

A Framework for Technological Management in e-Business Deployment

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Abstract

Electronic commerce is playing a progressively more important role in the emergence of internet. The OECD [1] predicts that e-commerce sales will reach US\$1 trillion by year 2005. With soaring popularity of the internet attracting people going online in recent years, selling online becomes a profitable but extremely competitive and risky business.

As a result of technological developments in recent years, powerful computing resources have been made readily available and affordable. Such advancements help businesses drive operational costs down and offer opportunities for offering enhancements of services. They also bring upon problems such as increasing demands in security due to more powerful computers being used by hackers breaking into computer networks. Effective management of technology has been seen as an important aspect of managing e-business projects.

A framework converge on management of technology is presented for analyzing

rapid changes during the course of an e-business project deployment. It concludes with some insights for further research in the challenges of e-commerce management.

Keywords: consumer behavior, information analysis, project management

1. Introduction

The emergence of electronic commerce in recent years has brought many shoppers onto the internet, making e-Business an increasingly popular way to buy. In line with the growth in the number of people making use of the internet and buying on the internet, the demand in technology advancement for service providers becomes vital [2]. As more people upgrade from conventional dial-up internet access that provides a maximum speed of 56Kbps to various high-speed internet access methods such as using cable modem and ISDN, there is a greater demand in data throughput. Similarly, a demand in security is of great concern to all parties. While customers have to ensure that their private information such

as credit card details will not fall into hands of any unauthorized persons, the merchants have to ensure that their web sites remain operational and not tampered with. As computing tools become more powerful, hackers become more capable of breaking into computer systems and stealing information from the internet.

While e-commerce handles electronic payment, technologies in the banking industry [3], [4], to a large extent, is closely related to that of e-commerce. This paper presents a new framework, which incorporates the proposal to offer an effective method for management of technology and to easily adapt to ever changing demands.

Unlike other engineering development projects, e-commerce projects require constant and fast adaptation to ever changing market environment, we have outlined some unique features in [5] giving rise to the need of a framework especially derived for e-commerce deployment for technology management.

In this paper, we begin by giving an overview of characteristics of electronic business projects with an emphasis on business-to-consumer commerce. We then detail the important role of managing technology in e-commerce. Finally, we present a framework as an effective means of technology management in e-commerce, followed by a summary.

II. E-Commerce Projects: An overview

Many articles published in recent years have documented a wide range of topics associated with e-commerce. There are many factors that make e-commerce project management a tedious task. Earlier study in

managing e-commerce projects [6] stated the importance of adapting to fast changing technological advancements. Technical components for sustaining e-business can broadly be categorized as software, hardware and network. What makes e-business different from the traditional means of trading is that “electronic” is closely tied to technology.

All three components listed above are essential to connect people together, between customers and business, business to suppliers and financial institutions. While the necessary software facilitates the transfer of appropriate information, security, which handles auditing, authentication, and authorization, poses a major challenge to e-business deployment. E-business is somewhere that provides potential customers a comfortable place to shop at. Major advantages include finding an item by using search utilities is one convenient feature that cannot be provided by a physical shop, and to enjoy freedom of shopping anonymously [7]. To fully realize the benefits of e-business, we have to start by exploiting the ease of adaptation to new gadgets through technology.

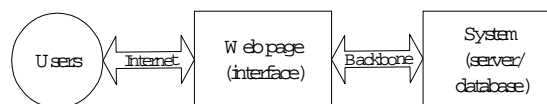


Fig. 1 The function of an online catalog-entry point of an electronic shop

The first entry point to online shopping is typically a colorful catalog that often features interactivity, stored in the server for simultaneous access by multiple users. In order to appeal to the widest range of customers, a catalog must be attractive yet easy to use. It is therefore crucial that the

catalog is well managed during the development process, as well as throughout the maintenance phase. The structure of this catalog is shown in Fig. 1. The interface that facilitates information retrieval can be made so universal that hardly any change to it is necessary. Behind it there is an electronic shopping cart that stores items that have been picked by a customer. Only the database needs to be updated for any new products and services or removal of obsolete items. The interface consists of a number of web pages; its presentation can easily be changed temporarily for a specific occasion such as adding decoration for Christmas. All these can easily be accomplished electronically. A process for web-based development helps handling changes and gathering feedback for management while the project is in progress [8]. Managing such diversity is an important attribute of e-business development. The process starts with requirements gathering that leads to a complete understanding of what the catalog, or more generally the entire web site needs to achieve, and a drafting of the detailed action plan for the web site. At the end of the process is an end product that meets the objectives of the plan as a result of the project execution. In between there are many factors associated with the project such as time, risk, financial resources, human resources and access to certain necessary materials. All these are potential obstacles to a project and must therefore be managed so that disruptions will not affect project development. Project management can help forecast anything that may affect the project and the project manager can therefore take necessary actions so that the project will go as planned.

Management of such process is primarily influenced by the following factors:

Technological obsolescence- e-business relies heavily on computers. It is well

known that computer products change so rapidly that new equipment obsolesces very quickly. For this reason, effective planning is necessary to ensure that all resources are *utilized during their useful life.*

Improvements in technology and performance- Recent advancements in computers have helped driven system cost down considerably. For instance, in late 1990s the storage capacity of a hard disk drive was typically several gigabytes. Now for the same price a drive of 60 GB or over is readily available. The lower cost in communications means allowing more people access to the server simultaneously at a more affordable price. Processes can be handled much more quickly compared to a few years ago.

Changes in environments- Change in environment may cause certain merchandise not being sought. One good example is sales of umbrellas, sales is usually at its highest during the rainy season but a change in weather pattern can greatly affect their sales resulting in over stocking of umbrellas.

Sales of many unessential items can be affected by economic situations. When times are bad during economic recession people tend to be more reluctant to buy non-essential luxury products.

Changes in legislative trade agreements- government legislation changes can affect e-commerce planning as we discussed in [4]. For example. the use of CFC in refrigerators was banned in many countries about a decade ago. Over stocking of products failing to comply with new legislations must be avoided.

*Increase in operational costs-*it is often difficult to predict changes in operational costs, both technical and non-technical related. Office space rental is an example of

non-technical related operational cost. The cost of certain components such as dynamic RAM can fluctuate drastically. We experienced a steady reduction in the price of memory modules in early 2001 and was dropped by 70% by year end. It was then more than doubled that of the lowest level in February, 2002. We can see here how quickly costs can change.

While proper management in technology help forecast changes, project management can be made easier with reduction in risk.

Technology also helps drive down the cost of transaction processing [9], through more reliable electronic processing [10], more customers will shop online with confidence. It is shown that technology plays a substantial roles in e-business, we summarize the impacts of technology in e-business and present a framework for managing these factors in the next section.

III. Technology Management

When looking at the process of e-commerce deployment, it is important to understand what the process entails and why

technology management is so important. In the preceding section we discussed the impacts of technology to e-business with examples to indicate some important issues to consider. A block diagram of a simple engineering system with an input and an output [11] as shown in Fig. 2 can be used to model an e-business system.

This block diagram represents the way a customer interaction is processed by the e-business system, namely the web server. An input sent remotely from the customer's computer is received via the internet by the system. The system needs to process this input and to generate an output. Which, in this case, is a response back to the customer. Often the output generated needs to be fed back to the system for further process. As we look into the operation of this system in more details, we talk about what really goes on within the web server and we shall see why technical management is important and also how it can be managed appropriately. The system development process can be modeled by a precedence network shown in Fig. 3, which shows the framework of e-business deployment. Here, we concentrate on the technical development of the project.

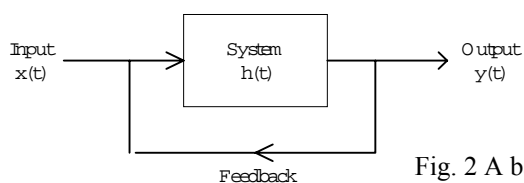


Fig. 2 A basic systems for e-business

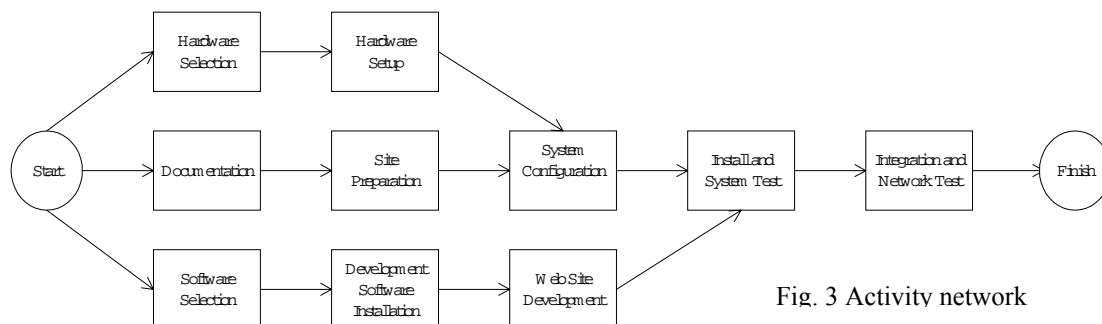


Fig. 3 Activity network

We illustrate the operation by looking at a simple case when a customer looks for programming books. The customer sends an input that indicates the 'retrieval of "books" that is in the "programming" category'. The system output is obviously a list of programming books available at this e-business store. How the system generates this output are the technical aspects we look at. From Fig. 1 we see how the web site is organized. The database that contains all merchandise data is linked to the web pages that serve as an interface with the customer.

In essence, the system is mainly supported by these three components:

Web server: provides a navigation system to users, consists of various pages delivering a wide range of information and functions.

Mail server: takes enquiries from users and places mail order to vendors electronically.

Database: keeps track of a wide range of company information such as inventory, stock movement and level, etc.

The web site defines ways in which the system provides services to customers and how to handle responses from customers. Its importance in both usability and reliability should therefore be self-explanatory. Having looked at some major components of the system, we describe a framework that manages technical aspects of an e-commerce project effectively.

IV. Framework for Information Analysis and Monitoring

As the above discussion outlines, various issues are related to technology management. One of the major objectives of technology management is to improve quality of service provided by the system and

to minimize risks in the project management process. Here we discuss the important technical aspects of an e-commerce project with respect to project management. Fig. 4 shows two separate waterfall models, (a) represents the overall system deployment and (b) shows the technical management steps.

A. Technical Feasibility

The technical resources needed may be derived from requirement specifications. They involve availability and effective utilization of hardware, software and expertise. Considerations may include whether specialized tools that require training are involved. System design and subsequent implementation will be based on the documentation derived from the results of feasibility studies.

B. User interface

Method of interaction determines how the system responds to users' actions and what resources are required. When designing user interface, attention has to be paid on the type of systems customers use and what is provided to them. In e-commerce trading web sites, navigation is often provided by object-based interaction, where objects such as icons and product images are used for selection. Another commonly used element is a form that allows users to enter certain information into the system, such as delivery details and payment options. In most cases, information captured from forms is transferred to a database for storage and subsequent processing. Their design must also be associated with the database.

C. Security

Setting up effective system security is a critical task in project deployment. Security issues apply to both internal protections such as accidental data deletion and modification, and external protections against hacker

intrusions and computer viruses. While too much security makes the system slow and difficult to use, a compromise has to be made for practical implementation.

In addition to providing security to protect the system itself, considerations must be taken for compliance with other external systems. Services such as Secure Electronic Transaction [12] for electronic transactions needs to be taken into consideration.

D. Testing

The final stage of e-business deployment before trading commences is to test the system thoroughly to ensure that all modules function correctly and integrated into the overall system successfully.

A model outlining the transformation stages can be summarized in Fig. 4. This leads to a more detailed management model for e-business project deployment by expanding Fig. 4.

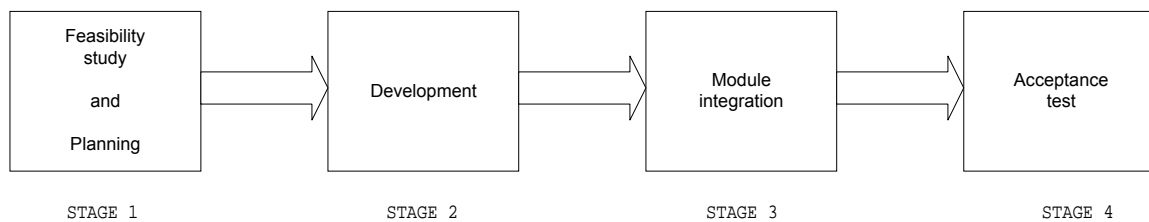


Fig. 4 Transformation stages of project deployment

The four stages shown in Fig. 4 consists of the following steps:

Stage 1:

-Evaluation: Before any work commences, evaluation provides an answer to whether the project is feasible. The evaluation process by itself is a small project on feasibility study. The project's objectives must also be clearly defined.

-Planning: Planning is a very important phase because it can help or obstruct the progress of a project. It gives a direction on how the project can be done. At an early stage the project starts with an outline plan. Details will be filled in as the project progresses due to uncertainties. Necessary information on these uncertainties will become known when the project develops. Planning only helps get the project started, once started the plan must be constantly updated.

- Analysis: Requirement analysis is a process that identifies what is required from the project to meet its objectives. It updates the information of evaluation with more details. At this point a detailed specification for the project is deduced.

- Design: It devises how the project can meet its specifications, what needs to be developed to meet the objective. Part of the design is to decide on what standards to follow and what will be deployed.

Stage 2:

- Infrastructure configuration and implementation: The major part involves getting the server up and running that facilitates further progress. This may involve both hardware and software configuration. Physical connections within the corporate network and onto the internet. Configuration for security is also an important part of the project.

- Coding: When the project is executed, one large part is to generate the end product that meets the project's objective. Coding is the process whereby major components of an e-commerce web site, for example the HTML pages, are created. It may be classified as writing programs.

Stage 3:

- Module test: Each individual module has to complete its own functionality test to ensure it is fully operational before modules are put together to form the overall system.

- Integration: tested modules are merged in the overall system and the commerce system is formed.

Stage 4:

- Testing: The product must be tested to ensure that the specifications are met and it

is reliable. Quality assurance is an important factor in e-commerce trading.

- Finalization: When the product is tested and running, care must be taken to make sure that all relevant components are linked up and they entire system can perform up to expectation. Trading can commence when everything is finalized.

- Maintenance: In the fast growing internet business, constant updates are necessary to remain competitive. The e-commerce web site must be well maintained and continuously change with the business environment.

All of these steps are critical to the project, and they are all closely related to each other. These stages are detailed in Fig. 5.

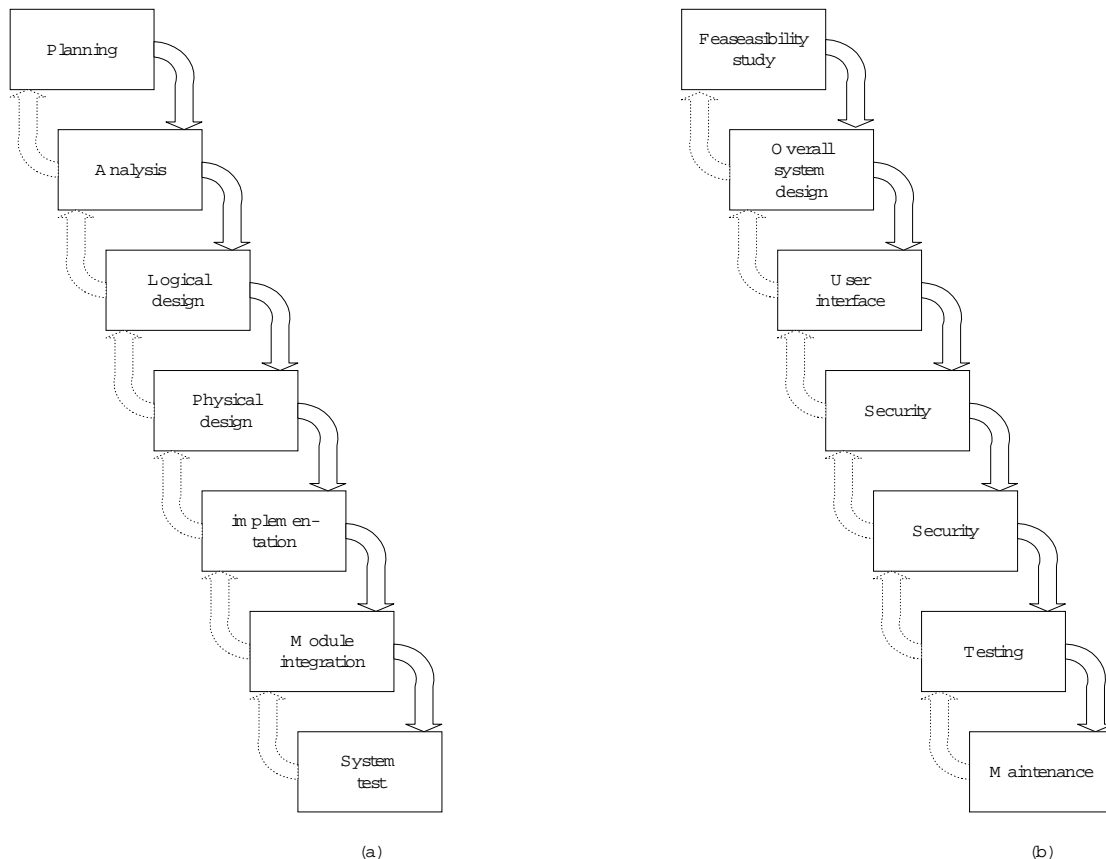


Fig. 5. Waterfall model of (a) system development, (b) technical implementation

Fig. 5 brings together a number of phases discussed above to analyze the actual technical management framework in an e-business project development process. It is possible to gain a practical insight into the issues relevant to the development of a framework to improve technical management process. Consider an environment in which there is a sudden major change in requirements such as the implementation of a new procedure for customers placing orders during the early stage of project deployment, we can adapt to such requirements based on the specific phase involved in the system. In this example, we only need to refer to the user interface design phase.

V. Conclusion

While this paper provides insights into technology management for e-business deployment, we have shown how the project can be broken down into individual phases according to their technical requirements. We have also focused on the technical aspects associated with the project. While the complex nature of e-business will preclude the application of most conventional project management techniques, devising the above framework will provide an information environment which can lead to significant improvement in the effective management of e-business deployment.

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