Review of Improving the effectiveness of root cause analysis in post mortem analysis: A controlled experiment

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1. Introduction

Post mortem analysis (PMA) the most common name used for retrospective analysis (Wohlin, Höst, M and Henningsson, 2003) is becoming increasingly more important in software engineering projects. Most notably because of problems and challenges software projects face. Unfortunately problems in software developments have become still quite frequent. Causes for these problems are not always clear. Knowing the cause of past success and failures has therefore become critical to improve future software development projects (Dingsøyr, 2005). This requires an organization willing to view failures as opportunities to learn something.

Hamid and Madnick (1990) describe the primary reasons why company failed to learn for past mistakes he states that mistakes are hidden rather than reported and evaluated. Secondly the important lessons to be learned are hard to acquire, they often need to be dug out from deep within the project experience. Glass (2002) also states that the software engineering industry is too busy to think about the future development of software projects and how they can be improved. Keegan and Turner (2001) also determined that many software companies do not have time for meetings to review past projects and lessons learned from those projects, even though various methods for analysing completed projects exist.

By using PMA members of the project team can recount what they have learned during the project and this can be used for future projects. This act of learning from past performances is part of the field knowledge management (Dyba, 2001). Utilizing these attributes a software organisation can become “a learning software organisation”. Which has been defined by Dybä (2001) as ‘An organisation that creates a culture that promotes continuous learning and fosters the exchange of experience’. By creating this culture members of the project team will gain new experiences on how to deal with problems that arise when being part of a software project.

Bjornson, Wang and Arisholm (2008) compare two PMA methods one existing method which uses a brainstorm method called the KJ method and one modified method. The effectiveness of both methods are compared in a controlled experiment. The objective is to determine which one of these method is more effective and how the two methods differ in results.

2. Example

2.1 PMA method original example

The first step of the original method is to have a KJ sessions adapted from Scupin (1997). In this KJ session each member of the project group gets a number of post-its. On these post-its they describe the positive experiences and negative experiences in the project. When completed a facilitator places the experiences from the post-its in a fishbone diagram (fig1) where each arrow presents a cause. An arrow that aims at another arrow is a sub cause of that cause. This gives the members the opportunity to determine the possible root cause of a problem.

2.2 PMA method 2: the revised method

The revised method also uses the KJ sessions, however instead of placing them in a fishbone diagram they are placed in a casual map (fig 2). Every oval represents a concept and every arrow describes the cause and effect relationship.
2.3 PMA revised method

The division of the tasks is unclear
- Late delegation of tasks
- Unprepared manager
- Bad evaluation

Bad cooperation

Fig. 1 Fishbone example

2.4 Effectiveness Analysis Method

The effectiveness of both methods are measured by the following formula:

\[
\text{Analysis Effectiveness} = \frac{(I_{phase2} - (I_{phase1} \cap I_{phase2})) \times 100}{I_{phase2}}
\]

- \(I_{phase1}\) = number of items represented by post its.
- \(I_{phase2}\) = number of items generated by either fishbone diagram or casual map

To analyse the effectiveness they compute how many of the items found in \(I_{phase2}\) are new from \(I_{phase1}\)
3. PDD

The following will show a PDD diagram which the describes the process of the KJ method in an illustrative way, an activity diagram will explain the activities represented in the PDD diagram and an concept diagram will explain the concept that are presented in the PDD diagram.

Fig 3 PDD diagram

Activity Diagram

<table>
<thead>
<tr>
<th>Activity</th>
<th>Sub-Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Project</td>
<td>Identify positive experience</td>
<td>Identify positive experiences during the project development (Project Team)</td>
</tr>
<tr>
<td></td>
<td>Identify negative experience</td>
<td>Identify negative experiences during the project development (Project Team)</td>
</tr>
<tr>
<td></td>
<td>Identify Processes</td>
<td>Identify processes followed during the project development (Project Team)</td>
</tr>
<tr>
<td></td>
<td>Group experiences by common Process</td>
<td>Group experiences by processes (Project Team)</td>
</tr>
<tr>
<td>Draw a fishbone diagram</td>
<td>Select experience</td>
<td>Selecting an experience of which the group would like to</td>
</tr>
</tbody>
</table>
4. Related work

Dingsøyr (2005) state that retrospective analysis is an important method for sharing knowledge within software projects. There are many names to describe retrospective analysis. Dingsøyr describes the most common in: “project retrospectives”, “post mortem analysis”, “postproject review”, “autopsy review”, “after action review”, and “touch down”. Myllyaho, Salo, Kääriäinen and Koskela, (2004) review of “Small and Large Post-Mortem Analysis Methods” conclude that post mortem analysis is highly recommended and very useful within software engineering. Salo et al. (2004) reiterate this by stating that post mortem analysis has significantly improved learning and satisfaction of project teams.

Stalhane, Dingsøyr, Hanssen and Brede Moe (2003) have compared PMA methods with a semi-structured interview method there aim was to find out whether situations have an impact on the various post mortem analysis methods. What they found was that it depends on whether there is a broad analysis or a focused analysis. If a broad analysis is required PMA is more useful.

Lethinen (2010) determines that scientific work on root cause analysis which is part of the post mortem analysis is limited. Studies by Bjornson, Wang and Arisholm (2008) are one of the few studies that focused on gathering causes for problems within organisations. Lethinen also states that there is limited knowledge on how root cause analysis should be used in post mortem analysis.
5. References


Hamid, T.K., & Madnick, S.E. (1990) The elusive silver lining: How we fail to learn from failure in software development, *Sloan School of Management*


