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Suggestion of Method of Application of Web-based Collaboration System

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Abstract
Construction Industry performs different projects geographically and timely. The present project management requires the collaborations in distributed environment. Many construction companies use web-based collaboration systems to perform the efficient collaboration. Looking into existing trend of study and practice use, they set limits to the improvement of functions of system, system development and application of solution. But, they are difficult to customize in a point of view of users because the existing system and solution are stiffened. That is, they have the lack of system flexibility. In addition, they don't offer the functions such as scheduling to be necessary for construction projects. Application of solutions and system development require much cost and time. Many companies including the small and medium construction companies don't use collaboration solutions and systems because of the above problems. As different functions are needed, the large enterprises procure the separate solutions, or develop system by themselves. Through analysis of trend of study and practice use, this study points out problems of existing solutions and systems, and present the method of application of web-based collaboration system through a software improve those.

Keywords
Collaboration System

1. Introduction

According as the construction project becomes large, professional and complex, many construction companies implement projects which are geographically and chronologically different. Current management of the projects, therefore, requires the personnel to collaborate each other who are in distributed environment. As a tool of the collaboration, a lot of organizations have attempted to apply a Web-based Collaboration System. Within the domestic, the collaboration has been made in a narrow scope through the management of archives that uses the systems such as Continuous Acquisition Life-

cycle Support/Electric Commerce (hereafter, CALS/EC) Knowledge Management System (hereafter, KMS), Enterprise Resource Planning (hereafter, ERP) and Groupware and the sharing of information.

To examine the trend of research and the forms of application, there emerge three aspects: the aspect of the improvement of the function of the collaboration in detail, Application Service Provider (ASP) using the solution of the companies that invented the system and the procurement of the solution through equipping the server of its own, and the development of the system of its own. But solutions and the systems invented of their own, in developing their own systems have some difficulties in customizing by keeping in mind the purposes of the End-users and the characteristics of construction project- temporality, distributed work environment, complexity- because of the rigidity of the architecture. That is the weakness of the lack of the flexibility in the system. Even in the case the customizing becomes possible, it takes too much time existing companies that develop the solutions or they have to reform this by receiving the code from the companies. The existing solutions and systems lack of the support for the management of the effective progress and of the prime cost in a construction project, which has become complex and large. The function of the management of progress, which is only a form of Bar-chart and materialized by PMIS is not able to carry out an in-depth management of the construction process and of the prime cost. By this reason, many companies, including the small and medium construction companies, cannot even conceive the idea of applying the solution of collaboration or the collaboration system. Even the large companies, when they need various functions, utilize the solution individually.

The paper, therefore, will examine the problems in the existing research trend that is limited only to the improvement of the functions. This research will also point out many problems: the problem of taking too much time and expenses; the difficulty in customizing; and the inability to reflect the characteristics of the solution and system in a construction project. In order to improve these problems, this paper would propose a couple of ideas: the need for utilizing the system patch through which the function, when it is necessary, can be added; and the need for utilizing the collaboration system by using the software that can reduce the cost and time.

2. Research Trend and Application in KOREA

The research within the country has yet been very poor in both academies and research centers, primarily has been done centering on the company and government. Even researches within industrial organization and government do not directly deal with the collaboration system that I deal with in this paper, but deal with only in researching Knowledge Management System (KMS, hereinafter referred to KMS), Enterprise Resource Planning (ERP, hereinafter referred to ERP), Project Management Information System (PMIS, hereinafter referred to PMIS), construction CALS/EC. That means that they deal with the collaboration system only when they materialize the system related to KMS, ERP system, project information management and construction CALS/EC.

The research on the collaboration system within the academic world has never been done, only a limited research in the area of computer-related majors. First, to examine the research related to the electronic computer, some research on the environment of the development of the collaboration system is in progress. That is, it is to propose the most appropriate environment for the development of the collaboration system through the analysis and comparison of existing collaboration system. [10], [12]. [13], [14].

The research on the realization and the design of the collaboration system based on the web has also been in progress. In the past, the collaboration system was possible and designed under the Client/Server (C/S) environment. But, at present all collaboration systems has an excellent accessibility everywhere by the development the technology of computer and internet and the design and realization becomes possible by using the web as the basis, with which the analysis of information and collection are easy. Currently since all of the system are structured by the web, the research as to what kind of function can a system

accomplish, focusing on the detailed function of the system by the user's perspective is under way. [3], [15], [16].

To look into trend of the studies on the management of knowledge under way related to the collaboration and construction CALS/EC very briefly, first, the studies done by industrial research centers shows that many companies focus on how to accomplish the function of collaboration in developing the solution relevant to the work. To look into the detailed function of solution, it accomplishes the collaboration simply as a way of communication, such as, to support e-mail and electronic settlement because it is related to the work from the aspects of storing the knowledge and application of it. It also supports the collaboration within the organization by connecting Electronic Data Management System (EDMS) and groupware. Because CALS/EC is an integrated information system that exchanges and shares information between the companies that order and those which receive order in the process of planning, design, construction, and maintenance [17], research on the collaboration system is actively in progress since it is inevitable to connect it with the work. To give a more detailed description; within governmental research centers the research on the collaboration system has been under way in the research centers such as Korea Institute of Construction Technology (KICT) and Korea Construction CALS Association. The studies focus on the establishment of electronic management system, the development of the electronic procurements system for the construction material and electronic bids related to the work for constructors, permission and civil work.

3. Analysis of the Function of the Existing Web-based Collaboration System

The paper draws upon the basic requirements and features of the collaboration system through the analysis of the function of the collaborative solution that has been referred to in the investigation of the requirements and its application proposed by F.Fena-Mora. Following the requirements, the paper will analyze many types of solutions and system referred to in the chapter that focused on the trend of research and application.

Table 1 illustrates the functions that are developed when installed mentioned in the Table 1.

Table1. Functions Connected with Collaboration of Existing Collaboration

General Requirements	Existing Collaboration Solutions						
	CSIS	e-novator EKP.NET	Autodesk Buzzsaw	PMIS	CAIRO	Tele-presenc	KDNS
Synchronous communication	○	○			○	○	
Asynchronous communication	○	○	○	○	○		○
Management by groups		○					○
Information sharing				○			○
Conferencing function	○	○	○		○	○	
Open Architecture		○			○	○	
Data storing & Management	○	○	○	○	○		○
History management and sharing of Document	○	○	○	○	○		○
Real-time exchange of document	○	○			○		○
Real-time Event notification etc.							
System Architecture	center	center	center	center	center	center	center

Table2. Cost and Terms for Development of Solution

Name of Solution	Terms	Cost	Type of Service/ Cost
e-novator EKP.NET	About 1 year	About 300 million	Sale (Customizing)
Autodesk Buzzsaw	About 2 years	About 300 billion	ASP/0.3 million (500MB, Month)
CSIS	About 1 year	About 100 million	Sale/15 million (for 15 sites)

As is shown Table 1, existing solutions are different from the ones equipped by system. To examine the functions relevant to the collaboration system of existing solution, the PMIS and KMS support store of data and management, management of the history of documents and sharing and asynchronous communication. This is the result of the construction of the system connecting it with Electronic Data Management System (EDMS) and Groupware.

4. Analysis of the Problems of the Existing Web-based Collaboration System

The paper draws upon the problems of the existing web-based collaboration system through analyzing the trend of studies and application, and functions. To examine the trend of the research briefly, within the country, the research on the collaboration system is very poor and outside country, researches are mainly done primarily by companies and academies focusing on the development of collaboration system and the reformation of the function-the mutual exchange with multiple device, realization of 3D Conferencing function, and the simultaneous realization of synchronous/asynchronous communication. To examine the situation of the application, they develop the systems of their own or perform the collaboration by using current solution.

Table3. Cost and Terms for Construction of KMS

Unit; $, Thousand

Company	Cost	Terms	Service company
Korea Industrial Development Co.	About 368	00.03.–00.08	HYUNDAE Information Tech. Co.
Korea Highway Corporation	About 325	00.07-01.12	Metabuild Co.
POSCO Engineering & Construction Co.	About 250	01.03-01-07	Cyberdaim
Ministry of Information and Communication	About 1,000	2000-2001	Ssangyong Information & communication Co.
Korea Water Resources Corporation	About 417	not open to the public	Handsoft co.
DAELIM Industrial Co.	Not open to the public	00.01-00.06	DAELIM Information & communication co.
Environmental Management Corporation	About 17	2000	Ssangyong Information & communication Co.

Table4. Above-mentioned Problems

Problems
Developing collaboration solution (or system) needs much cost and time
Customizing collaboration solution needs much cost and time
Customizing collaboration solution is comparatively difficult
Education and application of collaboration solution needs long time of adaptation
Much service and sale cost of collaboration solution
Impossibility of reapplication of data on using Application Service Provider (ASP)
Stiffness of solution and system architecture
Lack of function such as Scheduling and costing etc. for construction project

Source : Korea software Industry Association (2001), "Examination Report of Trend by Divisions for S/W Industry-KMS" Quotation

In many companies, including small and medium companies, it is very hard to utilize the solution that supports collaboration due to the difficulties and problems mentioned above, those of cost and time and those in function. Large companies also have to develop the system that they need for themselves. In short, the problems can be summarized as follows. Table 5 summarized these.

5. Conclusion

Construction industry has become large, complex, and professional as the environment of economy and market change and the construction technology and the related one are improved. By this trend, the importance on the project management in the construction industry becomes stressed. The construction project demands the collaboration since the project by its feature is implemented in the distributed working environment, geographically and chronologically. Many construction companies establish the web-based collaboration system and utilize it to support the collaboration. Within the country, poor as the research on the issue, there are lots of studies in progress outside the country. So far the research has been done focusing on the development of the system and solution and solution Application Service Provider (ASP) service and the functions of mutual exchangeability and the integration of synchronous/asynchronous system. However, the collaboration system, demand high cost and lots of time in developing. Because of the strict structure, it is very hard to implement various projects and

customizing them by their features. If possible, lots of time should be spent. Considering the fast speed of the development of the computer and information technology, including Internet technology, it is temporary and the function of the management of the work process that is necessary to the real construction industry is weak. To examine the application of the system, it has been applied primarily by large companies and many companies, including small and medium companies are in the situation that they cannot use the system as a tool for the effective work management. Even large companies, in their needing the functions, have to depend on solutions developed by other companies.

To improve these problems, therefore, the features of the construction project-temporality, complexity, distributed work environment- should be considered in detail; patching the project by time and project should be possible; the function like that of the management of schedule should be supported directly. In this research, the paper examined the concept of collaboration and relevant area, the trend of research, and the application and analyzed the problems. The paper selected software that can realize the function of system patch and management of the schedule through reflecting the characteristics of the construction project, presenting a prototype of the web-based collaboration system, analyzing its application and effect. As the outcome of this research, with the aid of the function of system patch, the user can customize the project feature by feature. It is expected that the function also can be helpful to the effective decision-making through the use of the function of the management of schedule, and increased the applicability to many companies, including small and medium companies. Unlike existing form of collaboration that has supported work by installing various systems, the web-based collaboration system can produce a lot of effect in time and cost through the use of the function of the system patch.

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