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Quality Maturity Model



Foundation for process institutionalization

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RBS - IDC

About Us

- “ RBS is the among the top 10 banks in the world, mostly operating in UK, Ireland, US, Others
- “ RBS has development centres in Edinburgh, London, India, Others
- “ IDC is the largest development centre of RBS outside UK
- “ IDC is a 12 year old organization supporting multiple business lines . Retail & Corporate, Global Banking, Insurance
- “ Assessed at CMM level 4, Certified to ISO 9001, 27001. Currently under compliance review of SoX, processes aligned to CMMI level 3
- “ Integrated QA team facilitates delivery of implementing Quality strategy

Agenda

- “ What is QMM
- “ How can QMM help
- “ QMM 5 maturity Levels
- “ Level 2 - Initial
- “ Level 3 - Integrated
- “ Level 4 - Quantitatively Managed
- “ Level 5 . Continuous Improvement
- “ Summary



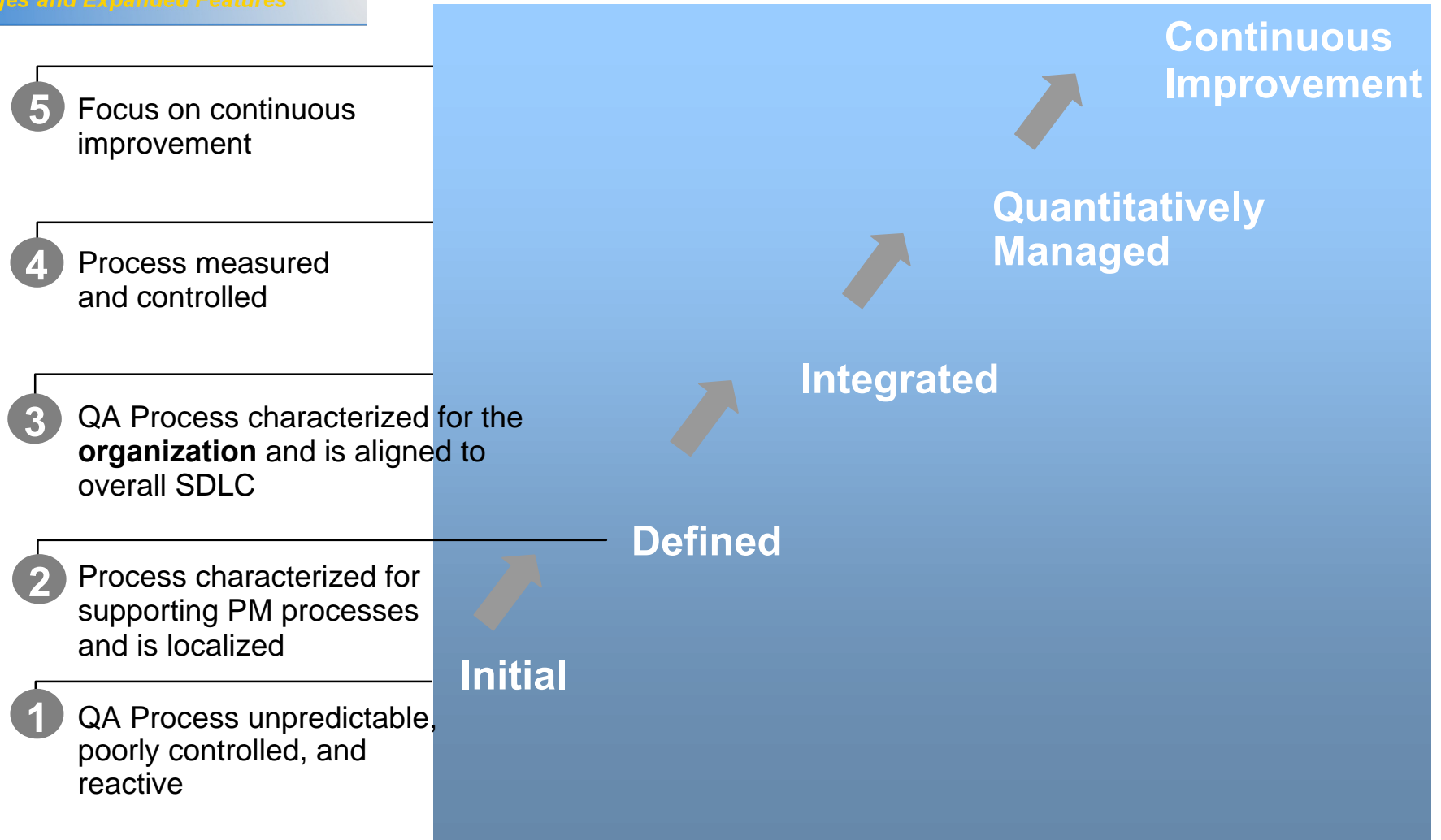
What is QMM

- “ Model defines strategies and approaches for implementing and institutionalizing Quality assurance strategies in an organization from Initial level to continuous improvement level
- “ QMM consists of five maturity levels that reflect a degree of Quality Assurance (QA) process maturity
- “ QMM (Quality Maturity Model) is a proven framework, evolved over a period of time while deploying Quality assurance practices in different business lines/programs and identifying practices through
 - . pilots
 - . learning
 - . Implementing best practices

How can QMM Help

- “ QMM has been established as a model to support organizations meeting their business objectives
- “ QMM can help define a step by step approach on improving and maturing QA practices including quantitative visibility and proactive improvements
- “ Higher visibility of project level QA and value addition in overall delivery
- “ Easy to use and tailorable framework
- “ High level process compliance visible during external assessments/audits
- “ Alignment of QA processes for continuous improvements at project level

QMM 5 Maturity Levels



Level 1 - Initial

“ Level 1

- . QA processes implemented in ad hoc manner
- . Reactive QA support required due to problems at project level
- . Depends on what project manager want (rather than what is required by the project) and their view of Quality Assurance
- . Individual dependent
- . Even project level processes may not be stable

Level 2 - Defined

“ Level 2

- . At this level, projects select QA processes based on their need and implement them.
- . Focus is on having set of QA processes which align well with Project management processes.
- . Some project level QA plan and measurements may be reported
- . Project level facilitation is a focus and reviews may are carried out, if required.
- . Lack of focus of QA approaches across SDLC
- . No consistency across projects/programs and organization wide
- . Lack of integration of project level processes with organization wide existing processes

Level 3 - Integrated

“ Level 3

- . At this level, projects implement an organisation wide QA process (which is integrated with other processes as well)
- . They have option to tailor it based on project specific need.
- . At this level, QA processes focus on ensuring across SDLC, processes achieve their goal.
- . QA processes also focus on ensuring organisation wide understanding of processes.
- . Project level reviews are planned along with projects life cycle progress and focus is on both process & product quality reviews.
- . Formal QA metrics defined at organization level are implemented.
- . Process improvements may be initiated based on QA findings/recommendation
- . Organization wide capturing & sharing of Process asset library, learning & suggestions
- . Organization wide Internal quality audit and independent reporting to management
- . Consolidation and reporting of QA results at organization level
- . Organization beginning to focus on implementing best practices from industry specific models

4 . Quantitatively Managed

“ Level 4

- . At this level, focus is to manage the QA process quantitatively so that project performance can be provided adequate quantitative visibility including identifying improvements.
- . Develop Balanced scorecard for organization wide QA processes.
- . Define control limits to manage QA processes and publish an organization wide process capability baseline
- . Improvements identified based on analysis of Balanced scorecard & analysis of organization wide QA data
- . Use of statistical tools for improvements such as 7 QC tools, control charts
- . Establish Knowledge management framework

5 . Continuous Improvement

“ Level 5

- . At this level, focus is to continually improve QA processes to align with ever improving delivery models. Bring in the proactive improvement element.
- . Identify Continuous improvement activities for QA at organization level & implement them. QA delivers high level of process maturity through industry wide best practice models
- . Use of formal improvement tools such as six sigma, lean management, Juran's methodology, workout, for continuous improvement

QMM Process Areas

“ Level 2

- . QA Facilitation (Project Level)
- . Process Assurance (PM Activities)
- . QA Measurements (Project Level)

“ Level 3

- . Software Quality Assurance (SQA)
- . Internal Quality Audit (IQA)
- . QA Process Definition & tailoring of processes
- . QA metrics definition and reporting
- . Process improvements

“ Level 4

- . Quantitative Management of QA processes
- . Knowledge Management (KM)

“ Level 5

- . Causal Analysis and Resolution
- . Continuous Improvement

L2 . QA Facilitation

“ QA facilitation at project level”

Identify and perform facilitation

SQA facilitation is performed for supporting day to day process need for projects

1. Manage queries on processes by projects
2. Guide project manager in tailoring processes and templates
3. Conduct training on project specific QA processes
4. Support improvements at project level
5. Assist project for any external certification and assessments

Process Assurance (PM activities)

“ Perform Process Assurance focusing on (PM activities) ”

Identify and perform process assurance for project management related activities

1. Review project plan and project schedule for the project at defined frequency
2. Establish risk management in the project
3. Support project level tracking & reporting
4. Take corrective action on review findings as and when required

Measurements (Project level)

“ Project level QA measurements reporting (schedule, effort) ”

Identify and report QA measurements at the project level

1. Define measurement to measure QA performance for individual projects
2. Report status at project level

Software Quality Assurance (SQA)

Following are the high level practices for the process area:

“ **SQA Planning**

- . Plan for SQA activities
- . Plan for SQA Resourcing

“ **SQA Activities**

- . SQA Process Review
- . SQA Product Review

“ **SQA Monitoring and Control**

- . Monitor SQA Plan
- . Conduct Progress Review

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Project Quality Assurance (SQA) (contd.)

“ Plan for SQA activities”

Plan for management of project SQA activities

SQA prepares a periodic schedule of the planned SQA activities. The schedule covers the following tasks:

- » Process reviews
 - » SQA facilitation
 - » Document reviews
1. Identify all SQA activities for the period with planned effort
 2. Establish a mechanism to take input and agreement from project manager for SQA plan. Align with project plan
 3. Update plan on a defined frequency

Quality Assurance (SQA) (contd)

“ Plan for SQA Resourcing

Establish and maintain the SQA resource

Better planning and identification of SQA resources in advance help in supporting the projects better and avoid and surprises.

1. Establish and maintain an organizational policy for planning and performing the SQA process
2. Provide adequate resources for performing the SQA process
3. Assign responsibility and authority for performing the SQA process
4. Train the people performing or supporting the SQA process as needed
5. Collect historical data on SQA effort and the activities performed

“ This data act as a basis for identifying the average SQA effort which is required for forecasting the SQA resources.

Software Quality Assurance (SQA) (contd)

“ SQA Process Review

Objectively evaluate the designated performed SDLC processes against the applicable process descriptions, standards, and procedures.


1. Establish and maintain clearly stated criteria for the evaluations.
 - “ What will be evaluated
 - “ When or how often a process will be evaluated
 - “ How the evaluation will be conducted
 - “ Who must be involved in the evaluation
2. Use the stated criteria to evaluate performed processes for adherence to process descriptions, standards, and procedures.
3. Identify each noncompliance found during the evaluation.
4. Identify lessons learned that could improve processes for future products and services.

Internal Quality Assurance (SQA) (contd)

“ SQA Product Review

Objectively evaluate the designated work products and services against the applicable process descriptions, standards, and procedures.

1. Select work products to be evaluated, based on documented sampling criteria if sampling is used.
2. Establish and maintain clearly stated criteria for the evaluation of work products.
3. Use the stated criteria during the evaluations of work products.
4. Evaluate work products before they are delivered to the customer.
5. Evaluate work products at selected milestones in their development.
6. Perform in-progress or incremental evaluations of work products and services against process descriptions, standards, and procedures.
7. Identify each case of noncompliance found during the evaluations.



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Quality Assurance (SQA) (contd)

“ Monitor SQA Plan

Monitor commitments against those identified in the SQA plan.

1. Regularly review commitments (both external and internal).
2. Identify commitments that have not been satisfied or that are at significant risk of not being satisfied.
3. Document the results of the commitment reviews.

Quality Assurance (SQA) (contd)

“ Conduct Progress Review

Periodically review the QAG progress, performance, and issues.

1. Review of QA group progress on the plan at defined frequency (weekly, monthly) to track performance of plans, issues/ findings raised during reviews and their status/ escalations.
2. Share summary status with stakeholder management

Typical Work Products

- . QAG task list
- . Project Status Review
- . QA group metrics

Internal Quality Audit (IQA)

Following are the high level practices for the process area:

- “ **Planning IQA**
- “ **Conducting IQA**
- “ **Monitoring & closing IQA**

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Internal Quality Audit (IQA) (contd)

“ Planning IQA

Establish a high-level yearly IQA plan.

1. Identify the various sources of input to the plan. The various sources can be:
 - “ Inputs from Senior Management
 - “ Inputs from project/program milestones
 - “ Input from previous years Internal Quality Audit reports/external audit/ assessment plans
 - “ Inputs from SQA Plan
2. Develop the plan at the start of the year
3. Review and update the plan

Internal Quality Audit (IQA) (contd)

” Planning IQA (contd..)

Establish and maintain monthly IQA schedule as per the defined audit coverage criteria

1. Develop and define the audit coverage criteria.

The coverage for the projects can be based on various factors like size, complexity, iSQA findings. Support groups can also be identified to be covered at a specified frequency (typically once in quarter)

2. Develop monthly IQA schedule and circulate it to all key stakeholders (auditor and auditee) for their acceptance
3. Make available the plan at a central repository for all stakeholders

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Internal Quality Audit (IQA) (contdõ)

” Conducting IQA

Perform audit as per the schedule.

1. The Internal Audit is conducted as per the published processes used for carrying out the activities.
2. Project Manager is responsible to show the evidences of process documentation.
3. Internal auditor(s) will record the findings in audit note sheet and get it signed off from auditee.
4. Based on the findings, the auditor will prepare the internal audit report
5. The approved internal audit report is sent to Project Manager for filling the corrective and preventive actions.

Typical Work Products

1. IQA report

“ Monitoring & Closing IQA

Monitor the IQA progress against the planned schedule and follow up for closure of non-conformances.

1. Monitor IQA progress against the schedule.
 - “ Progress monitoring typically includes the following:
 - “ Periodically measuring the actual completion of activities and milestones
 - “ Identifying significant deviations from the schedule estimates in the IQA plan
2. Document the significant deviations in the project planning parameters.
3. Follow up on closure of identified non-conformances and observations
4. Perform escalation in a timely manner to avoid process breakthrough situation

. QA Process Definition

Following are the high level practices for the process area:

- “ **Establish Quality Group Process Assets**
- “ **Establish Tailoring Criteria and Guidelines**
- “ **Establish the Quality Group’s Process Asset Library**

2) A Process Definition (contd)

“ Establish Quality Group Process Assets

Establish quality group process assets.

1. Decompose each standard process into constituent process elements to the detail needed to understand and describe the process.
2. Specify the critical attributes of each process element.
3. Ensure that there is appropriate integration among the processes that are included in the organization's set of standard processes.
4. Document the organization's set of standard processes.
5. Conduct peer reviews on the organization's set of standard processes.
6. Revise the organization's set of standard processes as necessary.

Q)A Process Definition (contd)

“ Establish Tailoring Criteria and Guidelines

Establish and maintain the tailoring criteria and guidelines for the quality group's set of standard processes.

The tailoring criteria and guidelines describe the following:

1. Mandatory requirements that must be satisfied by the defined processes
2. Options that can be exercised and criteria for selecting among the options
3. Procedures that must be followed in performing and documenting process tailoring

Typical Work Products

1. Tailoring guidelines

QA Process Definition (contd)

“ Establish Quality Group Process Asset Library

Establish and maintain the process asset library.

1. Design and implement the quality groups process asset library, including the library structure and support environment.
2. Specify the criteria for including items in the library.
3. Specify the procedures for storing and retrieving items.
4. Enter the selected items into the library and catalog them for easy reference and retrieval.
5. Make the items available for use by the projects.
6. Periodically review the use of each item and use the results to maintain the library contents

3 . Metrics Reporting

Following are the high level practices for the process area:

- “ **Establish a metrics framework**
- “ **Report metrics**

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Metrics Reporting (contd)

“ Establish a metrics framework

Establish a mechanism for metrics definition for QA group.

1. Define the various measures required for QA group
2. Identify the data collection mechanism and consolidation
3. Identify the tailorable aspects of metrics if any
4. Integrate the metrics as part of overall QA processes
5. Tolerance for metrics to be defined and used for tracking and reporting



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Metrics Reporting (contd)

“ Report metrics

Establish a mechanism for metrics reporting at QA group level and organization level.

1. Consolidation of data in a central repository
2. Report the metrics at identified frequency
3. Reporting of metrics data through QA group reports and organization wide reports

Process Improvement

“ Perform process improvement

Establish a mechanism for performing process improvement arising out of project recommendations/QA findings.

1. Define the mechanism of receiving/identifying QA findings / recommendations / suggestions
2. Perform impact analysis and identify the necessary process changes
3. Make changes to the process and sent it for review
4. Approved improvement is incorporated into organization wide QA processes

Quantitative Management

Following are the high level practices for the process area:

- “ **Establish measurement objectives**
- “ **Specify Measures**
- “ **Specify Data collection and Storage procedures**
- “ **Specify Analysis procedures**
- “ **Identify improvements**

Quantitative Management

“ Establish measurement objectives

Measurement objectives documents the purpose for which measurement and analysis are done, and specify the kind of actions that may be taken based on the results of data analyses.

1. Set up QA group measurement objectives aligned to measure performance against 4 quadrants of Balanced Scorecard
2. The sources for measurement objectives may be management, technical, project, product, or process implementation needs.
3. Example of measurement objectives include the following:
 - “ Findings/Non-conformances closure cycle time
 - “ Cycle time/Benefits of implementation of learning/suggestion/best practices

Quantitative Management (contd)

“ Specify Measures ”

Measurement objectives driven from BSC are refined into precise, quantifiable measures.

1. Identify measures for each of the 4 quadrants (Delivery, People, Financial, Customer)
2. Measures may be either **base** or **derived**. Data for base measures are obtained by direct measurement. Data for derived measures come from other data, typically by combining two or more base measures.
3. Establish goal and thresholds for the defined BSC measures
 - Goals and thresholds may be either developed using analysis of historical data (through PCB) or through management targets / priorities
4. Examples of commonly used base measures include the following:
 - “ *Average non-conformance closure cycle time*
 - “ *IQA compliance with monthly schedule*
 - “ *Overall staff retention*
5. Examples of commonly used derived measures include the following:
 - “ *No. of SQA findings per project per review*
 - “ *Average SQA effort /project/month*
 - “ *No. of training hours per year per member*

Quantitative Management (contd)

“ Specify data collection and storage procedures ”

Explicit specification of collection methods helps ensure that the right data are collected properly. It may also aid in further clarifying information needs and measurement objectives.

1. Identify existing sources of data that are generated from current work products, processes, or transactions.
2. Identify measures for which data are needed, but are not currently available.
3. Specify how to collect and store the data for each required measure.

Quantitative Management (contd)

“ Specify Analysis procedures

Specifying the analysis procedures in advance ensures that appropriate analyses will be conducted and reported to address the documented measurement objectives (and thereby the information needs and objectives on which they are based). This approach also provides a check that the necessary data will in fact be collected.

1. Following are the analysis mechanisms used:
 - “ Process Capability Baseline

Quantitative Management (contd)

Process Capability Baseline

1. PCB represents performance of various QA group processes in the organization in quantitative terms. It also forms as a basis for predicting the behavior of the processes in near future assuming that similar kind of work will be performed.
2. Measurements and metrics related to QA group which have to be baselined are identified and prioritized.
3. Prepare an analysis report using appropriate statistical techniques
4. Use analysis of data to set / refine goal and thresholds for measures in BSC
5. Example of high level metrics which can be baseline are:
 - “ Average SQA effort/project/month: It helps in forecasting the actual QA resource requirement for the future projects.
 - “ Number of SQA findings/project/review: It helps in identifying the process compliance in the projects.

Quantitative Management (contd)

” Identify improvements

Improvements are formally identified from the data analysis performed.

1. Improvements are identified from Balanced scorecard, PCB using statistical tools like 7 QC tools.
2. Analyze the organization's set of standard processes to determine areas where improvements would be most helpful
3. Pilot improvements
4. Select improvements for deployment

Knowledge Management

“ Establish Knowledge Management

Set up knowledge management framework

1. Identify an appropriate tool to deploy the KM framework
 - . Example of tools can be workflow systems (Lotus Notes), Internet based applications, excel based tool.
2. Set up KM framework to capture knowledge at various part of SDLC (e.g. Best practices, learning)
3. Organize the received assets
4. Share the knowledge through documents
5. Use/reuse the assets
6. Identify improvements if any

Knowledge Management (contd..)

Find / Create

- Project/Functional group Experiences
- Queries/Solutions
- Tips & Tricks
- Best Practices (Industry)
- Post Project Review

Improvement

- Rating & evaluation
- Assets improvement.
- Benefits realized
- Lessons learnt
- KM Process/Tool Improvement

Organize

- Categorization
- Review & approve

Use / Reuse

- Search for examples, query resolutions
- Discussion forum/Practice Communities
- Usage of available assets.
- Knowledge Sharing

Share

- Document
- Distribute

Causal Analysis & Resolution

Following are the high level practices for the process area:

- “ **Determine Causes of Non-conformances**

- “ **Analyze Causes**

- “ **Implement the Action Proposals**

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“ Determine Causes of Non-conformance

Root causes of non-conformances and other findings are systematically determined..

1. Gather relevant non-conformance and finding data.

Examples of relevant non-conformance data may include the following:

- . Internal quality audit non-conformances
- . QA review findings

2. Determine which non-conformances and other findings will be analyzed further.

Examples of methods for selecting defects and other problems include the following:

- “ Pareto analysis
- “ Histograms
- “ Control Charts

“ Analyze Causes

Root causes of non-conformances and other findings are systematically determined..

1. Conduct causal analysis with the people who are responsible for performing the task.
2. Analyze selected non-conformances and other findings to determine their root causes.
3. Propose and document actions that need to be taken to prevent the future occurrence of similar non-conformances and other findings.

“ Implement the action proposals”

Implement the selected action proposals that were developed in causal analysis.

1. Analyze the action proposals and determine their priorities
2. Select the action proposals that will be implemented.
3. Create action items for implementing the action proposals

Continuous Improvement

“ Continuously improve the processes

Identify and continuously deploy the new improved processes / tools / methods

1. Identify CI initiatives to achieve organization objectives/goals identified in Balanced Scorecard
2. Take up CI projects using appropriate tools such as six sigma, lean management, work out
3. Encourage cross functional team based CI
4. Review performance of initiatives / CI projects
5. Report status & benefits to management

Summary

	QA Process Maturity	Project / Program Process Maturity
Level 2	<ul style="list-style-type: none"> " QA focused on facilitating project management processes " QA review PM artifacts " QA reporting at project level 	<ul style="list-style-type: none"> " Matured PM processes for projects " Better quality PM deliverables " Better insight into regular project monitoring & tracking
Level 3	<ul style="list-style-type: none"> " QA process focused on establishing process asset library, initial metrics framework " IQA is established " SQA support for entire SDLC 	<ul style="list-style-type: none"> " Sharing of learning / best practices across projects " SQA support for entire SDLC leading to improve engineering deliverables " Third party view of project through IQA " Pro-active identification of findings
Level 4	<ul style="list-style-type: none"> " Knowledge Management " Quantitative Management 	<ul style="list-style-type: none"> " Quantitative visibility into QA process management through BSC " End to end active repository for project learning, documents, tips & tricks.
Level 5	<ul style="list-style-type: none"> " Causal Analysis & Resolution " Continuous improvement 	<ul style="list-style-type: none"> " Decrease in in process and post delivery defects using identified CI tools " Improved budget using innovative techniques for executing projects



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