E-Procurement Reference Model for Small Government Department

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ABSTRACT

E-procurement or Internet-based procurement system is the system that let buyers combine catalogs from several suppliers, check the availability of items, place and track orders and initiate payment via the Internet. At present, most Internet-based procurement systems are still in a very early stage and most importantly, there is no system available to implement e-procurement system especially tailored toward the requirements of small government departments. In order to support the procurement activities through the Internet, this paper provides a reference model for e-procurement system aimed specially at the requirements of small government departments. Development of the reference model is important so that it can provide guidelines and serve as a good starting point to understand user's and system's requirements and assist system development in a particular industry.

Keywords
e-procurement system, internet based application, government department, Unified Modeling Language.

1.0 INTRODUCTION

The bulk of today's procurement-related communication processes and most of the information exchanged between business partners as well as within organizations occurs on papers. The workflow routines that companies install to handle procurement are frequently very complex.

New technologies such as the Internet and World Wide Web are raising big hopes of changing this picture. Probably the most vivid developments in Internet-based procurement systems are happening in the area of indirect procurement that is the purchasing of non-production items such as office supplies or computer equipment. Numerous companies are developing systems that let buyers combine catalogs from several suppliers, check the availability of items, place and track orders, and initiate payment over the internet.

At present, however, most internet-based procurement systems and the search engines are not sophisticated enough to help locate information in an efficient way. The merging of data and performing some degree of semantic reconciliation from the distributed sources has to be done efficiently and correctly.

1.1 OVERVIEW OF INTERNET-BASED PROCUREMENT SYSTEM

Procurement is a process of obtaining materials and services and managing their inflow into an organization toward the end user [Segev, Gebauer & Beam, 1998]. The exchange of goods or materials and services evolves a large part around communication and information processing between customers, suppliers and third parties. This relationship is shown in Figure 1.

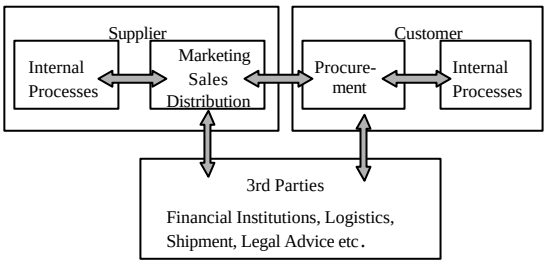

Figure 1: Procurement: Spanning Multiple Boundaries

Gebauer, Beam and Segev (1998) had divided the act of buying goods and services, i.e. purchasing activities into three phases:

1) **Information**: Prospective buyers identify their needs and evaluate potential sources to fulfill them, gathering information about market conditions, products and sellers.
2) **Negotiation**: Individual business partners start to interact with each other and determine prices and availability of goods and services. Successful negotiations are usually finalized with a contract.

3) **Settlement**: The terms of the contracts are carried out and goods and services are transferred in exchange of money or other forms of payment.

In recent years, many attempts have been made to use the Internet as a medium to handle the procurement processes. This internet-based procurement system use Internet technologies to change the picture of costly and inefficient procurement processes by providing a low cost and highly automated system, a better service quality and increased flexibility. To clarify, this type of procurement system can provide control over the catalog content and possibly decide on the set of catalog items and suppliers. In addition, the system can also improve the purchasing operations by automating internal workflow and allow buyers to be able to increase a purchasing power in the future.

There are two types of material or services that business buy; 1) Direct materials or services that go into production and 2) Indirect materials or services that do not go into production (e.g. office supplies). From Industry Report by Stephen Inc. Internet Research Team (1999), it stated that buying of direct material is very much automated in large companies via EDI and ERP. However the system involved is very expensive and complex where small companies cannot afford. And currently the buying aspect of indirect materials is not automated. Furthermore, according to the report, the old purchase process has its own limitations such as paper-intensive in administrative process, low employee efficiency, long order cycle time and high amount of error.

From a report on assessment of The General Services Commission's Electronic Procurement Project, one of the main issues identified is that project requirements have not been clearly defined. Currently there is no such system available to implement e-procurement system especially tailored towards the requirements of small government departments.

In order to support the e-procurement activities for the indirect materials through the Internet, this paper provides a reference model for the Internet based procurement system. The idea behind this research is to understand all the functionality required in the e-procurement system and the reference model intended to document general requirements towards an e-procurement system for a small government department. Thus, this study focuses on a small government department specifically academic departments in a University.

2.0 METHODOLOGY

This phase will discuss on the methodology and modeling language used to develop an e-procurement reference model for the small government department. The methodology used in this paper is a simplified version of the Rational Unified Process (RUP). One way to view the proposed system's value is to put the reference model's functionality into a general perspective. Figure 2 below shows the Internet enabled purchasing process in the government small department.

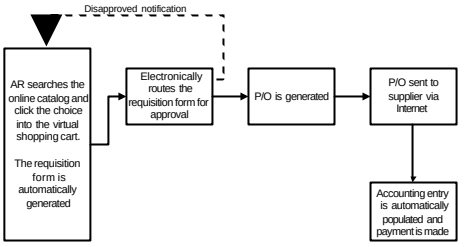

Figure 2: The Internet Enabled Purchasing Process

2.1 SYSTEM ANALYSIS

In this process, a use case of the reference model for Internet-based procurement system is established using the Unified Modeling Language (UML). The following actors describe individual positions that are related to the procurement system.

- User/Customer: A person who is browsing a product catalog and/or select and order products via the Internet.
- System Administrator: A management position that is responsible for administrating procurement system access and provides electronic shopping services and manages company's registration.
- Registered Company: An entity that provides a product catalog which includes tasks for the placement and pricing of products.
- Accounting System: Standard software for the handling of electronic payment services.
- Bursar: An authority of government agency that is responsible making payment for the buying product.

Figure 3 shows an overview of the reference model's Use Case Packages, based on the UML syntax.

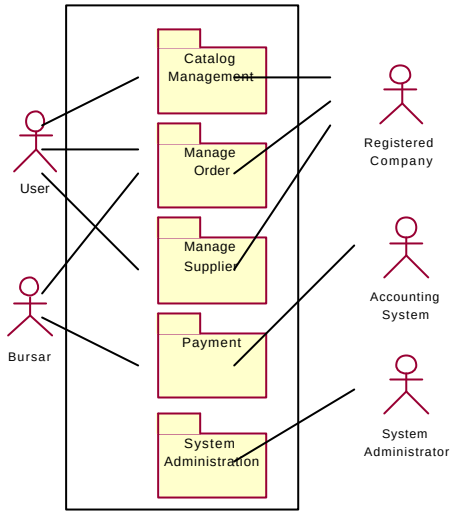

Figure 3: Reference Model – Use Case Packages

In the next section, the use case packages of the reference model are discussed in detail.

2.1.1 Catalog Management

This use case package (shown in Figure 4) provides functionality for managing catalog that involves export and manages product information and notices the customer of a new product.

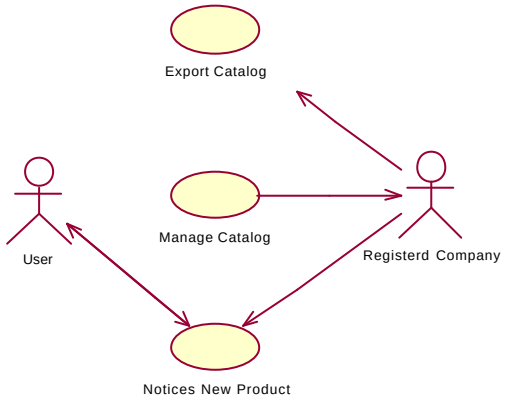

Figure 4: Use Case Diagram of Catalog Management

a) Use Case "Export Catalog"
Objective
This use case provides the capability to produce customized product catalog data.
Motivation
Product catalogs support the sales and marketing processes. The registered company provides the sales and marketing services of a company via the Internet.

b) Use Case "Manage Catalog"
Objective
This use case provides the capability to manage (edit, delete and cancel) product related information within the master product catalog.
Motivation
The motivation for this use case is a necessity to manipulate the different product information.

c) Use Case "Notices New Product"
Objective
Newsletters or notices about new product that target individual recipients via e-mail and mail can be performed.
Motivation
The intention of the newsletter is to inform customers about the company's new product and it is also an effective way to maintain a relationship between a company and its customers.

2.1.2 Manage Order

This use case package provides functionality for managing the order information and browsing a catalog. The use cases and actors involved in this package are shown in Figure 5.

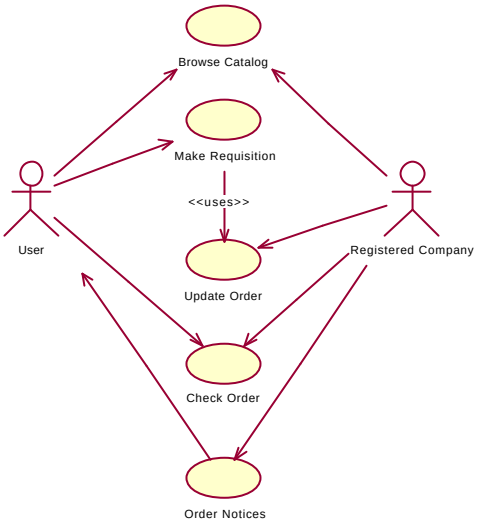

Figure 5: Use Case Diagram of Manage Order

a) Use Case "Browse Catalog"
Objective
A master product catalog can be searched and viewed by a read-only access.
Motivation
It allows users to browse or search a product's catalog, select and order products via Internet and provides electronic shopping services.

b) Use Case "Make Requisition"

Objective

Online requisition can be made and the order information is routed to the registered company.

Motivation

Customers are enabled to purchase a product via the Internet.

c) Use Case "Update Order"

Objective

The use case provides the capability to update the order information.

Motivation

All orders information via online are documented for registered company and to be handled as customer's request.

d) Use Case "Check Order"

Objective

The order status can be requested.

Motivation

The customer requests instant information about order status.

e) Use Case "Order Notices"

Objective

The order status is noticed.

Motivation

The motivation is the necessity to inform the customer about the order status.

2.1.3 Manage Suppliers

It provides functionality for managing and browsing supplier information. The use cases and actors involved in this package are shown in Figure 6.

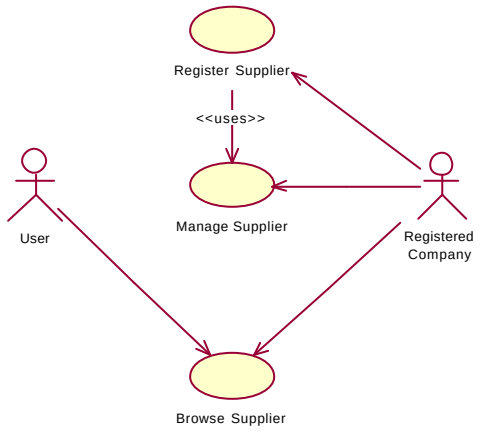

Figure 6: Use Case Diagram of Manage Suppliers

a) Use Case "Register Supplier"

Objective

This use case provides the capability to add new supplier information within the registered supplier lists.

Motivation

The motivation for this use case is the necessity to create a new supplier including their product information.

b) Use Case "Manage Supplier"

Objective

This use case provides the capability to manage (edit, delete and cancel) information of the registered supplier.

Motivation

It is necessary for supplier to modify the information, e.g. a change of company's business processes.

c) Use Case "Browse Supplier"

Objective

With this use case, it will be able to search and view registered supplier data by a read-only access to the information data basis.

Motivation

This functionality provides the capability to split and adapt the access to the registered supplier data.

2.1.4 System Administration

It provides functionality for managing forms, user information, accessibility and viewing report. The use cases and actors involved in this package are shown in Figure 8.

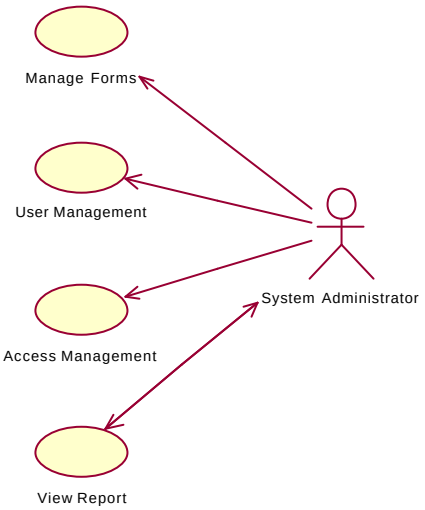

Figure 8: Use Case Diagram of System Administration

a) Use Case "Manage Forms"

Objective

Standard HTML forms are provided for integration in HTML pages. In this context, a 'form' is a data collection set that contains one or more data elements, and includes specifications of what is required in a particular filed text or attachment.

Motivation

This use case provides standard forms to the user and Registered Company and it allows associating tasks with a form.

b) Use Case "User Management"

Objective

This use case provides the capability to maintain system user information (e.g. username and password, supplier code, order code etc) and organize system users into user groups.

Motivation

The system usage should be restricted to registered users due to security reason.

c) Use Case "Access Management"

Objective

This is where the definition and customization of data fields of a business object can be accessed and/ or manipulated by users.

Motivation

Users should be allowed to manipulate or access certain data or functionality to support the exchange of information as much as possible

d) Use Case " View Report"

Objective

The complete history of e-procurement activities that have been done can be accessed.

Motivation

It is useful for managers to access all activities and related document for the market analysis and promotional activities

2.1.5 Payment

It provides functionality for processing requisition and payment. The use cases and actors involved in this package are shown in Figure 9.

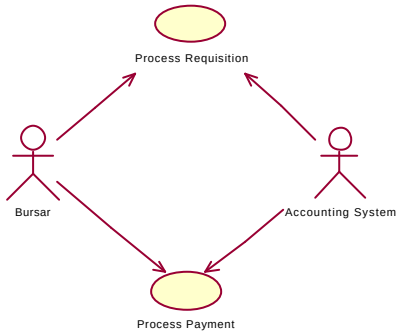

Figure 9: Use Case Diagram of Payment

a) Use Case "Process Requisition"

Objective

This use case has the capability to process requisition forms fill in by the users who are wishing to buy items from suppliers.

Motivation

Bursar has to process the requisition form for approval. Purchase Order (PO) is generated after the bursar approves the requisition. Later, a PO will be sent to supplier via Internet. The accounting entry will be automatically updated.

b) Use case Process Payment

Objective

This use case allows the bursar to process payment to supplier.

Motivation

Bursar processes the payment to supplier. The payment is made upon supplier after receive of invoice.

3.0 SYSTEM DESIGN

This phase discusses about the system design of E-Procurement System. It suggests five basic components and interfaces that E-Procurement System must support. The components are listed below:

a) Manage Catalog

Catalog shopping allows Administrator Register (AR) of the department to electronically search for a particular item or service across many suppliers and then make the best purchase decision.

b) Manage Supplier

Suppliers must have the ability to register themselves, establish and maintain a detail profile in the system.

c) Manage Order

AR of the department may browse and easily locate a needed item under contract and generate an electronic requisition form with description of purchase, order code, item name, price and vendor. A link to the form is automatically routed via email to Bursar to appropriate staff for approval and to purchasing clerk for further processing.

d) Process Payment

The system generates a receipt document that is routed to appropriate parties to verify that the item was received and that it is acceptable.

e) Generates Report

Each departments and suppliers need the ability to generate transaction activity reports from the E-Procurement System. Therefore, this will require a central repository or data warehouse of all procurement data.

3.1 The Procurement System Process

Figure 10 shows the structure of Procurement System Process. This procurement system allows buyers to make an automated searching for the suitable product where the agent accesses the catalog data of the suppliers autonomously.

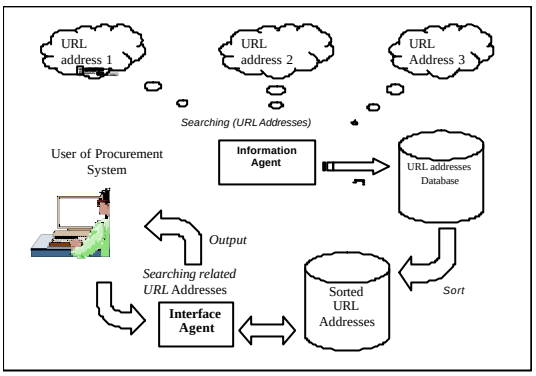

Figure 10: Structure of Procurement System Process

4.0 CONCLUSION AND CONTRIBUTION

The major contribution of this research is providing a reference model for electronic procurement system specifically for small government department. Hopefully this research can offer a lot more contributions to system developers, government and suppliers. E-Procurement Reference Model can be used as input for user requirements customizing standard software.

5.0 FUTURE WORKS

This research can be extended to other government department. The prototype of the system can be enhanced with more functionality such as applying Tender Processing in procurement which could ease the Tender Board to bid among suppliers. Formal method approach can be used to specify requirements of this system. Subsequently, the generic software architecture can be defined for e-procurement system in government agencies.

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