Risk Management Processes & Techniques for the Successful Delivery of Web based Software Projects

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Abstract -This study investigates risk management processes and effective techniques for web based software projects implemented for different IT organizations. There is limited literature on what risk management processes & techniques software practitioners use. This study tend to focus on application development for new requirement, software enhancement and application support projects. It investigates the criteria to identify, analyze, plan and control the risk. It also suggests important risk and risk categories and techniques perceived to address these risks and how effective those techniques are considered to be. One of the primary risk i.e customer supplier relationships is found to be of primary importance, yet this risk is not suggested by the project management literature.

In order to have successful delivery of the software projects, there is a need to have in-depth exploration of risk management. As a result of this study, it is suggested that project team may find it useful to consider the risk management processes and effective techniques discussed in this article and how applicable these are to their individual organization. It is suggested that research into standard project risk management approaches may need to be combined with business risk management approaches to gain a full understanding of the risks faced and addressed by project team.

Keywords-*Risk Management Issues, Risk Management Processes, Risks Encountered, Risk Management Techniques, Project Management.*

I. INTRODUCTION

This study investigates risk management processes & techniques for resolving uncertain events or conditions that, should it or they occur, has an effect on at least one of the project objective (Cost, Time, Scope, Quality). In our contemporary world, software plays a part in almost every aspect of our lives. This includes government administration, telecommunications and virtually every sector of the economy. Government and business have become so reliant on software that it is hard to see how they would function without it. Software is crucial to the productivity of wealthy countries. The public have an increasing, direct exposure to software, particularly commoditized applications. In short, software has become pervasive. Risk can broadly be categorized under People, Process, and Technology& Environment.

Study team finds following hypothesis as an important criterion for the root cause analysis of the failures.

H-1: Uncertain events or circumstances having negative impact, causes failure of the web based software projects.

H-2: Human Interaction, Abstraction, Complexity, Volatility factors are responsible for the failure of software projects.

H-3: Formulation of risk management strategy framework can prevent failure of IT projects.

H-4: Adoption of effective practice model can prevent failure of software implementation projects.
Moving forward on a project without a proactive focus on project risk management increases the impact that a realized risk can have on software project and can potentially lead to failure of IT software projects.
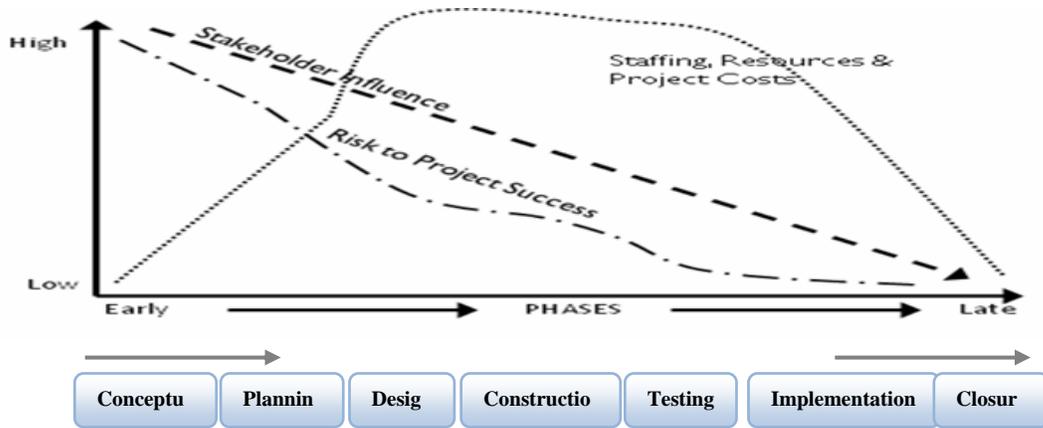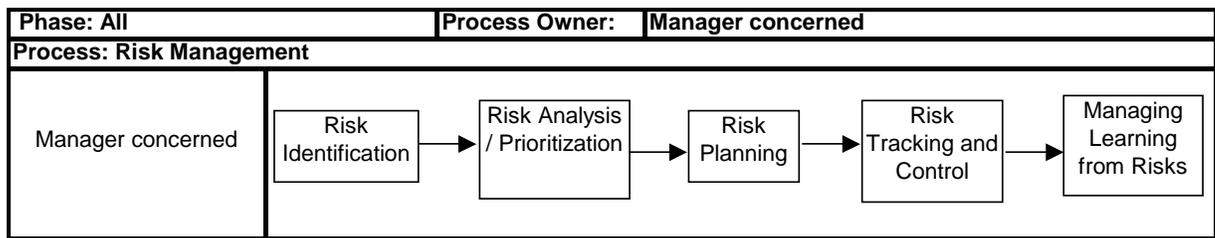
Fig 1: Impact of risk on different phases of software development life cycle.

Following risks seems to be the potential areas where future research might be useful.

They are: customer relationship issues, High attrition rate/retaining best talent, introduction of new technology and unrealistic schedules and budgets. Project Risks related to customer relationship issues were of particular significance and have tended to be over looked in IT project management literature.

II. RISK MANAGEMENT PROCESSES & METHODOLOGY

Fig 2: Risk Management Processes & Methodology

Phase: All		Process Owner:	Manager concerned
Process: Risk Management			
Manager concerned	Risk Identification → Risk Analysis / Prioritization → Risk Planning → Risk Tracking and Control → Managing Learning from Risks		

Risk Identification

The Manager concerned will

- Identify the risks and the risk category, source under which the risks can be grouped. There are many methods for identifying risks. Typical identification methods include the following:

  o Examine each element of the project work breakdown structure to uncover risks. Conduct a risk assessment using risk category, source.
  o Interview subject matter experts.
  o Review risks of similar projects from the organizational risk database.
  o Review the project criticality assessment rating and report to identify potential risk from project complexity, business, technology, customer, team perspective
  o Review the commitment review form to identify potential risks from project complexity, business, technology, customer, team perspective

  o Examine design specifications and agreement requirements.
  o Risk to be identified from information security perspective as well.

Risk Analysis/ Prioritization

o As few projects or initiatives operate in a complex techno- commercial environment with different stakeholders and differing priorities, they are challenged by many risks. The Manager concerned will need to prioritize them in a way that will allow him to focus attention on the vital few rather than the insignificant many. In order to do so in a systematic manner, he must quantify (to the extent possible) the exposure which is defined as the product of the probability of occurrence and the impact if the undesired event does, in fact, take place. :

o Estimate probability of occurrence of the undesired event. Where it is not possible to have an objective and quantitative scale for probability, the following guideline may be used.

o Probability Range	o Probability Ratings
1% through 33%	Low (1)
34% through 67%	Medium (3)
68% through 99%	High (5)

- Estimate the level of impact for each risk. This estimate should, preferably be in monetary terms and should reflect the loss to the project or the organization in case the undesired event does take place.
- Determine risk exposure (probability * impact): Again, it is preferred that both the probability and the impact are quantified. Where it is not possible to quantify either of these, the following table may be used for guidance.

Impact / Probability	Low Impact (1)	Medium Impact (3)	High Impact (5)
Low Probability (1)	1	3	5
Medium Probability (3)	3	9	15
High Probability (5)	5	15	25

- Rank the risk based on risk exposure (e.g., risk with highest value of risk exposure will be ranked first). It is not practicable to try managing all the risks; team may identify top few risks (for example, projects may want to focus on top 3 or 5 Risks) based on risk rank and manage those risks.
- If risk exposure is in between 5 to 25 as per above probability vs. impact matrix then those risks should be tracked and attended .
- Ensure risk actions are executed when the risk exposure rating reaches the threshold of medium risk exposure (=5 or 9).
- Ensure reporting / escalation of the risk and the status to management when the risk exposure rating reaches the threshold of high exposure (=15 or 25).

- Update the risk register with Identified risks from the above risk ranking table.

Risk Planning

The Manager concerned will:
- Identify an approach to manage the identified risk from risk ranking table . For each identified risk, the approach could be one or more of the following:
  a. To Eliminate risks
     i. Avoid: Eliminate the causes by changing the approach/ method while still meeting the user's needs so that the risk is avoided
     ii. Transfer: Transfer the risk ownership to another project, team, organization or individual to minimize the impact of the risk.
  b. To Mitigate risks
     i. Mitigate: Determine the mitigation plan to reduce the probability of occurrence of the risk. Risk mitigation plans are developed and implemented as needed to proactively reduce risks before they become problems. Develop alternative courses of action, workarounds, and fallback positions, with a recommended course of action for each critical risk.
  c. To develop contingency plans
     Develop a Contingency plans to reduce the impact if the risk does occur.
- It is mandated to have a contingency plan for risk having High probability with Medium impact or High Impact (risk exposure = 15 or 25)
- Based on the approach, Identify plan to eliminate, transfer or mitigate the risk and role/person responsible for executing them.
- Define the events/ triggers or the periodicity at which the risk exposure will be reviewed and recalculated if necessary.
- Define the threshold beyond which the identified plan for risk will be executed.
- Define the various possible actions that would be initiated. The action could be mitigation plans or escalation to senior

management/ customer/ other stakeholders, etc.

- Probability, impact, exposure, status of the risks remain unchanged.
Project manager to re-assess the Risk probability, Risk impact and Risk exposure after applying the identified Mitigation / Contingency plan.

Risk Tracking and Control

The Manager concerned will periodically monitor the following and update the risk register:

- Risk monitoring and tracking actions are implemented as planned
- Risk monitoring and tracking actions are as effective as expected, or if new actions need to be developed
- Project assumptions are still valid.
- A risk trigger (an indication that a risk threshold is crossed or is about is about to be crossed) is activated.
- New Risks that were not previously identified have been identified.

Learning from Risks

The Manager concerned will capture the lessons learnt and the knowledge in performing the risk management activities in reusable form for reuse within the team and by the organization. The Manager concerned will update the project/program closure report with:

- New risks. If the project/program encounters an issue that had not been identified earlier as a risk, it will review whether any signs (leading indicators) could have helped to predict the risk.
- Successful mitigation strategies. Capture experiences of strategies that have been used successfully (or even unsuccessfully) to mitigate risks under various risk category and risk sources.

III.   RISK IDENTIFICATION & EFFECTIVE TECHNIQUES

The following page highlights the risks which are worth controlling and effective techniques that are being used by experienced project managers for planning and controlling the risk.

Sl. No	Risk Identified	Most Effective Techniques to control the risk
1	Unclear or misunderstood scope/ objectives.	• Use various methods and tools to capture the soft scope/business requirement. For example: Face to Face discussion, interviews, questionnaires, automated tools etc. • Capture Risk, Assumptions, Issues and dependencies along with business requirements. • Put forward all the issues in front of concerned people to have more clarification. Intermediate reviews, feedback from concern people. • Finally, Requirement Specification Document sign off by business user.

2	Frequent Change in Requirements	- Freeze the requirements after discussing with business stakeholders. Requirements document sign off from business & Re-estimation in case of scope modification, as per change control process guidelines. .Assess impact of additional/changed requirements and notify the customer. - Delivery may be divided in drops for each known part of the overall scope. - Implement Change Control Process - Adoption of Agile Methodology
3	Unrealistic schedule & budgets.	- Regular Project Reporting metrics of progress on weekly basis. - Monthly review by QAG-Quality Audit Group and Quarterly PMR (Project Management Review) by senior management.
4	Introduction of New Technology	- Identify the skill gap and train the resources accordingly. - Involve SMEs (Subject Matter Experts) , - Conduct External review - Take help of existing trained resources (If any).
5	Failure to manage end user expectation	- Ensure to involve end user starting from the initiation phase by scheduling recurring (weekly/bi-weekly) calls or as per the project requirement. - Take end user's feedback. - Build relationship with end user. - Adopt Agile Methodology.
6	Lack of senior management commitment to the project	Setting up governance model and taking buy-in from senior management before initiation of the project, as senior management ability to contribute to the project identifies real business drivers.
7	Customer Relationship Issues	- Communication at all levels including informal. - Invest in extra effort beyond what was contracted in order to improve customer relationship. - Involve senior management - Build relationship and trust with customer
8	Staging problems.	- User Acceptance Testing - Check in- check out version control. - Development/Test/User Acceptance environment.

9	Gold Plating	• Identify Gold Plating and determine if it has additional value – turn risk into opportunity. • Reporting systems vs. budget. • Project charter – "continuous improvement" for future phases.
10	Subcontracting	• Don't subcontract, instead utilize own (Employee) resource. • If there is no choice but to subcontract, then implement close monitoring and control process.
11	Resource Usage and Performance	• Resource planning including bi-weekly meetings tracked on intranet • Performance reviews as needed. • May have to pull people off the projects due to stress. • Training program plan aligned with skills needed.
12	Unclear Roles and Responsibilities	Define Roles & Responsibilities and agree with impacted parties in the beginning of the project.
13	Late identification of system Environment	All the impacted environments and associated interfaces should be identified before start of the development and testing phase.

IV. LIMITATIONS

This study focused on the risk management processes and techniques implemented by experienced project team in different IT organizations. It did not set out to establish scientific truths of those practices.. The perceptions of certain roles within the different IT organizations were canvassed. However it did not consider the perceptions of all stakeholders involved in execution of the project.

The collection of data on this subject from different roles within the organization is not the same as triangulation of the results. Triangulation of research data involves using different methods to verify the validity of the data collected.

Conclusion

Author contention is that it is important to understand what risk management processes are used for web based projects and what practices are effective. Author have adopted exploratory research methodology and presented live projects data. Interviews were selected as one of the appropriate method, apart from live projects data to achieve the objectives of this study. Nineteen interviews in eight IT software organizations were conducted to collect data for this study. Three different perspectives on project risk were investigated. Those were the perspectives of the delivery managers, project managers and developers. This study had a primary aim to investigate risk management issues and identify risk management processes and effective techniques. Specifically, the objectives were to:

1. Determine processes for identification , analysis, planning and controlling the risk &
2. Identify effective risk management techniques required for the successful

delivery of web based software projects.

For the primary objective, the intention was to investigate what processes were used and how effective these processes were in some detail and in a structured way. For the secondary objective, there was an intention to explore risk management techniques with a broader scope in the hope that the work would not only provide insights but also suggest areas of particular interest for future research.

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Pramod Kumar has total 17 yrs of IT experience. He is Program Director in Tech Mahindra Ltd (A wholly owned subsidiary of Mahindra & Mahindra group having $ 14.2 billion turnover). Tech Mahindra is engaged in IT services and implementation of software projects for telecommunication vertical.. He has implemented more than 100 medium/large software projects during his career. He has worked in many Tier-1 multinationals. He has been awarded best project manager many times during his 17 years of career. He has completed his B.Sc (Math), B.Tech (E &C from M.I.T, Manipal, Karnataka, India), MBA (Symbiosis University, Pune, India). He is pursuing part time PhD from Singhania University, Jhunjhunu, Rajasthan, India.