



Technical White Paper

Business Value of Embracing Metrics and SPC-based Management

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Abstract

This white paper discusses how metrics-based Management and Statistical Process Control (SPC) can be used during the execution of a project for enhancing business value for customers as well as service providers.

It also gives examples of different types of projects where Metrics-based Management and SPC led to increased value-addition for the customer and enhanced operational efficiencies for the customer organization.

About the Author

Padma is the Group Head for one of the four development groups at Sonata. She has handled large projects with multiple teams, and has extensive expertise in large projects management, multiple accounts management and customer interfacing. In addition to being in-charge of project delivery in her group, she also participates in other support activities, such as pre-sales, organization-wide quality initiatives and resource recruitment.

Table of Contents

(Sample can include any of the following)

- 1. **Background1**
- 2. **What to measure?1**
- 3. **Measurements based on types of projects2**
- 4. **Summary.....5**

1. Background

Software engineering, as an area of engineering, is not fully embraced with processes and measurements. Though there is a continuous effort to move in that direction, implementation to the same extent of thoroughness, like a manufacturing setup, is tough.

Standardization of processes and associated measurements are very difficult, and more often than not, the first question associated with them is, “How shall I benefit from them?”

At the same time, it is difficult to answer questions such as:

- A customer asking, “For the last three years, you have been working on the same project. What is the business value you brought in?”
- Another customer, challenging, “Your team is not half as productive as my team is.”
- A Project Manager getting frustrated, “There does not seem to be any way out for the amount of chaos, night-outs and weekend working before the Release Date. Hope there is some solution to this.”
- A Prospect, asking, “In the paradigm of increasing employee costs and reducing dollar value, how do you maintain or lower my maintenance costs over 3 years?”

The only answer to all these questions is:

Measure, Measure and Measure.

Standardization of processes and measurement are the keys to successful teamwork!

2. What to measure?

As there is a lot of literature available on the net, this section is being handled in brief.

One approach is the one based on Balanced Score Card, which defines Metrics in four dimensions for different levels: Customer-oriented, Internal Process-oriented, People aspects, and Learning & Improvement aspects.

At project level

Assess the customer’s key goals for the engagement. In some cases, you may not get direct responses from customers saying, “This is precisely what I am looking for.” But it is for the Project Manager to identify some measures, which reflect the customer’s objectives for the relationship.

Then assess the key goals of the project for its internal monitoring. The key is to focus on internal processes during execution of the project. Ensure that the measures identified by the Project Manager are very effective so that the customer’s objectives can be met by monitoring them.

Typically, Project Level Metrics are monitored weekly, and week-on-week trends are drawn. If there are concern areas in these, then corrective actions are drawn up in the weekly meetings.

At individual level

Key questions that need to be considered here are:

- “Have I progressed to the planned extent for today?”
- “Is my delivery with zero defects?”

It helps greatly to monitor these guidelines everyday. Keeping the remaining hours zero on a daily basis helps avoid working on weekends.

At organization level

In an organization with different types of customers, to whom different types of services are provided, and where each customer’s objectives for the relationship are different from those of others, it is not possible to consolidate the metrics for a particular project into those for the whole organization. You cannot mix apples with oranges and bananas.

In such cases, similar projects can be grouped together, according to their type, and then the metrics can be consolidated for each type.

E.g., some of the following statements can be made by consolidating the metrics of similar projects:

- “None of the QA projects missed the committed Release Dates. We have a unique technique, which can successfully predict the date of the QA release on the basis of past data.”
- “In all our enhancement projects, the defect containment is >97%. In other words, defect leakage to the customer is <3%.”
- “In support engagements, we are fulfilling 95% SLAs.”
- “At the organizational level, re-usability has improved by 10%.”

3. Measurements based on types of projects**3.1. Project 1****3.1.1. Challenge**

In this project, the team had the responsibility of releasing the product to market as per the date decided in the beginning of the Release Cycle.

But during the Testing Cycle, multiple activities were carried out:

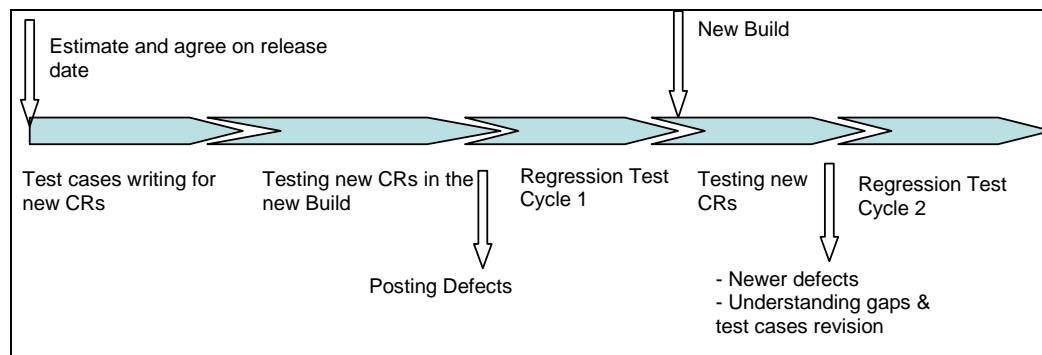
- Test Case Preparation.
- New Features Verification.
- Regression Cycle 1.

- Regression Cycle 2.
- Regression Cycle 3.

If it were a release without any complex features and if the CR verification had been done without any defects, meeting the committed Release Date would not be an issue.

But in this project, surprises were cropping up very often. The Fix given drastically varied from the requirement and needed a huge rework; it had to go through many more rounds of rework cycles than expected; and clarifications were needed on the requirements. All these factors delayed the Fix and the Build could not come for Regression Cycle in time.

Hence, in each Regression Cycle, 2-3 weeks before the release, there used to be escalations and tension-filled moments, which led to postponement of the Release Date.



3.1.2. Solution

The following processes were carried out to solve the aforementioned problem:

- Causal Analysis for deviations in the plan.
- Fine-tuning the Estimation Model.
- Consider all deterministic and non-deterministic parameters; give appropriate weight-age to them in the Estimation Model.
- Create Regression Model for determining the Release Date on the basis of multiple influencing factors.
- Use that for Estimation Model for determining the Release Date of future projects.

By using these statistical means, uncertainty about the Release Date was eliminated and the PM was able to estimate and plan it accurately.

3.2. Project 2

3.2.1. Challenge

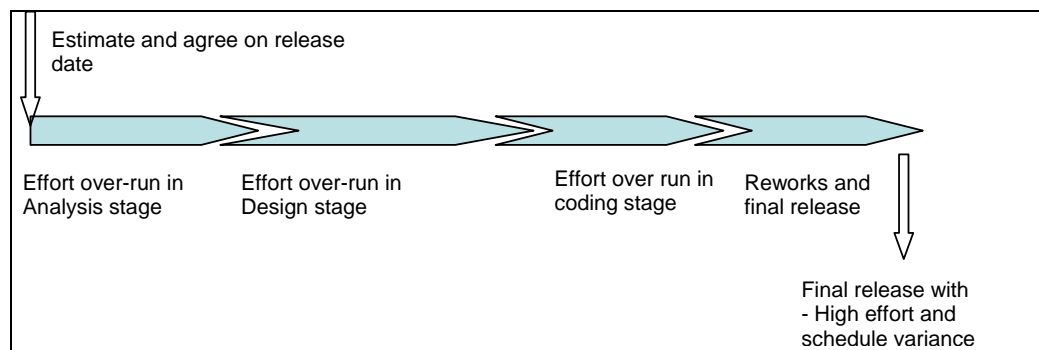
The objective of this project was to develop complex enhancements for a product. The product's features were tightly coupled with its core modules and needed extensive interactions among the team to finalize the requirements.

The multiple teams that came into picture were:

End-customer, Architecture group and the Development group.

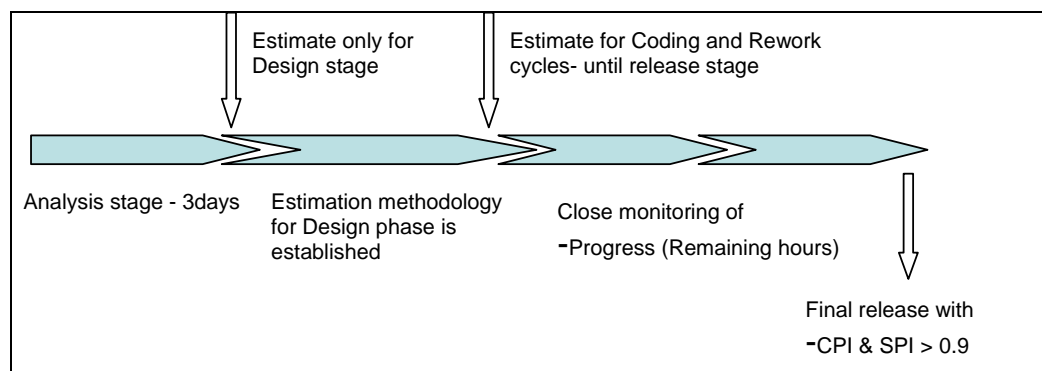
The project started with a budgetary estimate. But the accuracy of the budgetary estimate could be validated only after a thorough analysis and high-level design were done.

In the initial releases, huge effort over-runs and consequently, the corresponding repercussions were there.



3.2.2. Solution

In order to beat this problem, the following process changes were brought in:



In addition to these process changes, Defect Prediction was also done for monitoring quality. For Defect Prediction, an Empirical Model based on past releases data was used.

For each work product, the number of defects in different stages was predicted:

Internal Review Defects: System Testing Defects: External Testing Defects.

Reviews were conducted and results were analyzed for the following aspects:

- Was the number of defects predicted equal to the number of defects detected in each stage or not?
- Defects analysis, root-causes identification and implementation of appropriate corrective actions.

These in-process control measures helped maintain the quality of the deliverable.

How this resulted in adding business value

The examples given above illustrate how Metrics can be used effectively to overcome the issues involved in execution of projects and accomplish data-based checking before making commitments to the customer.

But how does this translate into Business Value? The technique is to examine the current year and the last year's estimation basis documents. It is noticed that for developing a certain level of complexity feature, lesser time is taken in the current year than last year i.e. with release-on-release analysis of estimated vs. actual variances and further fine-tuning of estimation basis to keep the variance at minimum, there will be revisions of the estimation basis.

In other words, the productivity of the team increases, which, in turn, is a measure of enhanced RoI for the customer.

Be pragmatic

Please note that if measurements are done without proper directions and goals, there will be multiple losses:

- Huge losses of the time invested in collecting and analyzing data.
- Disgruntled team as they would not see any positive results of the exercise.
- Unhappy customer.

Hence, be pragmatic and roll out a meaningful Metrics program that meets the requirements of a particular project. Just as one size does not fit all, the Metrics program has to be completely tailor-made for a particular project.

4. Summary

A simple, well-defined Quantitative Project Management Plan provides immense benefits in benchmarking a project/company internally (release-on-release performance) as well as externally, vis-à-vis other projects/companies.

However, if not implemented, it leads to the loss of a lot of valuable hidden information in the project and difficulty in gauging the opportunities for improvement, as latent inefficiencies will continue undetected.

Hence, have a measurement program and get an insight into the real pain-points in the project. Resolve those and make the project a success.

Measure, Measure and Measure.

What You Measure is What You Get.