

# Quality Assurance

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# Introduction

## •Purpose

The purpose of the Software Quality Assurance Process area is to provide management with appropriate visibility into the process being used by the software project and of the products being built through the close monitoring of the QA group.

## •Scope

The scope of the model is drawn from CMM/CMMI® levels 2 and 3 and can be used in conjunction with the other Processes defined within the SPI Guide for SMEs to serve a small or medium sized software business and cater for its growing needs.

## •Objectives

The aim of this document is to develop a simplified model of the Software Quality Assurance Process for small and medium size organizations according to the requirements of the CMM/CMMI® models.

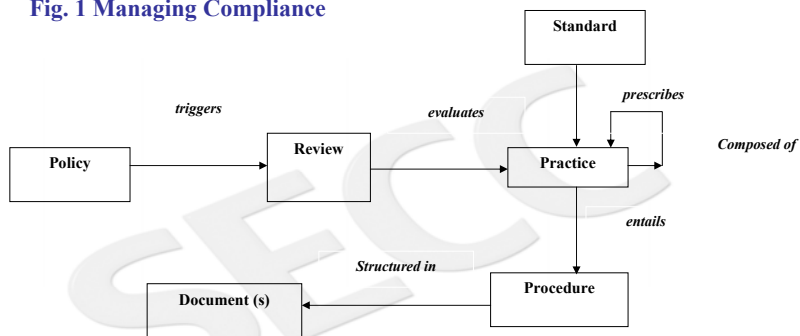
## •Intended Readers:

Senior Management and the SQA group



# SQA's Concern is Compliance Management

Fig. 1 Managing Compliance



The software quality assurance group works with the software project during its early stages to establish plans (documents) which are essentially drawn from company standards and policies. The standards prescribe the practices which entail the procedures that will add value to the software project and satisfy the constraints of the project and the organization's policies. By participating in establishing the plans, standards, and procedures, the software quality assurance group helps ensure that they fit the project's needs and verifies that they will be usable for performing the necessary reviews and audits throughout the software life cycle.



# The Roles of the SQA Group

The SQA group or individual

- helps establish plans, standards, and procedures for the software project in line with the organization's policies.
- verifies that they will be usable for performing reviews and audits throughout the software life cycle.
- reviews project activities and audits software work products throughout the development life cycle

and

- provides management with visibility as to whether the software project is adhering to its established plans, standards, and procedures.

Compliance issues not resolvable within the software project are escalated by SQA to an appropriate level of management for resolution.



# Responsibilities of the SQA Group

**The SQA Group or individual:**

- **Participates in negotiations (within a project) concerning**
  - commitments as consequence to allocated requirements
  - changes in commitments
- **Reviews project's statement of work (and/or proposal)**
- **Reviews project's resource estimates, time schedule, commitments**
- **Develops the project's quality plan (SQAP) and quality assurance activities**
- **Participates in preparation and review of project plan**



## Responsibilities of the SQA Group (Cont'd)

- **Reviews development activities (process and product)**
- **Reviews/revises products before delivery to the customer**
- **Reports SQA-results**
- **Reviews/revises periodically activities and results of**
  - **Requirements Management (RM)**
  - **Project Management (PM)**
  - **Software Product Engineering (SPE)**
  - **Peer Reviews (PR)**
  - **Configuration Management (CM)**
- **Is responsible for that measurements are defined and implemented for QA**



## The SQA Plan

**The SQA group's activities are performed according to the SQA plan. In brief, the plan covers:**

- **Responsibilities and authority of the SQA group.**
- **Resource requirements for the SQA group (including staff, tools, and facilities).**
- **Schedule and funding of the project's SQA group activities.**
- **The SQA group's participation in establishing the project plan, standards, and procedures for the project.**
- **Evaluations to be performed by the SQA group.** *Examples of products and activities to be evaluated include: operational software and support software, deliverable and non-deliverable products, software and non-software products (e.g., documents), product development and product verification activities (e.g., executing test cases), and the activities followed in creating the product.*

(ref. CMM SQA/AC.2)



## The SQA Plan (Cont'd)

- **Audits and reviews to be conducted by the SQA group.**
- **Project standards and procedures to be used as the basis for the SQA group's reviews and audits.**
- **Procedures for documenting and tracking non-compliance issues to closure.**
- **Documentation that the SQA group is required to produce.**
- **Method and frequency of providing feedback to the software engineering group and other software-related groups on SQA activities.**

(ref. CMM/CMMI®)



## The Policy for Implementing SQA

**This policy typically specifies that:**

- **The SQA function is in place on all software projects.**
- **The SQA group has a reporting channel to senior management that is independent of the project manager, the project's software engineering group, and the other software related groups.**
- **Senior management periodically reviews the SQA activities and results.**

(ref. CMM/CMMI®)



# The SQA Process

**Within the SPI Guide for SMEs, the Main SQA Process is outlined under the following items:**

- **Entry Criteria (for SQA)**
- **SQA Activities**
- **Exit Criteria (for the SQA)**



# The SQA Process Flow

QA100 *Preparation of QA Plan*

QA200 *Quality Measurement Setting and Tracking*

QA300 *Managing Deviations in Activities and Products*

- *Reviewing the Requirements Management Process*
- *Reviewing the Project Management Process*
- *Reviewing the Configuration Management Process*
- *Reviewing the Software Product Engineering Process*
- *Reviewing the Peer Review Process*



# The SQA Activities

Activity	Key Roles
Initial Cooperation	SQA, PM
Plan Preparation	SQA, PM
Project Proposal Review	SQA, PM
Process Review	SQA, PM, RM, SPE
Project Review	SQA, PM, SCM and SM
Product Review	SQA, SPE and PR
Noncompliance Reports	SQA, PM and SM
Measurement Setting	SQA with each of the relevant Processes

Note : The SQA activities are reviewed by independent quality assurance experts.

Table 1 : The Software Quality Assurance Activities



## SQA Manages the Compliance of Deliverables from the Software Development Processes

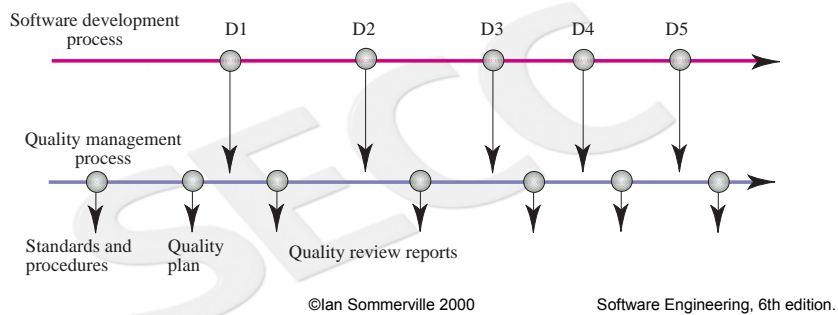


Fig. 2 Quality Management of Deliverables from the Software Development



# The Set of Sub-Processes within the SQA Process

- Preparation of the SQA Plan
- Quality Measurement Setting and Tracking
- Managing Deviations in Activities and Products
  - Reviewing the RM Process
  - Reviewing the PM Process
  - Reviewing the SPE Process
  - Reviewing the PR Process
  - Reviewing the CM Process



# The Details of each Sub-Process include the following items

- Sub-Process Title:** e.g. Preparation of SQA Plan
- Process Id.:** 100
- Purpose:** ...to plan the QA activities throughout the project.
- Entry Criteria/Inputs:** .....
- Exit Criteria/Outputs:** .....
- Assets:** .....
- Activities:** .....



## Guidelines and Templates : Recommended Template for the SQA Plan

### The main sections of the Software Quality Assurance Plan (SQAP)

- A. Purpose
- B. Reference documents
- C. Management;
- D. Documentation
- E. Standards, practices, conventions, and metrics
- F. Reviews and audits
- G. Test
- H. Problem reporting and corrective action
- I. Tools, techniques, and methodologies
- J. Code control
- K. Media control
- L. Supplier control
- M. Records collection, maintenance, and retention
- N. Training
- O. Risk management

based on IEEE Std. 730-1998



## Other Guidelines

**1. A Simplified Guide for Following the SQA  
Activities which may serve as a checklist (to be  
implemented on a spreadsheet)**

**2. SQA Metrics Methodology**

(based on IEEE std. 1061-1998)



# Potential Sources of Risk

In this section the most widely recognized sources of risk for a software project are listed and followed by mitigation strategies that can help avoid and/or deal with such risks.

## Potential Risks

The 10 top sources of risk . The first four are :

- Lack of top management commitment
- Failure to gain user commitment or Inadequate user commitment
- Misunderstanding requirements
- Inability to manage the complexities of system development and implementation

## Mitigation strategies

Such as :

- Relationship management
- Management of ambiguity and change through effective processes.
- Developing contingency plans to cope with staffing shortfalls and new technologies.



# Some Suggested Metrics

In this section, a list of Suggested Metrics for inclusion within the SPI Guide for SMEs is included to establish the importance of metrics and how they can be used in assessing the effectiveness of the established SQA process and to provide ground foundation for future improvement. The SQA process needs to define and collect metrics for each of the Processes within the SPI Guide.

A list of typical metrics, grouped by the Processes within the SPI Guide for SMEs.

- **Requirements Management**
- **Project Management**
- **Quality Assurance**
- **Software Configuration Management**
- **Software Product Engineering**
- **Peer Reviews**



## A Sample from Suggested data and Measurements

**This is a sample of typical data and measurements for the Peer Reviews KPA**

Examples of data collected on Peer Reviews include:

- identification of the software work product reviewed,
- size of the software work product,
- size and composition of the review team,
- preparation time per reviewer,
- length of the review meeting,
- types and number of defects found and fixed,
- number and severity of defects found in the software requirements;
- number and severity of defects found in the software code.
- rework effort.

Examples of measurements on Peer Review activities include:

- number of peer reviews performed compared to the plan,
- overall effort expended on peer reviews compared to the plan,
- number of work products reviewed compared to the plan.



## Conclusion

- **The Software Quality Assurance Process within the SPI Guide for SMEs is an initial step for tailoring the CMM/CMMI® QA process areas to the Egyptian user.**
- **This presentation summarizes the preliminary work that was conducted in achieving the above goal.**
- **The short term plan for this work :**
  - **helping the SMEs with the application of this simplified model within their work environments through training**
  - **collecting feedback from the application experiences**

**And the long term plan is to continuously**

- **fine-tuning the model in accordance with the collected feedback on its application.**



Software Engineering  
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# Quality Assurance

**Thank You**