A B2B/B2C Hybrid E-Commerce Model

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Abstract: *Nowadays, the world of business is facing new challenges in both social economics and technology due to the emerging global electronic marketplace that is shaped in our society. With the increasing use of the Internet, every enterprise, in theory at least, has the appealing possibility of expanding its market to unexpected limits by the implantation of an electronic commerce alternative. But the entry of an organization into the e-commerce world involves strategic decisions that are not free of costs and risks. These costs and risks are many times the obstacle for the organization integration into the virtual commerce community, especially in small organizations or businesses where the amount of investment cannot be so large. In order to allow easier enterprise integration into the e-commerce world whatever its size, an electronic commerce model is proposed where the two major e-commerce solutions on Internet, Business-to-Business (B2B) and Business-to-Client (B2C), are presented and joined by an XML-based communication protocol. The idea behind the model is that the enterprises break the unnecessary third-parties dependencies, making themselves the responsible ones to maintain their own electronic catalogs. This characteristic is possible because a catalog-designer tool is provided to them to make and maintain the catalogs, and also to send the catalogs to the e-commerce server that automatically will publish them. The final result is a commercial Internet site, with a one-stop web-window shop philosophy, where the sellers publish their electronic catalogs and the consumers can browse them easily.*

Keywords: E-commerce model; B2B; B2C; E-catalog; XML

1   Introduction

E-Commerce is quickly becoming in a broadly accepted commercial alternative. This means new and amazing challenges for business houses in both social economics and technology to follow the society's increasing demands on electronic marketplace solutions.

Internet is the responsible and the catalytic of these technology-based commercial activities that gives to the enterprises the appealing possibilities of expanding their markets to unexpected limits.

But the implementation of an Internet site that provides the services for performing commercial transactions over the web is not always an easy and happy decision. The costs and the risks associated with the new form of business are

frequently an obstacle for the integration of the organization into the virtual commerce community, although these new commercial environments could help them to improve their competitiveness in a substantial way. This barrier is especially true and meaningful for small organizations or businesses where the amount of investment in the new solutions cannot be so large.

In the way to reduce the amount of necessary resources for the organization entry in the e-commerce opportunities, an e-commerce model is presented in this work. It is a B2B/B2C (Business-to-Business / Business-to-Client) hybrid model whose main principle is offering to the enterprise a uniform platform that implements the services for an e-commerce strategy development.

The key concept in this proposal is that the enterprise has the minimum dependencies with third-parties organizations to create its virtual commerce solution. In this model the enterprise has only to interact with an Internet commerce server, where the enterprise will publish its products, as its shop-window for them. This is possible due to two main reasons: first, looking for a common e-commerce site, the proposed business model is based on electronic catalog (e-catalog); and second, the enterprise is the responsible to create and maintain its own e-catalogs of products through a catalog-designer tool, with a visual and friendly user interface [7].

With these characteristics the whole business environment is more flexible; therefore the organization can adapt the business model to its needs, according to the global business rules allowed by the e-commerce sever. And also, and perhaps the most important thing, the organization is self-sufficient to maintain its electronic business without depending on other entities.

As we said above, the model presents elements from both B2B and B2C business dimensions. The B2B side is mainly related to the communication between the organization and the e-commerce platform site. On the other hand, the B2C dimension gives to the final clients an opened door towards a one-stop web-window shop [9] with the related products of several enterprises. This means that the e-commerce server is the intermediary or the bridge between the enterprises or sellers and the final clients or consumers. The integration among the B2B and B2C dimensions is based on an XML (eXtensible Markup Language) protocol solution.

The remainder of the paper is organized as follows: Section 2 overviews the proposed e-commerce architecture. Sections 3 and 4 examine the B2B and B2C dimensions of the model respectively, while Section 5 provides information about the XML-based protocol. Finally, Section 6 concludes the work.

2   An overview of the model architecture

As we introduce before, the proposed model tries to facilitate the entry of an enterprise into a virtual commerce area, based on a e-catalog shopping policy that is supported by two main components: an e-commerce web server and a catalog-designer tool [6].

However, the overall architecture introduces more agents and more relationships among them. In figure 1, the most representative entities, with the main communication flows, are presented.
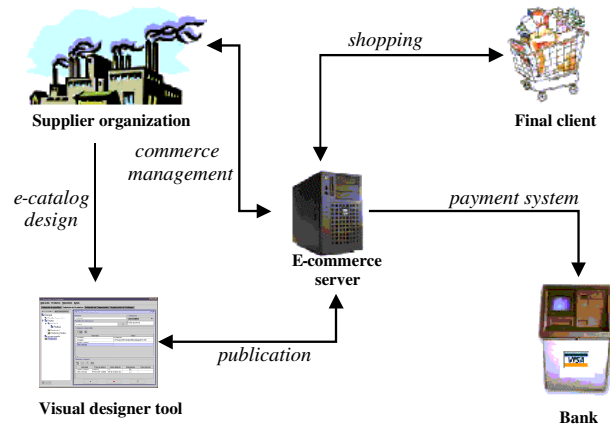
Figure 1. General structure of the proposed model

As it's shown in figure 1, there is a central element, the e-commerce server, which interconnects the different involved parts in a typical commerce environment, but with more dynamism compare to the traditional business forms.

The e-catalog is the chosen element by which the user views and interacts with the seller's information. An e-catalog can be defined as electronic representations of information about the products and/or services of an organization [10]. The decision of e-catalog usage is based on these elements are widely accepted in web-based business. Also, while other applications can provide similar services, e-catalogs provide a range and effectiveness of service that exceeds the capability of any competing application, as physical or CD catalogs for example. The interactive possibilities of e-catalogs eliminate physical storage and makes continuous updating effective and efficient [2].

The enterprise, or the organization in general, becomes the main actor of its own virtual business. It is the responsible for the inclusion and the management of its own contents in the server, which allows the organization entrance into the e-commerce environment. The use of a specialized software tool to design the e-catalog allows to the organization to be an active element inside the e-commerce process.

The design tool lets e-catalog definition, publication and update, and also the setting up of a web server architecture that allows clients to have access to the e-catalogs. But, for an efficient communication between the tool and the server, and for an automatic server setting up, the e-commerce server has to arrange the restrictions for the e-catalogs to which the software tool is conformed. This

is a different perspective because it is not necessary delegating these tasks to other service providers.

As far as the enterprise is concerned, the proposed architecture model includes the facilities to allow setting up a window-shopping of its products in the server side, i.e., maintenance of statistics and other kinds of business information, a budget of the costs derived from the use of this environment, alert and maintenance of historic information about its orders, organization of exhibitions, in order to show the features of the latest products available on the enterprise and so on.

The relationships between the organization and the e-commerce web server, through the catalog-designer tool and also through the server management services, represent the B2B dimension of the proposed e-commerce model.

Besides, the server has to provide to the final clients with every typical service to navigate through the e-catalog and to perform the purchases [1], such as search of a product in any published catalog, shopping cart management, selling certificates, navigation help, etc. and all these through a uniform and intuitive interface. These server's functionalities define the B2C dimension of this model.

The data interchange between the enterprise and the server, and their later automatic publication for final client's accessibility, is based on an XML storage format that defines the structure of their e-catalog ontologies.

Both B2B and B2C dimensions need that all the communications are performed onto secure protocols, based on certificates and public and private key mechanisms, to guarantee the privacy of data, because the integrity of an enterprise's data is at least as important as safeguarding traditional assets like cash [2].

Now, a more detailed description of the presented components will be made on the following sections.

3   The B2B dimension

The B2B dimension in the proposed hybrid model is justified by the existing relationship among the seller organizations and the enterprise that supports the e-commerce web server. Both the enterprise and the e-commerce server need each other to be successful business.

The e-commerce server has to facilitate to the enterprises the contents creation, the update and the management of their products, and also a universal means for the supported e-catalogs. An authoring tool offers all these capabilities.

Then the majority of the transactions between the sellers and the e-commerce server are made through the catalog-designer tool provided by the e-commerce organization. So, this tool is the base for e-catalog generation and its later publication.

A seller or supplier organization develops the e-catalog's contents with this visual tool, saving the e-catalogs in an XML format. The designer of the e-catalog is the person in charge for e-catalog maintenance, making it in its local

machines, and sending the results to the e-commerce server after. The designer and the enterprise have not to be worried about electronic catalog integration, because this is an automatic task in the server side.

We chose this kind of interaction because, on the WWW, any individual with access to Internet has the potential to be an information provider by making content available for consumer. We promote this notion by the electronic catalog-designer tool that builds up an interface between the organization and the server where the e-catalog designer has not to be a computer expert, only it needs basic office automation concepts, because every knowledge about the saving format of the e-catalogs and the communicating issues for e-catalog publication aspects are encapsulated inside the tool functionality.

The visual catalog-designer tool allows both the conceptual and the visual design of an e-catalog, and also its later maintenance, with the goal of publishing it on the e-commerce web server.

One of the major constraints in the design of this tool was to succeed in using it for a widely number of users. Related to this constraint we work in two directions: the portability of the tool and its language independence.

According to the first point, we need platform independence to be free of the final clients' work environments, we don't want to force them to change their custom working platforms for a compulsory one, because it could be a failure cause of this e-commerce model. In this way, Java 2 has been selected as implementation environment for the firsts prototypes of this tool.

On the other hand, language independence is a fundamental property in order to have an international commerce sphere in general. The tool is designed to allow multiple-language support (English and Spanish languages are supported by now). Related to the international commerce support via Internet, the proper countries currencies, specially the most important ones as euro, dollar, pound and yen, are included in the e-catalog properties, looking for a real flexible environment for every final client, independently of its nationality.

The working process with the catalog-designer tool is structured around the work-view concept. The idea is that the information could be shown by different angles, one for each defined work-view. This perspective is justified in two main reasons. Firstly, we want to reduce the amount of information that is shown to the user of the tool, sparing this way an unnecessary information overload. On the other hand, we look for that the user of the tool centers its efforts in the specific task that he is doing into the global process of the catalog design.

The main work-views defined in the presented visual design tool are [6]:

- **Template definition view:** It is something like a data type definition mechanism that can be applied to describe the fields of the products.
- **Product view:** All the functionality for concrete products is gathered in this work-view.
- **Component view:** It establishes the particular business components definition that allows setting up the commerce environment wanted by the organization, and making it real in the e-commerce server.

– **Catalog organization view:** It presents the grouping of the products in catalogs for its later publication in the server, and also the maintenance of these.

The basis of this work philosophy is in the Model View Controller (MVC) pattern [3]. In this case the model part is formed by the complete catalog information, the view part is represented by the work-views introduced above, and, finally, the controller part is the responsible to maintain the work-views related one to each others in a consistent and lasting way; for this reason another view is introduced, the repository view. The repository view is not a working view; it has the purpose to group the different elements managed by the tool, maintaining the cross-references among them to guarantee the consistency.

4   The B2C dimension

From a final client perspective, the e-commerce site should present a uniform environment where the client can perform its purchases, with every typical commerce service, but having access to a wide range of supplier organizations.

We adopt the one-stop web-window shop metaphor [9]. The e-commerce server acts as a middleware layer between several supplier enterprises and the final clients. The view for the customers is that the servers stored integrated information about a concrete market domain and its related products.

The offered facilities in this dimension are the typical ones that are presented in every e-commerce site, putting special attention to the mechanism to allow buyers to locate products and services with specific characteristics, and to provide secure bidding and negotiation systems with which a buyer can solicit bids and receive quotes.

5   B2B and B2C integration by and XML-based approach

The proposed e-commerce architecture has two basic components, the catalog-designer tool and the web site. Then we need to have a common data definition to represent the products in the e-catalogs that allows the e-catalogs integration in the server in an automatic way with the same semantics as they were defined in the designer tool.

The adopted solution is using XML to define the structure of the product and e-catalog ontologies. XML is being regularly used in the e-commerce area, and several XML-based standards for product descriptions have been already proposed [8], also in [4] several XML-related B2B frameworks for e-commerce are studied.

A set of rules has to be established by the e-commerce server side; otherwise each supplier tends to use different fields for product and e-catalog descriptions.

In our proposal, initially the designer-tool and the server share a set of DTDs (Data Type Definition) files that allows both the semantic description for the products and the interchange data protocol definition for e-catalog transmission

between the designer-tool and the server. In a future the DTD definition files are going to be changed by XML Schema descriptions.

Actually, the overall e-catalog description and transmission is supported by three main DTD files [5]:

- **Control.dtd:** It has all the necessary information to guarantee the e-catalog's correctness from the designer-tool.
- **Catalog.dtd:** It represents the e-catalog structure (see figure 2).
- **Log.dtd:** It maintains the log file in the designer-tool side.

```
<!ELEMENT catalog (products, sheets, resources)>
<!ATTRLIST catalog name CDATA #REQUIRED>
<!- list of the products in the e-catalog ->
<!ELEMENT products product+>
<!ELEMENT product field+>
<!ATTRLIST product
        id CDATA #REQUIRED
        transaction (add | modify | delete) #REQUIRED>
<!ELEMENT field value>
<!ATTRLIS field
        code CDATA #REQUIRED
        name PCDATA #REQUIRED
<!ELEMENT value #PCDATA>
<!- set of sheets in the enterprise e-catalog ->
<!ELEMENT sheets sheet+>
<!ELEMENT sheet included_product*>
<!ATTRLIST sheet file CDATA #REQUIRED>
<!ELEMENT included_product EMPTY>
<!ATTRLIST included_product code CDATA #REQUIRED>
<!- list of the attached resources ->
<!ELEMENT resources resource+>
<!ELEMENT resource EMPTY>
<!ATTRLIST resource
        id CDATA #REQUIRED
        transaction(load | delete) #REQUIRED>
```

Fig 2. Catalog.dtd

6 Conclusions

In this paper an e-commerce model has been presented with the main aim to make easier the introduction of the organizations into the commerce on Internet. Specially, we have tried to make possible that small organizations manage their own virtual businesses, looking for nearing them to e-commerce world.

The proposed architecture has two main components: a visual catalog-designer tool with which the enterprise can create and maintain its own e-catalogs, and an e-commerce web server where the e-catalogs are published permitting final clients navigate through them.

This model integrates the two major divisions of e-commerce: the business-to-business oriented e-commerce, or B2B, and consumer-oriented e-commerce, or B2C. The B2B dimension appears due to the exiting relationship between the supplier organization, which wants to publish their e-catalogs, and the e-commerce organization, which offers the e-commerce infrastructure. There is a symbiotic between the supplier and the e-commerce organizations because each one needs each other to get success in their businesses. The B2C dimension is the final result of the symbiotic relationships between the e-commerce organization and several suppliers, establishing a one-stop web-window shop with all the e-catalogs presented.

One of the most interesting characteristics of the proposed model is the dependencies reduction of the supplier organization from third parties, allowing that small enterprises have a place in the global marketplace on Internet with a moderate investment. This aspect is due to two main features: first the e-commerce platform is an intermediary between the suppliers and the final customer that offers all the necessary facilities of an e-commerce site, is like a middleware layer that connects the two extremes of a commercial situation. On the other hand, the catalog-designer tool is a crucial element to get the suppliers' independence, controlling themselves their own e-catalogs.

The glue component between all the presented components is the e-catalog definition using an XML-based format that defines the necessary product and e-catalog ontologies and establishes a protocol for product interchange between organizations.

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