

# 基于 BIRIS 的海运物流服务平台案例研究<sup>①</sup>

马 超 王忠杰 徐晓飞 (哈尔滨工业大学 计算机科学与技术学院 黑龙江 哈尔滨 150001)

## A Case Study on BIRIS-Based Marine Logistics Service Platform

Chao Ma, Zhongjie Wang, Xiaofei Xu

(School of Computer Science and Technology, Harbin Institute of Technology, Harbin 150001)

**Abstract:** With increasing competition in international marine logistics service industry, the voice of improving marine logistics service for reducing operation cost and improving service quality is much higher. Aiming at the marine logistics services between Weihai and Korea, this paper makes a case study to design a BIRIS-based public platform for this service. Firstly, current business scenarios of Sino-Korea marine logistics services are briefly analyzed and some business issues that need to be solved urgently are listed, e.g., lack of effective communication channel between cargo owners and various service providers, low coordination efficiency between different service providers etc. Aiming at these problems, a BIRIS based marine logistics service platform is designed. TO-BE business scenario, SOA techniques for developing such platform, and some examples of identifying services, designing service interfaces and designing portal for each service provider, are elaborately shown.

**Key words:** marine logistics service; BIRIS; service platform; case study; SOA

Marine logistics service is the function that depends on ship as main means of delivery for the physical transportation of cargo, and this function is advanced to solve the problem of the space and time distance between production and consumption in the case of the production and consumption occur respectively in two or more different countries<sup>[1]</sup>. The main organization of marine logistics service include ship owner, cargo owner, freight agency, trucking company, container storage station, dock, customs, customs agency and tally company etc. These organization's service is described as following: ship owners mainly provide freight space rental service, which are key organization of marine logistics service; freight agencies accept cargo owner's request, help him

book freight space to ship owners, request land transport from trucking company and request customs declaration from customs agency etc; container storage stations provide cargo store service; trucking companies mainly provide land transport service between cargo owners and container storage station; docks provide the location for the ships to load and unload cargos; customs are national supervision organization, by which each batch of inward and outward cargos must be approved; tally companies mainly provide service for customs, help him check cargos.

This paper took the marine logistics services between Weihai and Korea as research background. Through analyzing current business scenarios of the marine

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logistics services, we found there are two main business issues. One is the lack of effective communication channel between consumers and various service providers; another one is low efficiency of coordination work, transmission information and sharing data between different service providers. The cause of the business issues is mainly that IT systems of marine logistics service organizations have not been utilized effectively. These inner systems work independently, are unable to satisfy requirement of coordination work and unable to transmit information effectively each other. In addition, the completion of business processes sometimes must be drawn supported from some unnecessary manual handling. The result is that operation cost of marine logistics services has not been reduced and service quality has not been improved for a long time.

With increasingly high voice of reducing international trade cost and developing international trade conveniently, the competition in marine logistics service industry is much fiercer. The present marine logistics service can't supply demand of market. This situation urgently needs us to improve the present marine logistics service by means of the new method of service engineering. To address this issue, BIRIS (Bilateral Resource Integration Service Mode) was applied to marine logistics service. BIRIS is a new service application mode which is proposed by ICES<sup>[2]</sup>. Bilateral Resource Integration is resources integration of consumer and service provider, BIRIS is able to be applied to improve service. This paper designed a BIRIS based public platform. The results showed that operation cost might be reduced and service quality might be improved by this method.

The rest of this paper is organized as follows. In Section 1, we analyzed current business scenarios, and found that some business issues exist in marine logistics service. In Section 2, aiming at above issues, this paper presented a solution that BIRIS was applied to design a public platform, analyzed how to reduce the operation cost and how to improve the service quality by the public platform, and then described how to design the BIRIS-based marine logistics service platform. In Section 3, this paper analyzes benefit of the platform. Finally is the conclusion.

## 1 AS-SI Marine Logistics Service

Marine logistics services consist of two classes of actors, one class is consumers, and another class is service providers<sup>[3]</sup>. The object of consumers is cargo owners, who are sponsors of one marine logistics service. Just because of one cargo owner's request of transportation of cargo, one marine logistics service occurs. Finally, all fee of marine logistics service is paid by this cargo owner. The object of service providers include ship owners, freight agencies, trucking companies, container storage stations, docks, customs, customs agencies and tally companies. In the whole process of one marine logistics service, these objects carry on coordination work. They are combined together to complete one transport task, and provide one marine logistics service for this cargo owner. As a result, they share the fee paid by the cargo owner with each other. The relationships between various objects are showed by Fig. 1.

In this figure, we can see that, in order to provide one marine logistics service for cargo owners, different objects of service providers must carry on complicated and mutual work. In general, it is freight agencies that provide agency service for cargo owners. Freight agencies accept cargo owner's request, help him book freight space to ship owners, request land transport from trucking companies and request customs declaration from customs agencies etc. Correspondingly, ship owners, trucking companies and customs agencies provide these services for freight agencies. But cargo owners sometimes choose to by himself carry on some of these businesses. At this time, ship owners, trucking companies or customs agencies provide some services for cargo owners directly. Container storage stations provide cargo store service for freight agencies or cargo owners, and also provide container management service for ship owners. Docks provide loading and unloading cargos service for ship owners. Customs accept customs agencies' request. In the process of disposal of request, checking cargos service may be provided for customs by tally companies. Through service provider's coordination work, one marine logistics service is provided for cargo owners.

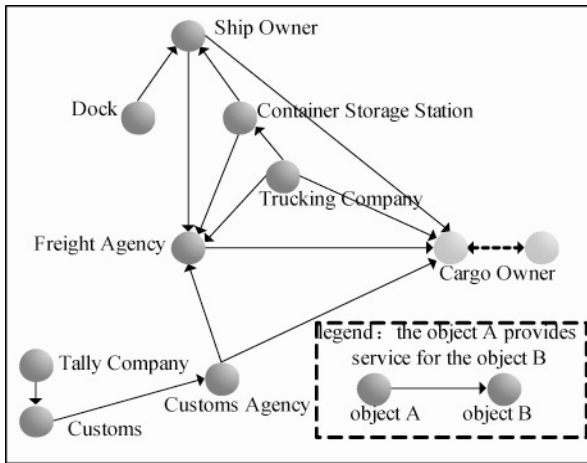


Fig.1 The relationship of various objects

### 1.1 Scenario of the business

In support of ICT, marine logistics service industry have realized preliminary information construction. Almost each object of service provider has their own IT system, but these systems work independently. Even if there is some interaction between these systems, it is the sample electronic data interchange merely. Such situation is quite difficult to satisfy requirements of marine logistics service. This paper took business of full container load exported as research example, pointed out some business issues to be solved. Let us think about the following several scenarios.

#### 1.1.1 The first scenario

Cargo owner A wants to transport one batch of cargos from the Weihai to Korea. The first kind of condition, he would choose a freight agency to carry on all the business referring to exporting cargos, such as booking freight space, requesting land transport and requesting customs declaration etc. At this time, Cargo owner A faces with some problems, e.g., which freight agency he should choose, how to cooperate with freight agency etc. Cargo owner A may search for a solution on Internet, and also may consult acquaintance for a solution. But no matter how to do, Cargo owner A needs to spend a great quantity of resources to solve these problems. However, Cargo owner A is not willing to spend excessive resources, e.g., money, time and human resources etc. what is worse is that Cargo owner A still bear some risks, because that he can't ensure that his choice is correct.

The second kind of condition, Cargo owner A would

choose a freight agency to carry on only booking freight space, Cargo owner A by himself carry on other businesses, such as requesting land transport and requesting customs declaration. At this time, Cargo owner A faces with more problems than above condition, such as how to choose appropriate trucking companies and customs agencies. The result is that Cargo owner A may needs to spend more resources to solve these problems.

#### 1.1.2 The second scenario

Freight agency B accepts Cargo owner A's request of booking freight space, and then need to carry on some series of operations by means of his inner system, such as input/import booking note, creating ten-part form, printing ten-part form. The ten-part form printed is given a field operator for booking freight space to ship owners. After that, the field operator is waiting for a response from ship owners.

Ship owners C receives some bill of documents referring to request of booking freight space from Freight agency B, and then also need to carry on some series of operations by means of his inner system, such as input/import ten-part form, inquiring whether freight space is full or not. If the inquiring result is that freight space is not full, the ten-part form is submitted to department manager for checking, and then the business enters waiting state. After ten-part form is checked by department manager, Ship owner C carries on corresponding processing on the basis of check result, and then transfer check result to the field operator. The filed operator takes the check result back to Freight agency B. At last, the filed operator notify Cargo owner A. We can found that, because that there is lack of effective coordination work between these inner systems, it make service providers spend a great quantity of resources to process a just small piece of the whole business.

Except booking freight space service, business of full container load exported still include many other services, such as land transport service, customs declaration service and docket service. Each service is provided by means of coordination work between different service providers. But because that their inner systems work independently, when the service providers carry on coordination work, they face with the same problems as that they faces with when booking freight space. The service providers need to spend a great

quantity of resources to solve these problems. Such situations make operation cost become high, as a result, cargo owner need to spend much money to transport each batch of cargos.

**1.2 Business issues to be solved**

Through the above analysis, we found that there are some business issues in the present marine logistics service industry. The meaning of finding out these business issues is that we could improve marine logistics service by solving them. These typical business issues are as follows:

Cargo owners need to spend a great quantity of resources to look for the appropriate service providers, but not always can get a satisfying result.

The information interaction is inconvenient and unreliable between various organizations of marine logistics service. They have to input/output data or import/export data repeatedly. There is also a data redundancy problem in the inner systems.

Human resources are not used reasonably in the present marine logistics service.

There is the lack of credit management and quality management in the present marine logistics service.

**2 A Solution: BIRIS Based Marine Logistics Service Platform**

**2.1 TO-BE business of marine logistics service**

In order to solve the above problems, this paper designed a BIRIS based marine logistics service platform. The architecture of the platform is shown in Fig.2. The platform can be built through resource integration of consumers and service providers. It consists of the encapsulated inner system layer, the technical function layer, the business function layer and the cargo owners' resources linked by Telephone, Website and SMS. The encapsulated inner system layer are the systems of service providers, they may be legacy system or a brand new system. The technical function layer includes some inner invisible function of the platforms e.g., service definition, service design, service selection and quality evaluation etc. By means of them, the platform realizes the business function layer. The business function layer include some visible business services, e.g., booking freight space service, inland transport service and

applying to custom service etc. They can be used by cargo owners and service providers and can be represented by means of Portal pages. According to different demands, we have designed the appropriate Portal page separately. The user can obtain service from the platform by accessing Portal page, simultaneously, also can accept the request from other users, and provide the service for them. Let us think about the scenarios described in section 1.1.

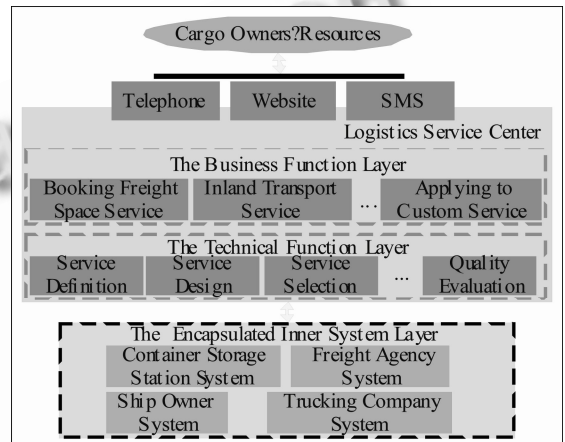


Fig. 2 Architecture of the platform

Cargo owner A wants to transport one batch of cargos from the Weihai to Korea. He needs to query the route information, and needs to choose a freight agency to help him book freight space. Making use of the public platform, it is not necessary to spend much time looking for the supply information. Cargo owner A needs merely to access his own Portal page. He may obtain all kinds of services from Portal page, e.g., inquiry, service execution, and monitoring etc.

Similarly, when providing service for cargo owner, service provider may process cargo owner's request by accessing his own Portal page, and simultaneously may also carry on cooperation work with other service providers by accessing his own Portal page.

Freight agency B may accept Cargo owner A's each request by accessing his own Portal page, and in order to process the request, Freight agency B needs to book freight space to ship owners, request land transport from trucking companies, and request customs declaration from customs agencies. Freight agency B could obtain these services through making use of marine logistics

service platform.

### 2.2 Software techniques for developing BIRIS-based marine logistics service platform

By means of SOA techniques<sup>[4-6]</sup>, this paper identifies one by one service provided by the inner systems, encapsulates the service to service interfaces, and then design Portal page. By accessing Portal page, consumers and service providers may obtain service from other users or provide service for other users.

The technique structure of marine logistics service platform is shown in Fig.3. There are mainly three layers: the first layer is the inner systems of service providers; the intermediate layer is implementation technique of the marine logistics services platform, the upper layer is Portal.

The inner systems layer consists of the IT systems of service providers, which may be legacy systems, may also be newly developed systems.

The implementation technique layer consists of Web Service, SCA, Dojo, BPEL4People, WS-Human Task, Port let and Widget etc. The details are shown in Table 1.

The Portal page layer consists of different kinds of Portal pages. Based his own on demands, each Portal chooses appropriate Port let.

Table 1 List of the technique

Name of technology	Summary
Web Service	Web services are frequently just Web APIs that can be accessed over a network and executed on a remote system hosting the requested services. It will be used to encapsulate the inner system of service provider.
SCA	SCA is a set of specifications which describe a model for building applications and systems using a SOA. It will be used to encapsulate the inner system of service provider.
Dojo	It is tool for constructing dynamic web user interfaces. It will be used to encapsulate the inner system of service provider.
BPEL4People	BPEL4People extends the capabilities of WS-BPEL to support a broad range of human interaction patterns, allowing for more complete modeling of business processes within the BPEL language. It will be used to encapsulate the inner system of service provider.
WS-Human Task	human tasks are considered to be part of business processes. It will be used to encapsulate the inner system of service provider.

Portlet	Portlets are web components -like Servlets- specifically designed to be aggregated in the context of a composite page. Usually, many Portlets are invoked to in the single request of a Portal page. It will be used to realize Portal page.
Widget	Widget is a user interface object that has a layout and some properties. It will be used to realize Portal page.

In order to guarantee that the satisfying service quality can be provided for the platform user, the credit and quality evaluation system are also introduced into the platform. The credit management would focus on whether punctual the time of cargo owners paying is or not, whether accurate the information of vehicle type or radial truck provided by trucking companies is or not etc. The quality management would focus on which freight agency' success rate of booking freight space is higher, which trucking companies' time of arriving at destination is more punctual etc.

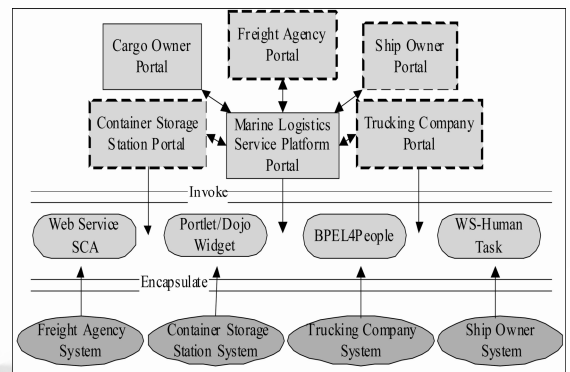


Fig. 3 Technique structure

### 2.3 Design and implementation of BIRIS-based marine logistics service platform

The design and implementation procedure of the platform consists of three steps, which is service identification, design and implementation of service interface, design of Portal page.

#### 2.3.1 Service identification

The first step is that we need to identify service provided by the inner systems. This paper took booking freight space business as an example for explaining service identification method. We may divide these services into three kinds. The first kind is boundary function of each system, which is open for other systems. Such as, the booking freight space function of freight

agencies system is encapsulated by means of Port let or Widget technique, the exposition is UI. The second kind is internal function of each system, which could be invoked synchronously. Such as, the route and the price information query function of ship owner system is encapsulate by means of Web Service, Dojo or SCA technique, the exposition is API. The third kind is the function that has to be accomplished by people, which could be invoked by other systems asynchronously. Such as, the booking freight space function of ship owner system must carry on manual handling for a result, which is encapsulated by means of standard call-back mechanism based on WS-Human Task.

The above kinds of services could be encapsulated into synchronous invoking or asynchronous invoking interfaces. UI the API belongs to the synchronous invoking interface, but the third kind of service referring to manual handling belongs to the asynchronous invoking interface. As shown in Fig.4, the booking freight space business consists of accepting the request of booking freight space provided by freight agency, querying the result of booking freight space, querying the fees settlement, accepting the request of freight space, accepting the request of booking freight space provided by ship owner. The first three services provided by freight agency belongs to the synchronous invoking interface, but the last two services provided by ship owner belongs to the asynchronous invoking interface.

freight space provided by ship owner belongs to the asynchronous invoking interface. This paper took above two service for example, explain the implementation method of service interface.

Freight Agency: Querying the Result of Booking Freight Space (Synchronous Invoking)

Input: the Number of Book Note, the Name of Cargo Owner; User Authentication;

Output: Equipment Interchange Receipt/ Failure Notice of Booking Freight Space;

Process:

{Query Equipment Interchange Receipt/ Failure Notice of Booking Freight Space in inner system of Freight Agency;

}

Ship Owner: Accepting the Request of Booking Freight Space (Asynchronous Invoking)

Input: Ten-part Form; User Authentication; Ten-part Form (B/L No.)/ Failure Notice of Booking Freight Space;

Output: Request Response;

Process:

{Input/Import Ten-part Form;

Approval Request of Booking Freight Space;

Send Ten-part Form (B/L No.)/ Failure Notice of Booking Freight Space;

}

### 2.3.3 Design of portal page

Portal page is user interface from which user may obtain personalized service. Each Portal page include the several service types which are inquiry, request, service execution, monitoring, settlement, appraisal, personalization, each service type is realized by one or more portlets. According to private demand, user may put corresponding portlets into Portal Page. For example, the personalization is a new service type which appears after BIRIS is applied to design marine logistics service platform. Personalization is realized by only one portlet which includes several service items, e.g., personalized information setting, Top ten various service providers recommended, normal service mode etc. In general, the portlet of personalization is always put into user' Portal Page.

## 3 Benefit Analysis of the BIRIS-Based Solution

Through carrying on resources integration of

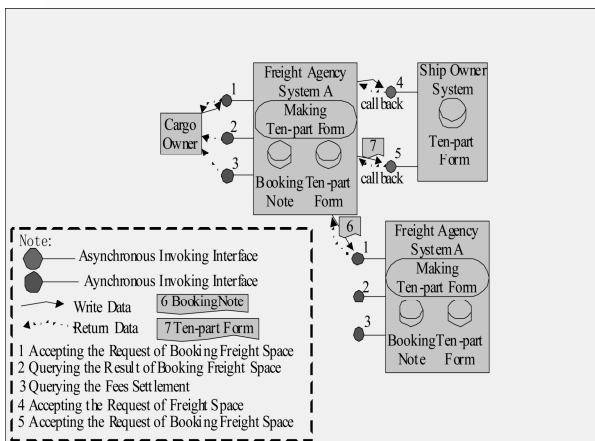


Fig.4 Method of service identification

### 2.3.2 Design and implementation of service interface

The querying the result of booking freight space provided by freight agency belongs to the synchronous invoking interface. The accepting the request of booking

consumer and service provider, the platform has optimized marine logistics service mode. So that we may obtain much benefit, e.g., adequate supply and demand information, high coordination efficiency between different service providers, high availability of human resources, high degree of cargo owner satisfaction etc. We explain how to obtain this benefit from the platform as follows.

The platform carries on resources integration of various service providers, cargo owner is able to obtain much supply information of various service providers by accessing Portal page, e.g., ship owner's route information, price information of freight agency, vehicle information of trucking company etc. Through comparing with this information, cargo owner is able to find the appropriate service provider finally. At the same time, along with quantity of cargo owner who uses the platform increases, service provider may also obtain more order. Making use of the mutual promotion, the platform carries on more resources integration, the cargo owner and the service provider may obtain the adequate supply and demand information easily.

The platform encapsulates inner system function of various service providers. Service provider carries on business operation by making use of the platform, not by making use of the inner systems which are independent any more. So that service provider need not transmit business data between each system back and forth. When making use of the platform, business data always maintains consistency through technique of synchronized update of data. In addition, through mashing up service, we may obtain new service which can increase the consumer satisfaction degree.

Manual activities may be considered to be part of business processes by means of asynchronous callback mechanism of the platform. Through making use of the platform, we may get rid of unnecessary manual activities. For example, when booking freight space to the ship owners, the field operator of freight agency need not be waiting for a response from the ship owners all the time, because that the inner system of ship owner return a response to the inner system of freight agency by means of asynchronous callback mechanism of the platform.

This platform provides service of the credit and quality evaluation, the user may evaluate the credit and service quality of other users, simultaneously must also accept evaluation which other users carry on. The benefit is that the user is able to find the appropriate service provider from the much information quickly, in addition, the function make service provider pay more attention to the service quality provided himself.

## 4 Conclusion and Future Works

Target users of such BIRIS-based marine logistics service platform are large numbers of consumers and service providers. Such platform is able to provide them a new mode to reduce operation cost and to improve service quality. Likewise, if BIRIS has been applied to other industries, such as health care service, a satisfying result would also be obtained.

In the future, we will explore a value aware methodology which may be applied to the development of marine logistics service platform designed in this paper.

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