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Risk Analysis in Web Project Management

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Abstract

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The web has become the main platform for deploying business and social application and organizational information systems. Web Project management is relatively new field of knowledge, which has been dynamically developing. Goal of project management is providing solutions to existing problems, ranging from simple problems of preparing a wedding to setting up a factory or building a space ship. While providing a solution it deals with management of resources, people, time and communication. Additionally it addresses problems of managing risk and informing stakeholders of a project. These problems have lead to invention of tools like: Work Breakdown Structure, Gantt chart, PERT diagram and Critical Path Method. Another important aspect of project management is that it involves teamwork and collaboration of team members. The aim is to bring an easy to use and complete application for project managers and team members that will provide the most needed tools and enforce communication between team members.

Risk assessment is an important part of the project. It is often carried out individually by the various disciplines involved in a construction project [1]. As the industry moves towards more collaborative working practices, it is vital that tools are available which enable risk assessment to be collaboratively undertaken. The paper addresses what are the new ways to reduce risk in web project management.

Keywords: ***Web project management, Risk Analysis, Quantitative Risk Analysis.***

1. Introduction

AEC(Architecture, Engineering, and Construction) projects typically are projects in which a large number of participants have to work together on the design and production of a complex product. However, there has always been a high degree of fragmentation and geographical dispersion between the members of a construction project team. Hence computer supported collaborative work (CSCW) in the design process of such projects is generally regarded to be the critical factor for success, and IT-based enabling tools are required to facilitate geographically distributed team members collaborative work. Such tools need to address specific areas of construction [4]. Risk assessment is an important area in this regard, as construction projects are initiated in complex, dynamic and uncertain environments resulting in many kinds of risks. These risks affect potentially the cost, time and quality of the construction project [5].

A risk assessment tool is essential for AEC professionals to ensure that the design meets the expectation of the project within the limitations of the budget and time. Such a tool should have the following objectives:

* Identify the potential risks associated with a project;
* Determine the relative significance of different risks and put them in order of priority.
* Develop a plan to avoid, mitigate, monitor and manage risks; and Guide future construction management effort

2. SYSTEM WORKFLOW

The main stages of the risk assessment system can be shown in below figure. A UML activity diagram [1] is used to illustrate the system workflow and capture process communication between the actors in construction project. This diagram shows how the project manager and the typical team members play their parts in identifying and ranking the risks of project. The generic team members include a client, an architect, a structural engineer, a mechanical & electrical (M&E) engineer, and a contractor. The result of completing the process is the generation of a ranked list of project risks and an action plan for managing them.

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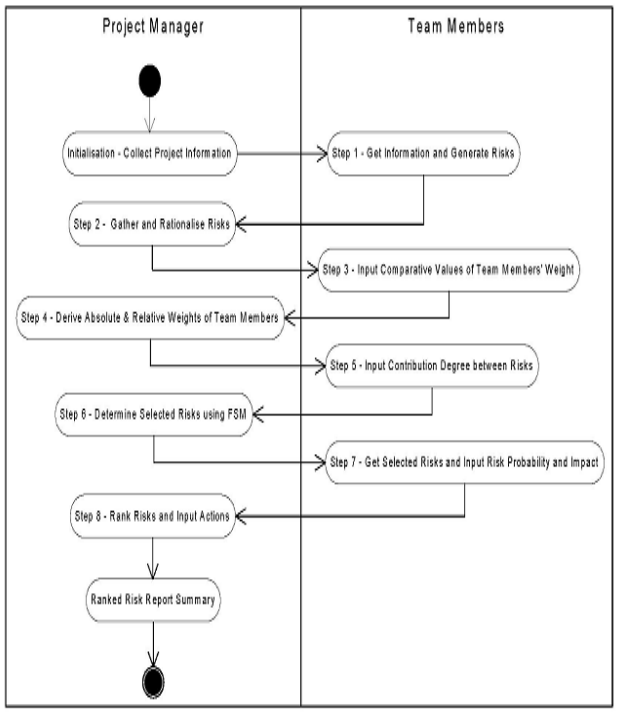

Figure 1. Risk assessment process

3. QUANTITATIVE RISK ANALYSIS

3.1 What is Quantitative Risk Analysis and how can it help you?

Typically, there are a large number of uncertainties involved in the generation of cost estimates for a large project [2]. One way to take into account, understand and possibly manage these uncertainties is through a technique called "Quantitative Risk Analysis". Quantitative risk analysis is a process that identifies and quantifies the uncertainties associated with a project and then develops a 'probabilistic model7' to represent the project. The output of this model then provides a view of the risk and uncertainty associated with cost of the overall project as well as the component parts of the project.

For example, the output from a quantitative risk analysis model can answer many questions such as: "What is the probability that the total cost of the project will exceed a specific value?" with the answer in the form of "There is a 20% probability that the total costs will exceed $10 Million."

Uncertainties and risks in a quantitative risk analysis model are usually represented by a probability distribution. For example the costs associated with structural steel are no longer represented in the cost estimate as a single point with an additional allowance for escalation as in traditional estimating. Instead, structural steel costs would now be represented by a range of possible costs, including escalation, along with the probability of each possible cost for structural steel. In addition to modeling the costs for particular line items or sub-systems, it is recommended to model the uncertainty associated with potential risks that might affect multiple line items or sub-systems. These risks are often called "Risk Drivers" - examples of such risk drivers might be weather, regulatory permitting, main contractor risks, the level of design completion when the estimate is produced, etc. Risk drivers can also be represented by probability distributions but it important to also identify which specific cost items might be affected by each risk driver and the impact of the risk driver. When modeling individual cost items as well as risk drivers, it is important to carefully consider the impact of systemic relationships in the project being modeled. One example might be that the labor cost for installing structural steel is directly proportional to the amount of structural steel in the project. As the amount of structural steel increases, so does the amount of structural steel labor. It is critical that this relationship be included in the model as a correlation. The model should not be permitted to estimate the structural steel labor at the low end of its possible range while simultaneously estimating the amount of structural steel at the high end of the range. If this were to happen, the final result of the model would under-estimate the possible range of the overall project cost.

3.2 Advantages of Quantitative Risk Cost Estimation

Using quantitative risk analysis as a basis for cost estimation can provide a number of advantages over traditional methods, including:

- Risk analysis changes the entire paradigm of how the project team thinks about and addresses cost estimation. The process of building a project risk analysis encourages an open discussion about risks and uncertainty. This by itself is an important and often useful exercise resulting in both reduced risk and reduced cost.
- Cost forecasts are not forced into the "pigeon hole" of single point estimates. Instead, risk analysis recognizes that cost estimates are inherently uncertain. Traditional methods ignore or attempt to "average out" the risk and uncertainty.
- The process helps the project team to also identify risk drivers that project management should focus on to reduce the project's costs.
- It allows stakeholders to better understand the project's risks and the probability of the actual costs being above the base-case estimate or the budget.

- Quantitative risk analysis models should be very transparent and have all assumptions clearly documented to encourage acceptance by all stakeholders. This transparency also allows managers to identify areas in the cost estimate
- Where some of the root causes for cost overrun (technical, political, optimism bias) have crept into the model.
- Sensitivity analysis helps identify areas of the project that have the potential for causing the most uncertainty. These are therefore the areas of the project most likely to cause cost overruns and are the areas where the project team would want to concentrate their risk management efforts.

3.3 Who Should Produce the Risk Analysis?

One school of thought is that the cost engineers or managers associated with the project should lead the effort to produce a risk-based cost estimate. What usually happens when this path is chosen is often a scenario similar to the following:
A Monte Carlo software tool is selected
One or several of the cost estimators is given the software and sent to a software training course
Those folks are then expected to produce a comprehensive, transparent, easy to use and accurate cost estimation model in (often) a very short period of time.
In many cases this is unfortunately a recipe for failure, for the following reasons. A cost engineer experienced in traditional estimation techniques will likely not immediately be a good risk analyst. Producing a quality risk-based cost estimate requires a quite different and new set of skills. It requires someone experienced not only with the specific software tools but also with conducting a workshop, expert elicitation, probabilistic mathematics, correlation identification, model building and documentation (all important and needed for producing an accurate and useful quantitative risk analysis).
In addition, it is important to consider time requirements, learning curves and opportunity costs of having an expert cost engineer pulled away from other productive work. It will probably take an inexperienced analyst doing his or her first risk-based cost estimation three to five times as long as an experienced risk analyst to produce a good and useful cost estimation model. In the long run it is often less expensive to find and hire an expert risk analysis consulting firm experienced with all facets of quantitative risk analysis as it relates to project risk analysis. Such a firm can develop and document a quality risk analysis model based on your specific needs and business processes in a fraction of the time and for a fraction of the total cost of a completely in-house effort. In addition, a good firm will educate and work with the in-house staff so that they become familiar with the tools and techniques required for the analysis. Not only will the project now have a useful risk-based cost estimate, but the users of the model will be prepared to modify and reuse the model without re-engaging the external consultant.

3.4 What to Look For in a Risk Analysis Consulting Firm

Locating, choosing and hiring the best consulting firm capable of assisting with the construction of a probabilistic cost estimate can be a challenging experience. To assist in this process, we provide a few key areas that we consider critically important to the selection process:
Technical expertise: Does the consulting firm have staff with the technical expertise to create a robust and functional yet transparent and user friendly Monte Carlo model? Can they demonstrate proof of such expertise?
Experience: What type of experience does the firm's staff have in the area of project and cost risk analysis? What other types of projects have they worked on? An experienced consultant will produce a better outcome in a shorter period of time.
Broad background: There are many statistical, probability and modeling techniques and tools available. Choose a consultant with broad experience (i.e. not just a consultant that knows a certain software package) so that they are familiar with a variety of techniques and can apply the best mix of available methods to your situation.
Customer focused and flexible: It is important for a consultant to pay careful attention to your specific requirements and provide a customized solution tailored to your needs.
Informative and educational: Work with an outside firm that is truly interested in raising the level of knowledge of your entire team. Also, the solution you receive should be completely transparent and not be a "black box" that only the consultant understands.
With increased expertise and a transparent model, your team should be able to modify and reuse the solution without the need for re-hiring the consultant.
Personal service: You should expect personal yet professional service, a high level of responsiveness, complete integrity and independence from a risk analysis consultant. Be sure to ask for and check references, request a proposal outlining what services will be provided as well as complete costs and a timeline.

3.5 Next Step

This paper has only briefly introduced the application of quantitative risk analysis to the field of project cost estimation. If you need help starting, implementing or completing a risk-based cost estimation program, consider

contacting Vose Consulting. We offer a wide range of services and have extensive experience including:
Facilitating the development of a dedicated internal risk Analysis function:
We have helped a number of large corporations design, develop, train and implement an internal risk analysis department.
Risk analysis modeling: We can rapidly design, develop, and validate complex risk analysis models customized to your specific cost estimation and project risk requirements.
Model review: Vose Consulting has reviewed a large number of models built by our clients. We can produce an assessment of your model's soundness, completeness accuracy as well as provide recommendations for improvement. Many clients have found this to be a very valuable and cost effective service.
Training courses: We offer both public and custom in-house training courses in the area of quantitative risk analysis.
Workshops: Our clients have often found a hands-on custom project risk analysis workshop to be very effective. We meet with the client for approximately one to three days where we provide intense customized training in a specific area of interest as well as develop together a model based on the client's specific needs. At the end of the workshop, the client leaves with a robust functioning model in combination with the knowledge and experience needed to modify and enhance the model on their own.
Custom software tools: Risk analysis models are often built using standard, off-the-shelf software tools and in most cases this is works very well. Sometimes however, if may be necessary or desired to have a custom software tool or application built for specific and unique requirements. Vose Consulting has a team of highly experienced professional software engineers who have built a number of bespoke risk analysis applications for our customers.

4. PROPOSED WORK

4.1 E-commerce Integration:-

Problem: There is cost risk to Developer and the client also. Sometimes developer takes whole amount but unable to complete project within deadline so it results loss to client. However Developer provide whole project client produce delay for payment so it is also not good.
Solution: When project is started client and developer should create milestones and it is approved by both and authorized bank. It avoids risk of cost. Here parties create milestone according to percentage completion of project. For each milestone some amount is related. Example- When developer create 30% work client should approve that work so that automatically payment is done through bank gateway.
That means client create special account that contain project whole amount but this amount is deducted with agreement of client. So due to this cost risk will be reduced.

4.2 Deploy your web project on cloud

If you create your project on cloud then it is beneficial to us for following factor: Load balancing, Traffic test, Scalability, Reliability, Security, Robustness and Monitoring also.

4.3 Use API provided by Cloud Vendors to reduce task of Programmer

You can use API provided by cloud vendor to reuse code and save time and development effort.

5. CONCLUSION

Due to Web Project Management we reduce the risk by using some risk analysis techniques. Quantitative Risk Analysis is best technique to avoid risk. In my proposed work I am using e-commerce integration with web project, use of cloud concept in web project. So due to this we can analyze the risk of the web project.

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