

Опыт построения и использования практики количественного проектного управления, соответствующей требованиям модели CMMI v1.2 и согласованной с бизнес-целями организации

Станислав Калканов
Luxoft
SKalkanov@luxoft.com

Николай Быков
Luxoft
nbykov@luxoft.com

Abstract (Russian)

Когда организация начинает реально использовать количественное управление проектами, соответствующее *high maturity* требованиям модели CMMI или когда организации необходимо количественно оценить эффективность процесса разработки ПО и отдачу от инвестиций в его развитие, одним из ключевых факторов успеха является использования подходящих средств автоматизации измерений и системы Статистического Анализа и Управления (САУ). Эта система должна адекватно учитывать особенности производственного процесса организации, а также позволять получать данные, необходимые для расчета количественных бизнес целей организации.

Система САУ компании Люксофт реализована как приложение Microsoft Access. Система интегрирована с применяемыми в проектах измерительными формами, основанными на Microsoft Excel и специализированных измерительных библиотеках. Система используется для накопления проектных измерений, анализа проектных метрик и причин их вариаций, анализа стабильности процессов разработки, подготовки метрической отчетности на уровне проектов, программ и производственных центров, а также для поддержки статистических бейзлайнов.

Данная презентация знакомит с основами организации системы САУ Люксофт и рассказывает, как данная система используется для эффективного сбора, анализа проектной статистики и подготовки отчетности по количественным индикаторам процесса разработки ПО.

Презентация отвечает на вопросы как:

- 1) обеспечить сбор и обработку статистических данных для анализа статистических гипотез и подготовки статистически значимых наборов данных;
- 2) вычислять количественные индикаторы и готовить статистические бейзлайны уровня организации;
- 3) готовить статистические данные для количественного управления в проектах.

Keywords: CMMI, количественное управление проектами, бизнес-цели, метрики.

Practical experience of quantitative project management practice development and usage to meet CMMI v1.2 high maturity requirements and organizational business objectives

Stanislav Kalkanov
Luxoft
SKalkanov@luxoft.com

Nikolay Bykov
Luxoft
nbykov@luxoft.com

Abstract (English)

When organization starts its way to high-maturity CMMI levels or just has strong intention to quantitatively understand software development process effectiveness and ROI of process improvement it's necessary to use appropriate Statistical Process Control tool aligned both with organizational culture an processes as well as with organizational business objectives.

Luxofts SPC tool is a MS-Access based application for support and automation of all SPC-specific activities of. It's integrated with Microsoft Excel-based measurement forms used in projects to collect data, analyze causes of variation, test stability, report on all levels and maintain statistical baselines.

The presentation will discuss the creation of a Luxoft proprietary SPC tool and how it is used to collect, analyze and reporting quantitatively managed indicators the easy way.

It gives an understanding of how:

- 1) provide statistical data analysis to prove statistical hypotheses and define statistically proven data sets*
- 2) calculate SPC indicators and generate performance baselines for the organization*
- 3) prepare statistical data for quantitative project management.*

Keywords: CMMI, High-Maturity, Measurements and Analysis, Statistical Process Control, Business Goals.

1. Introduction

When an organization starts to implement CMMI high maturity practices, especially OPP and QPM, it's very important to create a functional but still easy to use statistical process control support system. It should be:

- flexible to support metrics data collection in heterogeneous environment;
- provide all statistical functionality necessary;
- offer good reporting possibilities to provide all necessary statistical views on the project, program and organizational levels;
- allow to calculate software engineering metrics in a form aligned with organizational business objectives.

We will address how SPC support system can be established based on example of Luxoft SPC support tool used for quantitative management support in Luxoft more than 7 years.

The presentation will elaborate on the tooling side:

- How overall measurement & analysis practice including SPC approach can be establish across the organization
- how to establish flexible approach of collecting measurement results from different projects in one single database
- how to select statistically-relevant data and what tests can be done for that
- how to calculate SPC indicators and how to form useable Process Capability Baselines based on indicators for different delivery centers as well as for the whole organization
- what reports are created for project, program and organizational levels
- how to make statistical reports for the business and marketing purposes

And on appraisal/CMMI considerations:

- how the tool implements selected CMMI high maturity practices of OPP/QPM

- how the tool eases the implementation of CMMIs subpractices to fulfill SEIs raised bar.

2. Measurement & analysis process

Some details on the way Luxoft does measurements and how it impacts the tool:

Project measurements are made with the help of Luxoft proprietary tools and libraries as well as standard features of defect tracking systems like ClearQuest or Jira. All the project measurement are collected and stored in pre-defines xls files. After project is finished, all the final data come into Luxoft proprietary SPC tool for statistical analysis. As a result final statistical report for the project is generated and BeyondPCB (PCB stands for Process Capability Baseline) statistics set is updated. BeyondPCB set is changed during the year after every project closure but once in a year BeyondPCB is baselined. It becomes approved PCB set for the next fiscal year (both on delivery centers and company-wide levels).

3. SPC tool

Luxoft SPC tool is MS Access based proprietary system for collecting, analyzing and reporting quantitative project indicators. From mathematical toolbox point of view it's based on six sigma principles. Now the analysis is based on 48 metrics and permits to have 31 indicators under statistical control.

Detailed SPC tool features:

- Import and storage measurement results for completed projects/project releases
- Storage of 17 additional "project context" attributes like delivery center name, project manager(s), project type (DEV/MNT), technologies (Java/.NET/etc.), business domain, etc.
- SPC calculations and analysis
 - o SPC indicator definition

- Measurement statistics for the SPC indicator definition
- Statistics data quality checks
 - Visual control of statistics data & SPC indicator quality
 - Sigma-deviation diagram control
 - Sigma-based tests control
 - Overall status control
 - Primary statistics in anomaly control
 - Moving Rang control
 - Overall status control
 - Primary statistics in anomaly control
- Control of statistical data representativeness
- Statistics/data stratification and sub grouping
- Statistical data removal based on SPC-criteria
- Statistical data removal from non-basis projects set
- Statistical data removal due to informal criteria
- Boundary values removal
- SPC indicator calculation (approx. 15 methods)
- SPC indicator normal distribution calculation
- SPC indicator critical data ranges calculation
- Create report in xls-format for further visual XmR-chart analysis
- Process Capability Baseline (PCB) calculations
 - SPC indicator value updates in PCB after SPC calculations
 - SPC indicator value updates in beyond-PCB after SPC calculations
- Typical reports generation
 - Strata indicators and their values
 - Quality of indicators in strata
 - Projects in basic set of projects
 - Projects in particular strata
 - Project parameters (size in SLOCS & FP, duration, project team size)
- Project quantitative analysis reports
 - Set of quantitatively tracked metrics for the project and their values
 - Aggregative “business” metrics values (economy, project effectiveness, product quality, process quality)
 - Cumulative quality of the project
 - Xls documents generation in special template to be used for as appendices
- to the project closure report with statistical analysis results
- Project benchmarking
 - Comparison between project indicators with corresponding PCB values for the delivery center
 - Comparison between project indicators with corresponding beyondPCB values for the delivery center
 - The same in comparison with company-wide PCB/beyond PCB
 - Comparison with aggregative “business” metrics values (economy, project effectiveness, product quality, process quality)
 - Comparison with the best historical values
- Project estimation precision analysis

4. Conclusions

Full featured and aligned with organizational needs Statistical Process Control tool is essential prerequisite to build CMMI high maturity compliant quantitative project management practice. It helps to save a lot of money on data collection, processing and analysis and provide data necessary for quantitative monitoring of organizational business objectives.

With current SPC tool it's possible to support all SPC analysis needs of 3000+ distributed company. It's used more than 7 years and proves it's efficiency.