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AN APPAREL TRADE QUOTATION ARCHITECTURE BASED ON BPM AND SOA

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Abstract

Based on the analysis of problems and difficulties in apparel quotation system, this paper puts forward the combination of BPM and SOA as a new idea for analysis of apparel quotation system, according to their advantages in business goals and requirements analysis, and the corresponding services' definition, extraction, optimization and integration. Through the combination, system flexibility, rapidity and accuracy could be achieved. The establishment of Service Repository according to the business requirements, is a crucial part in the architecture, however there are no definite rules for service extraction. In this paper, the detailed activities and steps, as well as a specific establishment case is illustrated. At last, architecture based on BPM and SOA for the apparel trade quotation is put forward, and its composition and implement are also analyzed.

Keywords: BPM, SOA, apparel trade quotation.

1 INTRODUCTION AND LITERATURE REVIEW

Accounting for the international trades, the main challenge is to determine the prices of export commodities. Most apparel foreign trade enterprises feel difficult when they make such decisions because of inefficient, costly and risky quoting process. Furthermore, information about the quotation is scattered in various business department, which raises the needs for the integration of quotation and other operating system. On the other side, changing market requirements and competition make it crucial for apparel companies to design and exert a flexible, rapid and accurate quota process.

The related research can be summarized in two groups. The first is about the apparel trade quotation system, such as a three technical layers architecture with java (Lihua He, 2003), a quick system based on web (Ling Han, 2006), a quotation prototype system (Chenggui, Li, 2005), and a system based on ERP environment (Fanli Meng, 2003). However, these systems are not flexible to the enterprises' operation, and can't integrate the legacy resources and systems.

The second is about SOA (Service Oriented Architecture), which is applied to improve the flexibility, integration, and rapid reaction of system. For example, ERP system based on SOA (Yuan Rao, 2006), application of SOA in Supply Chain System (Ying Liu, 2007), and financial and customer system based on SOA (Wenchin Tsai, 2008). These researches make contributions on how to adopt the main idea of SOA in system design, but they ignore the analysis of business process, furthermore, don't combine the business process optimization with SOA.

In this paper, SOA and BPM (Business Process Management) are applied jointly on analysis and design, to build a flexible and integrated apparel quotation system. The remainder is organized as follows: In section 2, we introduce the convergence of BPM and SOA in apparel quotation system. Section 3 makes detailed explanation on business goal and process analysis, as well as corresponding services extraction. In section 4, an apparel trade quotation architecture based on SOA is put forward.

2 CONVERGENCE OF BPM AND SOA

2.1 Main Idea

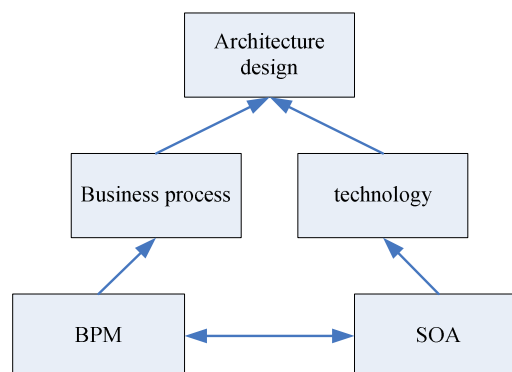


Figure 1 Convergence of BPM and SOA Hanging 1

In order to build the apparel quotation architecture, services need to be extracted and integrated on the basis of business requirements analysis. In this process, BPM and SOA play different roles. BPM, purely focusing on optimizing the way actual work gets done, is carried out for business process decomposition and optimization, which mainly contributes for architecture analysis, for example services definition. On the other side, SOA, being good at adaptability, takes the responsibilities of technology supporter on services extraction and combination to implement the architecture.

There are no definite rules for service extraction in SOA architecture. To meet the dynamic business requirements, SOA extracts and integrates services wholly on the consequences of BPM analysis, and through these, architecture will gain higher agility, flexibility and reusability, which can bring a closer alignment between business process and IT resources, furthermore reduce the costs.

Consequently, the combination of SOA and BPM is a better way for business process optimization and the implementation of information systems, which is summarized in figure 1.

2.2 Why convergence is needed in apparel quotation

As we analyze above, when being applied together, BPM and SOA become synergetic, and raise the system agility and responsiveness to changing business requirements. So it is an efficient way to solve the prevalent issues in apparel quotation, which is illustrated in table 1.

Apparel Quote process Problems	Characteristics of BPM&SOA
Lengthy process, long time	Rapid, on-demand services combination to gain time
The lack of accuracy	BPM is good at analyze the various business factors, guaranteeing the system being based on accurate needs and resources.
The lack of flexibility	Offering a variety of system function options through the integration of services.
Poor cross-sectors cooperation and lack of Information sharing	Realize effective cross-sector cooperation by invoking standards-based interfaces for information sharing
Consumption of resources, High costs	Services are highly reused to reduce development costs

Table 1 Correspondences between characteristics of SOA/BPM and challenges in quotation

3 ESTABLISHMENT OF THE SERVICE REPOSITORY IN ARCHITECTURE

Establishment of the service repository is the process to build services set according to business requirements. As well known, services are the basic components for SOA, and Service Repository establishment is the foundation for follow-up service integration and invoking.

3.1 The Steps for Establishment

This paper introduces the idea of BPM for business process decomposition combination, deletion, and optimization under the guide of business goals, and then for the Service Repository establishment. The course can be divided into three steps, as shown in Figure2. Firstly, business process is grouped into core business process and supporting business process. The former is represented by function diversity and create core competition abilities; while the latter refers to function modularization and can not produce direct value. Core process is decomposed into small activities step by step, and then fine-grained candidate services are extracted from the small activities. Contrarily, supporting process is divided into coarse-grained services. (such as service1 and service 4 in figure2) .This work continues until there is no need decompose the business process, which means that the activity can complete a particular function certainly. Secondly, in the way of matching business goals with business process, problems in the process are found and then optimized by building new goal-service and supplement candidate service in Service Repository. Finally, for services implement, decisions need be made on whether to build new services for new functions or to transform from the legacy systems, so that the legal systems are reused and provide SOA standard interface to contact with the other services.

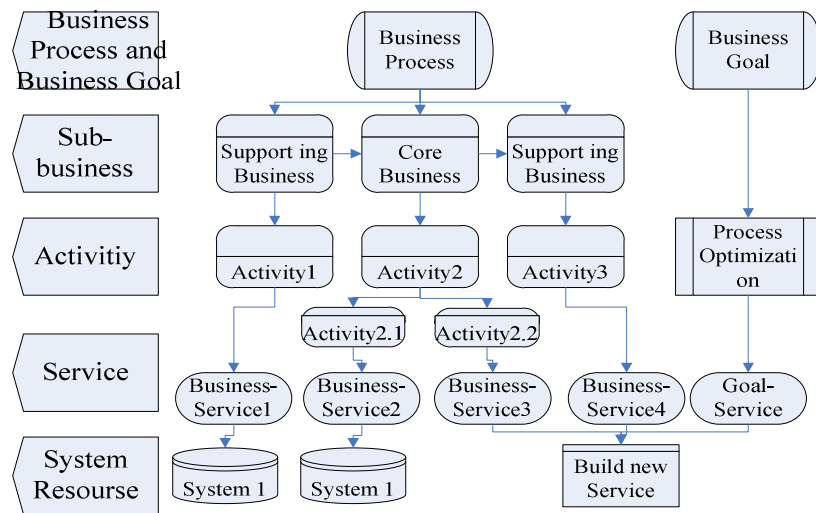


Figure2 Service Repository Establishment Steps

3.2 Service Repository for Apparel Quotation Architecture

According to business goals and requirements, the whole business process about quotation is fractionized into the following phases: Accept RFQ, Analyze RFQ, Quote, Offer Quotation and Fent(make sample), among which, Quote is chosen for detailed description in this part. Sectors of enterprises involved are Financial, Sales, and Production Sectors, as shown in Figure 3. Based on the steps mentioned above, quotation service repository is built for the apparel quotation architecture.

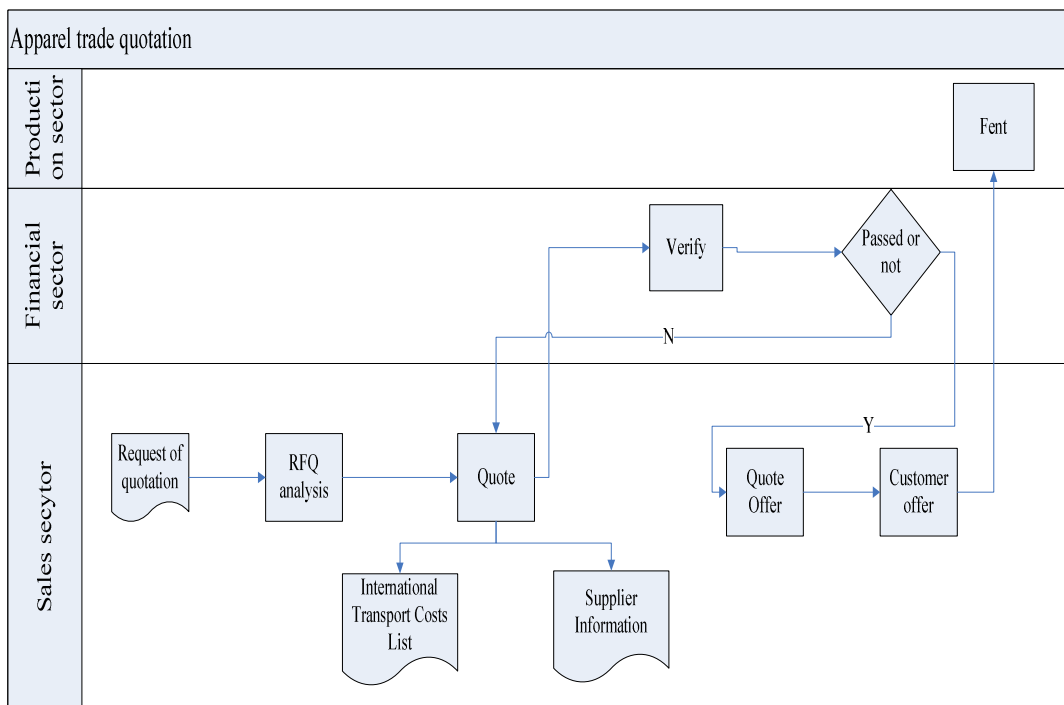


Figure 3 Apparel international trade quotation process

At first, Quote is decomposed into Select Price List, Update Price List, and Make Quotation. The two former activities are determinate and can act as the service directly. While Make Quotation is indeterminate, including three cases Sample Quotation, New Product Quotation and Old Product Quotation. The two latter cases contain cost, fee and profit, while Sample Quotation only contains cost. At the same time, the cost of New Product Quotation needs to be accounted timely by ERP. On the contrary, the Old Quotation's cost can be selected from the cost list. Therefore, Make Quotation is decomposed into five services, Account Cost, Select Product Cost List, Account Fee, Make

Quotation, and Update Price List. Then according to the goals of flexibility, rapidity and accuracy, the quotation process is optimized and embodied as corresponding goal-services, being illustrated in Table2. As mentioned before, the legacy systems are taken full used to the service implement in the architecture. For example, the service of Account Cost can be transformed from ERP system. All the analysis above on service source, service classification, implement and examples can be summarized by Table3.

accuracy	Customer Analysis	Environment Analysis	Quota Analysis	Exchange Rate Analysis	Export Drawback Analysis	Market Competition Analysis
rapidity ¹	Import RFQ	Transfer Message	Mail Management	RFQ Systematic	Automatic Report verify	Track RFQ
Flexibility ²	Account FOB Fee	Account CIF Fee	Account CFR Fee			

Table 2 Goal Service in “quoting”

Service -Source		Service Classification		Implement	Examples
Business Process	Core Business	Business - Service	Fine-grained services	Build new service	Select Product Cost List
				Transform legacy to services	Account Cost
	Support Business		Coarse-grained services	Build new service	Verify Quotation
				Transform legacy to services	Make Sample Plan
Business Goal		Goal-Service		Build new service	Account FOB Fee

Table 3 Establishment of Service Repository in Architecture

¹In order to improve speed of quotation, we improve interaction between system and customer, and optimize the quote verify process.

² Apparel international trade quotation has three kinds of ways, including Free On Board (FOB), Cost Insurance and Freight (CIF) and Cost and Freight (CFR)

4 APPAREL QUOTATION ARCHITECTURE BASED ON SOA

On the analysis and research above, an apparel quotation system model based on SOA is put forward, shown in figure 4.

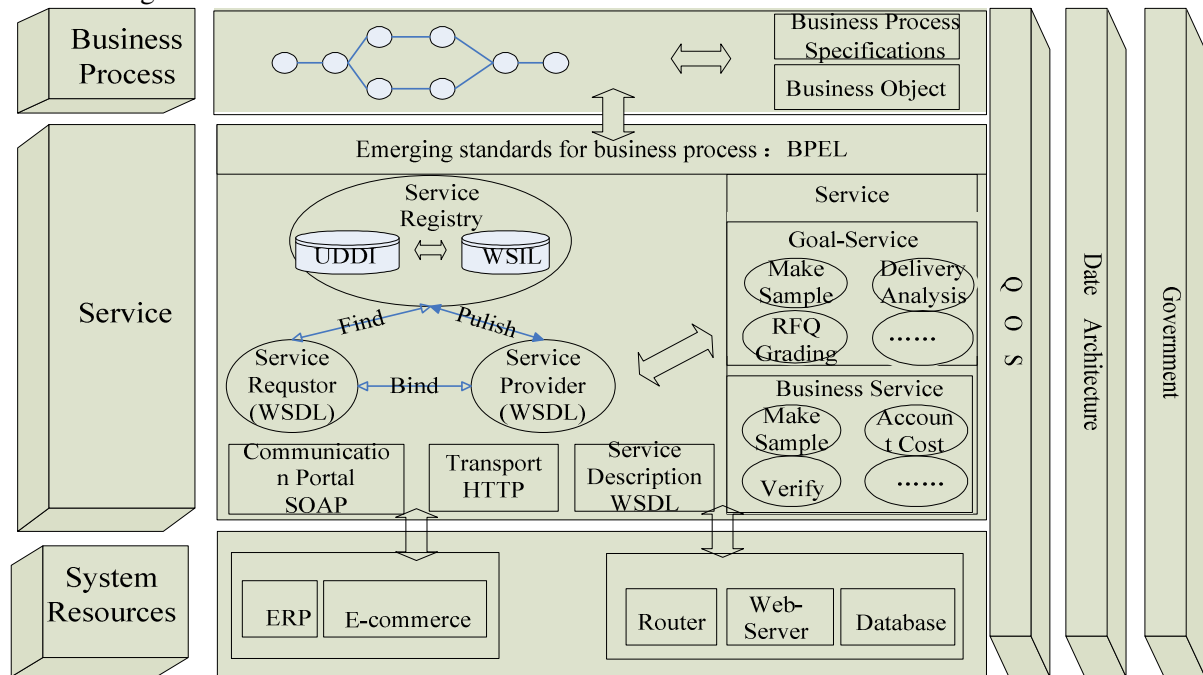


Figure 4 Apparel quotation architecture based on SOA

4.1 Layers in the architecture

The architecture is consisted of three layers: Business Process Layer, Service Layer and Resource Layer. In the top layer, the business process is described by defining the business objects and specifications and then the business requirements are transferred to the Service Layer. Consistent modeling approach is used to simplify communication between all parties involved in the business process. Moreover, in the middle layer, Service Registry, Service Requestor and Service Provider act as the guarantee components for services' finding, publishing and binding. Service Repository includes the business-services and goal-services, such as Quota Analysis, Account Cost, Verify, Grade RFQ, and so on. Additionally, different protocols are contained in this layer for communication. The bottom layer involves some legacy systems, as well as infrastructures, which support the process and data for quotation, for instance, ERP, E-commerce Website, Database and Web-server.

The Service Layer links the Business Layer and Resource Layer. Services are extracted to meet the Business Process Layer's requirements through service discovery and combination. On the other side, services are transformed to the legacy systems to provide better support for the business.

4.2 The implement mechanism in Service Layer

The Service Layer plays an important role in the architecture. Firstly, it receives the business requirements with Business Process Execution Language (BPEL) from the Business Layer. And then Service Requestor finds service in the Service Registry and gets service description, as well as a URL address. Furthermore, the Service Requestor contracts with Service Provider to get available services. Additionally, the Service Provider invokes services from the Service Repository. Finally, these invoked services are orchestrated to execute a Business Process with BPEL.

Universal Description, Discovery, and Integration (UDDI) and Web Services Inspection Language (WSIL) are portals for service publishing and finding. The transport acts as mechanism for the transfer of services requests and responses between services consumer and provider. A number of

transportation standards are used widely for web services, and the most popular one HTTP is chosen for the architecture. The service communication protocol describes and defines the technologies and standards, being required to supply a transport mechanism between integrated services. Simple Object Access Protocol (SOAP) is chosen to implement the service communication, and especially, it allows a service requestor to make a remote contract with service provider. Web Service Description Language (WSDL) is a common service description, which makes sure that the service requestor and service provider are independent. In a word, all of these portals facilitate the communications in Service Layer.

4.3 The supports for architecture's application

As shown in figure 4, three layers for supplementary is designed in the architecture, and they are QOS (quality of services) layer, data architecture layer and governance layer. The QOS layer provides standards to support the quality management in many aspects, such as availability, reliability, security and safety, etc. The Data Architecture layer provides a unified representation and enablement framework that integrates with domain-specific data architecture to facilitate value chain integration. The governance layer provides guidance to ensure the proper design of architecture, which establishes principles of how to define SOA solution, how to monitor in running systems and how to handle exceptions at runtime.

5 CONCLUSION

This paper focuses on the improvements for apparel quotation in international trade. Through analysis, we find out there is a great need for a flexible, rapidly reactive, accurate quotation system. To deal with this, the combination of BPM and SOA is uniquely brought forward on the basis of the characters and advantages analysis especially for apparel quotation business process. Through the combination of BPM and SOA, we propose a set of methods for the establishment of service repository, which is pivotal in architecture, and gives concrete illustrations on ideas, steps, as well as a specific case. Consequently, an architecture based on BPM and SOA for apparel quotation is put forward.

This paper mainly solves two problems: how to apply BPM in analyzing the quotation process and requirements according to changing business environment; and then how to define, extract, optimize, and integrate services to build an architecture on SOA. Being feasible and systematic, these works could improve the quotation system's flexibility, rapidity, accuracy and reuse for apparel enterprises.

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