An Ontology Based Service Specification for Enterprise Systems

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***Abstract*— Enterprise service architecture creates an IT environment in which standardized components will work together for reducing complexity. Service Discovery discovers a web services that meets our requirements and hence describes a particular service. Since there is no complete and clear understanding about the behavior of service, ontology is used for providing relevant services to the end user. Even though Web Service Definition Language (WSDL) and Universal Description Discovery Integration (UDDI) standards are used for the definition of service interfaces and service registries, they do not provide enough basis for a service consumer to get a full understanding of the behavior of a service. Ontology is a generic knowledge that represents agreed domain semantics that can be reused by different kinds of applications or tasks which is an efficient method to provide clear notion of service. Hence a generic service specification framework for an enterprise using ontology is proposed to get a clear view about the service provided and its functionality. The service specification framework is based on a founded theory, the ψ theory which can be applied both for specifying human services (i.e., services accomplished by the human beings) and IT services (i.e., services accomplished by the IT systems) .The ψ theory is all about the operation of organizations and communication between and production by social actors which underlies the notion of services.**

***Keywords*—SOA, UDDI, WSDL, ICT, service discovery, enterprise ontology, Service Specification, human services, IT services**

1. INTRODUCTION

Businesses operate in dynamic business environments and therefore Information and Communication Technology (ICT) systems have to constantly adapt in order to meet the changing business requirements. So far adaptation of Information and communication technology systems, in order to cope with these changes is difficult, since ICT systems in an organization strongly cohere. Service oriented architecture (SOA) enables the ICT systems to cope with rapid changing business requirements by providing ICT systems' functionalities as services to other ICT system and therefore service specification takes an important role in the recognition of SOA. It provides a characterization of the functionality that a service offers and how the service can be used.

In service-orientation, service providers interact with service consumers by offering them services. In this interaction, both service providers and service consumers have certain expectations and assumptions of each other's responsibilities. Serious problems can occur if these expectations are not made accurate or explicit in a kind of contract, which is also known as service specification. Though the Web Service Definition Language (WSDL) [1] standard enables provider and consumer to have a common view on the interface of the service and the Universal Description Discovery Integration (UDDI) [2] can be used as a means for publishing some service information, they together do not provide enough basis to deal with questions regarding for instance the semantics of provided functionality, the semantics of the input and output parameters, the availability of the service, and the costs of calling the service.

An important issue on service specification is the lack of support to business people in service specification. Business people have to be involved in service specification, because they need to validate whether a certain service really fulfil or satisfy their needs for business process support. The Web Service Description Language only enables to specify technical service information of Web services. Service information with respect to the business can be exposed using Universal Description Discovery and Integration. However, UDDI is a very technical oriented way for specifying services.

2. RELATED WORK

Traditional service discovery mechanisms of web services are based on UDDI.UDDI is a directory service in which the business can search and register for webservices.UDDI uses WSDl to describe the interfaces to web services the UDDI standard is currently most popular in practice as a standard for service registries. This XML [4]-based standard states both what to specify and how to specify it. In the web service standards, researchers and practitioners defined that the service contract consists of an interface definition (WSDL), a message structure definition (XML Schema), and also if required, WS- Policy [5] definition. Moreover another two standards for specifying the Service Level Agreement (SLA) are also evolving and they are Web Service Level Agreement (WSLA) [6] proposed by IBM and WS-agreement [5] proposed by the Open Grid Forum (OGF). Artificial Intelligence researchers however proposed semantic web service standards like OWL-S [10], WSMO [7], and WSDL-S [8]

In existing System, companies were used to competing based on one or two competitive performance objectives such as price and quality However, present markets demand both price and quality in addition to greater flexibility and responsiveness and thus today's organizations must compete based on all competitive objectives. The existing system allows different specifications to exist side-by-side if they are needed, yet places little obligation on the service provider to support specifications that are judged to be of little or no value. The existing system of our project also uses the T-Models. The UDDI only prescribes a very small set of information that has to be specified. It has possibilities for describing the service function in the T-Models, but these T-Models are unstructured. Therefore, there is no consistency across specifications, which makes automated discovery and also manual discovery difficult. Also, in each individual case one again has to think about which aspects to describe in the T-models.

In today's economy, co operations between organizations tend to be highly subject to change. Traditional static supply chains make way for dynamical organization networks. A lower price, a higher quality product, a larger product portfolio, or a faster delivery; all these factors act as reasons for changing the own organization and to adapt the relationships with business partners. The pace in which these changes need to occur, results in high demands on the supporting information systems of organizations. The concept of service-orientation helps organizations to deal with this required interoperability and flexibility. Available international standards enable organizations to quickly connect their information systems and the notion of orchestration makes the relation between business processes and the supporting IT services explicit.

The purpose of enterprise ontology [3] is to promote common understanding between people across different enterprises, as well as to advance communication between people and applications and between different applications. Enterprise ontology gives the opportunity to make a clear distinction between the activities in an enterprise and the realization and implementation of these activities using human beings or ICT systems. The Framework regards organizations as social systems and sees IT systems as support for social actors in performing communication-related activities and production-related activities It enables to find out the relation between human beings and ICT systems whereby we can come upon a way for exposing service aspects at a non-technical oriented way.

3. PROPOSED METHODOLOGY

The proposed system uses the well defined and proven scientific theory, the ψ theory[9]. Based on this theory, Generic Service Specification Framework is established. This theory introduce the six services, that are ontological human services, infological human services, Datalogical human services, ontological IT services, infological IT services and Datalogical IT services. Ontological services are based on the decisions and judgments. Datalogical services are based on the data transmission and storage. Infological services are based on the information which is easily identified. Thus this process provides the effective services for the consumers. By applying this theory anyone can extricate the essential knowledge of the operation and the development of the organization of an enterprise, which mean s a commercial or nonprofits company as well as a network of enterprises. This type of essential enterprise model is called the Enterprise Ontology.

Here system introduces the human services and IT services. Human services are the services that are implemented by human beings. IT services are the services that are implements by the IT system. Both this two services provides the three logical services, are ontological, Datalogical and infological. From this concept, system performs the process of; know about the details of service provider, Know about the details of service production and Know about the details of service production and finally perform the contract options. Thus system generates the best services system.

GENERIC SERVICE SPECIFICATION FRAMEWORK

The Generic Service Specification Framework focuses on three particular area of concern. First one is service provider information, which contains the information needed about the one that takes the final responsibility for the service. Then service contract information, which contains service information in terms of costs and service levels. Then concentrates on service function information, which comprises information that clarifies the function of the providing service component. In terms of enterprise ontology, it describes the production act of the service and all other aspects that are involved in the production world. Then there is service usage information, which makes clear how a service consuming party can make use of the service.

Framework for service specification is an outline of the service aspects to be specified for service selection and service usage. The framework has to encourage effective, convincing and efficient specification of services which is understandable to all types of stakeholders. The use of the Generic Service Specification Framework should lead to service specifications, which contain the service information needed by distinct stakeholders. This framework differently deals with service quality than the organization's framework. Requirements specifiers using the organization's approach incorporate all quality aspects to be specified in the functional specification of a service.

Service Provider Information

Service provider information contains the information needed about the one that takes the final responsibility for the service Contact information is therefore included in service provider. information. It comprises the name of the contact person and the

phone number, email or address depending on the possibilities to contact the contact person. Next to this, service provider information should provide the provider name and a description about the service provider.

Service Contract Information:

Service contract information includes one or several contract options from which the stakeholders can choose. A contract option consists of a particular service level and the costing details for using the service with this particular service level.

Service Function Information:

Service function information comprises information that clarifies what kind of service is provided. It is of interest to management stakeholders and service consuming parties as well. Management stakeholders need to know whether the service provides the functionality which meets the business requirements.

Service Usage Information:

Service usage information clarifies how the service consuming party can successfully make use of the service as described in the service function information. This information is of interest to service consuming parties. Service usage information concerns how the service consuming party can communicate with the providing service component.

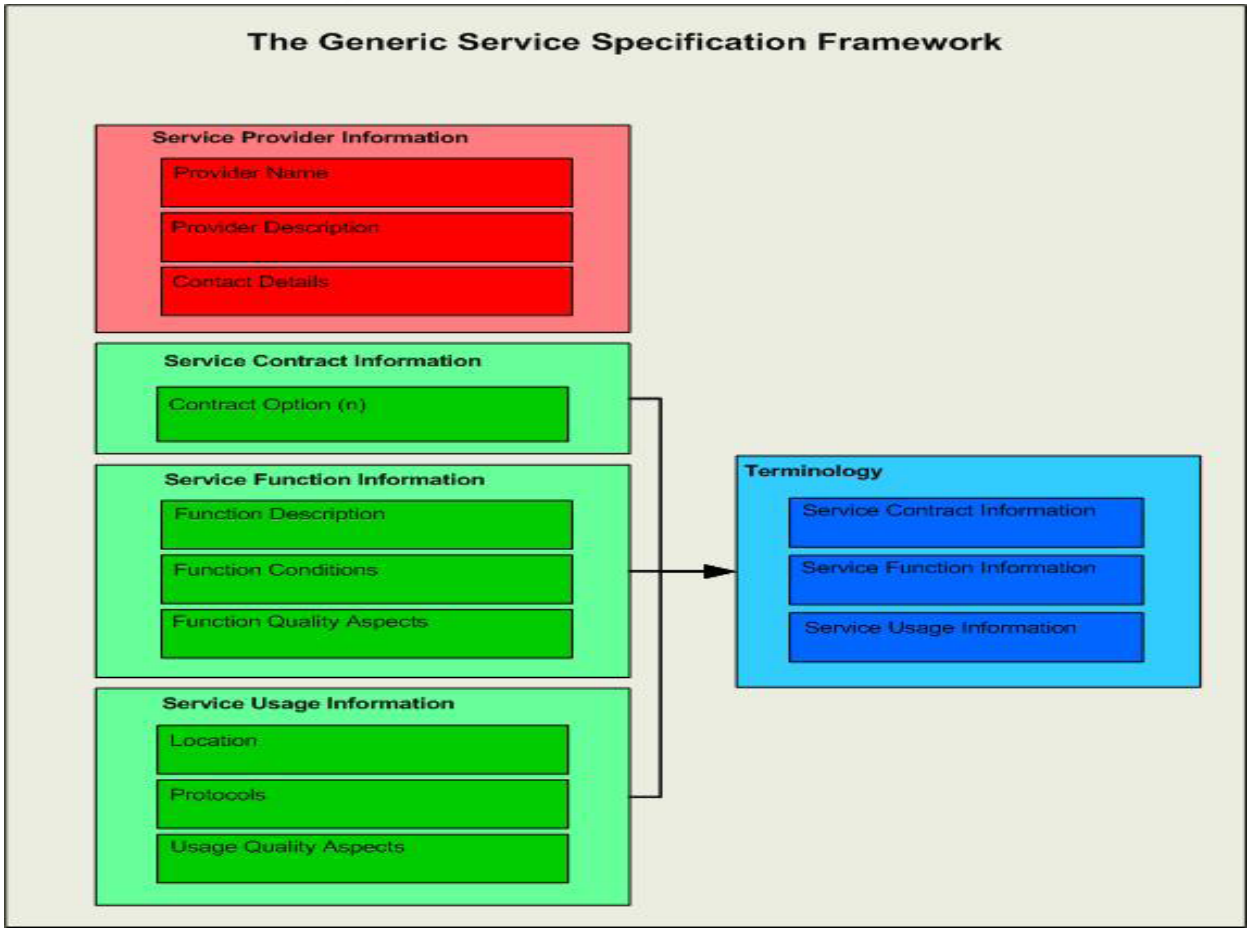

Fig 1

In order to perform a service request, the service consuming party needs to know where it can find the service providing party. Regarding business services, the physical location of the service providing party may be denoted in the specification. It is not needed to particularly denote the physical location of the service providing party. Either phone numbers or email addresses to be used in order to contact the service providing party.

The performance of a promise act depends on the fact whether the service consuming party and the service providing party agree with each other. In order to come upon this agreement, the service consuming party should meet several conditions. Service usage information describes the protocols that are used for communication. Protocols are ways for sharing thoughts by speaking, listening, writing or reading using a common language. The type of protocols depends on the human beings that provide the service. Service function information denotes the preconditions and invariants that have to be in existence prior to service execution in terms of production facts(P-facts). P-facts resulted from P-acts have been created by the execution of other services .

The performance of a promise act should only be regulated using the invariants and preconditions and should not concern how these invariants and preconditions came into existence. When at least one of the conditions is violated, the service providing party performs a decline act. The service consuming party can discuss with the service providing party to still enable an agreement. In case of delegation, there is a clear distinction between the service provider and the providing service component as parts of the service providing party, where the actual service performance is done by the providing service component. In that case, the service consuming party should contact the service provider as the one who takes the final responsibility for providing the service. The actual service execution is followed by the statement of the service providing party that the execution has been performed. As prior to service execution, the service consuming party should hold to the protocols in order to receive the service result successfully. If the service result did not meet the post conditions the service consuming party will reject the service result. In other words, the service consuming party rejects the service result due to a fault of the service execution.

4. CONCLUSION AND FUTURE WORK

This work proposes a novel solution towards the service specification. This method gives reliable results with very less computational complexity .The experiments on real world data set show that the proposed approach works reasonably well in all different conditions of the services. It gave the opportunity to clearly denote the differences and relations between business services and ICT services. The view of enterprise ontology on ICT systems and how they support human beings in their activities provide a means to judge the business value of an ICT service.

The Generic Service Specification Framework is applicable to business services and ICT services as well, which means that business activities as business services and services in SOA as ICT services can be specified in the same way. By this, the framework makes business people easier to validate ICT services, since each particular service aspect of ICT services and business services can be compared with each other.

In future work we can validate this framework in more real-life case studies, especially at enterprises that have a large amount of services, and also to map existing standards to the different aspects of our Framework. Moreover can make this framework useful in large maritime organization.as well as can evaluate the framework additionally at an aviation company

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