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MANAGING DIGITAL LIBRARIES: THE VIEW FROM 30,000 FEET

Project risk management

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Abstract

Purpose – The aim of this article is to develop an understanding of the issues related to risk management in digital library projects as well as techniques for mitigating risk in these projects.

Design/methodology/approach – Using evidence from other research in the area, this article outlines the major risk issues within a project and then defines a model for mitigating risk within a project.

Findings – The article finds that understanding the risk management entails understanding the underlying factors that contribute to project risks. These risks are often the same, regardless of the nature of the project. The first step in risk assessment is risk identification. Once risk identification is complete, risk analysis is used to identify the likelihood the risks that have been identified will happen. While there are several formal methods that can be used for risk analysis, many project managers use some type of matrix-based decision process for analyzing and evaluating project risk. The most successful project managers maintain open lines of communication throughout their organizations to stay in touch with constituent's needs.

Originality/value – This article fills a gap in the digital project management literature by helping project managers understand the issues related to project risk and how to avoid them, thereby insuring greater probability their project will come to a successful and satisfying conclusion.

Keywords Digital libraries, Project management, Risk management, Risk analysis

Paper type Viewpoint

Introduction

Risk management is something that is more frequently associated with bridge building, mechanical engineering, or actuarial science than digital library projects. Yet, one of the critical aspects of good digital library project planning and management is risk management.

One way of defining "risk" is that risk is a problem that has not happened – yet. While this may be a bit simplistic, it does get to the core of the issue a project manager faces: "What are the problems I might encounter while performing this project and how do I avoid them?"

Given the critical nature of this question, one might think that risk management would be high on every project manager's agenda. Unfortunately, risk management is often not given the attention it warrants. This does not necessarily mean that the project manager does not consider the issues related to risk, but rather that often project managers only perform a superficial examination of the issues related to risk and then add a "margin for risk." This technique, known as "using a WAG[1]" does not work. The reason is simple: the likelihood a WAG will be significantly underestimated is as equal as the likelihood it will be a valid overestimation[2].

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Nonetheless, project managers often resort to these techniques because the risks in projects are outside of their immediate control. An example of this type of lack on control is dependency on an outside software vendor. Therefore, because a project manager may feel somewhat helpless in dealing with the risk, they approach the issue with a guess figuring it is better than doing nothing at all.

This is misguided because all risks can be effectively addressed in one of several ways. Risk can be:

- reduced or eliminated by including problem remediation activities into the project plan;
- transferred to other activities or other responsible parties, such as an outside vendor;
- absorbed or pooled by simply planning for them; and
- avoided by putting quality control practices and procedures into place.

Some of these techniques are more easily performed and less costly overall than others. For example, it is easier and less costly to avoid risk in the first place, rather than attempting to fix or remediate problems once they have occurred. Not surprisingly then, when good project managers think about risk management, they focus on mitigating risk within the overall project.

Risk factors

Understanding the process of risk management entails understanding the underlying factors that contribute to project risks. The project management literature is strewn with investigations into project risk factors and repeatedly investigators find many of the same risk factors, regardless of the nature of the project.

As Keil *et al.* (1998) have noted, the most common risk factors are remarkably consistent across projects:

- lack of top management commitment to the project;
- failure to gain user commitment;
- misunderstanding the requirements;
- lack of adequate user involvement; and
- failure to manage end user expectations.

One point that is especially interesting here is the use of "commitment" rather than "support." Keil *et al.* point out that this distinction is critical. It is easy to support a project by throwing money or empty words behind it; it is an entirely different thing to actively work on the behalf of a project and to continue to do so for the long haul. Project managers need this latter type of support.

To this litany of risks, Jones (1994) adds that projects involving information technology are also particularly subject to the following additional risk factors:

- creeping user requirements;
- excessive schedule pressure; that is doing too much in too little time;
- low quality work as a result of undue pressure;
- cost overruns; and
- inadequate configuration control.

Many, but not all, of these factors are caused or exacerbated by inadequate evaluation of the various categories of risk that are inherent in every project.

Risk categories

McConnell (1996) outlined a hierarchy of risk categories that project managers should be cognizant of when performing their project planning. By doing so, they may be able to avoid the risks that have been outlined so far.

In his research, McConnell identified four major categories of risk: dependencies, requirements, management issues, and lack of knowledge.

A project manager can avoid dependency risks by being mindful of such issues as:

- intercomponent dependencies within software;
- intergroup dependencies that occur when work is split across functions;
- the availability of people to perform task functions at the needed time; and
- subcontractor relationships and the reliability of delivery according to schedule

Requirement risks are typically caused by:

- lack of a clear vision for the overall project;
- lack of agreement on requirement, particularly within the organization overall;
- requirements that are not truly prioritized;
- development within a rapidly changing environment using a rigid project management methodology; and
- inadequate change management processes that do not provide documentation for later reference.

Risks related to management often represent a convergence of issues from the prior two categories:

- inadequate overall planning and task identification within the project;
- inadequate visibility into actual project status either because of poor project management or obfuscation by project team members;
- unclear project ownership and decision making processes;
- unrealistic commitments which lead to unrealistic expectations; and
- staff conflicts and poor communication.

Interestingly, technology is not a major component of any of these three risk categories. It is only in the last category, lack of knowledge, where technology becomes the major issue, mainly due to inadequate training. This lack of training can result in a poor understanding of methods, tools, and techniques. In addition, project members who are not subject matter experts may face issues related to inadequate application domain experience which results in systems that do not need user needs.

Risk assessment

It is one thing to identify and outline a long list of (potential) problems, but it is a significantly different matter to try to address them. This is where risk assessment comes into play.

The first step in risk assessment is risk identification. In risk identification, the team looks at all of the items and events within the project from the perspective of the various risk categories and identifies those that could potentially have a significant negative impact on the project. Then, the team considers the potential consequences if the risk should occur. For example, in a digital imaging project that is reliant on vendor provided software, a delay in the delivery of the software is a potential risk and the potential consequence of this would be the delay of many, if not all, subsequent project tasks. Bear in mind that if a risk is related to one or more other risks, i.e. if risks have dependencies, good practice dictates that the related risks should be evaluated together as one.

With risk identification complete, risk analysis is subsequently used to identify the likelihood the risks that have been identified will occur and, if so, when that risk is most likely to happen in the overall project timeline.

There are several formal methods that can be used for risk analysis, such as decision analysis, cost risk analysis, schedule analysis, and reliability analysis. However, for many projects, less formal methods work well.

Risk prioritization

A favorite method many project managers use for analyzing and evaluating project risk is based on some type of matrix-based decision model. In these models, tasks are distinguished based on some criteria, such as mission essential tasks versus mission support tasks and then ranked according to criticality or some measure of probability.

The author has found that a more stabile measure of risk prioritization can be arrived at by fusing elements of strategies from several matrix-based schemes. The combination of these schemes leads to a cubic-structure, rather than a matrix, as risks are evaluated along three dimensions: impact, probability, and discrimination. The effect of this ranking model is similar to that proposed by Traeger (2005) for more generalized business impact analyses.

The first dimension, impact, is taken directly from the research of Lansdowne (1999) and uses a five-point scale for evaluating risk impact:

(1) *Critical risk* – five points – would cause program failure.

(2) *Serious risk* – four points – would cause major cost or schedule increases and secondary requirements may not be achieved.

(3) *Moderate risk* – three points – would cause moderate cost/schedule increases; important requirements would still be met.

(4) *Minor risk* – two points – would cause only small cost/schedule increases.

(5) *Negligible risk* – one point – would have no substantive effect on cost or schedule.

The second dimension, probability, is based on Kendrick's (2003) rubric of:

- *High probability* – five points – likely occurrence with a 50 percent or greater chance.
- *Medium probability* – three points – unlikely with a 10 percent to 49 percent chance of occurrence.
- *Low probability* – one point – very unlikely with a 10 percent or less chance of occurrence.

The third dimension, entitled discrimination and based on criteria from Kendrick (2003), is unique within simple decision-based models. It provides an additional perspective that is designed to gauge the impact of the risk to the overall framework of the project, rather than looking at each risk as an independent variable within the project. The levels of discrimination are:

- *High effect* – one point – project objectives are at risk, this risk will result in a mandatory change to scope, schedule, or resources.
- *Medium effect* – three points – project objectives will be achieved, but significant replanning will be required.
- *Low effect* – five points – no major plan changes will result; the risk is an inconvenience or can be handled with minor overtime work.

With each risk evaluated in the context of the three dimensions, a point value can be assigned to each risk using the formula:

$$\text{Overall risk factor} = (\text{Probability}*\text{impact})/\text{discrimination}.$$

All of the project risk factors can then be ranked by severity of risk and, therefore, overall potential impact on the project.

Risk control and resolution

This ranking is necessary because it would be difficult, if not impossible, to provide a plan for dealing with every possible risk in every step of the project. With each risk assigned a risk factor value, the team now has a roadmap for mitigating project risk by developing contingency plans only for the tasks that have the highest risk factor.

In most projects, the rule of thumb is that the team should focus its risk resolution efforts on the top 20 percent of the identified risks, but this is not a hard-and-fast rule. Risk resolution may need to be more extensive. Barki *et al.* (2001) have noted that the risk management profile of a project needs to vary according to the level of risk posed by the project itself with more risky projects needing more extensive risk resolution.

For instance, the initial implementation of a digital repository is less risky than a subsequent software migration to a different repository architecture. Migration is more risky than implementation because in a migration there is a body of material that is in potential jeopardy which does not exist in an initial implementation. In an initial implementation, the only thing in jeopardy is the conceptual model – either it will work or not. Because there is no substantive body of material in danger of being lost or corrupted, this activity is less risky than migration of digital objects.

Some strategies for risk monitoring and avoiding risk

Although it is a cliché, it is true that the most effective risk avoidance strategy is to ensure communication throughout the project team and organization. Too often, project managers fail to keep all of the necessary people "in the loop" about the project.

Some elements that can help in facilitating communication include having a good project tracking system that is accessible to all concerned parties. Within the project tracking system, the overall project plan and risks can (and should) be documented. With this in place, the system could provide for milestone tracking; that is, indicate when significant events have occurred or have passed. Within an environment such as

this, continual risk assessment can be implemented and given high priority. This is important to the project success because it allows all team members to identify what the top risks are at an given moment within the project timeline.

Flexible planning is the cornerstone on which continual risk assessment is built. Although the project manager does not want to be continually changing course in response to every event, it is crucial to adapt and change plans as new information becomes available.

A method for facilitating plan change is to use evolutionary prototyping and the spiral model of system development (Boehm, 1986). In an environment using these methods, teams are able to develop initial prototypes quickly, implement the best-understood parts of the system first, and develop succeeding versions in response to the increasing complex problems the system is attempting to address.

An additional benefit of project tracking is the ability to learn from the past. The project manager should record the results of risk assessments as well as the mitigation strategies for each of the risks pursued. Frequently, this information is invaluable either later on in the project or in subsequent projects.

Moreover, while they are often given short shrift, post-project reviews are vitally rich sources of information on how to improve future project performance. In particular, post-project reviews can provide extensive information on patterns of response (and the effectiveness of those responses) to unanticipated problems.

But when all is said and done, we come back to communication again. One of the most effective ways to avoid project risk is to stay in touch with project constituents and supporters. Certainly it make sound "common sense," but it has also been shown by Keil *et al.* (1998) that project managers who establish and maintain long-term relationships throughout their organization are the most successful in completing projects on time and to their clients' satisfaction.

In summary, project risk management is a necessary and critical task of the project manager and project team. Understanding risk management entails understanding the underlying factors that contribute to project risks, which are often the same regardless of the nature of the project. The first step in risk assessment is risk identification. Once risk identification is complete, risk analysis is used to identify the likelihood the risks that have been identified will happen. While there are several formal methods that can be used for risk analysis, many project managers use some type of matrix-based decision process for analyzing and evaluating project risk. The most successful project managers maintain open lines of communication throughout their organizations to stay in touch with constituent's needs. By managing risk within a project, the project manager and team ensure that the project will be delivered on time and to the satisfaction of the end-user community.

Notes

1. More colloquially known as a "wild ass guess".
2. For more ridiculous ideas on running a project, see my earlier article, "How not to run a digital library project" (Cervone, 2004).

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