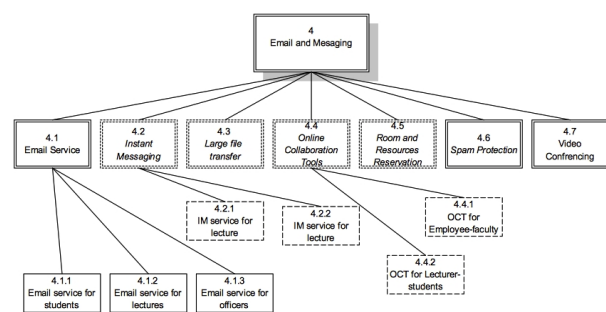


Figure 3. IT Service Taxonomy Diagram

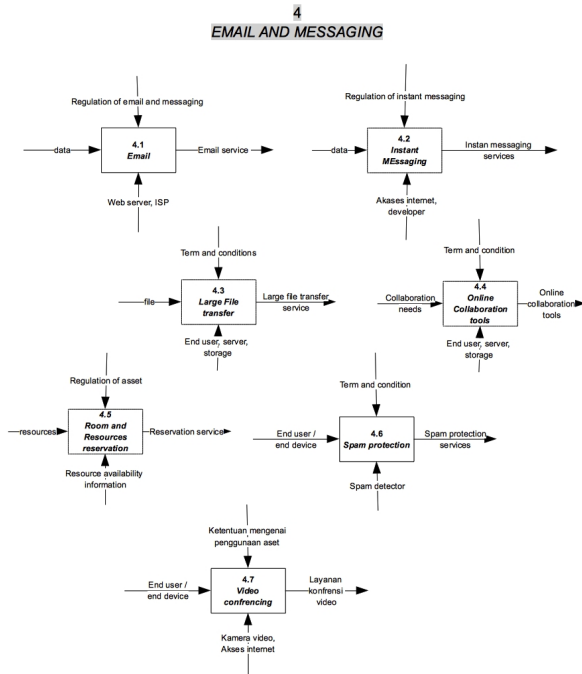


Figure 4. IT Service Delivery Diagram - Level 1

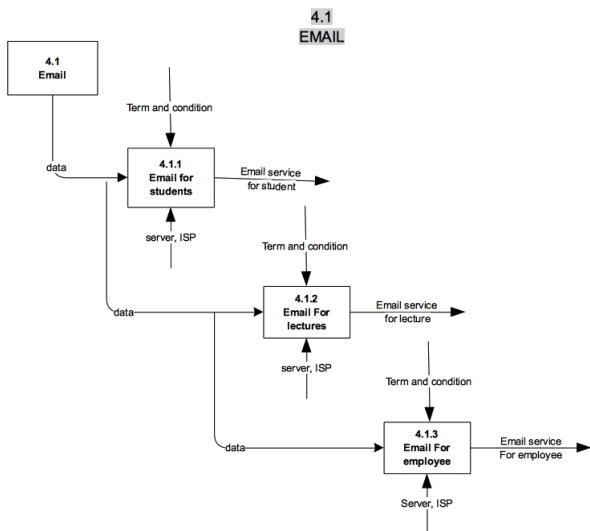


Figure 5. IT Service Delivery Diagram - Level 2

**SUMMARY**

This study proposed a model to help identifying IT service needs for organizations in the form of modifications of SOMA’s service life cycle combined with IDEF modeling notation. Proposed IT Service Requirement Identification Model named SOMA-DEF consists of three phases:

business modeling and solution management phase, identification phase, as well as specification and documentation phase. SOMA-DEF consists of two notations which are IT Service Delivery Diagram and IT Service Taxonomy Diagram. This proposed model contributes as a reference in designing and managing IT service requirement of the organization especially in order to aligning the use of IT with organizational objectives to be achieved.

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