

# ANALYSIS OF REQUIREMENT CAPTURE BASED ON UML

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**Abstract:** Unified modeling language UML is a visualized modeling language of current object-oriented areas. Many enterprise information system developers concern how to apply this technique to the development of enterprise information management system. The capture demand in UML is the first stage of system development. Its purpose is to find the real demand and suitable for user, the customer and developers, which is the way to the success of the demand for development system determines. Purchasing management system is a very important part of the enterprise information management system. In order to solve most of enterprise information system development and maintenance problems, this paper uses cases prototype model, combines started software expatiates on how to use UML to purchasing management system of capture demand analysis based on purchasing management system as example.

## 1 INTRODUCTION

Capture demand is the first and important stage of management information system development. According to statistics of authoritative department, at present success rate of software is about 25 per cent, 75percent of the software was a failure. In this 75 percent of failure, about more than 50 percent of the software is caused by demand reason. Because any system will have a lot of users and each user just know how to use the system themselves and therefore they cannot treat tectonic system to have accurate, detailed and comprehensive understanding and description. While listening to the user's demand personnel, there inevitably will be described in different understanding, it often has difference in the demand staff grasps and the actual demand. If this gap was not discovered during the development phase or later, the system inevitable meets influence of failure. So the role of the appropriate requirements elicitation and analysis method of system success or failure played cannot be taken lightly.

So far, there are two capture demand method, interface prototype model and use case prototype method (Junwei Li, 2010). According to

the software system needs, interface prototype model produces interface prototype of software system. Users can perceptual aware future system function, interface style and operation mode. Thus ther rapidly judge whether system in line meet their own expectations and whether it can meet the needs of their own work. Through the completed function of the interface, The analyst get further functional requirements by using interface prototype and induce user modify his ideal system, put forward new demands, and so that user can obtain more complete, more correct demand.

## 2 OVERVIEW OF CASES PROTOTYPE MODEL

In 1992, Ival Jacobson proposed OOSE (Object Oriented Software Engineering) method (Ival Jacobson, 1999). The biggest characteristic is to face cases (Use-Case), and it introduces concept of participants (Actor). Now, use cases as an effective way of obtaining business process and system function demand has got the generally accepted in the development process use-case. Modeling became requirement definition and analysis method of

Unified Modeling Language (UML) system. Cases are the description of a set of actions sequences (and its variants). System produces observation value for participants by implementing this action sequences. Action series expressed interaction of system outside things and system itself. Participants' valuable results value is behaved for users' goals. In essence, purpose of use-case modeling is to describe system performance with behavior user's perspective. Cases for domain experts, final users and developers provide a communication tool, provide developers with a kind of cognition and understanding of elements (like system, subsystem or class) method, also test each element of the basic during evolution and development (Shuwei Hu, Xiuru Zhang, 2008). So, to seek definition and use cases in software development is very important. However, due to the limitations of use case itself, misuse of concrete operation cases, often makes no correct capture system demand, causing unreason of the system of object structure design, which affects good performance of the system function and the realization.

Based on the theory, purchasing management system of capture demand prototype workflow is defined below:

- 1 Enumerate the candidate needs;
- 2 Understand the context of the system (environment);
- 3 Capture functional requirements;
- 4 Capture non-functional requirements.

### **3 DEMAND CAPTURE OF PURCHASING MANAGEMENT SYSTEM**

Purchasing management system helps purchasing personnel control and finish all process of purchasing material from purchasing plan and purchasing application, purchase order to delivery receipt and inspection of incoming (Yuhua Zhang, 2009). It can effectively monitor the implementation of the purchasing plan, procurement cost change and supplier delivery performance which helps purchasing personnel select the best suppliers and procurement strategies to ensure purchasing high quality, high efficient and low cost of performance, which makes the enterprise keep best supply condition.

#### **3.1 Enumerating the Candidate Needs**

In the cycle of the system life, the customer, users and developers will put forward many good ideas, what can become the real demand; These ideas can be kept as a series of candidate list of demand, what may be chosen to be implemented in the future system version. Combined with examples, software developers know the main function of the realization of the purchasing system below after communicating with the users.

##### **1. Entry of Requisitions**

It is automatically affronted from the warehouse management system. Warehouse management system can judge every stock order point (minimum reserves). Once the inventory quantity is less than or equal to order point, Warehouse management system will automatically generate requisitions made.

##### **2. Making Purchase Plan**

Procurement department examine and verify requisitions callouted by professional staff. According to request of requisitions, purchasing managers Choose reasonable price, credit good suppliers, formulate purchase orders and deposit purchase orders files from the supplier file and inventory quotation. Procurement price is generally maintained by two methods. One is that the supplier is firstly chosen, and then revise all inventory quotation given by supplier provides. Two is that inventory is chosen firstly, then revise quoted price supplied by all the available stock. At the same time the purchase is optimized, purchasing orders are created.

##### **3. Receiving Management**

According to purchase orders or other forms of receiving, arrival notice is formed. Receiving member put materials into the product quality status, issue receipt after warden qualified examination. With resumption of material, storekeepers then dump the goods and put the goods into the available inventory.

##### **4. Invoice Handling and Procurement Settlement**

When the purchasing department or the accounting department received the supplier invoice, the invoice is entry computer. According to purchasing order number purchase order number systems selects invoices associated with the data verification from purchase orders and the storage subsystem, complete of the procurement settlement, and generate statements.

##### **5. Payable Management**

Procurement receives supplier's purchase invoices, and verify whether invoice match the requirements.

Invoices which do not match the requirements are returned to the suppliers to re-open. Purchase invoices which meet the requirements, are submitted to financial payment. Purchasing department submits financial payment after approving the adoption of payment requests.

6. Inquiring Statistics

It is the realization of all purchase requisitions or purchase orders Subtotals query, the completion of the procurement plan, the statement of arrival.

3.2 Understanding the System Context and Capturing System Functional Requirements

3.2.1 Understanding the Context

Generally speaking, cases can be divided into two categories: business cases and system cases. But they are not precisely defined. The so-called business case refers to interactions about business functions provided by the system's and actor's activities, the links between the various entities and business activities in the performance problem areas. Business cases are used to establish business use case model in the field of problem. System cases refer to interactions between activists and system, performing the system function requirements and dynamic behavior. System cases are used to establish use case models of system. Each business case is supported by a set of system cases. In the initial phase of system development, developers should focus on business cases.

Business modeling is the main method of expressing system context. Its context detail business process supported by the system. In addition to the business object involved by determined business. Business model confirms staff for each process, whose responsibility and the operation they will carry out.

First, business use case model is established to confirm the business cases used by business participants and actor. Business use case diagram of purchasing management system is below:

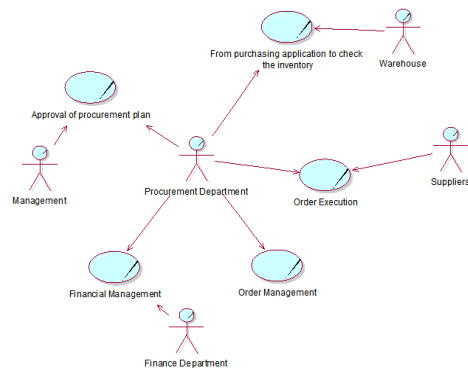


Figure1: Business use cases.

There are 5 participants: procurement department, management, financial department, warehouse, suppliers and 5 the business use cases,

From purchasing application to check the inventory: Warehouse issued a purchase requisition to the purchasing department and after the arrival of the goods inspects and stores them.

Order management: purchasing department makes purchasing plan, creates purchasing order, tracks and enquiries and maintains order etc.

Approval of purchasing plan: purchasing department will develop a procurement plan to management for approval, only the implements it after it is passed.

Order Executive: procurement department informs supplier shipments.

Financial management: purchasing and financial department make financial balance sheets, and generate a variety of invoice.

Then business object model is established, including the staff and a business entity, who are combined together to realize the same business cases.

Business object model is business internal model, describing how a group of staff use some business entity realize business cases. Diagram of business objects of purchasing management system shows below,

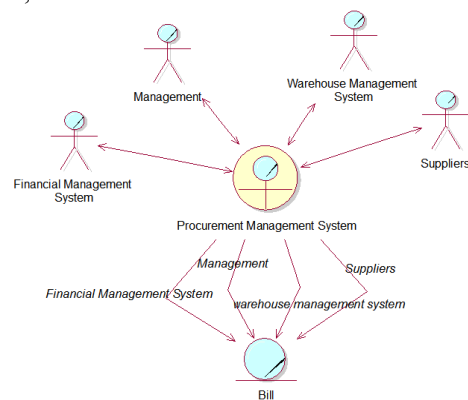


Figure 2: Business objects.

The figure shows that business case exists between financial management systems, management, warehouse management systems supply businesses and the procurement management system which are Interacted by the entity of bills. Finally activity diagram is established to explain realization of business use cases. Purchasing management system activity diagrams is shown below:

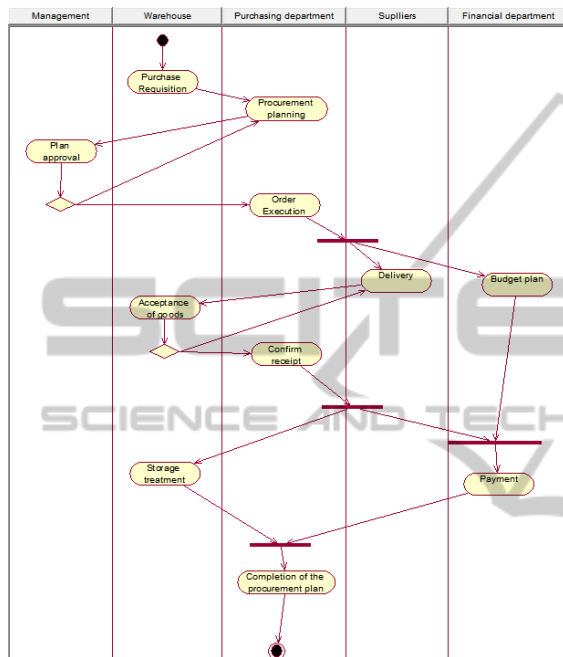


Figure 3: Activity diagram.

Graph describes a process of procurement activity from beginning to end. The warehouse issues purchase requisitions on purchasing department. According to purchase requisition and database information, procurement department make a procurement plan and to give it to the management to review. If it's passed, supplier is informed of delivery and financial department is reminded of the financial budget at the same time. After receiving the goods, warehouse conduct its quality inspect, when passing inspect, warehouse feedback the goods information to the purchasing department. After checking information, purchasing department notifies warehouse to storage and informs financial department of payment. Finally procurement department will summarize all bills.

### 3.2.2 Capturing Functional Requirements

According to above the third figures, we can easily capture the topmost functional requirements of purchasing management system. Major roles

involved in the system are system administrators who is in charge of system management, Procurement department who is Responsible for purchasing plan formulation, implementation and order management etc., warehouse department who is responsible for issuing purchasing requisitions and check and store goods, financial departments who is responsible for the financial budget and accounts payable settlement, management who is responsible for purchasing plan review, suppliers who are responsible for providing purchasing department the needed goods.

### 3.3 Capturing Non-functional Requirements

A non-functional requirement is a kind of such demand that it is to solve the problem how to make this system can work in practical environments. Of course to meet the functional requirements is very important in the process of design solutions. But, if not non-functional requirements are considered, the solution is difficult to obtain actual effect. For customers may not be even unable to use the system function. Many non-functional requirements will be generally carefully designed and implemented at the bottom of foundation technology platform. The non-functional requirements which this paper presents the design of purchasing management system is below:

#### 1. Constraints

For environment application are quite different, it requires the system has a good mobility which can be able to adapt to Win7, Windows XP, Vista, Windows2000 server environment, etc., Server2000 and server2003 and other web servers, databases meet requirements of Oracle and Sqlserver2005.

#### 2. Runtime Quality Attributes

(1) high-performance, response time requirements:

Purchase Order Entry: less than 5 seconds;

Purchase Order small: in 5 seconds;

Single payment order system: less than 5 seconds;

Purchase invoice billing: less than 5 seconds;

Purchase receipt (see order): less than 5 seconds;

Single payment account: less than 5 seconds;

Purchase invoices (see receipt): less than 5 seconds;

Analysis of response time: less than 5 seconds;

Failure transaction rate: less than three per cent.

(2) Requires a system with better ease of use, mainly easy to use in the data permissions to avoid cumbersome. The screen has rational layout, making full use of screen space to reduce the number of user errors. Page should have a unified style, avoiding the

user interfacing styles for different times.

### 3. Attributes of development quality

(1) It requires minimizing the number of connecting to the database, the number of rows each time to read, the number of rows each time to write into the database. Data optimized to achieve the optimal level of general. It also requires avoiding full table query, try to use the index to reduce the update transactions. When the program is running, because of a lot of system modules, there are a large number of objects cannot be released, while the continuous new objects generate. When the object is greater than the required number of system memory free memory, it will surely come up a lot of memory overflow error. It requires avoiding large objects which is more than 10M, while the effective decomposition of large objects should be done.

## 4 CONCLUSIONS

Purchasing management system development is complicated system engineering and is also an important part of the enterprise management system. At the stage of capturing demand analysis, in order to satisfy the needs of our clients and improve software expansibility and flexibility, object-oriented method of developing is used. At the same time with using UML language, under the guidance of the prototype model, developers describe the combined business-related use case diagram, business object diagrams and activity diagrams with ROSE software. The acquisition needs proposed by this paper provides the foundation and framework for the development for the next procurement management system.

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