IMPLEMENTING PRODUCT AND PROCESS QUALITY ASSURANCE

With permission from a client of The Process Group

One of the Process Areas (PA's) in the CMMI* is Process and Product Quality Assurance (PPQA). This process area supports the delivery of high-quality products and services by providing the project staff and managers with appropriate visibility into, and feedback on, processes and associated work products throughout the life of the project.

In this article we share an example process definition for PPQA from one of our clients.

The company uses seven part-time Software Quality Assurance (SQA) staff, each person working eight hours per month on average performing audits. Each auditor is either a developer or tester as his or her primary job. To ensure objectivity, each person is assigned to a project other than the one they work on. All audit activities are managed by the leader of the Engineering Process Group (EPG), a part-time position of seven hours per month for a population of 80 software developers.

The benefits of implementing a lightweight audit process are to:

- Maintain the gains made in process improvement over the previous five years
- Detect process refinements needed to simplify process implementation
- Share engineering and management practices across the development groups

Process and Product Quality Assurance (PPQA) Audit Process

1.0 PURPOSE
The purpose of this Audit Process is to provide SQA staff with a standard method for performing audits.

2.0 SCOPE
This process applies to software projects within the XYZ organization.

3.0 RESPONSIBILITIES
The SQA staff is responsible for conducting audits using this process and the audit checklist(s) (see www.processgroup.com/PPQA_Audit-Checklists-v1.zip).

* Capability Maturity Model Integration v1.1 / v1.2

4.0 CONDUCTING AUDITS

4.1 Audit Preparation
Each SQA staff member (auditor) will keep appraised of the project he or she has been assigned to by reviewing the project's Software Project Management Plan (SPMP) and schedule. The auditor will meet with the Project Leader approximately one week prior to a scheduled audit. At this time the following shall be discussed and/or identified:

- The actual date of the audit
- The location of project plans and artifacts to be audited
- The names of project team members whom the auditor can contact should questions arise

Prior to the actual date of the audit, the auditor shall:

- Identify and prepare copies of the required audit checklists
- Review associated project plans and artifacts

4.2 Conducting Audits
The auditor shall perform audits of the project teamwork activities by reviewing resulting work artifacts and making comparisons to the associated process within the team's documentation. As a minimum, the audit shall follow the items contained in the audit checklist(s). The results will be recorded on the checklist.

The Project Leader will be informed of the audit results via the reporting activity and must resolve any noncompliant issues. Resolving noncompliant issues should be handled in a timely fashion (less than two weeks is expected) unless some unavoidable circumstances prohibit resolution.

Noncompliant issues that are not resolved promptly and are not included in a plan for resolution shall be escalated by notifying the EPG Lead of the situation. If the EPG Lead cannot bring about resolution of noncompliant issues, then he or she will escalate the issues to the Technical Director.

5.0 AUDIT REPORTING

The completed checklist acts as the audit report.

5.1 Naming Conventions

A standard naming convention for audit report files is used. File names will be a concatenation (with underscores) of: Group name_Project name_Audit name_Date.

The group, project, and audit names can be abbreviated to avoid long file names. The audit name shall correspond to one of the audit types in Table 3. The date is in the form, mmddyy, and is the actual date of the audit. An example would be Project1_Release215_ PMC_060204.doc

Below the Project and Project Leader, a separate row shall be used to record metric data for each audit. If multiple audit types are audited together (e.g. Project Planning, Project Monitoring and Control, and Requirements), a unique row shall be used to record the data for each audit type.

In addition, a separate row shall be used for each audit to record issues found in each process area (PA). In the sample (Table 1) a project-planning audit was conducted on 11/03/xx. During that audit, four major and two minor issues were found in Project Planning (PP), two major and five minor issues in CM, and three major and one minor issue(s) in Measurement & Analysis (MA). Both the Audit Name and Process Area columns are populated using pre-defined pull-down menus. The Audit Name correlates to the checklist

Project Name / Project Leader	Audit Date	Planned/ Unplanned Audits	Audit Name	Process Area	Work Products Reviewed	Number of Major Non-Compliant Issues	Number of Minor Non-Compliant Issues	Number of Major Non-Compliant Issues Closed	Number of Major Non-Compliant Issues Elevated to EPG Lead	Number of Major Non-Compliant Issues Elevated to Senior Management	Number of Hi-Priority Risk Items in Project Risk List	Hours to Prepare and Conduct the Audit	Auditor
Project 1 (Smith)	11/03/xx	Planned	PP	PP	2	4	2	0	0	0	4	3	Liu
				CM	1	2	5	0	0	0	0		
				MA	2	3	1	0	0	0	0		
Project 3 (Smith)	11/25/xx	Planned	PMC	PMC	0	0	0	0	0	0	0	4	Liu

Table 1 Record of PPQA Audit Metrics

5.2 Location of Reports

The audit reports shall be stored into the group Configuration Management (CM) system (//qa-reports/project-X/<file>).

Auditors shall email a copy of each audit report to the associated Project Leader and the EPG at epg@xyz.com when the report is completed. The EPG shall be responsible for storing the file in the appropriate directory.

6.0 METRICS

Auditors shall be responsible for providing the EPG with metric information on an individual project basis. Auditors shall use a copy of a blank metrics spreadsheet obtained from the Process Asset Library (PAL) (www.processgroup.com/ PPQA-Metrics-v1.xls). An example is shown in Table 1. Once filled in, the auditor shall email the spreadsheet to the EPG at epg@xyz.com.

6.1 Project

In the spreadsheet, "Project Name" shall be replaced by the actual name of the project, using an abbreviation that makes sense if necessary. Below the project name, the project leader's name shall be entered in parenthesis.

name while the Process Area corresponds to the CMMI PA name. A blank entry is provided in the Audit Name drop-down menu for audits with multiple rows. The checklist has a column to identify the PA for each item checked. Below is an example of a checklist to illustrate.

6.2 Planned/Unplanned Audits

This metric allows the auditor to specify if the audit was planned (scheduled in the SPMP) or unplanned. Unplanned audits are conducted at the discretion of the auditor, based on previous evaluation of process performance.

ITEM NO.	PROCESS AREA	VERIFICATION ITEM	YES	NO Maj	NO Min	N/A
1.	RD	Are the requirements documented using the template in the PAL or using a customer-defined format?				
2.	REQM	Is there a traceability matrix for the requirements? Note: a traceability matrix implies that a requirement is traced to a design element, test case and area of code.				
3.	REQM	Are requirements tracked and updated according to the Software Project Management Plan (SPMP), or the Software Configuration Management Plan (SCMP) if it is a separate document? Need to verify that changes to requirements are controlled.				
4.	RD	Are requirements analyzed using a technique other than a peer review (e.g. use cases, Object Oriented Design methods, writing test cases for each requirement, etc.)?				
5.	REQM	Are requirements under Configuration Management?				

Table 2 Excerpt from an Audit Checklist

This metric serves to compare planned work to actual work, which has a direct impact on hours and funding. This metric must be tracked as each SQA audit is completed. A significant number of unplanned audits shall trigger analysis of actual versus planned funding for SQA activities.

6.3 Audit Name

This column is used to record the type of audit being conducted. A separate row shall be used to record metric data for each audit type. Table 3 illustrates the phases of a project and the abbreviation to be entered into this column of the metric spreadsheet. This table is provided on the Info tab of the spreadsheet. Use a blank in the Audit Name column when an audit requires more than a single row as described in section 6.1. Options QA and EPG are provided for use in recording the results when QA and EPG activities are audited.

Audit Type	Abbreviation
Blank	
Project Planning	PP
Project Monitoring and Control	PMC
Requirements Management	REQM
Risk Management	RSKM
Design	DESIGN
Verification - Validation	VER-VAL
Status Meeting	STSMTG
Peer Review	PRVW
Quality Assurance	QA
Engineering Process Group	EPG

Table 3 Audit Types

6.4 Process Area

This column contains the CMMI Process Area of the issue being reported.

6.5 Work Products Reviewed

During the life cycle of a project, the team will generate project work products (e.g. Software Requirements Specification, Design Review, etc.). The SQA auditor will enter the number of work products that were assessed during the audit into the Number of Work Products Reviewed column. Note that this figure is the total number of work products reviewed. For example, if 20 test logs were reviewed in addition to the test plan the total number of work products reviewed would be 21.

6.6 Number of Major Noncompliant Issues

This metric tracks the number of major noncompliances. Section 4.2, Conducting Audits, describes escalating noncompliant issues. A major noncompliant issue is identified as a significant deviation from the documented process, for example, when the project lacks something that is necessary and specifically named in the process documentation. The following are examples of major noncompliant issues:

- Lack of an SPMP or other plan
- Projects not following what is documented in the SPMP
- SPMP missing major section(s) (e.g. MA)
- Documents not being kept up to date
- Lack of a schedule and/or Work Breakdown Structure

6.7 Number of Minor Noncompliant Issues

Minor noncompliant issues shall be annotated as such in the comments section of the associated checklist. Example noncompliant issues include:

- Typographical errors
- Documents with titles or locations that are not exactly as referenced in a plan
- Documents with noncurrent release attributes
- Late posting of meeting minutes, peer reviews, etc.

Minor noncompliant issues are problems that should be tracked to closure. However, they are not collected for metrics analysis.

6.8 Number of Major Noncompliant Issues Closed

This metric tracks the number of noncompliances closed or resolved. There should be no noncompliant issues left unresolved. Section 4.2, Conducting Audits, describes escalating noncompliant issues.

6.9 Number of Major Noncompliant Issues Elevated to EPG Lead

The EPG Lead shall review the audit reports and will be apprised of any noncompliant issues. Section 4.2, Conducting Audits, describes escalating noncompliant issues.

6.10 Number of Major Noncompliant Issues Elevated to Senior Management

This metric tracks the number of noncompliances elevated to senior management. Section 4.2, Conducting Audits, describes escalating noncompliant issues.

6.11 Number of High Priority Risk Items

This metric tracks the number of risk items that have a priority higher than 50 (out of 100). The metric allows the EPG to monitor the number of high priority risks being tracked from the planning to closure phases of a project.

6.12 Hours

This metric tracks the time it takes an auditor to prepare, conduct, and document an audit.

6.13 Auditor

The auditor shall enter his or her last name here. A first initial shall be employed when different auditors have the same last name.

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