

Utilization of statistical process control (SPC) in emergent software organizations: pitfalls and suggestions

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From the abstract

- A common view is that SPC can only be usefully applied in mature organizations.
- Achieving maturity takes 5-10 years.
- ***Should a company wait so long before using SPC techniques?***
- Answer this question by way of a case study.
- Give practical guidance on the use of SPC in an emergent organization.

Literature review reveals that

- SPC may not be applicable to every software process
- SPC should only be applied to critical processes in an organization
- Not all SPC techniques are applicable to software processes
- Processes should be well-defined and stable in order that SPC techniques can be successfully applied

Case Study

- Organization established 1998 (the date of the paper is 2006)
- Certified CMM level 3 in August 2002
- Substantial historical data available in the form of metric datasheets
- Data includes metrics collected while organizational processes were in transition from CMM level 2 to level 3

Case Study

- Company to remain anonymous
- Published data to be multiplied by a constant before being presented in XmR charts
- Data considered, some metrics discarded
- Remaining metrics prioritized
- Finally selected three:

Case Study Metrics

- Defect density:
defects/size
- Rework:
rework effort/total effort
- Inspection performance:
defects/inspection effort

Before implementing SPC

- Adequate preparation is vital
 - Diagnose state of the organization
 - Plan improvement
 - Choose metrics
 - Define new processes
 - Analyze, organize and normalize existing data
 - Determine baselines

Benefits of using SPC

- Detect outliers by means of control limits
- Less subjective than having managers view Pareto charts
- Data used to drive decisions rather than to vindicate them
- Reorganization of the data improves data quality.

Importance of data quantity quality

- Need enough data of sufficient precision and detail to define control limits
- Obtaining sufficient data is difficult for small organizations

Difficulties associated with metrics

- Each metric has particular characteristics and complications
- Exacerbated by use of existing data
- Many metrics are not defined in a way that allows the desired statistical analysis
- Different kinds of analysis appropriate for different metrics

Conclusions

- Use a tradeoff analysis to convince management that SPC is a good idea
- Prepare carefully
- Create a well organized highly usable metrics database
- This case study convinced the organization to adopt SPC
- SPC is possible, though more challenging, in an emergent organization