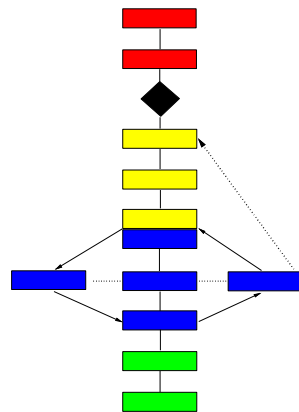


# Quality Management Guide

MITP  
v5.1



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This edition applies to Version C5.0 of Managing the Implementation of the Total Project (MITP), and to all subsequent releases and modifications until otherwise indicated in new editions.

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## **Preface**

### ***About This Document***

This document describes how to manage the quality of a project using MITP. The procedures for managing project quality are contained in the Project Control Book Guide.

For information about the MITP life cycle, the key techniques, and the support techniques, see the MITP Handbook. A glossary of terms may be found at the back of the MITP Handbook

### ***Who Should Read This Document***

The 'you' in this document is the Project Manager, but other people can read and extract useful information from it.

### ***How to Use This Document***

The table of contents provides a clear roadmap to the main topics outlined in this document.

### ***ISO9000 Control Information***

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## **1. Quality Management**

### Subtopics

- 1.1 Introduction
- 1.2 Quality Assurance
- 1.3 Assurance of MITP Activities
- 1.4 Assurance of Content-Specific Activities
- 1.5 Quality Responsibilities
- 1.6 Quality Activities
- 1.7 Quality Plan
- 1.8 Quality Records
- 1.9 Practical Guidelines
- 1.10 Project Assurance Review

## **1.1 Introduction**

Quality management demonstrates that the project is being performed to prescribed standards. In this context, quality relates to:

- The requirements of the sponsoring organization, from a quality perspective
- Project management processes
- Any other processes specific to the particular project
- Project deliverables.

The first two elements are addressed by the use of MITP as a quality management system in its own right. This system can be applied in a general manner to projects with differing content. The last two elements are unique to a particular project.

In this document, the term quality assurance (QA) means the verification of both MITP activities and content-specific activities to prescribed standards. It is used as a general term and does not refer to any company organization. This conforms to the objective of this document - to be generally applicable.

The following expands on the subjects of QA, the quality plan, and quality records, and provide a framework for the provision of quality management for projects.



## 1.2 Quality Assurance

QA verifies that activities are being carried out to prescribed standards. This verification is carried out on activities associated with the use of MITP activities and on activities specific to the project (content-specific activities). Assurance needs to be clearly distinguished from project control. Project control is exercised by the established project structure in the normal course of events and is, by definition, internal to the project organization. Assurance can be exercised both internally and externally as shown by the figure.

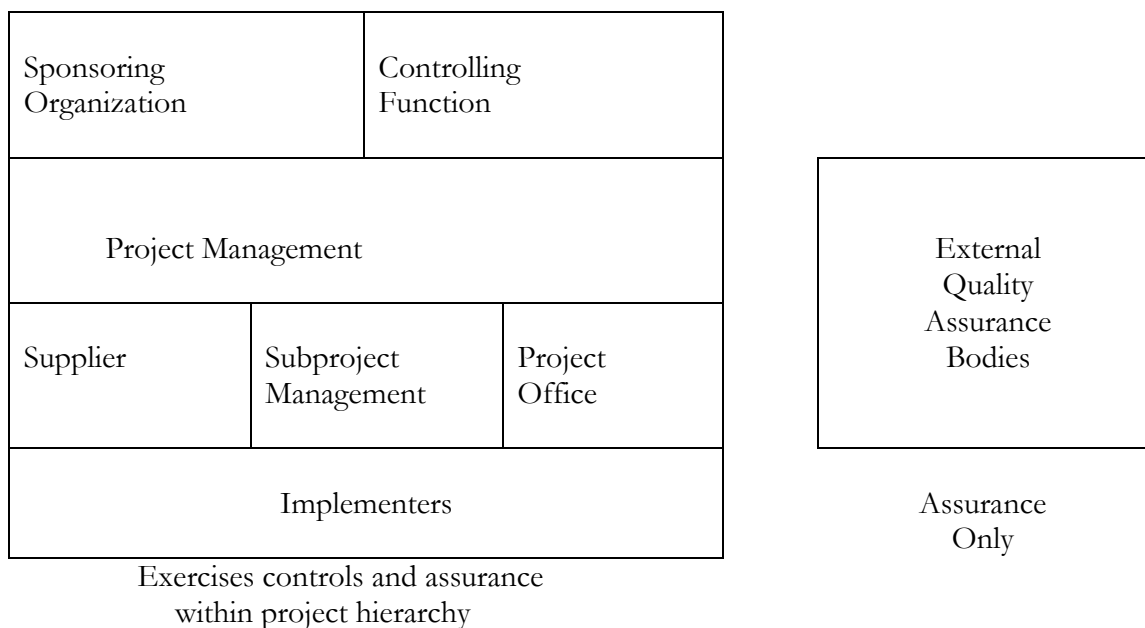


Figure 1. QA Organization

Based on this structure, the external bodies can carry out independent quality assurance activities that may be associated with both MITP activities and content-specific activities as appropriate.

The normal project organization exercises all controls, and additionally carries out its own assurance activities. Assurance activities, such as plan sign-offs, are carried out within the organizational hierarchy. For example, a subproject plan requires your approval, whereas the overall plan, with all its financial information, requires the approval of the sponsoring organization.

The difference between assurance and control is important. For example, in the case of progress tracking, assurance is concerned with whether progress is being tracked properly, whereas the status against the plan is the concern of the controlling project organization. Assurance, therefore, is not a means of ensuring that a project is on schedule or within budget.

### **1.3 Assurance of MITP Activities**

Internal review of the use of the MITP activities is carried out in a hierarchical manner in the normal course of events and in accordance with the defined schedule. External review is normally carried out through a quality review, which is a formal process to assure compliance with MITP as a quality management system.

The scope of an external review can be very wide and cover all the process elements of MITP and all related records. The scope of an external quality review, however, is a matter for the external body itself and is not a matter for you (even though the scope may be jointly agreed during project startup so that you are aware of the requirements for the presentation of information).

A quality review, therefore, is not the same as a progress review, although the latter may include review of quality matters as appropriate. If noncompliance is found by an external review body, then the necessary corrective actions are the responsibility of the project organization. Major noncompliance items, such as project plans, may be serious issues requiring urgent resolution.

### **1.4 Assurance of Content-Specific Activities**

Internal assurance of content-specific activities is carried out through verification of the project deliverables. Associated with each deliverable will be a description of the checks and validations to be performed, as appropriate, and a reference to any other prescribed standards or guidelines associated with the checks themselves. The extent of these checks is a question of judgement, but you will have consulted with your QA function where this exists. A deliverable will be signed off at the appropriate level within the project hierarchy when the prescribed verification activities have been carried out successfully.

A deliverable should at least undergo an independent internal check that it meets its specification, independent meaning by someone other than the person who carried out the work.

External bodies may be involved in the verification of deliverables, thus adding a further element of independence, but normally they would be used to verify compliance with any content-specific process or methodology, for example, a prescribed application development methodology.

### **1.5 Quality Responsibilities**

You are the owner of the quality management process in general and the quality plan in particular. Your role is necessarily internal to the project. The external QA body or bodies provide independent assurance of process and content as appropriate, but do not own the quality management process.

In many cases, your organization may have its own QA function. You should ensure that the requirements of such a function are incorporated into the quality plan.

The responsibilities in summary are:

- Agreement to the required standards and establishment of these standards within the project;
- Preparation of the quality plan;
- Execution of the quality plan;
- Maintenance of quality records.

In some projects, you may delegate this work to a quality manager and may use the Project Office to administer the quality plan.

### **1.6 Quality Activities**

Quality management is performed throughout the life of the project in a similar manner to that of project management.

At the start of the project, a quality plan is established, based on the need of the project and the Project Sponsor's organization.

Throughout the project, quality activities are performed and logged and, if necessary, the quality plan is changed.

### **1.7 Quality Plan**

With the foregoing definition of assurance and its distinction from project control, the quality plan amounts to a description of the assurance activities and a related schedule, these activities being related to the MITP activities and the content-specific activities.

In the most general case a quality plan would include all the subproject and other plans and a description of the management system to be used. To avoid unnecessary duplication it is recommended that the quality plan merely refers to these other elements, although in some cases there may be the requirement for a full standalone quality plan, for example, some areas of government. In this case a valid way of meeting the requirement would be to append the type of plan described here to the collection of plans and the description of the management system.

MITP is prescribed as the project management standard and so a general reference to it will suffice. The content-specific standards are generally not prescribed and so these would either be included or referenced in the quality plan. Additionally there may be guidelines for personnel carrying out assurance internally.

Thus a quality plan comprises:

- A brief description of the project scope and objectives;
- A reference to the plans and the MITP management system with an indication that these include the ISO9000 elements for objectives, organization and responsibilities, deliverables, and schedule;
- A statement of, or reference to, the standards to be employed;
- A description of the external review bodies and a schedule of associated reviews or other involvement.

It is not necessary to include a schedule of internal assurance activities since these are automatically defined by the overall project schedule. There is no value in duplicating the information. Also note that the checks and controls to be applied to the deliverables are defined as part of the work breakdown structure (WBS).

### **1.8 Quality Records**

Quality records constitute the evidence that quality assurance activities have been carried out, and in the broadest sense include all records generated by the project.

Since MITP is a quality management system in its own right then the records generated as a result of its use as a project management system constitute quality records by definition. In this sense the Project Control Book (PCB) represents a file of quality records. The PCB will be open to scrutiny by the external review bodies as required.

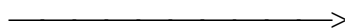
The quality records arising from the assurance activities comprise:

- A log of project plans, for example, subproject plans or risk management plan, and deliverables, indicating appropriate sign-off within the project hierarchy (the initial log may be considered to be part of the quality plan if desired)
- Records of content-specific assurance activities such as inspections, whether internal or external
- Records of quality reviews conducted by the external bodies.

Figure 2 shows the origin of quality records. Note the relationship with the WBS.

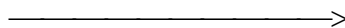
OriginQuality records

Project  
control  
activity



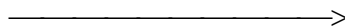
All records defined  
by the MITP process  
(filed in the PCB)

A specific plan  
for example  
subproject risk)  
management with  
designated  
approver



Log of specific  
plans and  
deliverables

A deliverable  
(with designated  
approver)

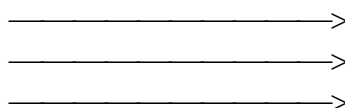


Detail	Sign

Work  
Breakdown  
Structure

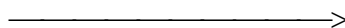
Description of deliverable
Check 1
Check 2
Check 3
Designation of approver

Verification  
activities



Records of  
verification  
activities

External reviews



Records of reviews

Figure 2. Origin of Quality Records

See the Project Control Book Guide for a description of the record of QA activities and the log of plans and deliverables procedure.



### **1.9 Practical Guidelines**

At the practical level quality management comprises:

- Agreement of the required standards and establishment of these standards within the project;
- Preparation of a plan of assurance activities - the Quality Plan;
- Execution of this plan;
- The maintenance of quality records.

The following shows your actions related to quality management. The sequence reflects the MITP life cycle.

1. Based on the objectives of the project as agreed with the sponsoring organization, define the standards to be applied to the project (MITP and content-specific standards) and agree with the sponsoring organization. Incorporate the requirements of your QA function.
2. Identify appropriately qualified external QA bodies for MITP and for content-specific activities.
3. Establish guidelines for defining controls and checks on deliverables according to importance or criticality. Note that this will require an element of judgement. These guidelines will require endorsement by the sponsoring organization and by your QA function.
4. Ensure the incorporation of appropriate checks and controls in the description of the deliverables in the project WBS.
5. Ensure that an approval hierarchy exists for project deliverables and that signatories are specifically designated. Note that this includes the quality plan itself.
6. Prepare the quality plan in accordance with the information in "Quality Plan" in topic 1.7.
7. Ensure that all project personnel are educated in the requirements for QA, including the designated standards.
8. Execute the quality plan in accordance with the schedule defined by the project plan (deliverables), and the schedule of external reviews defined by this plan. (External reviews should be scheduled at the end of the establishment of the project, periodically during management of the project, and at project completion).
9. Maintain a file of quality records. These are filed in the PCB together with the quality plan and will be open to inspection at all times.

These actions fulfil the requirements for quality management in the general case. They do not define the scope of external reviews.

Nevertheless, it would be expected that an external review of the MITP process would examine compliance with all MITP elements, the quality plan itself and also the quality records.

External content-related reviews would be entirely dependent on the nature of the project and so the scope of these cannot be defined generally. However, if an established methodology were being employed then it would be appropriate for the reviewing body not only to be involved in the scrutiny of deliverables but also in the review of the use of the methodology. This would obviously be applicable in the case of application development for example. These process reviews would be at the end of the

establishment of the project and during management of the project as for the MITP process reviews.

### **1.10 Project Assurance Review**

Project assurance reviews should be scheduled as part of the overall project plan. Reviews may also be requested by you or the Project Sponsor as required in response to specific situations.

Reviews should be appropriate to the situation and performed by personnel not directly involved with the areas of the project to be assured. The reviews could be short-term based on checklists, or more wide-ranging in-depth studies.

#### **1.10.1 Chair**

Leader of the project assurance team.

#### **1.10.2 Objectives**

- To perform an independent review of project status and plans against the objectives as stated in the project definition
- To assess the risks of not meeting the objectives in various areas
- To report and recommend actions to the Project Sponsor.

#### **1.10.3 Participants**

- The predefined group responsible for project assurance
- Other experts invited by the above for all or part of the review
- Project Manager
- Subproject Manager and team members for all or part of the review.

#### **1.10.4 Frequency and Duration**

Very much dependent on the project. Most projects would justify at least three reviews, even if that meant one every two months. During critical decision making stages, even monthly reviews might be right. In the normal course of a one- or two-year project, between four and six reviews are typical, duration about one day, plus time for writing up the report and presenting.

#### **1.10.5 Prerequisites**

- An agenda, published a week in advance by the chair
- Informal presentations addressing agenda subjects, prepared by you and under your direction
- Copies of project deliverables and copies of current project management data, for example, issue logs or plans.

#### 1.10.6 Typical Subjects for Discussion

- Revisiting basic assumptions on objectives, business environment:
- Assumptions behind plans, especially deviations from accepted practice
- Trends in important project parameters, for example, are problems being fixed faster than new ones are raised? Is more overtime being worked?
- Communications within and outside the project
- Possible major issues that are emerging, for example, signs that the ability or morale of the project team is being stretched, possibility of serious technical problems, state of critical dependencies into the project, personal relationships between key people.

Note: It may not be practicable to arrange a series of regular reviews as outlined above. A possible alternative is for the Project Sponsor to call for an occasional health check of the project from an independent source. This might take a similar form to the above, with perhaps more emphasis on talking to people outside the project team to gain a perspective that a regular reviewer might expect already to possess.

## **2. Deliverables Quality Management**

In this topic, practical guidance is given on the control of quality in deliverables. For purposes of illustration, it is assumed that the deliverables in question are computer software, but the principles involved can be adapted for other deliverables.

### Subtopics

- 2.1 Overview
- 2.2 Quality Planning
- 2.3 Standards
- 2.4 Total Life Cycle Quality
- 2.5 Techniques and Performance
- 2.6 Measurement and Trends
- 2.7 Management and Motivation
- 2.8 Quality Control in Subcontracted Work

## 2.1 Overview

Quality on a project can pertain to many different aspects of the project. While you must be concerned and manage client perception of the overall project, perhaps the largest contributor of client perception remains to be quality of the delivered product. This topic focuses on deliverable quality and assumes that you are aware of other quality factors in a project such as:

- Written communication;
- Verbal communication;
- Responsiveness;
- Presentations;
- Agreements and statement of work.

Many times, when discussions of quality occur, there is a certain amount of vagueness related to how to achieve the desired result. Quality is something that can be recognized when seen, however, you must be able to rely on more than this to ensure that a solution of acceptable standards is delivered. You are the focal point of responsibility of the overall quality of the project. Yet, you may have difficulty identifying the process for ensuring that tangible quality measures are taken or even what software quality really is.

Examples of failures in software development include:

- Coding flaws;
- Usability flaws;
- Missed requirements;
- Design errors.

There are many volumes devoted to the topic of software quality and it is not the intent here to duplicate that breadth of information. This topic focuses specifically on techniques and QA concepts that are proven methods with significant return on large and small development projects.

## **2.2 Quality Planning**

The process of planning for quality is a series of steps that ensures a methodical and quantifiable approach to quality. There are seven steps in software quality planning:

1. Establish aggressive and explicit numerical quality goals
2. Quality measures must be objective, requiring a minimum of judgement
3. The measures used are defined and documented
4. A quality plan commits to specific numerical targets and is updated as the project changes
5. The plan complies with quality goals, noncompliance requires replanning or exception approval
6. Quality performance is tracked
7. Complex projects should not be represented by a single quality measurement - the measures are treated as indicators of project performance.

You should produce a plan, which uses these items at the beginning of a project, regardless of the phase of development:

- Once the plan is established and agreed to, it should be managed as any project plan using formal change control
- No quality plan exists if multiple versions are in use.

Although it may appear difficult at first, establishing goals for quality can be done relatively easily by:

- Examining deliverables in the statement of work
- Examining activities, which produce the deliverable
- Determining the level of defect prevention that is inherent in the industry or generic estimate
- Raising the bar on that result to establish the goal.

As an alternative, industry averages are available in many software quality texts and also in estimating tools. Such tools may also allow you to model the entire life cycle in terms of defects produced by phase of development. Be careful however, to recognize any special circumstances or risk factors and compensate for them on the project.

Whatever the technique that determines the goals, performance against the goal cannot be measured without measuring the work product against a baseline or standard.

## 2.3 Standards

In discussing quality standards, be careful not to quickly generalize that these are the same for all projects. Clearly, certain applications have much more stringent quality standards than others. For example, in an application which is highly intolerant of defects, such as a aircraft navigation system, each line of code may be required to be certified as having been tested. On the other hand, such a method for an order entry system would be likely to drive the cost of development past the point at which the application is feasible.

### 2.3.1 Understanding the Client's Definition of Quality

Defining the client's quality expectation for the application is the first challenge you may have. Yet this is the first critical step toward meeting the project's quality objective.

Usually and unless stated otherwise as performance criteria, industry and the client's own quality norms will contribute heavily to the perception of quality at delivery.

The definition of the client's expectation for quality must:

- Begin at proposal development time;
- Include considerations for application quality requirements outside of industry norms;
- Account for the client's own quality track record;
- Include unique requirements that may require extraordinary QA efforts.

Examples of characteristics that may require effort above industry norms for typical application development are:

- 100% availability requirements
- Potential injury or loss of life
- Large volume applications
- Defense, aerospace
- Extreme downtime costs
- Contractually specified quality based acceptance criteria.

Significant risk factors such as these should also be examined in the systems assurance risk assessment process and should increase project risk and price.



### 2.3.2 Defining Test Terms

You must also understand what is meant by the client's terms which describe project activities. Some examples where quality disputes occur frequently because of different definitions of the work to be done are:

- Unit test;
- Integration test;
- System test;
- Acceptance test;
- Functional demonstration.

For example, if the client is to perform a system test and the client's definition of this activity is to actually just demonstrate the system, the expectation of finding defects is far different than the developer's definition may be. The code may be significantly under in defects compared to industry averages and still be very disappointing to the client.

In addition, the level of effort required to bring the system to the point of system test would be far less than that required to produce a functional demonstration. If the agreement is not clear on what is to be done, a significant cost overrun may result as well. To avoid this situation:

- Have a clear understanding of the work to be performed and concise description in the statement of work, review in detail with the client.
- Make sure the estimate for the activity corresponds to the level of effort required to ensure appropriate quality levels.
- Compensate for quality requirements which may be outside of the norm of the project represented in the estimate.
- Consider using a second estimation technique which accounts for quality variables more readily than a traditional task by task estimate.

### 2.3.3 Estimating the Impact of Quality Management

Some estimating tools provide varying degrees of estimates based on quality impacting parameters. These types of estimators actually narrow the norm to projects with similar characteristics and alter the estimate accordingly.

In doing a task by task estimate, you must pay particular attention to extraordinary quality requirements since the estimating grids will be based on a much broader and average set of project characteristics.

It is the adherence to standards that will be a significant factor in the delivered product's quality.

### 2.3.4 Quality Standards

- Standards are an important part of any discussion of quality since standards help build in quality rather than remove defects through an inspection, that is, testing, process.
- Standards set baselines by which variations can be measured
- Without standards, meaningful measurements cannot be made for assessing software quality.
- You must define what standards will be used and identify them in the quality plan.

#### 2.3.4.1 Classes of Standards

Two kinds of standard can be used to define the way software is developed and maintained. The classes of standards describe:

- The nature of the object to be produced;
- The way the work is performed.

The significance of this is that besides understanding the quality goals of the end products, the starting point for project quality is:

- The development methodology;
- Standards, for example, coding or conventions;
- Procedures, for example, design review or test case approval processes.

You must also ensure that there is a match or at least a thorough understanding and agreement of the methods used in the project and the client's methods. This will help avoid subsequent discussions of how development quality is being managed and a potential dispute. Be aware that:

- There can be considerable unplanned effort, or high dissatisfaction if a significant gap in standards and methods occurs once agreements are signed and underway
- The gap may result when the project does not conform to the client's standards, even if either the approach and/or standards could have produced the desired level of quality.

#### 2.3.4.2 Methodology Standards

Selecting and understanding the methodology used in the development project is a critical step in ensuring that quality expectations are met in the project. You must understand:

- The steps required to produce the result (method);
- How the work is to be done (procedures);
- What the work should look like (standards).

You are strongly advised to add an experienced resource supplement to your knowledge if you are unfamiliar with the methodology. Quality simply cannot be ensured without understanding the baseline for comparison - the methodology.

## **2.4 Total Life Cycle Quality**

While fairly quantitative techniques exist for the delivery stage of the project, it would be an oversight to start with quality measurement at that stage of development. Frequently in the delivery stage, errors in lines of code and testing results are indicators of software quality.

Most of the change after delivery in the first six to 12 months of production is due to failure of the analysis process, where the cost is greatest.

Clearly, fewer defects will need to be corrected or remain latent in the delivered product if QA measures are applied throughout the development process. Often you may think that because testing results are impressive, the quality of the product is high. This may be a completely false notion due to:

- A missed requirement or design feature that test cases were also built without;
- Low defect rates as a result of inadequate test cases.

Do not rely on testing as the key quality measure of quality and move the QA processes into all phases of development.

In summary:

- Ensuring a high quality deliverable must start in the early phases of the project and continue throughout the life cycle.
- Your adherence to the methods, standards, and procedures will have a significant impact on implementation phase deliverables.
- You must measure defects of actual performance against the baseline established by the methods, standards, and procedures as outlined in the quality plan.

While the techniques may vary slightly with different types of methodologies, there is also some commonality among them which can be applied across methodologies.

## 2.5 Techniques and Performance

Two proven, relatively easy to use, and universal techniques for assuring quality regardless of development phase and methodology are:

- Walkthroughs;
- Reviews.

In using these techniques there must be standards against which the actual work is being compared. These baselines come from the methodology and development standards put in place for the project.

### 2.5.1 Reviews and Walkthroughs

Reviews and walkthroughs are actually the same type of process. Usually the term walkthrough refers to reviews done for smaller units of work. Reviews involve larger scopes of work, more people, and are generally more formal.

- Reviewers should:
- Identify all design errors
- Identify all cases where the code or specification does not implement the design
- Identify interface misuses
- Assess usability
- Assess maintainability
- Assess compliance to standards and conventions such as:
  - Naming and data conventions
  - Logic structure
  - Error handling
  - Data integrity and units of work
  - Performance
  - Input and output handling.
- Assess other applicable standards or methodology requirements as defined by the quality plan.

The participants walkthroughs usually include a lead technical resource or architect, the owner of the work, and others as needed.

Walkthrough sessions are most often used for:

- Program specifications
- Modules of code
- Input and output specifications, for example, screens and reports.

### 2.5.2 Project Reviews

Project reviews should be conducted in two forms:

- Review of the project management system
- Review of technical project material such as:
  - Phase deliverables, for example, requirements, design, and reports
  - Logical and physical database and file design
  - Internal system design architecture
  - System test plan
  - Cutover plan
  - Process models
  - Other major development work products as specified by the methodology and standards.

### 2.5.3 Walkthrough and Review Procedures

The walkthrough and review procedures should specify that the review be crisp, well prepared, and focused. Usually the sessions can be brief for walkthroughs and lengthy sessions often indicate other problems. Reviews on the other hand are much lengthier, due to the broader scope of the material and can span several days. In either case:

- The reviewer must log any defects of the review and reinspect if required
- The log should be examined for common trends on a continual basis to identify common problems so that rework can be minimized.

### 2.5.4 Uses for Walkthroughs and Reviews

Walkthroughs and reviews can be used on a wide range of activities from requirements through coding. Studies have shown that code walkthroughs:

- Are extremely effective in coding and can remove as many as 85% of all defects, far surpassing any other defect detection techniques
- Cannot be used to remove higher level defects such as design flaws and missed requirements. Design and requirements reviews should be used for that purpose.

### 2.5.5 Design Reviews

Because walkthroughs are not intended to remove high-level design errors, it is imperative that design reviews be completed before coding begins. Design errors run through large numbers of programs and the effort to correct this type of defect expands enormously once coding begins.

There is probably no other far reaching defect, besides an overlooked requirement, than a system architecture design flaw, or data base design error. A severe error of this type which is not discovered until programs are written can result in:

- Large numbers of programs being rewritten

- A level of effort for rework approaching or exceeding the original scope
- Massive schedule slippage due to large volumes of rework and single threaded tasks such as regression testing
- High defect rates due to large scale modifications and incomplete unit regression testing.

## 2.6 Measurement and Trends

Through the use of walkthroughs, reviews, and tests, you can measure the number and types of defects occurring throughout the life cycle. One of the most valuable purposes of recording information about defects is the identification of future trends.

Measurements are valuable but the information simply states what has happened. Identifying trends is probably the most valuable use of measurement data because it enables you to predict what will happen and take proactive actions.

Two examples of valuable ways to analyze measurement data are:

- Defect clustering trends
- Testing defect trends.

### 2.6.1 Defect Clustering

Defect clustering is an interesting trend that at first glance is not intuitive. The basic concept is that defects seem to group together.

- You should pay particular attention to the functions of the system where there appears to be disproportionately higher amounts of errors
- It is very likely that when this occurs there will be even more defects yet to be discovered.

There is also another side of clustering which may indicate that the problem is with certain individuals on the team. This may be a skill issue, lack of concern for quality, or a motivation issue. You must diagnose the root cause and correct the problem, even if replacement of individuals is required.

### 2.6.2 Test Trends

Analysis of test results is also extremely valuable. When analyzed, test results can provide a wealth of information about:

- The stage of testing completeness;
- Team performance in correcting defects;
- Number of test cases run;
- Relationships between test cases run, defects fixed, and defects reported;
- Number of defects reported.

### 2.6.3 Errors Per Lines of Code

Another key measurement that you should monitor is errors per thousand lines of code. While some averages are available for comparing requirements through design defects against industry norms, one of the most commonly used is still the number of errors per thousand lines of code (KLOC). While you must be consistent in counting (usually executable code only), and normalize for differences for languages, it is a valuable method for comparing coding quality.

## **2.7 Management and Motivation**

Your own management style can also significantly impact quality. You should not use task estimates to motivate team members. Estimates as motivators may produce the following results:

- The work produced will be to the level of completeness provided by the estimated time, not the completion criteria of the task
- The overall effect with this type of performance will be to push large volumes of work into later phases of the project where of course it is unplanned
- The final resting place for these defects will be the system test where massive schedule slippage may occur because there is no where else for the work to go.

Using estimates as motivators can have a disastrous impact on quality. If you determine that the root cause of the defects is actually the resource, and the deficiency cannot be corrected, you should not hesitate to replace those team members with more capable ones.

There may be individuals on the team who insert more cost, in the way of defects, than their production is worth. Another way to look at this is:  
Dropping a poor performer from the team can be more productive than adding an additional person.



## **2.8 Quality Control in Subcontracted Work**

This brings up an interesting point with regard to ensuring the quality of subcontracted work: How can you influence this process when possibly the only responsibility of the supplier may be to deliver a completed subsystem?

The answer must go back to the way the agreements are structured with the supplier in the first place. This situation occurs more often when new development is being done rather than when software is purchased.

Although, even with off-the-shelf purchases, it would be wise for you to ask about the number of problems reported since the last release and in total for the product. In addition, the supplier should be asked about its:

- Methodology;
- Standards;
- Procedures;
- Production support;
- QA measures.

If the supplier is unwilling to share this information, you should seriously question whether to use the supplier.

If new development is being contracted for, then the agreements should be structured to allow for the QA reviews you need.

A "black-box" approach should not be taken with an assumption that the desired level of quality will be automatic in the delivered product.

This is especially true since production defects are only one level of quality. You must also be concerned with other factors of quality such as:

- Maintainability;
- Documentation;
- Recovery;
- Usability.

This can be difficult to control since you may not be able to dictate the standards and methodology used for development and therefore may lose a primary quality control mechanism. This situation underscores the need for you to build proper responsibilities for reviews into the agreements so that neither party is surprised by the other's expectations.



### 3 Quality Management Checklist

This checklist is intended for project and subproject managers.

Table 1. Quality Management Checklist	
Question	Y/N
Have you familiarized yourself with the information in this document?	
Have you defined the standards to be applied to the project and agreed these with the sponsoring organization?	
Have you identified appropriately qualified external review bodies for MITP activities and content? Have you discussed with these bodies what their review requirements will be?	
Have you classified the deliverables by importance and established guidelines for the extent of independent verification?	
Have you ensured that the deliverables defined by the WBS include a definition of checks consistent with these guidelines?	
Have you established a hierarchy for approvals within the project structure?	
Have you prepared the quality plan in accordance with the guidance and using the MITP form? Does this include an agreed schedule for the external quality reviews?	
Have you filed the quality plan in the PCB?	
Have all the project team been educated in the requirements for quality management in this project? Do independent verifiers know what is expected of them? Do they understand the need to document all checks and reviews using the MITP form and to file these in the PCB through the Project Office?	
Have you prepared a log of specific plans and deliverables using the MITP form? Have you filed this in the PCB?	

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## Readers Comments

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**Overall, how satisfied are you with the information in this book?**

Legend:

- 1 Very satisfied
- 2 Satisfied
- 3 Neutral
- 4 Dissatisfied
- 5 Very dissatisfied

	1	2	3	4	5
Overall satisfaction					

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	1	2	3	4	5
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Easy to find					
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