

Developing Variations of an Integrated eStore Model for SMEs

Konstantinos Markellos, Penelope Markellou, Maria Rigou,
Spiros Sirmakessis, Athanasios Tsakalidis

University of Patras,
Computer Engineering and Informatics Department,
Multimedia, Graphics and GIS Lab,
26500 Patras, Greece
E-mail: {kmarkel, markel, rigou, syrma, tsak}@cti.gr

Abstract. This paper addresses the issues relating to the business-to-consumer (B2C) and business-to-business (B2B) scenarios that have been implemented to foster the needs and requirements of specific SMEs and aims to provide insight to other businesses, which want to take advantage of eCommerce opportunities, by helping them design and implement efficient web strategies. Specifically, we present all steps of the methodology applied throughout implementation of the applications. Special reference is given to usability aspects since the scenarios involved transactions between enterprises with no previous background in eBusiness (spinning mills, raisin house, etc.). The effectiveness of the eStores (e.g. usable presentation and navigation) is also being under consideration.

1 Introduction

The exponential growth of the Internet has led to a radical change in the way business is conducted. The eCommerce has ballooned into a multi-billion dollar market, since the current trend is that more and more users access eStores for purchasing goods and services. The basic problem is that it has become very difficult to identify the best business practices [1]. The competition in this market is extremely fierce, so the companies that offer the best user experience are the ones most likely to succeed on the web. The main issue here is to combine technical and business opportunities in order to help companies succeed online by designing and developing usable and effective eStores with minimum time, cost and human resources [3], [4].

Business-to-consumer (often condensed to B2C eCommerce) and business-to-business electronic commerce (often condensed to B2B eCommerce) can facilitate internal interactions, improve customer relations and eliminate the constraints of time and place (e.g. provide customer support 24 hours a day, 7 days a week, accept and fulfil orders on anytime, anywhere basis). Specifically, regardless of the form, eCommerce can build on the advantages and structures of traditional commerce by adding flexibilities and functionalities offered by electronic networks.

B2C is the part of eCommerce where the consumer can visit web sites, select products by matching his needs with the data in the online catalogue and send the digital request to the manager for approval. The system automatically inserts the order into a database of pending orders, checks inventory at the warehouses, validates consumer credit status, creates the invoice and forwards the item. Comparing the traditional way of doing commerce with the

electronic one, we consider that many of the steps are the same, but the way information is obtained and transferred is different. The new form of doing commercial transactions can simplify communication, change traditional relationships, and offer new opportunities to both consumers and businesses.

B2B is the part of eCommerce where there is one or more set of transactions in which businesses, rather than a business and an individual, are at both ends of the line. The same category also includes those cases in which purchases for a company are made by the individuals who are part of it; this, for example, is what usually happens with stationery, which is requested by single employees but paid for and ordered on behalf of them by the company, and is generally referred to as corporate procurement. B2B eCommerce is becoming more and more important, because the Internet provides an easy and inexpensive way to connect different businesses in an efficient way. Many financial analysts, in fact, expect B2B to become the largest sector of the overall eCommerce market, with some experts placing it to as much as 90% of all transactions in the near future [8].

In this paper we describe our approach for the successful design and development of B2C and B2B online stores, which are in other words, supplier sites (a business that sells products and services to consumers as well as to other businesses).

All customers via an Internet browser can access the B2C.store, navigate through the online catalogue, select products or services, request approvals and forward orders to purchasing. On the other hand, the B2B.store can only be accessed by authorized users, who do not directly pay for their purchases, and provides a set of rules for accomplishing various tasks, such as authorizing orders that go beyond the individual's purchase limit or delivering a purchase order directly to a supplier.

The proposed methodology engages in a range of issues concerning user needs, advanced designing and development modules, support and evaluation of the whole process, so that shoppers and stores can achieve the necessary insight and progress. The approach allows the easy customisation of the developed modules to different kind of B2C and B2B stores (e.g. spinning mills, raisin house, etc.). Moreover, special attention is given to issues of customer support, product navigation, product information, and the purchase transaction. In each of these areas, our goal is to make buying goods and services comfortable, easy, and enjoyable [5], [7].

The implemented eStores:

- ✓ Give customers the opportunity to access online catalogues, special offers and personal information at any time they wish to.
- ✓ Examine the progress of the purchasing process through specific forms.
- ✓ Allow the users to select parameters such as: payment way, shipping way, etc.
- ✓ Use new technologies to provide advanced services and functionalities (personalized pages, shopping recommendation, secure electronic transactions, etc.).
- ✓ Offer a selection of components to support users (help, frequently asked questions, sitemap, index, chat room, newsletter, guest book, etc.).
- ✓ Provide facilities and usability features. The stores place a strong emphasis on understanding and specifying the needs of users.

Some other very interesting features supported by the B2B.store are the following:

- ✓ Customer (buyer)-specific pricing. For example, the store manager specifies that Customer A is to receive a discount of 20% on all purchases, and Customer B is to receive a discount of 5%. When Customer A logs in and views a product page, the price

is displayed at 20% off list price. When Customer B logs in and views the same product page, the price is displayed at 5% off list price.

- ✓ Saved requisition lists. Each customer can save multiple “shopping lists” and use them to quickly fill in a requisition without having to add each product individually.
- ✓ Shipping based on weight.
- ✓ Handling based on quantity.
- ✓ Free shipping and handling if the order is equal or over a specified amount.
- ✓ Credit limit and minimum purchase requirement per customer. The manager of B2B.store can specify a credit limit and minimum purchase requirement (in drachmas) on a per-customer basis. If the customer’s order exceeds his credit limit, the order is marked as “pending approval” so the store manager can review it, and a message informs the customer of that fact. If the customer’s order is below his minimum purchase requirement, a message informs the customer, and he is asked to add more items to his requisition.
- ✓ Tax adjustment for tax-exempt customers.

This work is organized as follows; the next section presents all the steps of the methodology followed in the implementation of the applications; special reference is given on usability’s aspects; section 3 describes briefly the main modules of the proposed system architecture, its functionality and the general platform developed to allow easy and straightforward implementation; section 4 presents the basic elements of B2C.store and B2B.store, prototype eStores developed for testing the proposed system, while the last section comprises conclusions and future plans.

2 Development Approach

Our approach for designing usable eStores involves several discrete phases that eCommerce engineers should take proper care of, in order to achieve usability and effectiveness [11], [12]. Lack of efficiency in any one of these phases can result in a general eStore marketing failure.

The importance of the proposed approach can be certified in the sense that:

- ✓ It adapts with minimum technical effort in different types of stores.
- ✓ It easily expands to handle unexpected growth in merchandising.
- ✓ It successfully enables consumers to browse products and then order them directly from the online store 24 hours a day, 7 days a week.

Building and maintaining a successful eStore is a continuous process, in which firstly we develop a vision of the site and then plan how to implement that vision. The next steps are the development of the plan, deployment and validation the system. Analytically, the process begins with the identification of the content and the functional specifications, continues with the presentation design and the definition of navigation facilities and finally covers advanced user interface features and usability issues. Emphasis is placed on the essential characteristics and features that a usable eStore should provide. Figure 1 shows the sequence of phases followed during the development.

Specifically, there are five phases in the approach:

- ✓ ***Identification of Content Design.***

The first phase is the identification of the information content which should be clear and specific. By thoroughly examining and planning we can significantly increase the efficiency and availability of the provided services, and ensure that the planning will be

accurately reflected in the future phases of the development approach. The store must determine and point out the proper information that the potential customers will find most interesting. Also, the structuring and the correct organisation of the provided information have a great influence on the web site success.

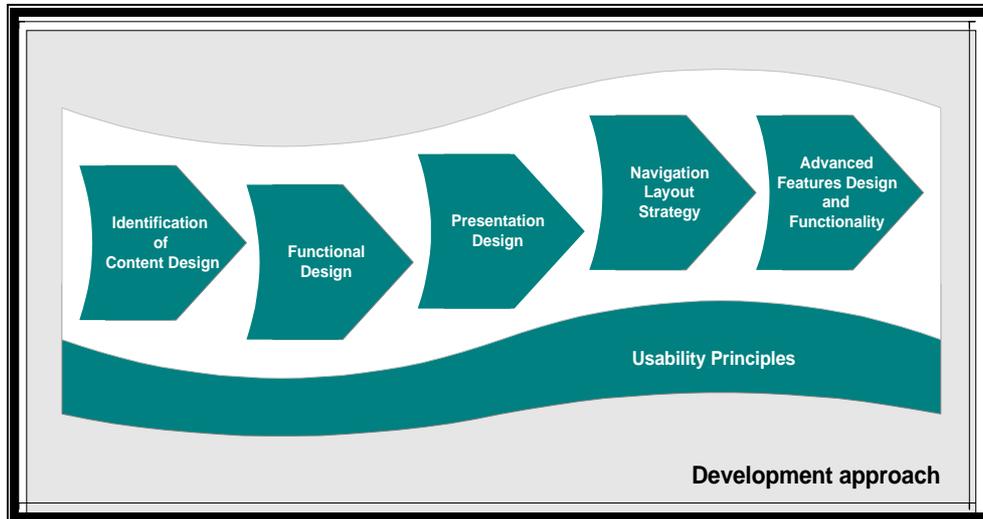


Fig. 1. Development approach phases.

- ✓ **Functional Design.**
The next phase is to decide about the provided functionalities. Within the context of an eStore this means significant facilities that increase users efficiency and satisfaction. Information and operations should be grouped and represented properly along successive web pages. Novice and expert user's support should also be taken under serious consideration. Generating appropriate diagrams that describe the event-sequence of the users and the flow of requests through the various modules of the system can highlight difficult-to-envison problems and potential bottlenecks.
- ✓ **Presentation Design.**
The presentation design phase should establish the eStore's identity and give a clear overview of its content. The designers should follow presentation standards and guidelines in order to take advantage of good practices and also increase the probability of user's satisfaction during the purchase process [9], [10]. The content should be presented in a natural way. The aim of a professional presence in the web is to guide and not to disorientate. The users must assimilate easily the store's behaviour. This means that some basic presentation rules should be adopted, such as: careful usage of colours, consistent sharing of graphics and text, proper selection of buttons and menus, correct placement of titles, text and images, appropriate choice of fonts and styles, unified and consistent format.
- ✓ **Navigation Layout Strategy.**
The navigation between pages is an important component for the success of an e-store. If a user has trouble navigating from one page to another or cannot reach fast the desired information, he/she will choose a different e-store to acquire the same item. Consumers

need to find everything they look for quickly and easily. They should feel comfortable while navigating through pages or scrolling down a page.

✓ ***Advance Features Design and Functionality.***

The last phase refers to the observation of the customer behaviour. The eStore adapts its presentation and functionalities to the identified user's profile. The customer preferences can be partly derived from his/her behaviour throughout his/her interaction within the store (e.g. sequence of web pages accessed). Sometimes for this reason, a special purpose questionnaire or a test is used in order to get a better view of the customer's purchase preferences. Collecting data on user visits to the store, including the frequency and duration of visits and use of various operations and functionalities, is critical to developing a site that meets the business needs.

The achievement of usability is essential for any competitive eStore [5], [9], [10]. Usability focuses on the user interface of the store and refers to the elements that the user directly interacts with e.g. screens, menus, and navigation controls. Furthermore, usability is a measure of how the eStore has succeeded its goals. Fundamental user interface design principles can be applied at the degree, which the eStore lived up to its initial expectations, such as: learnability, memorability, simplicity, efficiency, consistency, user satisfaction and low error frequency [7].

3 Architecture

In this section we shortly present the architecture of our solution. More specifically, we define basic components and important concepts and describe the relationships among them. The key architectural ideas are to support a broad range of applications, to enable scaling of the system and to accommodate evolution in functionalities. Modular design plays an important role in the integration of the various internal and external system components with B2C.store and B2B.store (prototype eStores we have developed) [2], [6].

The system consists of the following main components:

- ✓ ***B2C.store and B2B.store Modules:*** correspond to the web interface for communication between both the shopper (consumer or business correspondingly) and the store manager with the merchant web server. More specifically, it is concerned with marketing and selling goods and services. Also, the module manages the details of the transactions, from placing the order to payment and fulfilment. Proper handling of the transactions is important, such as ensuring that the relevant information is delivered to the right places and that the payment is collected correctly.
- ✓ ***Electronic Payment Module:*** supports the process of online electronic payment. In its simplest form the module takes over from the merchant web server order form at the point when payment by credit card is appropriate. The payment gateway connects to a traditional financial network to authorize the transaction. Then the merchant computer stores the acknowledgment and sends a receipt to the shopper.
- ✓ ***Database Module:*** information about shoppers, store and products being purchased are collected together in one place. Shopper information includes things like name, phone, shipping address, e-mail, means of payment, etc. Store information includes items such as payment methods accepted, means of fulfilment, etc. Product information includes items such as description, price, weight, taxability, etc. Also, this module allows the interconnection with the system servers.

- ✓ **Mediate Module:** enables the interconnection with existent systems (e.g. ERPs, MIS, other enterprise financial and logistics systems).
 - ✓ **Intranet Module:** facilitates the internal communication of the business and offers functionalities like notices, shared files, forum, calendar, chat, online catalogue, help, etc. Only authenticated employees can access the intranet. Moreover, they have different privileges and access rights with respect to their position in the company. Responsible for the provision of access is the site administrator.
- Because of the general-purpose architecture we do not need to build the components again. We simply reuse and customize them in every specific case. The system architecture is schematically presented in figure 2.

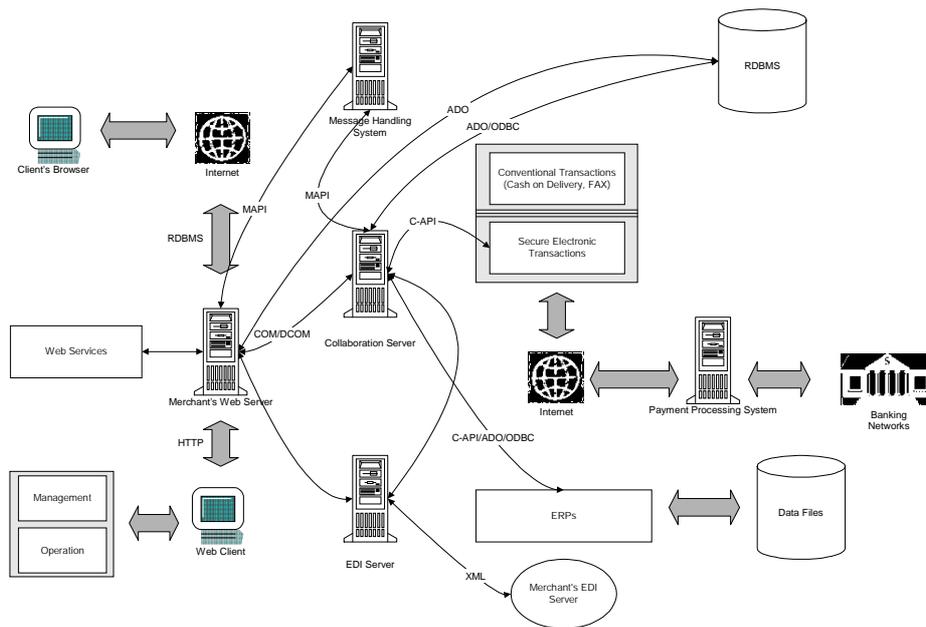


Fig. 2. System architecture.

4 Prototype eStores

Both B2C.store and B2B.store are a leading edge, graphically elegant sites and provide shoppers with a user-friendly shopping experience. As we have mentioned before authorized users can only access the B2B.store. The purchasing process is easy-to-use: the shopper simply chooses from an online catalogue, adds items to a basket and pays for the purchase total (which includes taxes and shipping costs) by credit card or by cash on delivery. eStores send a message (via e-mail) to the manager for fulfilment. Also, online registration gathers shopper information for marketing purposes (a shopper must be a registered member to purchase the contents of his/her basket). The structures of the stores are presented in figure 3 and 4.

The implementation completed in two phases. Phase 1 implementation included shopper personalization, product search, credit card processing, e-mail order verification, etc. Phase 2

implementation included tracking purchase history for shoppers, custom-entry pages for shoppers, daily and seasonal special highlighting, database-driven shopping cart holdover, and administrative enhancements to allow viewing of recent financial transactions and product database updates. So, the basic functionalities that the system supports are the following:

- ✓ **Login:** the first page that is shown to the client. Users have two options; either enter their login information (e-mail address and password) or register as new customers for the store. The goal is to collect appropriate information about the customer. User identification is useful for building personalized pages according to their preferences and needs.

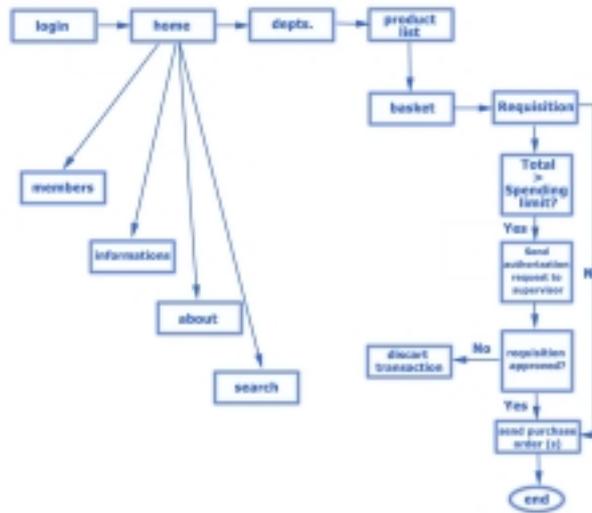


Fig. 3. Structure of B2B.store.

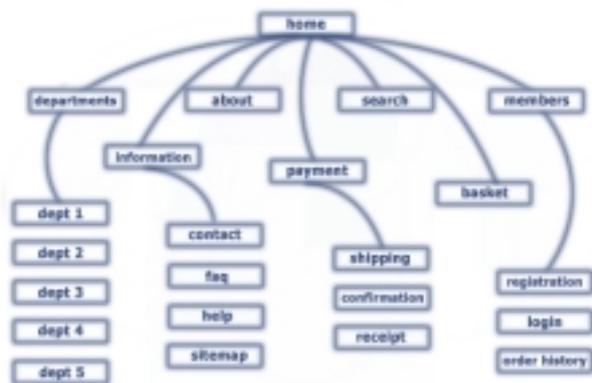


Fig. 4. Structure of B2C.store.

- ✓ **Home:** the home page allows shoppers to get informed about the store, browse the departments, search products from the catalogue, order products, manage their accounts, enter their saved lists, etc.
- ✓ **Members:** the user has the ability to change his/her password as well as any other piece of information (name, address, etc.). Furthermore, this section includes the order history facility, which displays a list of all the purchases successfully completed by the user in addition to the saved requisition lists, where each customer can save multiple “shopping lists”, and use them to quickly fill in a requisition without having to add each product individually.
- ✓ **Product Selection:** there are several ways for the shopper of the store to look through the available products. The most obvious method is to simply click on one of the departments that are available in the main page of the store and then look at the products that it contains. Another option is to use the search functionality to find a particular product in the catalogue. Finally, users can also jump to a specific item through promotional links, such as those that are supplied by the cross-selling or up-selling options.
- ✓ **Basket:** this page is mainly a list of all products that the shopper has decided to put aside for purchasing. It contains links for removing a product from the basket and links to the shipping information page (the first step in the purchase process). It is possible to change the number of items for a specific product or empty the basket.
- ✓ **About:** this section contains general information about the store.
- ✓ **Payment:** consists of the shipping and payment pages used to complete the purchasing process. The store performs several checks (e.g. credit card authorization) to verify that all the data that has been input is correct. If an error of any kind occurs, the system informs the user and instructs him/her to fix it. Moreover, the store automatically performs the final steps of purchasing processing and determines whether the order can be successfully completed. If so, an order ID is generated, and the appropriate information is stored. Finally, confirmation e-mail is sent to the shopper.
- ✓ **Search:** this function allows the user to find particular products of the store by using keywords.
- ✓ **Information:** this page includes contact information about the store, frequently asked questions (FAQ), help facilities and sitemap.

Figure 5 shows examples of the prototypes eStores.

Site Administration provides the store manager with the following options:

- ✓ **Merchandising Functions:** includes departments, products, and promotions. Departments and products are used to access databases that contain information about the product catalogue. Promotions are only available if the manager has chosen to support special offers, cross-selling and up-selling facilities.
- ✓ **Transactions:** this section includes two different links. Selection orders can be used to view all the purchases that were successful as well as run a few simple reports on them. Selection shoppers, on the other hand, can be used to view a list of all registered users that the store has.
- ✓ **System:** includes opening and closing operations. When major updates or redesign changes are required then the store can be temporarily “closed” so that the users cannot browse through it or make purchases. Otherwise the store will be in “opening” state.

Web site reports monitor shopper demographics, browser use, and site navigation, to ensure that the site is as accessible and as easy to navigate as possible.



Fig. 5. Examples of different eStores.

5 Conclusions and Future Work

Presented eCommerce solution involves doing business online. However, designing and implementing an eStore is a complicated job. Businesses want to profit from the power of digital information, understand the needs and preferences of customers and trading partners, and then deliver the products, services, and information to them as quickly and with as little human interaction as possible. So, businesses that aim at having an effective web presence need guidance and information.

The suggested approach comes to meet these requirements and provide valuable knowledge about the best eCommerce practices. The key benefit of the approach is that it facilitates the development of different kinds of eStores. It also accommodates the needs of shoppers and stores so that everyone feels pleased and satisfied.

In this paper we have discussed the main issues of the proposed approach. The functionalities and the architecture of the B2C.store as well as of the B2B.store were described. Guidelines that will be extremely useful for building an eStore were pointed.

Finally, we can say that our main future direction is to phase a more systematic methodology that will facilitate and guide the design and the development phases of usable B2C and B2B eStores. Obviously, there are many functional areas that need to be examined. As the eStores continue to grow, internationalisation of the sites for local languages will be considered. New advanced features will be embedded in the architecture to enhance the value of stores' offering to the users.

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