

***eWorks*: Development of a Web Based Site Assessment Software for Construction Progress Project**

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Abstract

In assessment of site, contractors have a lot of routine jobs such as checklists, daily reports, collection of construction data and the inspection. Contractor needs to access the real construction site to manage the construction project progress. They usually use sheets of paper or field notes. A gap in time and space between the outdoor construction site and the office which leads to the low efficiency and increasing cost of construction project. This project describes the development of a productive software tools to help contractors for site process evaluation and reporting. This software tool called *eWorks*. *eWorks* is an initiative that integrates the assessment of site process in construction project supply chain onto an electronic or digital medium using web based technologies in hope that it can transcend geographical, time, economical, people-based error and low efficiency making it faster, more efficient and more profitable for Contractors. This software will help to reduce the paper usage, visualization progress by using graphical image, video and Gantt chart format. *eWorks* is an innovative web based software solution for tracking and monitoring construction site assessment and progress.

Keywords: Web Based Technology, Site Assessment Tools, Progress Report.

1.0 Introduction

In today's environment, organizations are increasingly managing their activities and processes as projects to monitor performance more closely and make better business decisions about their overall work portfolio. Project Management Systems over the world are gaining critical acclaim for successful and timely execution of both large and small scale projects. These tools could help in monitoring and

tracking of timely availability/allocation of resources by triggering the tasks getting delayed, apart from generating various reports in the form of both graphical and tabular analytical reports helping in quick assessment and taking appropriate actions in time [1].

It is important to standardize the administrative information for an effective performance of each construction management (CM) process. The business breakdown structure (BBS) for CM is one of the breakdown structures for classifying CM information generated from each CM process, and it could be a useful tool for the standardization of various administrative information for a construction project. The process of CM includes many specialized information for management of time, cost, and quality throughout the project life cycle. The BBS is a standardized code system to classify those CM tasks for efficient management of information generated from detailed CM processes.

A work breakdown structure (WBS) is a representative code system and most construction projects have a unique WBS code system, however the WBS is focused on the work operations. On the other hand, BBS code is classified and focused for the business information, such as time scheduling, cost management, quality management and resource management that is generated through the whole CM duration of a project. For example, time scheduling tasks can be classified by critical path analysis, network diagramming and progress control process. BBS code classifies those detailed management information for each CM task as a standard breakdown structure so that project manager can manage and reuse those information through project duration. Accordingly, WBS code is necessary for managing construction operation information in

the construction phase, on the other hand, BBS code is necessary for classifying business information for each CM task through the whole project duration [2].

Web base application usually got the high requirements from users. This technology give more benefit to us to decorate a good work culture which is more manage and systematic. It also help user to improve standardize in pattern of works. This application may include storing data and which can produce information that user needed and it can access by Internet. [3]

This *eWorks* system is an initiative that integrates the assessment of site process in construction project supply chain onto an electronic or digital medium using web based technologies in hope that it can transcend geographical, time, economical, people-based error and low efficiency making it faster, more efficient and more profitable for Contractors. This software will help to reduce the paper usage, visualization progress by using graphical image, video and Gantt chart format. *eWorks* is an innovative web based software solution for tracking and monitoring construction site assessment and progress.

2.0 *e-works* Concepts and Architecture

The objectives of the development of *e-works* are to replace the manual system with the web-based system, to implement the research concept of construction progress report between contractor and client project into centralized system using internet technology and to evaluate the system and make sure it meet user requirement and could increase the productivity of contractors activities [4].

2.1 Productivity Excellence through an Integrated Construction Management System

This paper describes the actual case of how an Integrated Construction Management application designed specifically for the construction industry can enhance productivity, efficiency and competitive advantage [5].

E-works is one part of comprehensive application is an advanced web-based system not covering construction tendering, procurement, workflow management and document management but only project management functions. It is a full Internet based system with advanced PKI-based (public key infrastructure

based) security features to ensure data confidentiality, data integrity and authenticity [6]

2.2 Three-tier Architecture for *e-Works*

The aim of this an innovative web based solution project was to replace the manual system in site assessment tools. This solution enables the real time of activities in construction progress reporting process is well defined.

The purpose of the needs system architecture is to explain the function of the system that will be implemented and to obtain agreement of the developer and the user on the mentioned needs.

2.3 *e-Works* Architecture

Figure 1, shows a design of integrated *e-Works*, which uses Three Tier Architecture. The system consists of three components: Users Tier, Server Tier and Application Tier arranged in the following architecture [7].

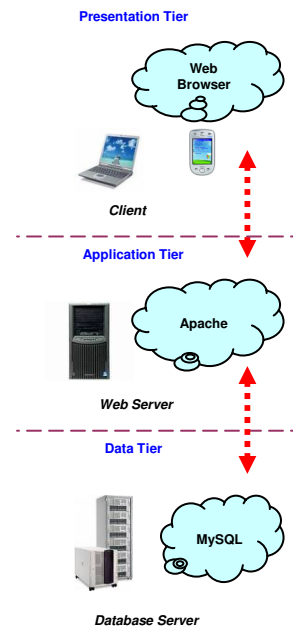


Figure 1: The *e-Works* Three Tier Architecture

i. Users Tier

The User Tier is composed of wireless access point, which can be set up at convenient locations where network connectivity and power are available. These devices for interaction with the user that enables them to access *e-Works* via desktop or wireless mobile device such as laptop, tablet PCs, Pocket PCs and PDA.

ii. *Server Tier*

The middle tier of *e-Works* is a Server Tier using Web Server Apache. The key of this layer are large storage capacities, renewable power and the ability to communicate with wireless network access point and the applications of *e-Works*.

iii. *Application Tier*

On this Application Tier, MySQL is used to manage the *e-Works* database and PHP as a script of web programming. The PHP is an advanced programming language that facilitates interactive interfaces and supports powerful databases. PHP also used open source scripting language that is specially suited for Web development.

3. *e-Works* Research Methodology

The Rational Unified Process (RUP) has been used as an approach to develop this system. The phases in RUP are:

i) *Inception phase*

This is an introduction phase that will be used to introduce the new system. In this phase, the probability risk and requirement must be identified. In another word, business case will be developed in this phase.

ii) *Elaboration phase*

This phase is use to analyse root problem that had been detect, develop project strategies, and remove a high cost problem from effecting the project. Project architecture will be develop in frame when the developer identify the scope, main function, functional and none functional requirement. In this phase, Use Case and Actor that interact with system will be identified and Use Case Description will be developed.

iii) *Construction phase*

This phase is use to complete the system development. All component and application element will be combine to adapt with the new product.

iv) *Transition phase*

This is the last phase which is very important to make sure end user can accept and use the system. In this phase, system will be test and correction will be doing from user feedback.

3.1 *Model Structure*

3.1.1 *RUP technique*

Figure 2 shows Iteration technique for Rational Unified Process (RUP) methodology. The iteration technique includes business modeling, requirements, analysis and design, implementation and test, deployment, project management, configuration and change management.

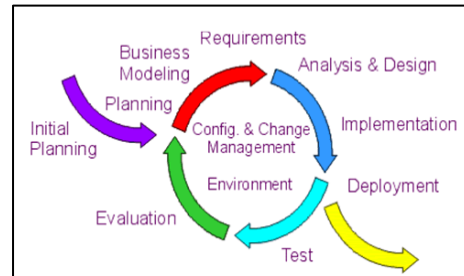


Figure 2: Iteration technique

3.2.2 *Phases in RUP*

Figure 3 shows the used of RUP in developing system. The phases that state at above shows inception phase, elaboration phase, construction phase and transition phase. In the left diagram is a workflow that developer involves in each phase. Different phase need a different workflow that has to be including in the development process

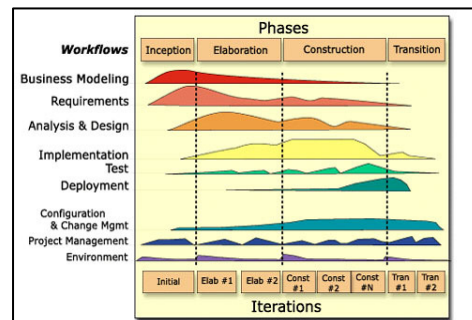


Figure 3: Phases in Rational Unified Process

4. *System Requirements*

The purpose of the needs work flow is to explain the function of the system that will be implemented and to obtain agreement of the developer and the user on the mentioned needs.

4.1 *Use Case Diagram*

Figure 4 shows the use-case model for *e-Works* System. This model shows interaction between 3 primary actors which are the systems admin (contractor) and client (owner project) and

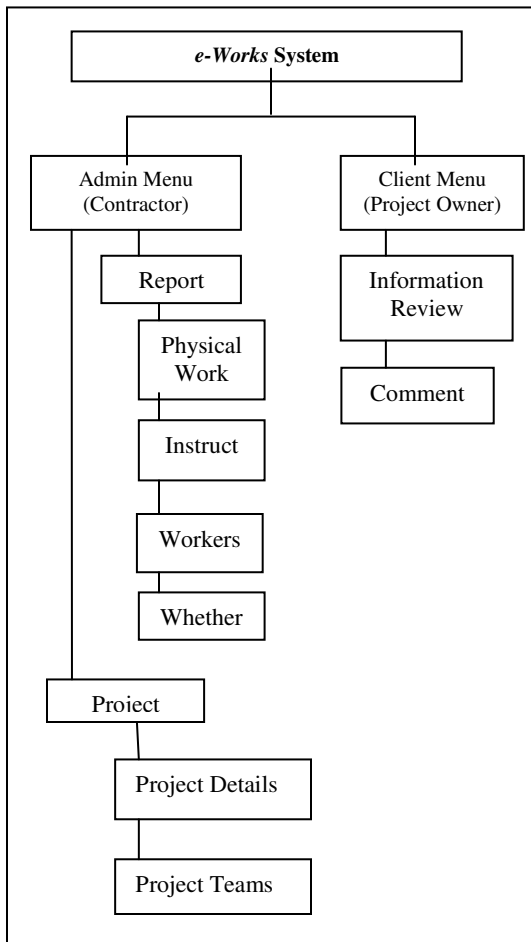


Figure 6: e-Works Menu Hierarchy

6.2 System Implementation

In the implementation part of the system, description of each module in *e-Works* System which is the system administrator (contractor) module and client (project owner) module will be explained with the aid of figures/diagrams.

6.2.1 System Log-In

Figure 7 shows the correct screen for the user to log into e-Works System. Users are required to enter by entering their usernames and passwords.

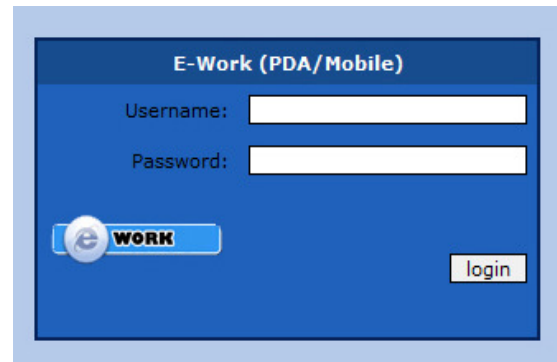


Figure 7: Login Interface

6.3.2 System Administrator Module

When a system administrator (contractor) logs in, the main menu display screen as in figure 8 to figure 12 will be displayed.

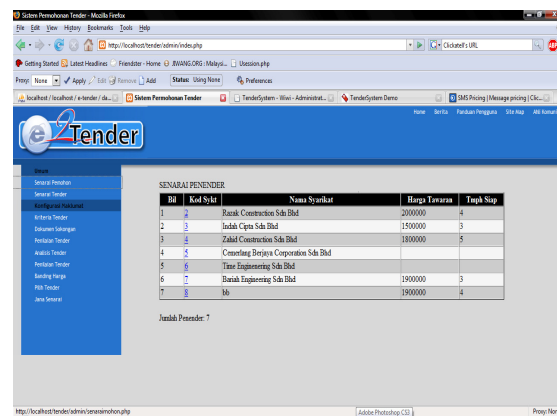


Figure 8 : Admin Interface

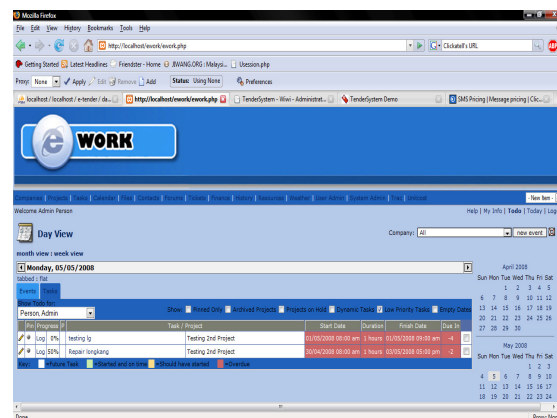


Figure 9: Job Task By Project Interface

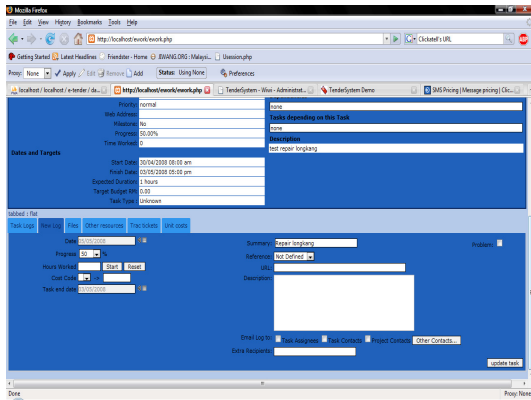


Figure 10 : Details about Task Progress Interface

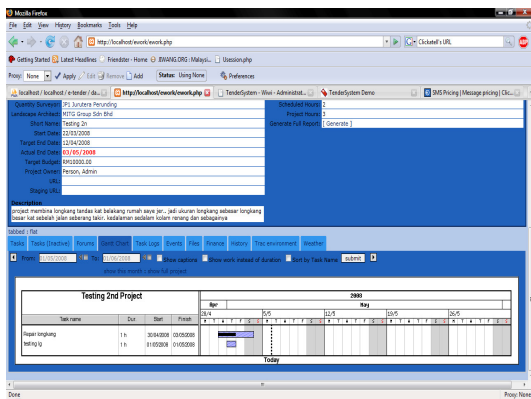


Figure 11: Gantt Chart Interface

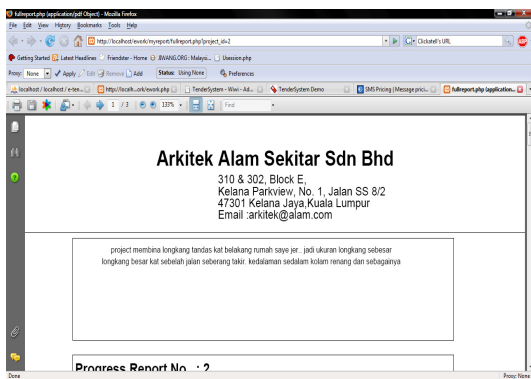


Figure 12: Construction Progress Report In PDF Format Interface

7. Discussion

The e-Works System will help the management staffs in handling activities by providing the following functions:

- i) Easy to develop and manage monthly report of construction progression.
- ii) Reduce time for preparing progress report. All the comment can get from client before attend monthly meeting.

This system has potential to be expanded because it is good for Construction Company which needs to handle large of number construction project. Between the concepts of sending report is easy and may make more attentions to them use it.

8. Conclusion

e-Works System is a system which focus on developed construction progress report that handle by contractor and it need to send to client or owner of construction project. This system may help the entire project partner making a good decision for the project and can reduce many critical cases happened such as unfinished project and extended time project.

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