

# Reviewing The Requirements Of Traditional E-Commerce

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## 1 Introduction

E-Commerce is attaining an independent and specific character, despite the existence of different systems with various properties and goals that come under this term. As such, different subjects regarding theoretical as well as practical aspects can address E-Commerce systems as a whole. One of the important issues in this respect is viewing the general requirements and looking for the ways to meet them.

The task of defining the general requirements for E-Commerce should, principally, be accomplished by scientists and specialists in financial and commercial fields, and those who can be considered as Information Technology (IT) clients for E-Commerce systems. There are, indeed, different E-Commerce systems requirements spread over different documents, like [1] and [2]. Nevertheless, a short review of the most important topics thereof, alongside, could be helpful.

Furthermore, there are different aspects regarding dealing with these requirements. While some of them are merely correlated with the available knowledge, methods and skills, some others are directly related to the available and applicable technologies.

This paper, mainly, aims at reviewing some of the general requirements of E-Commerce systems, and addressing some issues around dealing with these requirements.

The requirements addressed in this paper are involved with those group of E-Commerce systems that can be referred to as *Traditional E-Commerce*. Therefore, the paper begins with explaining this term. However, many of the here mentioned topics can be valid for the other kinds of E-Commerce systems as well.

## 2 Traditional E-Commerce

### 2.1 E-Commerce or E-Business

The word *commerce* is defined as the act of “exchanging” or “buying and selling” commodities or services. The word *business* has a more general meaning that covers almost every occupation and activity, in which one or more people are directly or indirectly involved, including commercial activities. Accordingly, Electronic Commerce (E-Commerce) and Electronic Business (E-Business) can be defined as follows:

- E-Commerce: Exchanging or buying and selling commodities and services using electronic means.
- E-Business: Conducting of business of any kind using electronic means.

However, in practice, or at least in this paper, “electronic means” can be replaced by “Internet”. Although E-Commerce and E-Business are often used interchangeably, in this paper we confine ourselves to E-Commerce in its specific meaning. Therefore, by E-Commerce we mean systems involved with activities like ordering and delivering in domains like shopping and stock dealing that (may) need to deal with heterogeneous and distributed environments.

### 2.2 Traditional or Non-Traditional

Traditional E-Commerce can be defined as *translation* of traditional commercial activities in electronic form (on Internet). Non-traditional E-Commerce can then be defined as commercial systems that are initiated and enabled by Internet and were neither thinkable nor implementable without it.

Despite the significance of Non-Traditional E-Commerce, Traditional E-Commerce is still of great importance. This can be, mainly, due to one general and one particular reason:

- In general, it is obvious that one first tries to automate the existing (and hence well-known) procedures. Since:
  - This is pushed by the target users, who want to automate their existing systems in the first place.
  - The problem definitions are already available and there is less need for extra studies and investigations.
  - The target users are more likely to know what to expect from the system.

- There is a better possibility for validating the system performance.
- In particular, the commercial procedures have been formed and established during a long and complex process. It is not easy to devise new procedures that at the same time are acceptable, trustable and applicable for both the suppliers and the customers.

Although in this paper we confine ourselves to Traditional E-Commerce, in the rest of the paper, for the sake of simplicity, the term “E-Commerce” alone is used.

### 3 Requirements

The general requirements of E-Commerce systems, like others, reflect the characteristics and functionality that they must possess. In this section, some of the important topics of these requirements are listed. Besides, the foremost feature(s) of and/or the related issues for dealing with each requirement is explained in brief. However, it is obvious that the special desired characteristics and functionality for a defined E-Commerce system must be extracted through the analysis of the regarding business.

Furthermore, it is noteworthy that many of the topics may be valid for many kinds of systems, and not just for E-Commerce systems. Nevertheless, this does not imply that they should not be mentioned as E-Commerce systems requirements. From the other side, not all of the topics may be valid for all E-Commerce systems.

The topics are as follows:

- Providing different access levels for different users: This results in a more flexible system that can handle different kinds of users with different privileges. Accordingly, the system gets a more general character and can attract more customers at different levels.
- Maintaining user profiles: This results in a more flexible system that can handle different kinds of users with different preferences. Accordingly, the system gets a more general character and can attract more customers with different flavours.
- Maintaining “all or nothing” principle for each critical task: In fact, this is a part of a general concept named ACID in transaction management, which stands for: Atomicity, Consistency, Isolation and Durability[3]. For commercial systems, especially where money transactions take place, maintaining this principle is of crucial importance.

- Supplying on-time response: Supplying fast response is one of the most obvious requirements of almost any (online) system. However, for E-Commerce systems, there are situations where a fast response is not of vital importance. The waiting period should be proportional to each specific function.
- Maintaining ease of use (user-friendly): Maintaining ease of use is one of the most obvious requirements of almost any system. However, for E-Commerce systems, where competition in attracting customers is of great importance, this is even more significant.
- Maintaining state of the user sessions: This provides the user with the possibility to quit his/her session and continue it later, whenever desired (and possible). This can be considered as a special case of maintaining ease of use.
- Supplying on-line help: The user should be able to ask for information about any important term, function, etc. This can be considered as a special case of maintaining ease of use.
- Providing search utilities: The user should be able to search for information about any important term, function, etc. This can be considered as a special case of maintaining ease of use.
- Avoiding bothering the user with not related issues: This can be considered as a special case of maintaining ease of use.
- Avoiding ambiguous terms: In commercial activities, any ambiguous term may result in big problems, and hence must be avoided. This can be considered as a special case of maintaining ease of use.
- Using different media types: This can be helpful in maintaining user-friendly systems.
- Supporting different human languages: This is a prerequisite for taking the advantage of the international trait of Internet.
- Supporting different currencies: This is a prerequisite for taking the advantage of the international trait of Internet.
- Supporting different money transaction middles: At present, there are different ways of money transaction on Internet, namely: digital money, electronic checks, electronic wallet and micropayments[4]. These methods must be supported as far as possible.

- Providing the user with intelligent assistance (up to a certain limit): There are many situations where the user should make his/her decision based on many different options and parameters. It would be helpful if the system itself could provide the user with valid and meaningful suggestions and advices. Of course it should not push the user in a certain direction neither make decisions instead of the user.
- Providing the user with (possible) alternatives and suggesting the preferred one(s): This can be realised based on the user's access level, profile and session information, and can be considered as a special case of providing the user with intelligent assistance.
- Offering the possibility to the user to change his/her entered data, alter his/her chosen choices and correct his/her typos, as far as possible: Offering this possibility is one of the most obvious requirements of almost any system. However, for E-Commerce systems, where any mistake may have a huge effect on the result, especially where money transactions are involved, this is even more significant.
- Providing the user with the process information: When a user initiates an off-line process, it would be helpful if he/she could be informed about the development of the treatment of his/her process. This can happen either based on the user's demand by logging into the system, or according to the specific points of the process in question by submitting messages from the system to the user.
- Providing simulations about the process in question: This can give the user a better idea about the process and help him/her better understand what he/she can expect from the system, and vice versa.
- Providing analysis tools for acquiring information about the customers' behaviour and trends: This would help the concerning business better understand the users' demands and act on them by leveraging the system characteristics and functionality.
- Providing analysis tools for acquiring information about the system resources: This would help the concerning business better understand the system performance and adjust the system resources accordingly.
- Accordance with the law: Commercial activities are often involved with complex laws that must be complied with.

- Accordance with the known and accepted procedures: The game rules of commercial activities, as aforementioned, must be obeyed.
- Maintaining privacy: Commercial activities demand different (significant) data from the user. Therefore, the user must be convinced that no unwanted party can access his/her data. Gaining the user's trust is an important issue in commercial activities.
- Protecting the user against damages through third parties: The user must be protected against any possible damage that can be committed by means of the system through third parties.
- Preventing misuse and abuse of the system: The system must be protected against unwanted users and activities that may cause damage to the system as well as the (legal) user.
- Maintaining security: This, in broad outlines, includes authentication and data ciphering. Authentication protects the system as well as the user against unwanted activities. Data ciphering prevents third parties from accessing confidential data. Therefore, maintaining security is a prerequisite for maintaining privacy, protecting the user against damages and preventing misuse and abuse of the system.
- Integration and correct interoperation with the non-electronic systems: This is concerned with two distinct issues. First, the system must find its place in the regarding information system, which can also consist of non-electronic means. Second, when the system is down or can not handle (all of) the users, for any reason, the non-electronic systems must be able to perform (parts of) the system tasks.
- Integration with the existing systems, including databases: This implies maintaining interoperation between the system and the existing systems, in particular (legacy) database systems, and taking the advantage of existing resources as much as possible.
- Location transparency: It is helpful if the (constituents of the) system be free from any fixed location. This makes the system more flexible, efficient and fault-tolerant. That means the (constituents of the) system can be spread over different locations, the load can be distributed and in case of fault can be conducted to safe locations. However, in practice, the locations are, at the first glance, chosen based on the characteristics of the system and available resources.

- Being easy to install, manage, maintain, alter and upgrade.

## 4 Meeting the requirements

As aforementioned, there are different aspects regarding coping with the listed requirements. Dealing with some of them is mainly a matter of possessing and applying the right knowledge, methods and skills. For this kind of requirements there is not so much to say. For those requirements dealing with which is basically concerned with the available and applicable technologies, however, different discussions and suggestions can be made.

In the following, first some of the major shortcomings of the existing E-Commerce systems are addressed, and then a few technologies that can be advantageous, regarding the latter category of the requirements, are mentioned. Finally, to make things more clear, an example case is briefly described to show how those technologies could deal with the requirements, in practice.

### 4.1 Shortcomings

Assessing the existing E-Commerce systems in the context of the mentioned requirements leads to different shortcomings. Although there are many different systems with different characteristics and properties, what makes a general assessment difficult, the following shortcomings can be addressed as the major common ones:

- Flatness regarding different users
- Not complying with the user-friendly principles
- Lack of the intelligent assistance
- Difficulties regarding integration with the existing systems
- Not flexible and fast enough in reacting to the changes

Furthermore, these systems are mainly based on client/server architecture using the Common Gateway Interface (CGI) technology<sup>1</sup>. Although the CGI based systems can provide a platform-independent front-end to different applications, they lack the desired scalability and openness needed for dealing with heterogeneous and distributed environments.

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<sup>1</sup>CGI is a standard that determines how scripts are to be called, and how data is to be passed between the httpd server and the script. It performs the same role for the server and the script as HTTP does for the server and the client[5].

## 4.2 Technologies

In order to deal with those requirements that are concerned with the technological issues, the following technologies can be advantageous:

- Three Layer Architecture (TLA)[6]: This architecture is based on the notion of distinction between user interface, business logic and data services, by placing each of them in a separate layer.
- Common Object Request Broker Architecture (CORBA)[7]: This technology, as introduced by Object Management Group (OMG), provides an infrastructure along with standard interfaces for horizontal and vertical domains<sup>2</sup>, as well as various services of common management use. CORBA can be used for maintaining the interoperation between and within the different layers of TLA.
- Business Objects (BOs)[8]: This notion can be used for realising the middle layer of TLA, namely the business logic layer. CORBA objects concerned with vertical domains are, in general, addressed as BOs.

The intended advantages that these technologies can bring are as follows:

- Distinction between user interface and business logic provides a better basis for dealing with specific issues around each layer, like maintaining different user levels and profiles, and user-friendly principle.
- As BOs (are supposed to) reflect the reality of the business in question, the accordance of the system with the regarding known and accepted procedures is preserved.
- Wrapping the (needed portions of the) existing systems into CORBA objects, makes their integration with the system, which in turn consists of CORBA objects, possible.
- CORBA objects are free from any fixed location, and hence adhere to location transparency.
- CORBA, as mentioned above, offers special services for various aspects of management, including security and transaction management.

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<sup>2</sup>OMG has a special Domain Task Force (DTF) for E-Commerce.

- By drawing a distinction between the three main constituents of the system based on TLA, having a robust communication means based on CORBA and reflecting the reality based on BOs, the system will be easy to manage, alter and upgrade.

### 4.3 Example case

Anyone who has tried to arrange a trip with specific constraints and limitations regarding, among the other things, time and money has experienced how bothersome the procedure can be. Checking for the available accommodations for the desired date and price range is indeed not as easy as it may seem to be. Checking for the available transportation means for the desired date and price range is almost the same story. Doing both altogether is more difficult than just a linear addition thereof. Using the regarding systems on Internet, unfortunately, doesn't ease this procedure as expected.

In an (almost) ideal situation, the accommodation and transportation systems treat users at different levels according to their history in using the accommodation and transportation services provided by the regarding companies, respectively. Each user is able to define which (quality of) services he/she is interested in. For example, the user can give preference to single room in three-star hotels for accommodation and economy class in airplanes for transportation. Besides, he/she can have the opportunity to choose his/her second, third, etc. choices. Furthermore, the user can choose his/her desired language, payment method, etc., and receive information about the hotels and airplanes in different media types on request.

The system will get the desired date and price ranges from the user, and provide the suggestions based on these information along with those already existing in the user record (if present). It can also take specific items like special offers into account.

However, using the above mentioned systems for accommodation and transportation, separately, may still not be completely satisfactory, since the results of the one may be incompatible with the results of the other, at least regarding the time range. Therefore, interoperation between the two systems is of special importance.

Adopting the mentioned technologies, could be a way to adhere to the requirements of this case. As a result of distinction between user interface and business logic, these two layers could be developed and modified separately, and hence provide a better basis for dealing with specific issues around each layer. As such, the user interface layer could concentrate on complying with the user-friendly principles, supporting different media types, human languages, etc. The business logic layer could reflect different concepts in accommodation and transportation services, like: "room", "seat" and "reservation" in the form of BOs, and maintain

different user levels and profiles. A user interface could then be developed for an integrated application using the business logic of both areas.

Furthermore, the (needed portions of the) existing systems like databases could be wrapped into CORBA objects in order to integrate with the system. Intelligence needed for providing suggestions, based on user choices and data stored in different databases, could be available through CORBA objects. For example, the existing information about hotels and airplanes in (legacy) databases could be used to fulfil the user requests related to these items. Besides, the new functionality could also be added to the system in the form of CORBA objects, whenever needed, and the interoperation with the existing systems based on the same architecture would be easier. For example, the system could be further improved through interoperation with an insurance service, based on the same architecture, using a (new) integrated user interface.

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## **References**

- [1] Enterprise E-Commerce: The Software Component Breakthrough for Competitive Advantage, P. Fingar, H. Kumar and T. Sharma, Meghan-Kiffer Press, Tampa, FL USA, 2000
- [2] <http://www.entropy.ie/checkpoint>
- [3] A First Course In Database Systems, J. Ullman and J. Widom, Prentice-Hall, Inc., 1997
- [4] <http://builder.cnet.com/Business/Ecommerce20>
- [5] Web Server Technology, N. Yeager and R. McGrath, Morgan Kaufmann, 1996
- [6] 3-tier Client/Server At Work, J. Edwards, John Wiley & Sons, Inc., 1997
- [7] Common Object Request Broker Architecture (CORBA), <http://www.omg.org/corba>
- [8] Defining The Business Objects, M. Abolhassani, TU Delft, proceedings of IIWAS'99, November 1999