*International Journal of Engineering & Technology*, 7 (3.32) (2018) 132-136

International Journal of Engineering & Technology

*Website: www.sciencepubco.com/index.php/IJET*

***Research paper***

# A Conceptual modelling of QOS' Web Service Framework

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## Abstract

The evolution of web service technologies is well known in many organizations. When many organizations want to develop our business, they will add new services in their businesses policy, these additions may help the organization to increase some policy but it is difficult to implement some requirements. To solve this problem, we present the new paradigm of QOS for develop web service that is the procedure to implement web service and help developer to create service appropriate each business process. This conceptual of modelling based on LSS and BWW framework and under business practice guideline the example is Cobit and ITIL for approximate each of business process. In success, we illustrate our approach by class diagram that design under conceptual of modelling quality of service for web service and implement web service for test this idea. Then we choose 2 scenarios in different combination of QoS requirements for test, the results show that this technique is satisfy for choose and we think this paper can be guideline for researcher in the future.

***Keywords***: *Conceptual modelling, Quality of service, Software framework.*

## 1. Introduction

Today, web services are one of the trends in business services, which was created by service oriented architecture (SOA) methodology [1]. Service oriented architecture (SOA) is a standards-of approach to managing services that can made all of different software packages for reuse components. Several important technologies and many ideas have been defined to support an SOA approach, when the services used by another provider pass the internet or an intranet, many companies have some problems e.g. Doesn't have any service for used. Normally, service selection used always select the service of best quality, so many similar web services request call the same web service of best quality too. However, each quality must guaranty by quality of service.

The quality of service (Qos) for web service is very importance for guarantee the when customer want to selected web services. QoS is defined as a set of quite many non-functional attributes. The example for attribute of QOS is security, performance etc. However, method for selected web service is based on techniques for conceptual modeling, these techniques must be consideration.

To address the above issues, we present diagram for conceptual modeling by rearrange LSS and BWW framework that is techniques for conceptual modeling of Qos. We are mapping associate features between LSS and BWW framework in order to create new concept conceptual modeling of Qos for web service and add business guideline practice e.g. ITIL, Cobit framework to business layer and add Qos ontology to third layer too. In summary, we implement web service under our model and test it. The result show very satisfies when we compare with before improvement.

## 2. Related Work

### 2.1. The LSS framework

One of the famous complete frameworks for exploring conceptual modelling quality was developed by Lindland et al [2]. This framework composes of 8 modules. The propose of this framework is quality framework based upon a systematic approach. The framework, shown in Figure 1

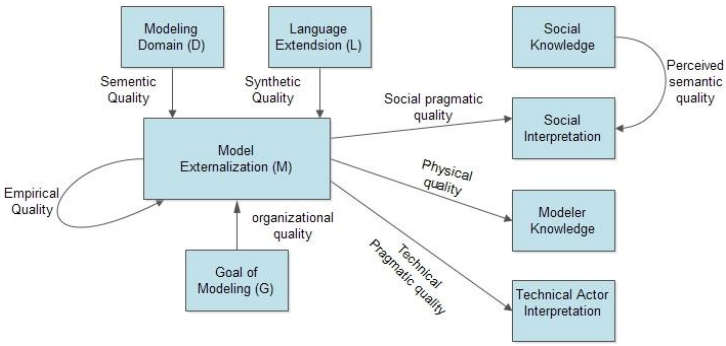


**Fig. 1:** LSS Framework [2]

Their framework borrows three important linguistic concepts syntax, semantics and pragmatics [6] and the model can generate these concepts to four aspects of compose of conceptual modelling, namely, language, domain, model and audience participation. [6]

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### 2.2. The BWW Framework

Bunge-Wand-Weber (BWW) ontology is well known in UML of conceptual modelling. BWW is a framework for analysis and conceptualization of real world objects. It includes categories that can be applied to analyze and classify objects found in an information system. The BWW framework begins with the application domain, also known as the real world system [3,4].

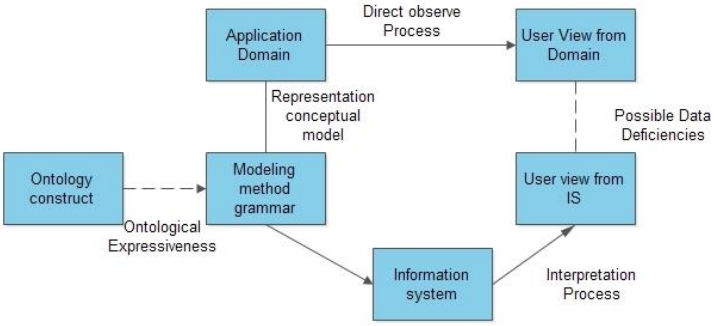


**Fig. 2:** BWW Framework [3,4]

The BWW models consist of the representation model, the state tracking model, and the good decomposition model [4]. It appropriate with user view.
After that we conclude the concept of LSS and BWW and compare feature between LSS and BWW framework and present in domain. Show in table 1:

**Table 1:** Compare feature between LSS and BWW Framework

| Domain | LSS Framework | BWW Framework |
|---|---|---|
| Model Domain (Physical Domain) | - Modelling Domain<br>- Goal of Modelling<br>- Model Knowledge<br>- Social Actor Knowledge | - Application Domain<br>- User view of Domain |
| Language Domain (Logical Domain) | - Language Extension | - Modelling method grammar<br>- Ontology construct |
| Conceptual Domain (Conceptual Domain) | - Model Externalization<br>- Technical Actor Interpretation<br>- Social Actor Interpretation | - Information system<br>- User view from Information system |

## 3. Approach to Create Modelling of QOS' Web Service Framework

### 3.1. Add Business Process to LSS Frameworks

In this section, we add business process in LSS framework and reasoning to generate business guideline practice e.g. ITIL and Cobit framework relate to Qos for web service. In Figure 3 gives a diagram of the relationship between LSS framework and business process and describes how we matching the business guideline practice and existing reasoning to support them.

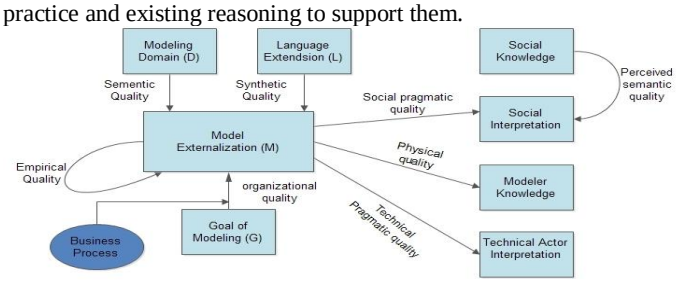


**Fig. 3:** Add business process to LSS framework

In this figure 3 The goals of modelling have set role for define structure of model. For model that relate business process, we add business guideline practices e.g. ITIL and Cobit framework that associate with Qos for web service to goal of modelling that under physical model. After that when mapping business guideline practices to LSS framework, flow of model will work normally.

### 3.2. Add QOS Ontology to BWW Frameworks

We add qos ontology to BWW framework. The qos ontology is one of ontology construct. It composes of relation between qos and qos expression then we use this reason and add qos ontology to ontology construct process and mapping the result of qos ontology with model from BWW framework. This process show in fig.4 in below.

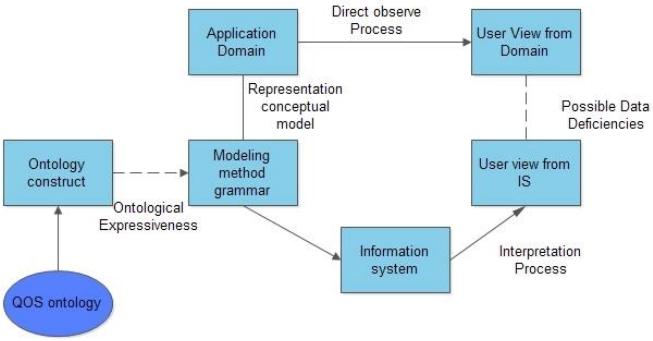


**Fig. 4:** Add Qos ontology to BWW framework

After that we create conceptual model of qos web service framework. We can describe in the next section.

## 4. The Conceptual Modelling of QOS' Web Service Framework

This section presents a new conceptual model that receives from method of rearranging the combined LSS and BWW frameworks. This method gives eight main possible issues. These issues can be representing cognitive framework used in or resulting from conceptual modelling from LSS framework and receive sets of states from the BWW framework. The eight elements compose of quality types that are separate into four layers follow the conceptual modelling process. These layers are the Structural layer, Knowledge layer, Behaviour layer, and Interaction layer. The complete framework and all relationships are shown in Fig. 5 and explained below:

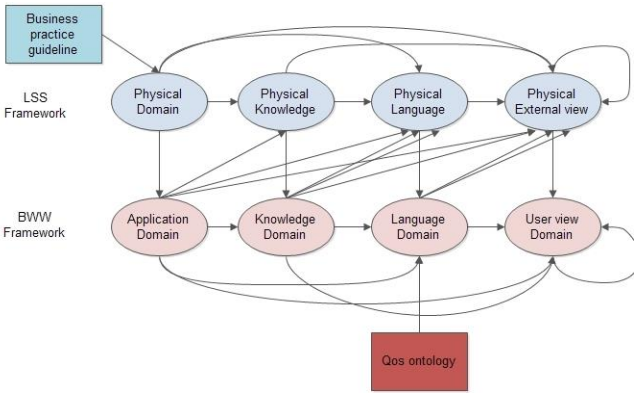


**Fig. 5:** Eight elements from mapping LSS and BWW framework

In figure 5 compose of two tiers. First: Tier of LSS framework compose of physical domain, physical knowledge, physical language and physical external view. Second: Tier of BWW framework compose of application domain, knowledge domain, lan-

guage domain and user view domain. After that we explain the components of each layer show in figure 6,7

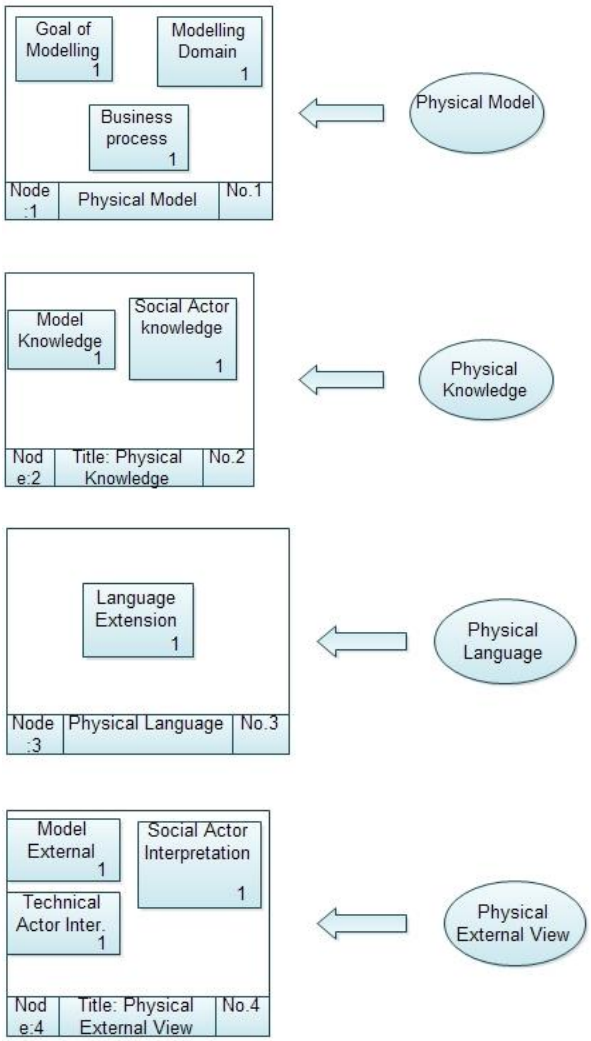


**Fig. 6:** Explain component of elements from mapping LSS framework

The details component of elements from mapping LSS framework compose of 9 elements.

1. Physical domain compose of goal of modelling, modelling domain and business process.

2. Physical knowledge compose of model knowledge and social actor knowledge
3. Physical language compose of language extension
4. Physical external view compose of mode external, social actor interpretation and technical actor inter.

And components of eight elements from mapping BWW framework show in figure 7.

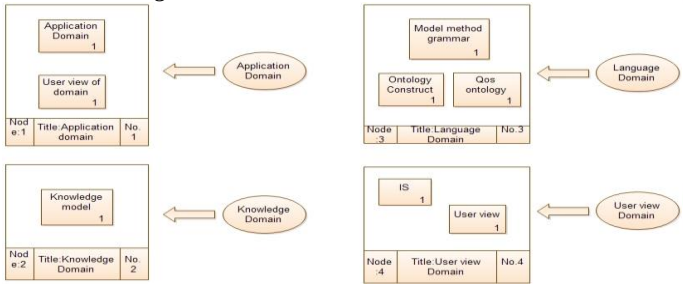


**Fig. 7:** Explain component of eight elements from mapping BWW framework

The details component of elements from mapping LSS framework compose of 8 elements.

1. Application domain compose of application domain and user view of domain
2. Language domain compose of model method grammar, ontology construct and qos ontology
3. Knowledge domain compose of knowledge model
4. User view domain compose of information system and user view.

After that we separate all of components in four layers. In order to present the conceptual model of qos web service framework. The First layer is structural layer. It describes the static part of the system and contains the structural for create model, elements of the business guideline practice e.g. ITIL and cobit framework. This layer is generally represented by uml diagram. It is containing of four elements compose of physical domain, physical knowledge, physical language and physical external view. The structural layer starts on a central role in the conceptual modelling process as the process transforms concepts from the physical model to the final process of physical external view. Each of line (quality type: S1, S2, S3, S4, S5, S6, S7) sends data between original to the end loop. The structural layer has seven quality types, concern about LSS and BWW framework.

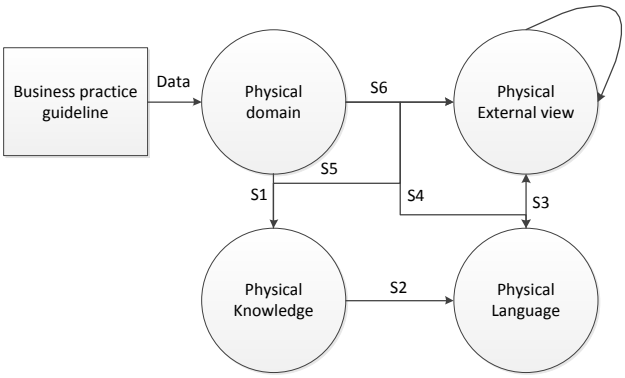


**Fig. 8:** Structural Layer framework

The second layer is knowledge layer. It has 7 quality types (K1, K2, K3, K4, K5, K6, K7) and work parallels with the structural layer. In this layer quality types refer to the quality of the model, language, and representation. Whereas the structural layer quality types of model, language, and representation quality are defined objectively. In language domain, we add Qos ontology in this element and map-ping each ontology that relate construct in this domain. Knowledge layer concern about semantic quality because it relates with ontology then we can example of this layer and represent in conceptual modelling (e.g., an Entity-Relationship diagram, data flow diagram use case diagram etc.) by comparing the meaning of the representation, so should be represented). This type of quality has been identified as a surrogate for semantic quality [5]. It can describe in fig 9 below:

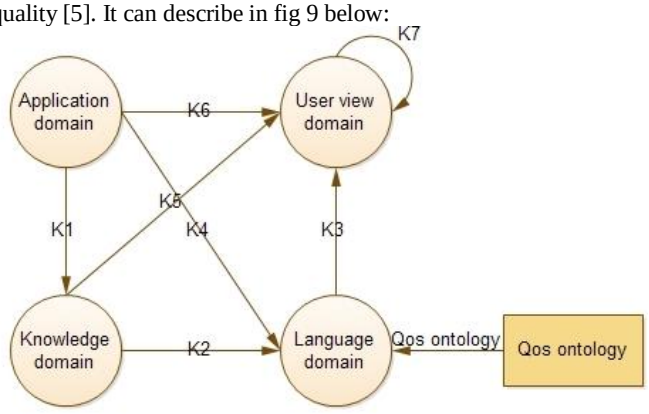


**Fig. 9:** Knowledge layer

The third layer is behaviour layer. It is an interaction between element of structural layer and element of the knowledge layer. All stakeholders need to learn behaviour layer must be using the knowledge layer and structural layer to retrieve data. The

behaviour layer measures how well that learning, interpretation, and/or under-standing takes place. The element addresses the comprehension of the final physical external view by the user view, which must use the representation to create the information system and other users who must understand what the representation is modelling. It can describe in fig 10 below

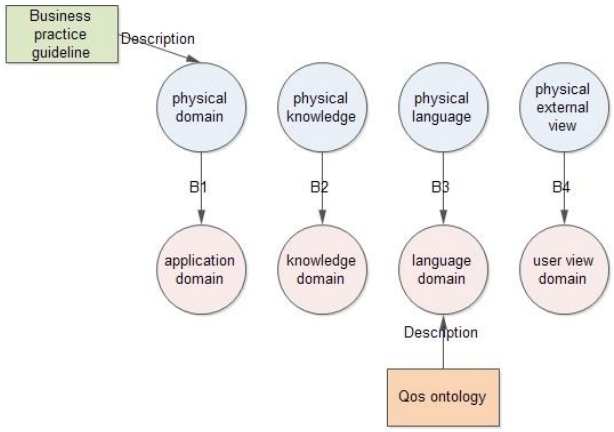


**Fig. 10:** Behavior layer

The last layer is interaction layer. It is a step for used business guideline practice to mapping some of module in physical domain. The application domain, knowledge domain and language domain send 5 quality types (I1, I2, I3, I4, I5) to physical knowledge, language and external view. For example, data to generate each of quality, a domain role's knowledge is used to create the physical model, the physical language, and the physical external view. About application domain, this quality type is especially relevant to domain ontologies; language domain that being developed must be appropriate to the developer's knowledge of the actual domain. The developer uses the modelling language, example is vocabulary the grammar the other language, to create the physical external view. In the true step for development software, whether the end result is a conceptual representation such as a conceptual model or class diagram or a complete information system, the model, and the language model is critical. Then we will manage these problems by translate domain role and developer knowledge by ontology method and mapping all of relation in order to create physical domain.

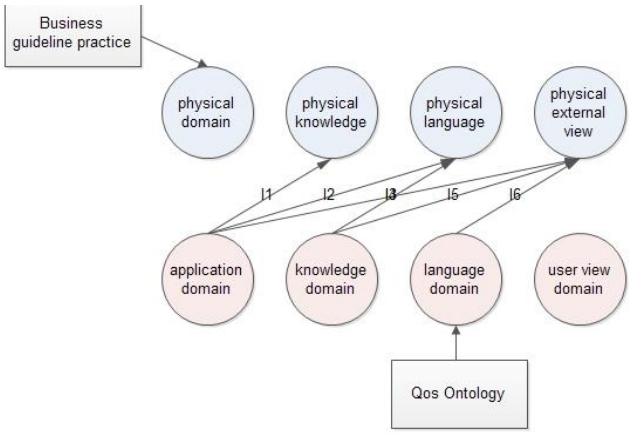


**Fig. 11:** Interaction layer

### 4.1. Test Conceptual Modelling

In this section, we choose one point of conceptual modelling and present an example of the use of the conceptual modelling that creates under concept of physical external view. The example illustrates class diagram create by conceptual modelling of Qos frame-work to examine the approach of physical external view. Here, we use the case study of request the price oil in daily. When customer request service, we calculate the quality of service and when provider response service. It will generate service for test the concept of conceptual modelling quality.

For instance, of class diagram, we design part of qos specification relationship with web service and qos class. It assumes that many qos specification will mapping with many criteria of service. In Figure 12 shows a class diagram.

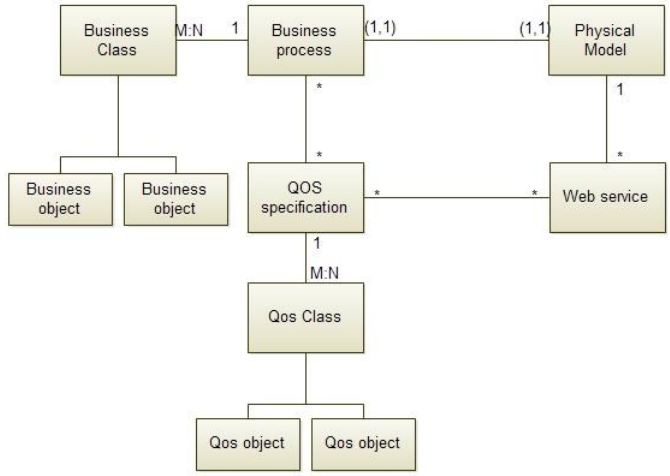


**Fig. 12:** Class diagram

To demonstrate the effectiveness of our model and approve our idea, we will consider two test scenarios compose of test scenario1 test respond time when user request and test scenario2 choose test for maximum throughput (TP) For example we implement 4 web service compose of: Number one implement with LSS concept, number two implement with BWW concept, number three any idea of implementation, number four implement associate with this research.

**Test Scenario 1**

We choose response time for test 4 web service. Number one implement with LSS concept, number two implement with BWW concept, number three any idea of implementation, number four implement associate with this research. Number four that has the fastest response time, or 0.453 seconds, which conforms to the data obtained in Table II

**Test Scenario 2**

We choose maximum throughput (TP) metric for test. The results from table II demonstrate that web service number four has the highest value which this web service has the highest throughput or 25 requests per minute.

**Table 2:** Results for testing

| Web service | Test Scenari1 | | Test Scenario2 | | Rank |
|---|---|---|---|---|---|
| | Result | Rank | Result | Rank | |
| Web service 1 | 0.365 | 2 | 23 | 3 | -1 |
| Web service 2 | 0.344 | 3 | 24 | 2 | 1 |
| Web service 3 | 0.231 | 4 | 12 | 4 | 0 |
| Web service 4 | 0.453 | 1 | 25 | 1 | 0 |

## 5. Conclusion

In this paper, we presented a new paradigm of conceptual modelling of qos framework, which is based on the concept of LSS and BWW framework. Then this framework develops by various quality factors in each layer that contribute to the web service quality and the relations among them. Our framework shows that the requirement quality in business process is the most important aspect, as it affects the quality of deliverables in the lower levels. This framework studying only data quality does not focus on the database level but it also requires focusing on modelling quality, and requirement quality. This reasons helps to retrieve the root cause

of defects of test web service. We aim to define a set of quality criteria concerning each quality factor. These are widely accepted for information and data quality evaluation such as security, availability and performance. However, the meaning is different in each quality factor. The selection of quality factors in our framework is based on the business practice guideline compose of ITIL and Cobit. framework, they are concrete and impacted by the user and some meaning of attribute for developer's perspective. Our quality framework allows managing the quality of data and information system.

Future research will create new model and new case study for examine each of the quality metrics under this conceptual modelling of Qos. The area of future research will be developing of specific metrics on each of the quality domain. And develop metrics under variety business practice guideline to assure the correct of conceptual modelling of Qos.

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