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Problem Resolution Investigation by Analyzing Challenges in Current Quality Assurance Processes

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Abstract: *In the context of software quality, Quality may be defined as a process-centered approach to ensure that an organization is providing the best possible product deliveries or services within the constraints of schedule and budget. There have been several studies into software project failure that have attributed failure to one or more areas of project management or quality management. Also there have been many research papers on the attribution of reasons for failure of projects like grossly exceeded budget and schedule parameters, or software delivery of poor quality that it was unusable etc. On one side, we find projects facing difficulty in delivering software within the constraints of schedule, budget, and quality. On the other side projects usually come across the situations quite often about the lack of conformance contributing to small incidents that has been escalated into large incidents before anyone has a chance to understand what that simple situation was. But the project managers, project leaders, and Quality Assurance people don't set out to develop defective software. Even if the bugs and errors are minimized by the system, customer satisfaction is more important and should be emphasized. As the project failure could not be considered as an accident, there is a need to analyse and understand how the best efforts are employed to deploy the defences against defects in the released product as the capable and well intentioned people following the current process sometimes allow a defective product to be released, deployed and operated.*

This paper project would investigate the processes from quality viewpoint to determine the problems to be found within the process and improvements to be made to the exiting process. This tendency of process improvement is encouraged by the frameworks such as CMMI, ISO, six sigma etc. It also describes the qualities that must be possessed by the project i.e. methods and techniques for supporting the work of software project managers and software developers in relation to software process improvement in order to create the desired outputs and outcomes.

Keywords: *Project Failure, Quality Management, Plan-Collect-Analyze-Adapt methodology, and Project Risk*

1. INTRODUCTION

Both the customer and the software organization invest large sums of money for the software projects yet achieve limited success. A good amount of literature survey and journal articles on project failure indicate that serious problems exist across the industry as a whole. Not all the projects experienced the same level of difficulty with these issues, but almost all had to face them. These studies show subjective evidence that confirms project failure is very common and this is a business problem [1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16][17]. Despite the body of knowledge on project management, processes, standards and governance, a large percentage of projects are abandoned, before or after the delivery of the project due to unmet requirements, large number of bugs and even unhappy end users as the software delivered had not provided the business value. While analyzing few case studies of the failure projects, huge rework time, higher maintenance and support costs, missed deadlines and budget, and poor morale are the main reasons of failure of any software system[19][20][21][22]. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. These studies indicate that serious problems exist across the software industry as a whole. The research we are conducting involves the analysis of few audit reports of large projects, interviews with project managers, and case study reports to build a

rich picture of how different stakeholders perceive the quality of software engineering processes. This survey combines insights and trends from various projects with detailed analysis.

2. CHALLENGES WITH SOFTWARE PROJECTS

The research conducted an evaluation of the existing process followed by various projects belong to various domains (Table1) and determined lessons (either success or failure) that found to be of limited use, i.e., the data being either collected occasionally or were being shared to only few projects in the organization along with a comprehensive literature survey to identify best practices. The projects usually provide best practices or lessons learnt focused more on technical aspects of the project than the business-oriented lessons. Project Management Reviews, Quality Assessments of projects artifacts, and internal audits provide an unbiased, objective technical and managerial assessment of a project. As a result, the development team will be benefited and is in a much better position to identify and resolve issues that could otherwise easily be overlooked, may be intentionally or unintentionally. Even though software failure is, for the most part, predictable and avoidable, large IT projects have had a history of overspending, delays, performance shortfalls, and abandonment after major investments[23][24][25][26].

Table 1. *Projects Examined in various domains*

Vertical / Domain	No. of projects examined
Manufacturing	12
Retail	13
Financial services	4
Health	6
Defense	2
Telecom	16
Total	53

Much of the failure of projects is attributable to the fact that if quality team does not raise these issues in a timely manner, there is a chance that they are more likely not resolved which would negatively affect the project. Effective oversight of projects can help to respond to these risks[27][28][29]. Our observation suggests that the project managers alone could not be blamed for not delivering the projects successfully. The Quality team has a significant role to play in managing project risk. The risk reduction strategies outlined are to be considered.

3. CONTINUOUS IMPROVEMENT LIFE CYCLE

The Quality Management Model is nothing but the combination of structure and process producing the outcome. When the outcomes are poor then there is a need to assess the existing processes. Capability Maturity Model Integration (CMMI), is a process improvement approach that helps organizations improve performance. The project members must be encouraged to describe those experiences that had significant challenges faced by them during the execution of the project and also provide or suggest valuable lessons and best practices to share with the other projects and future project teams[30][31][32] The methodology we followed focuses on systematic assessment, analysis, and improvement of processes and thus the projects will have accurate and understandable information on risks and benefits using Plan-Collect-Analyze-Adapt cycle as shown in the figure 1. Table 1. summarizes the actions carried out for each of Plan, Collect, Analyze and Adapt activities.

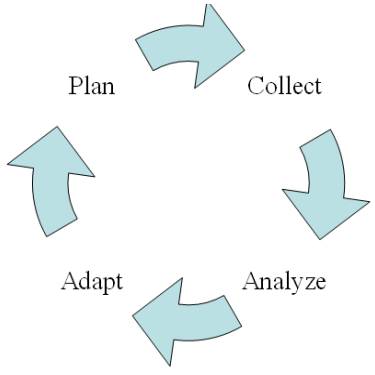

Figure 1. *Plan-Collect-Analyze-Adapt Cycle*

Table 2: *Plan-Collect-Analyze-Adapt methodology*

S.No	Activity	Actions
1	Plan	a. Identify the root cause of the problem in the present process b. Identify the study focus area c. Identify the data collection tools
2	Collect	a. Collect qualitative data by identify the best-practices and lessons learnt in the organization or identify the best- practices and lessons learnt in other organizations (identified through a comprehensive literature search) b. List all the key findings and insights
3	Analyze	a. Develop a Failure Mode Effects Analysis (FMEA) every quarterly or even monthly. This enables the quality team to identify what might go wrong and develop appropriate mitigation plans based on the probability, severity and ease of detection of the various problems or vulnerabilities, otherwise it ends up in the failure of the project. b. Identifying practices and that enable and improve the performance of the current process. c. Discuss the key findings and have an opportunity to interact with the project teams to analyse the best practices and lessons learnt for appropriateness.
4	Adapt	a. Create action plans tailored to their projects/processes based on the feedback from the consortium benchmarking study findings. b. Projects / processes are to adapt according to the action plan and monitor for improvement.

3.1 Key Findings Using the Plan-Collect-Analyze-Adapt Methodology

The detailed analysis of our study results revealed some of the most compelling study findings revealing many useful insights based on the real-world experiences of the practitioners with a wide range of projects.

a. Despite the overwhelming majority of project associates who recognize the value in standardizing process management practices, very few consistently use a systematic approach.

b. Only few projects measure their benefits and understand if the investment was worthwhile i.e. ability to translate significant investments in projects into real business value. There is a need for the projects to measure the return on their investments.

c. Most of the failure projects do not realize that doing the right project is just as important as doing the project right. A strategic review has to be conducted to track the benefits realised by the business.

d. The survey shows nearly fifty percent of the projects do not achieve what they set out to achieve. The failure projects surveyed perform poorly in at least one of the following– lack of timely delivery (schedule slippage), cost overrun (results in sunk costs), or inability to achieve the stated project deliverables.

e. The projects do not always have an effective manager to provide clear direction for the project or to escalate problems when necessary. The project managers and the quality managers have to face challenges or risks considering them as the nature of the project and should be more effective at managing the risks.

f. The quality and project managers together should involve in observing lessons during all phases of the project life cycle, and also conduct a lesson learnt session immediately after project closure and essentially categorizes these lessons learnt appropriately.The entire document should be in Times New Roman.

3.2 An Action Planning Process and Focus Areas for Improvement

The major contribution to software failure uncovered during the analysis was the absence of

leadership within the delivery process and it was not too surprising that only a small number of projects are delivered to the original time, cost, and quality requirements. The Process, Leadership, Stakeholder and Risk Management issues were not factored into projects early on and in many instances were not formally documented for political reasons and also were rarely discussed openly during Project Management Reviews or steering group meetings.

Our findings showed that effective quality team to be the most critical factor for completing the projects successful. Successful projects require a full, realistic understanding of the upcoming challenges or complexities or risks, followed by specific actions to address them which are listed below. Taking appropriate actions to address these will help projects especially high risk projects to avoid and overcome both expected and unexpected hurdles during the course of a project.

a. with cross organizational impact, interdependencies with the other systems' efforts or even e-governance projects are considered to be the high risk projects.
b. The quality team should conduct adequate reviews on the status reports sent monthly/quarterly by the projects to track the action points, closed items and planned activities/events. This helps to provide early warning signals to the management and the projects.
c. Strengthen overall effort to develop and implement an effective knowledge management system tool that provides just-in-time and just-in-case methodology of information retrieval. This must be supported by a well-defined process mapping.
d. Maintain Lessons Learnt knowledge base which is relevant, address an issue or provide relevant information, well organized, validated against the established standards, and procedures. Lessons learnt knowledgebase must be verified, monitored and maintained by the senior and experienced associates in the organization.
e. Develop a list of Management Watch List projects (Red Projects) and their deficiencies. Though this is happening in large organizations, an effective action plan is required for tracking the follow-up actions using the list as the basis for selecting projects for follow-up actions considering factors such as:
    (i) Potential financial benefits
    (ii) Project benefits
    (iii) Potential risks
    (iv) Assessments of the progress
    (v) Risks of IT investments
    (vi) Identifying opportunities for continued improvement, and
    (vii) Areas need management attention.

This will help in correcting high-risk problems, analyze actions under way and also further actions that may be needed.

f. Develop Innovative tracking tool to support decision making that integrates problem-solving capabilities with information from a variety of sources. Having adaptive search capabilities, it collects, stores, and analyzes data to provide just-in-time and just-in-case methodology of information retrieval.

4. CONCLUSION

The organization has to spend more resources, time, and cost to understand from the failure of the project. But the aggregated data regarding to best practices and lessons learnt would be definitely useful for development of the organization with regard to each specific area of improvement and

minimize risks in different projects across organization. So, the management should encourage recording, clarification, and sharing of lessons learnt and best practices as this helps to develop solid models to support decision making which in turn reflects lower risks on the part of projects.

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