

Quality Group Practice Guides

Process Improvement Guidelines

Abstract

Process improvement actions should be applied throughout an organisation to increase the effectiveness and efficiency of the activities and processes to provide added benefits to both the organisation and its customers.

Introduction

The objective of this guideline is threefold:-

- To introduce general concepts of improvement;
- To explain why process improvement needs to relate to the overall business strategy;
- To introduce some of the commonly used process improvement methods.

This document should be read in conjunction with the following Quality Group Practice Guides:-

- Quality Planning
- Costs and Benefits
- How to Design, Implement and Maintain an Effective QMS

Scope

The scope of this guideline applies to all processes in the software development and implementation life cycle.

Skills, Tools and Metrics

- ***Skills***

The skills required in the first instance are common sense, a good understanding of the current business priorities and an appreciation of commonly used product and process measurements. Specific training will be required if one or more of the formal process improvement methods are to be used.

- ***Tools***

The tools, at the top level maybe a framework of organisational improvement programmes and at the lower levels the use of brainstorming, fishbone diagrams, parto charts etc, dependant on the scale or complexity of the improvement being attempted. Some proprietary tools are available to support the process capability models described below.

A database should be built up of the results of all relevant product and process measurements and of the results of analysing these measurements. Charts or 'profiles' may then be plotted showing improvement trends.

- ***Metrics***

Appropriate metrics need to be identified at the start of a project to enable process improvement to be measured, tying these measurements to organisational goals and objectives

Process Description

- ***Introduction***

In most organisations, processes are usually improved by a mixture of small step improvements and strategic initiatives (break-through). ISO 9001:2000 requires 'continual improvement of the quality management system' based on-

- Product performance data;
- Feedback from customers and other parties;
- Validation data;
- Test data;
- Data from reviews or inspections of design or code;
- Financial data.

Improvement should also be planned for break-through projects to achieve specific strategic business objectives where, in general terms, the main drivers are customer satisfaction, competition and profit.

- ***Process Prioritisation***

It is evident that many initiatives can help to deliver a particular improvement target. For example, the overall competitiveness of the business may be improved by one or more of the following:-

- Improving delivery times/time to market;
- Improving process management;
- Reducing operating and development costs;
- Improving the utilization/flexibility of resources;
- Investing in new tooling, doing more staff training, or improving product performance.

Pursuing any of these initiatives will consume valuable resources, so it is important to decide which initiatives are likely to bring the most significant and most immediate business benefits. Therefore, in selecting which processes to improve, it is important to assess what overall impact each process has upon each of the major business objectives. A weighting method, which allows a suitable decision matrix to be constructed, is described in Appendix 3 of the Issue 5.0 TickIT Guide.

- ***Understanding Current Process Capability***

The basis of an improvement activity is initially to understand the current situation. It is vital to make an objective assessment of current process capability, decide how this might be improved and then set a target for improvement.

For example, a simple measure of the effectiveness of the 'Design, Code and Test' process may be the average number of errors found in testing per 1000 lines of code. The chosen improvement activity may be to review and improve code verification, with a view to reducing the error rate by half. Whether or not this has been achieved should be apparent from future process measurements.

- ***Process capability models***

These models are based upon defining the specific processes that an organization needs to deploy to meet its business goals. Examples are the SEI Capability Maturity Model® Integration and models based upon the international standard for software process assessment, BS ISO/IEC 15504

Both CMMi and BS ISO/IEC 15504 are biased towards software development. Albeit using different terminologies, they detail process outcomes or work products and the activities that need to be carried out to perform each process, so it is possible to evaluate the degree to which any process being assessed meets the prescribed criteria.

In the case of CMMi, for a certain level of 'maturity', a predefined combination of processes has to be shown to be in conformance with the model. The higher the maturity target, the more processes have to conform.

With BS ISO/IEC 15504, it is possible to make a capability assessment of any chosen combination of processes. This allows those processes to be targeted that are most likely to benefit the business.

Process Assessments

There are two main motivations for a software supplier to make process assessments:-

- As part of a process improvement initiative;
- To demonstrate particular process capabilities to prospective customers.

A supplier's customer may decide to perform either a CMMSM or ISO/IEC TR 15504 assessment to assess a supplier's key process capabilities before entering a contract commitment. The implications of such an assessment, particularly resource requirements, should be appreciated by both parties beforehand.

Total Quality Management

The concept of Total Quality Management has been widely promoted across all industry sectors and software companies are certainly not excluded. The focus for Total Quality within Europe is the European Foundation for Quality Management (EFQM) and in the UK, the British Quality Foundation.

The EFQM Excellence Model comprises nine elements, each of which may be used to assess an organisation's progress towards business excellence and also to set specific targets for improvement. In the UK, the British Quality Foundation promotes the EFQM Excellence Model as 'The Business Excellence Model'. There are active regional groups and a National Award Scheme.

Further Reading

1. The Issue 5.0 TickIT Guide, Appendices 1-4 (BSI-DISC, 2001, ISBN 0 580 36943 9). TickIT publications may be ordered from BSI Customer Services, 389 Chiswick High Road, London, W4 4AL. Tele: + 44 (0) 20 8996 9001 Fax: + 44 (0) 20 8996 7001, email: tickit@bsi-global.com: Internet: www.tickit.org
2. CMMI (Capability Maturity Model[®] Integration) for Systems Engineering/Software Engineering/Integrated Product and Process Development/Supplier Sourcing, Version 1.1, *Technical Report CMU/SEI-2002-TR-011*. The CMMI[®] Web Site www.sei.cmu.edu/cmmi/cmmi.html also contains other CMMI initiatives. SEI Publications may be downloaded from Internet: www.sei.cmu.edu/publications/publications.html
3. **BS ISO/IEC 15504-1:2004** - Concepts and vocabulary, **BS ISO/IEC 15504-2:2003** - Software process assessment. Performing an assessment, **BS ISO/IEC 15504-3:2004** - Guidance on performing an assessment. **BS ISO/IEC 15504-4:2004** - Process assessment. Guidance on use for process improvement and process capability determination, **BS ISO/IEC TR 15504-5:1999** - Software process assessment model and indicator guidance and British Standards may be purchased from British Standards Institution (BSI), Standards Sales and Customer Services, Tel: +44 (0)20 8996 9001, Fax: +44 (0)20 8996 7001, email: info@bsi-global.com, Internet: www.bsi-global.com
4. The European Foundation for Quality Management may be contacted at: Avenue des Pleiades15, 1200 Brussels, Belgium, Tel: +32 2 775 3511, Fax: +32 2 775 3535, email: info@efqm.org, Internet: www.efqm.org
5. The British Quality Foundation may be contacted at: 32-34 Great Peter Street, London SW1P 2QX, Tel: +44 (0)20 7654 5000, Fax: +44 (0)20 7654 5001, email: mail@quality-foundation.co.uk, Internet: www.quality-foundation.co.uk