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Project Management Paper

Project Management in IT Systems: The Factors That Lead to Success and Failure In the IT Project Management Arena

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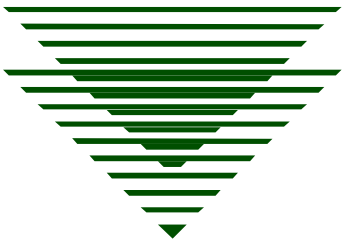

Abstract

The concepts of project management and system analysis and design are integrated in the discussions in this paper to illustrate how system design needs to be carefully planned through project management techniques. Project management tasks and system design tasks are compared side by side to give a brief overview of some of the concerns and tasks in each phase of the system design and implementation. IT projects are considered unique because they are often the result of an immediate need for a solution to a problem. Further, IT projects are particularly special in that technologies change very rapidly, and the technologies to solve a near future problem may not have even been invented yet, but will soon emerge. The planning and analysis phases of an IT project are the focus of this paper, as some of the common causes of IT project issues are brought out. Some suggestions for possible improvement are given.

Project Management in IT Systems: The Factors That Lead to Success and Failure In the IT Project Management Arena

Most projects have a number of things in common, namely that they are undertaken to solve a specific problem, and that they are finite in their duration. Most projects also follow similar common steps or phases: planning, analysis, design, implementation, and ongoing quality assurance and control. Projects involving information technology (IT), however, often differ in that the projects are often initiated as a result of a crisis reaction to a flaw in current technology or some other event that causes the need to explore technologies to replace existing ones. For instance, the need for many construction projects are anticipated and put into planning long before they are ever actually started. When a highway project is completed, as an example, it is predicted that the highway will need to be made wider to accommodate increased traffic and city growth. Thus another project plan, or phase of the original project is taken into consideration immediately. The technologies used in building a road probably won't change very much, and the outcomes of such a project can be easily predicted.

In the case of IT projects, it is nearly impossible to predict what technologies will even exist in the near future, let alone the long term future, to accommodate anticipated growth in the IT infrastructure needs. An organization anticipates that they will grow and have larger IT needs, but have no way of knowing what will be invented in the near future that they can use to accommodate their needs. Or, trying to predict what problems or vulnerabilities will plague the current IT systems isn't known until the minute they are discovered. Technology changes so rapidly in the IT world that project management plays a large part in day-to-day IT activities. Many large IT departments even have a designated group of people who only do special projects, moving from one project to the next due to this rapidly changing technology.

The purpose of this paper is to take a look at IT project management principles, and explore why these principles are so different from other types of projects, such as construction or other projects that come about as a result of long range planning. In looking at IT projects, this paper will discuss why certain aspects of these projects are more prone to failure, delay, or change in scope, and what strategies are needed to ensure project success. Project management terminology will be integrated with system analysis and design concepts in this paper to illustrate how the project management phases and the system analysis and design phases must be carefully coordinated and considered in order to ensure project success. The specific aspects of project management in IT projects that this paper will cover will be to discuss what can go wrong in the planning phase (and ways to prevent these problems), and what often causes problems in the analysis phase (and how to prevent these problems).

Significant Project Management and System Design Background

Project management concepts are important to ensure the organized flow of the project as a whole. By mapping out the phases and the work to be performed, the project is more likely to flow more smoothly, and all of the project team members are more likely to be operating in an organized fashion. In order for a project to be successful, the project will end on time, come in under a specified budget, and will perform as specified to meet the needs of customers and stakeholders (Kerzner, 2004, pg. 6). Having a written plan, defining the problem, defining the scope of the work that is to be done in a project, knowing what resources are available, and understanding who the stakeholders are all aspects of project management that must be taken into consideration.

Figure 1 briefly describes the overall project management phases and some of the tasks that take place in each phase, along with some of the system design specific tasks for each phase.

Figure 1 illustrates system design concepts as they apply to using system analysis and design methodologies. Keeping in mind that Figure 1 is only an overview of the entire process, the rest of this paper will concentrate on some of the more common problems and mitigations in the planning and analysis phases of project management, as these are the phases where problems in IT projects are most likely to adversely affect the outcome of the entire project. Once planning and analysis problems are identified and resolved, the remainder of the project phases are more likely to result in success.

Project Phase	**Project Management Tasks**	**System Design Concepts**
Planning:	• Problem definition • Project scheduling • Work breakdown structure • Feasibility study/business case • Project staffing • Project initiation • Time management • Risk management	• Proof of concept • Context diagrams • Defining data flow
Analysis:	• Gather information • Define system requirements • Define user and stakeholder needs • Set priorities • Testing and prototyping • Recommend and evaluate alternatives • Present to management	• Logical modeling • Physical modeling • Building prototype systems and testing • Technical and performance requirements • Usability and reliability requirements • Security requirements • Stakeholder requirements • Researching vendors
Design:	• Design network integration • Design the application • Design user interfaces	• Use case diagrams • Actor and role definition • System sequence diagrams • Activity diagrams • Flowcharting • Modeling

Project Phase	Project Management Tasks	System Design Concepts
Implementation:	• Verification and testing • User training • Installation and rollout	• Versioning • Input, Process, Output Development • Top-down development • Bottom-up development
Support:	• Turn over (to operation team) • Closeout (by project team) • Lessons learned documentation	• Maintain the system • Enhance the system • User support

Figure 1. Project Phases and System Design Concepts
Source: Satzinger, 2004, various Chapters

IT Project Problems

As stated previously, one of the major problems with many IT projects is that they come about as a result of a crisis or a reaction to discovered flaw. For instance, an organization knows that the operating system they are using on their desktop computers will be periodically patched to fix vulnerabilities, or that a "Service Pack" will be released to fix many vulnerabilities all at once. Until the specific fixes and features of the patch or service pack are known, it is very difficult to plan implementation. Once this type of operating system enhancement is released to the public, it may be discovered that it does not work correctly with all of the software on the computer. A project is then put in place to analyze and test the enhancement, discover alternative fixes for other software problems, discover how it will effect the users, and find out what the users need in order to make the enhancement work properly.

Another example is that even though an organization anticipates that it will grow, there is no way of knowing what technologies will exist in a few years to accommodate their growth, or allow them to do business in a more efficient way. Perhaps the organization has the need for a database that will be able to be accessed by a large number of field users. The field users can currently access a large database inside the company, but they have to first use other more

cumbersome tools to first access the corporate network from the outside. Then suddenly, a new product arrives on the market that will allow the field users to access this database through their normal connection to the Internet, without having to use other applications to first access the inside network (eGovernment/eAuthentication Training Seminar, 2004). The project to implement such new technologies will not be initiated or even thought of until the new technology is known. Once this new product is discovered, the project can be initiated to assess its ability to meet the organization's needs. The project will need to progress rapidly so that the new technology can be put into place as quickly as possible.

Once these types of projects are discussed and are in the beginning stages of formalization, the two key areas where many problems are discovered are in the planning phase and the analysis phase. The planning phase seems to encounter difficulties in that risks to the project are not always apparent. Analysis phase problems are typically discovered as a result of trying to determine user requirements against the results of testing and finding out what the system will allow the user to do. The following sections of this paper will cover these two phases more in depth, and will help illustrate some of the issues that result from them. Possible solutions or mitigations will also be discussed to help prevent and solve future occurrences of the issues that are discussed.

Planning Phase Issues

Two important aspects of the planning phase are defining the problem and identifying the risks involved with the various solutions. Or, evaluating the risk involved in not solving the problem at all. Defining the problem is typically a straight forward process in the IT world. For instance, the organization determines that a number of computer system problems have resulted from attacks that exploit known computer operating system vulnerabilities. Keeping the systems

up to date with vendor patches would help mitigate these vulnerabilities. Patching the systems to mitigate the attacks is a time consuming and staff-hour intensive undertaking. The organization discovers that there is an automated patch management system available that will allow patching of the computers from a centralized location, by a single or very few administrators. The risk of not implementing such a system is that patch management will continue to be very difficult at best, and at worst systems will not be kept up to date, and will continue to be vulnerable to attacks. The risk in implementing such a system is that the system itself will possibly hinder users by its very operation, or that certain users (such as remote dial-up users) will have their systems crippled by the patch management system trying to deploy over a slow connection.

Risk management has to be given very close attention in IT projects such as this, more so because of often hidden risks and rapidly changing risk factors that are inherent in IT projects. As stated previously, rapid technology change is an aspect of IT projects that causes rapid changes in system design and implementation. Failure to properly identify risks in IT projects can lead to unnecessary or wasted efforts, or even failure of the project itself (Wideman, 1992, pg. II-3). With respect to testing or modeling IT systems, this fact is extremely critical. Improper risk identification in the planning phase can lead to problems in the analysis and subsequent phases. Identification of applicable risks is important for setting up appropriate modeling and testing, and for helping the decision process for choosing the final solution for the problem which is to be solved. In other words, in the design of the system, the project team would want to test the system under as many of the circumstances as possible that lead to discovering what effects are caused by the planned design, to see if the outcomes that were predicted by the risks were significant enough to cause the project to go in another direction or cease altogether. These evaluations would help verify the severity of the risk and help identify

possible alternatives that would still solve the original problem, but with fewer risks and better outcomes.

Analysis Phase Issues

Defining system requirements and defining user needs is sometimes difficult in that the two don't necessarily mesh. For instance, the patch management system described above is needed because it will help protect the computers and the enterprise network infrastructure from attack. The users of the computers don't necessarily care about the network infrastructure as long as they can get to their data and access network resources. The fact that a malicious attack might jeopardize that access is not readily apparent to them. All they know is that if something slows down their computer, they can't get their work done as quickly. The computer patch management system, by its very nature of operation, may cause the computer to run noticeably slower during certain phases of operation. The user doesn't consider that this is necessary to protect their computer – they may not even know that this particular program is what is slowing them down. They just know that something is hindering their ability to work.

The system requirements identification was fairly easy in this example, just as identifying the problem was in the planning phase. Identifying the users' and stakeholders' needs then is the difficult part of this phase. Information gathering is crucial to this phase in order to find out what the users of the system are most concerned about. Also, communicating to the users and stakeholders what a new system will do for them (or more importantly <u>to</u> them) is also important. Constant communication with customers, stakeholders, and all others involved throughout the entire project will help to ensure that their expectations are met (Barkley, 2001, pg. 13). This will also help ensure that more possible risks are identified and tested, and that the solution will actually help solve the original problem without causing additional problems.

Solutions for Success:

Improper risk identification and insufficient identification of user requirements are two issues discussed in this paper that seem to have significant impact on the success or failure of IT projects. A few solutions are given here to help try to alleviate some of the pitfalls that may be encountered in the IT project arena. While it is not the scope of this paper to address every possible scenario and every failure point in IT project management, a few suggestions are included which will hopefully assist project teams.

Risk Identification: Start early in the project planning phases by brainstorming possible risks. Use project management best practices by listing risks in a risk analysis matrix. Be sure to list the likelihood of the risk occurring, along with the impact to the project (and solution) if the risk does materialize into a real obstacle. List the overall evaluation of the risk using these two factors (likelihood and impact) to determine how much overall impact on project planning this risk will have. Then, continue the risk analysis functions all throughout the project, not just in the planning phase.

It should be emphasized that although risk analysis is an ongoing process that identifying as many risks as possible up front is absolutely vital. Research will play a very important role in this process. Find out what occurred and what risks existed in similar projects. The beauty of IT projects is that many of them are duplicated by many other organizations and are not totally unique. Historical documentation about projects and system designs from within the organization and from other organizations will greatly assist efforts in determining risks for a given project.

Stakeholder and User Needs: Be sure to not only identify what the system needs are towards solving the stated problem, but how the users will be affected as well. Identify who the users of

the system are, as well as those who might be indirectly affected. For instance, an administrator may be the actual "user" of a patch management system, but the user who owns the computer and has to do the day to day work on the computer is also affected by the administrator's actions. In this instance, the administrator has the need to patch the computer systems, but the owner of the computer has the need to be able to do their work without interruption. Balancing these needs such as scheduling off-hours patch deployments is one type of solution in this instance.

Conclusion

Project management, especially in the information technology arena, needs to consist of a well planned set of activities. In a world of rapidly changing technologies, the need to design systems must be backed up by best practices used in project management. The planning and analysis phases are particularly susceptible to activities that can result in wasted time and a failed project. If these initial phases are not carefully planned, the rest f the project may fail.

By analyzing and planning for risks, the project team is more likely to discover those things which may cause problems in later stages of the project. By analyzing and discovering who all of the users and stakeholders of the system are, the project team will be able to determine how their needs will mesh with the identified processes of the system. The system design can then be better developed to meet those needs and to solve the original problem. Both risks and user needs should be evaluated and reevaluated throughout the project in order to make necessary adjustments in system design, and to produce the necessary outcomes of the system.

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