CMMi Implementation: Does it really benefit project teams?

13th Annual International Software Testing Conference in India 2013

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Abstract

IT organizations prefer to go for ISO or CMMi certifications these days. Though there are business values attached to in terms of gaining new customer base, but there is a cost associated in obtaining these certifications. Costs are mainly related to establishing a SEPG / Quality team, effort in many years to achieve the goal.

At granular level, project teams are responsible for implementing the processes in their routine work and collate data periodically to help analyse the project health, create various reports and then come up with corrective and preventive actions.

Key questions still remains same as what benefit the project team - managers and team will get in doing these activities. How does collected data helps managers in managing the teams and deriving optimizations, continuous improvements from the above said data OR how the data collection and analysis helps the team members become more productive. This white paper will look into insight as how project managers and teams can reap benefits in the day to day BAU work from the CMMi data and metrics collection.

The Current Scenario

Rohan Sharma is Project Manager in one of the leading IT Service Provider company. They are service UK and US clients and work on different services which include Application Development, Testing Services, Business Process Outsourcing Services and Infrastructure Management. The projects which Rohan manages are from Testing Service and it is on Retail Domain. Client is one of the leading Retailers in UK and has operations around the globe.

Rohan Sharma is acting as Account Delivery manager and the account provides Managed Testing Service to its UK client. Service includes functional as well as non-functional testing. Account is almost one and half years old. The team size has grown from 25 at the start to around 75 resources at peak. Projects are mostly T&M. There are instances when the projects are fixed price as well and Rohan has to ensure that the account margins are intact.

Scenario Background

**Organisation:** Company is struggling to grow the business as the margins are decreasing day by day. Competition is increasing, client is asking for reduced billing rates and continuous improvements. Cost pressure is increasing because pure play companies are offering the same work for a very less rate as they want to make money on volume. The only thing which the company can do is to raise their bar on quality delivery.

Marketing team confirms that to even get shortlisted for the new business and to compete with other big ticket vendors, company should have quality certifications. In one of the meetings with senior management, it was decided to go for CMMi level certifications.
Problem Background

Rohan’s project was one of the best suited projects / account for CMMi assessment because of following reasons:

- One of the key accounts for service line
- Account following complete life cycle and covering all testing phases
- Contract is due for renewal next year and other vendors are knocking at the clients door
- Client is continuously pushing for service improvements and cost reduction

Hence, Rohan was invited for a discussion with senior management. He was apprised that his account will participate in the audit. Initially it was excited because this was one of the key things happening in the organisation. There was lots of learning involved and if the outcome of the exercise was positive, it will be very good for account and also, can be showcases to client as well. He agreed and offered full support to the senior management and SEPG team.

Problem Details

When Rohan committed support for CMMi initiative, he was very excited. Mere thought that something new is being started which apart from benefiting the client, benefiting the company in getting new business will help the project team also. However, at the end of almost 1 year, he realised that his own situation has changed. He observed that to provide data to the SEPG team and process owner, lots of effort was required, team has to spent log of time in getting data, analysing data. Also, since this work was not billable to client, all the effort which was required for supporting the CMMi activities were to be absorbed by the project. So, problem started that team was not ready to spend more time on the initiative. Team was already overburdened with the work being asked by client. There were delays in project.

In short, Rohan was not able to fulfil his commitment to senior management on CMMi. When it came to delivering the actual work, he was not sure if it is really benefiting his own team in terms of cost benefit or in terms of better ways of working. Somewhere, Rohan was confused if this was the right thing to do. But, as per his experience, he also know that these certifications, they are not waste, they definitely provide value add and results in better ways of working. So, where the fault was?

This white paper will cover the dilemma faced by most of the Project Managers / Delivery Managers who work on CMMi Assessment and then further work for it sustenance part. The problem statement is “Do they really benefit “?

Solution Summary

There is a very famous quote which answers the above problem,

*There is a magic in graphs. The profile of a curve reveals in a flash a whole situation — the life history of an epidemic, a panic, or an era of prosperity. The curve informs the mind, awakens the imagination, convinces.* - Henry D. Hubbard, 1939

In single word, answer is YES. It does benefit the project teams as well. All the hard work done for maintaining / following these standards do help the project teams. Not only as a tem but also as an individual.
To observe the benefits to the project teams who work at root level, we need to stress upon 2 critical things:

1. Find relationship between different types of metrics
   - Identifying different real time metrics (as per data collection methods)
   - Defining metrics in terms of the data we collect/easily available from SDLC
   - Linking different metrics with each other
   - Collating metrics in a way that they directly associate with the top goals

2. Follow PDCA cycle: This is "Plan → Do → Check → Act.

In terms of software Metrics and Processes, this is linked by not only collecting the data but analysing it in context of the current project activities. For every metrics we analyse, we need to ask questions as:

   - What data is collected?
   - What does the data signifies
   - Where the data is pointing to/indicating
   - How can we correct the findings (preventive and corrective actions)
   - Once corrected, we need to feed back the corrections in our system so that when next time the data is collected, we get better results

At the top level, we need to identify the organisation goal and then link them to the minute activities we do in our project activities. Using statistical techniques, we should find a correlation between organisation goal and metrics. Once the relationship is established, then we can focus on improving the base processes and that will propel the improvements to the upward goal.

To understand the above concept better, let's list down the key activities done as part of testing life cycle. These are:

   - Requirements & Design analysis
   - Test Estimation
   - Test Planning
   - Test Design
     - Test Scenario Creation & Test Case Creation
   - Review of Testing Deliverable
   - Defining Test environment requirements
   - Defining Test Readiness requirements
   - Perform Sanity Testing
   - Test Execution
   - Test Reporting
   - Test Closure

Let's also list down what the key problems are faced by Project Managers while executing any project which are directly linked to success or failure of the project:
Key Problems from client’s side

- Requirements are not frozen, continuously changing and hence scope creep
- Test Deliverables are not signed off by client
- Queries are not being answered on time by business analysts, hence testing document is not complete
- Environment is not ready on time
- Development testing is not efficient on unit testing, too many defects leaked into System / Integration testing
- Environment is unstable and cause testing delays
- Defect turn-around time is too high

Key Problems from vendor’s side

- Estimations are incorrect
- Testing Deliverables are not of good quality (review process not very efficient)
- Lack of skilled resources / lack of domain knowledge / trainings

Key question here is, where does the above listed problem contributes to (how do they cause projects to fail)? Answer is below:

The above problems largely contribute towards:

- Effort Variance
- Schedule Variance
- Loss of Productivity (Overworked staff and degradation in motivation)
- Cost Overrun

As part of effective metrics management, we need to control the above 4 factors. This can only be done when the problems at root level are addressed. Hence, we need to establish a superficial relationship between the metrics which are affecting the project delivery with the problems (either from client’s end or vendor’s end)

Let’s perform the above action with help of few examples:

Activity 1: Incorrect estimations

Result:
- Team has to work overtime to complete the tasks
- Quality of work will be compromised because of long hours
- Because of bad quality deliverables, defects will seep into UAT / Live environment
- Client will not renew the contract, loss of business

Activity 2: Un-availability of test environment on time

Result:
- Delays in start / continuation of test execution
- Team has to sit idle at times and work overtime at times
- Pressure to perform more in less time
- Quality of work will be compromised because of long hours
- Because of bad quality deliverables, defects will seep into UAT / Live environment
- Client will not renew the contract, loss of business
Activity 3: Readiness checks not done properly

Result:
- Access issues are found during SIT stage
- Connectivity issues are observed
- Support not agreed and hence, delays in testing
- Tools not available on time and hence delay in testing.
- Delay will cause more work to be done in less time since schedule has to be firm
- Quality of work will be compromised because of long hours
- Because of bad quality deliverables, defects will seep into UAT / Live environment
- Client will not renew the contract, loss of business

In short, the activities are different but eventually, all of them will lead to increase in effort / schedule and will eventually result in loss of revenue / loss of business. This will impact both client as well as vendor.

How can we resolve the above problems?

Activity 1:
- Give training related to estimation models to the Test Managers
- Standardise the Estimation tools
- Ask client to provide as signed off documents for estimation
- Conduct estimation workshop to go over queries related to input document.

Activity 2:
- Create environment requirement sheet at the Test planning stage
- Regular follow-up on the environment requirements
- Raise flag well ahead of the environment ready date so as to plan mitigation

Activity 3:
- Readiness sheets created and reviewed by client environment teams and design architects
- Issues faced during readiness checks to be added as new readiness activity
- Readiness checks to start as early as possible in life cycle

Rohan was introduced to these measures by a Senior SEPG team member. He was told about the concept of **PPM (Progressive Project Monitoring)**.

PPM is continuous way of monitoring the implementation of various activities as part of solution to problems. In this, database of problems from previous releases is created. At the time of start of a new project, initially, as per capability baseline, project performance is forecasted. Then, different measures as suggested in the above examples are adopted and then again at the end of various phases, the performance is measured.

**Example:** As per capability baseline of the organisation, it was assumed that Effort variation for the project will be around 10%. We want to lower this %age for the current project. So, we will take measures at the start of project as per Activity 1 above. At the end of the phase, we will analyse the results and calculate the variance. Definitely there will be reduction. The new lessons learned as part of this exercise will act as input in next phase or next project. This Progressive Project Monitoring will continue.
Rohan was very much convinced now that using these PDCA cycles and Progressive Project Monitoring, he can bring in lots of improvements. Mere thought of providing the benefits of Effort and Schedule variation excited him. Eventually, this is what the client was complaining on these for past 1 year.

All the processes were analysed to observe the improvements and database was created. From the current project, preventive and corrective actions were identified. Problems were prioritised and then implemented. They were monitored and measured.

Result was evident not only from metrics part (improved baselines in 6 months period) but from project’s perspective as well. Since the project team implemented the measures, they themselves experienced as how these have helped in performing them better with these actions.

Apart from the above 2 process and measurement tools, following other tools which were part of CMMi process initiative also helped in better control and monitoring.

**Project Tracker:** As the name suggests, this is to track all the activities done with in the project life cycle. This helps Project manager to track the work breakdown structure activities at a minute level. Each activity can be tracked resource wise for following:

- Planned start date & end Date
- Actual start date & end date
- Revised start date & end date (if applicable)
- Planned Effort & Revised effort
- Actual effort
- Review Effort & Rework Effort
- Re-review effort
- Pre delivery Defects count (if applicable)
- Post-delivery defects count (if applicable)

![Project Tracker](image)

The planned data is entered by the Project Manager / Project lead. Actual data is entered by the test analysts working on the project. When there is deviation, then the remarks column is used to enter the reason.

The data is used further by the project manager to perform QPM report. **The output of this activity is fed back to Progressive Project Monitoring and also to estimation models.**
Causal analysis and resolution (CAR): This is MS Excel based tool to record the Review defects (internal and external). Pre-Delivery and Post-delivery software defects are also exported from Test Management tool into this. The data is then analysed for:

- Cause of Defect
- Severity of Defect
- Defect Injection phase
- Defect Detected phase

Once this data is available, then CAR report is created which is based on identifying the Root cause of defects, performing Pareto analysis.
All the possible root causes are further drilled down for dependency on following (using Fish bone diagram)

The CAR report helps in Reactive and Proactive defect management by taking preventive and corrective measures.

**Positive CAR Reports**

- A Causal analysis and Resolution Report for Positive outcomes related to
  - Customer feedback, Project process performance, defect prevention
- Objective is to
  - Analyze the event of positive outcomes in the Project / Organization
  - understand the causes
  - Based on the causes implement the positive outcomes in other phases and other projects in the organization

- Positive CAR Example: Defect rejection rate was less than 1% in one of the projects (where as the company baseline was 5%). On analysing the data and discussion with team members, it was observed that the team lead of this project has taken a detailed session on how to log good defects. Defect template was also used on this project. These 2 factors resulted in less than 1% defect rejection. This was a case of Positive CAR. Based on this analysis, best practice document was created.

**Negative CAR Reports**

- A Causal analysis and Resolution Report for Problems / Issues related to
  - Customer feedback, Project process performance, resource issues.
  - CAR is practiced to identify systematic process Non Compliances identified during internal Audits, External audits, and CMMI assessments.
- Objective is to
  - Analyze the event of problem/issues in the Project / Organization
  - understand the causes
  - identify Corrective and Preventive actions to avoid recurrence of such problem / issue
Benefits to Project Team

Rohan was very happy to share the charts with clients. In a meeting with client’s senior management, Metrics architecture, Progressive Project Management was showcased. The visual and real time benefits made client very happy. Client asked Rohan to implement this progressive management into all other projects and even agreed to fund the cost for process related initiatives.

Benefits summary

- As part of project life cycle, we do various activities. This includes review of base documents, estimation, planning etc. CMMi tells us how these can be grouped into process and sub process.
- We measure these activities as part of standards / CMMi Key Process Areas.
- Measurement is not sufficient if we do not analyse the data and do not plan with improvements.
- Metrics Architecture helps us in linking these small activities using statistical techniques and guides us towards improvement.
- There might be 1 time effort in setting these baseline equations. However, there are defined by SPEG / Quality teams. For project teams, the requirement is “Understanding” and “Implementation”.
- There is no additional effort in implementing these because the data is already available. We just need to put the data in context and change the way we look at the data.
- Various tools used for CMMi process improvements help in analysing the readily available data. They offer better monitoring and control over the project. Regular monitoring helps us in identifying preventive, corrective actions along with identifying best practices.
- Project teams benefit when they implement these very basic measures and then consistently.
References

1. Steria CMMi Assessment documents

Author’s Profile

Manish Singhal has total IT experience of around 16 Years with more than 14 years in software testing.

Prince2 registered Practitioner with experience in managing large testing projects, Project planning & management, ensuring optimal utilization of resources, Customer and stakeholder management.

Manish is specialist in Formulating Testing Process & Methodologies, creating RFP/RFI/Proposals & customized testing solution for various clients of Retail Industry and Delivery of independent Testing programs.

Manish has also participated in CMMi Level 5 assessments.
# Glossary

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<tr>
<th>Term</th>
<th>Meaning</th>
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<tr>
<td>CMMi</td>
<td>Capability Maturity Model Integration</td>
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<td>ATS</td>
<td>Activity Tracking Sheet</td>
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<tr>
<td>CAR</td>
<td>Causal Analysis and Resolution</td>
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<td>ST</td>
<td>System Testing</td>
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<td>SIT</td>
<td>System Integration Testing</td>
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<td>QPM</td>
<td>Quantitative Project Management</td>
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<td>PPM</td>
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