StudyPlanPOC.pdf
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Daniel's Study Plan
Proof Of Concept

Get the following from the PMP Prep CD (get individual files or use studyplanPOC.pdf):

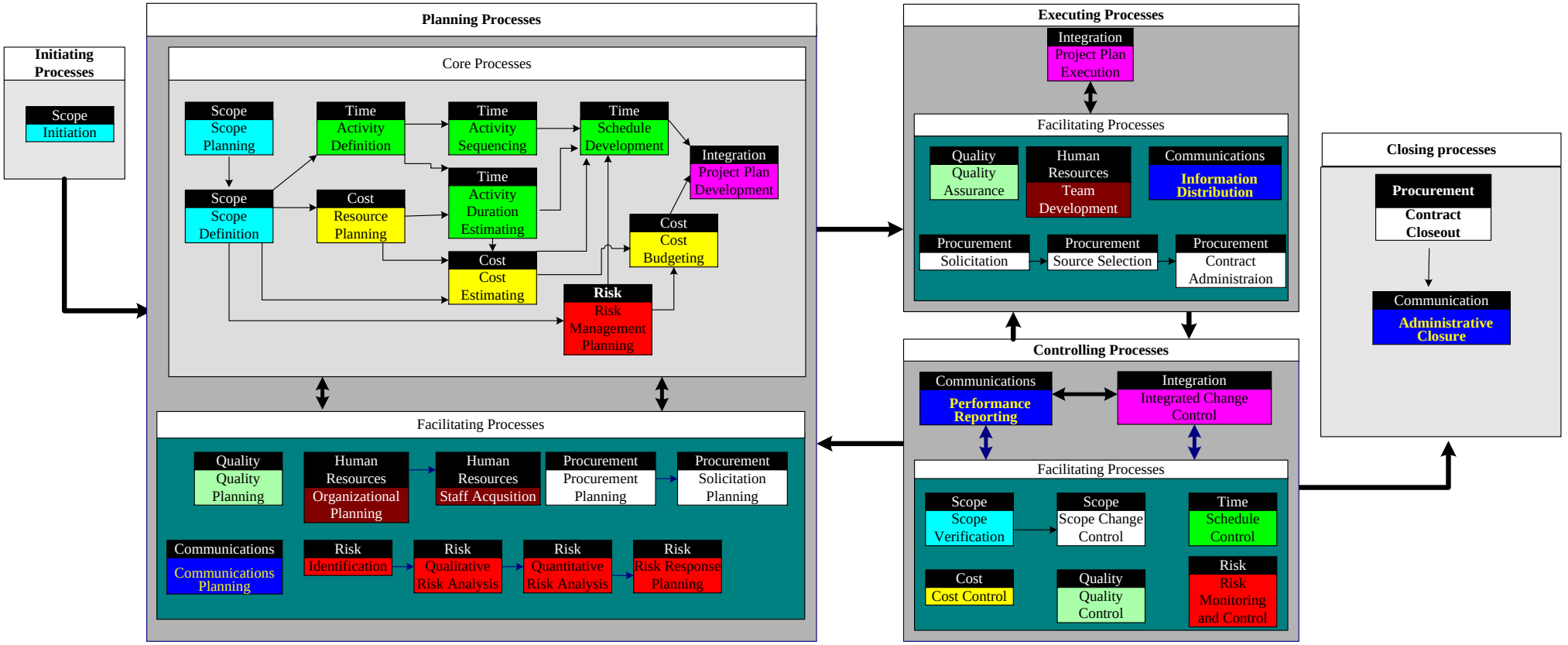
- Chapter 8: Project Quality Management from PMBOK
- PMP Prep database: book highlights from Chapter 8: Project Quality Management from PMBOK
- PMP Prep database: book highlights from Chapter 7: Quality Management by Rita Mulcahy
- PMP Prep database: Rita's Hot Topics from Chapter 7: Quality Management
- PMP Prep database: Daniel's Notes from Chapter 8: Project Quality Management
- Excel Q&A flashcards for Chapter_8_Quality_Flashcard_Q_&_A.xls
- Mulcahy Situational Questions - Chapter 8 - Quality Management
- Practice Exam Quality Management
- Practice Questions Project Quality Management
- PMP Prep database Splash Screen

Process: This should give you some idea how long it will take you to cover a knowledge area. There are 9 knowledge areas:

- start tracking time
- compare Chapter 8: Project Quality Management from PMBOK and the highlights to convince yourself that the highlights have all the information that you will need from the PMBOK chapter (convince yourself that you don't need to read the PMBOK; you only need to read my highlights)
- review all highlights information; make notes of any information that is new to you
- review Rita's highlights and Daniel's notes; make notes of any information that is new to you
- review Excel Q&A; make notes of any information that is new to you
- take the three exams; use the Answer Sheet on the CD if needed
- review answers for three exams; make notes of any information which you may need to know to score better on the tests next time
- stop tracking time; note elapsed time

- review PMP Prep Splash Screen to familiarize yourself with everything in the PMP-PREP database

As for test results, I scored low (50%-70%) fairly consistently on the Z tests. I did well on the R tests, and Rita's situational tests. I scored 86% on the real test. Don't get discouraged if you score low on the practice tests, but also don't accept low scores – keep studying the information that you miss.



Relationship Among Processes
after PMBOK Guide 2000

PMP Certification For Dummies

Chapter 8

Project Quality Management

Project Quality Management includes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It includes "all activities of the overall management function that determine the quality policy, objectives, and responsibilities and implements them by means such as quality planning, quality assurance, quality control, and quality improvement, within the quality system" (1). **Figure 8-1** provides an overview of the following major project quality management processes:

8.1 **Quality Planning**—identifying which quality standards are relevant to the project and determining how to satisfy them.

8.2 **Quality Assurance**—evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.

8.3 **Quality Control**—monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.

These processes interact with each other and with the processes in the other knowledge areas as well. Each process may involve effort from one or more individuals or groups of individuals, based on the needs of the project. Each process generally occurs at least once in every project phase.

Although the processes are presented here as discrete elements with well-defined interfaces, in practice they may overlap and interact in ways not detailed here. Process interactions are discussed in detail in Chapter 3.

The basic approach to quality management described in this section is intended to be compatible with that of the International Organization for Standardization (ISO), as detailed in the ISO 9000 and 10000 series of standards and guidelines. This generalized approach should also be compatible with a) proprietary approaches to quality management such as those recommended by Deming, Juran, Crosby, and others, and b) nonproprietary approaches such as Total Quality Management (TQM), Continuous Improvement, and others.

Project quality management must address both the management of the project and the product of the project. The generic term *product* is occasionally used, in literature regarding quality, to refer to both goods and services. Failure to meet quality requirements in either dimension can have serious negative consequences for any or all of the project stakeholders. For example:

Figure 8–1 | 8.1

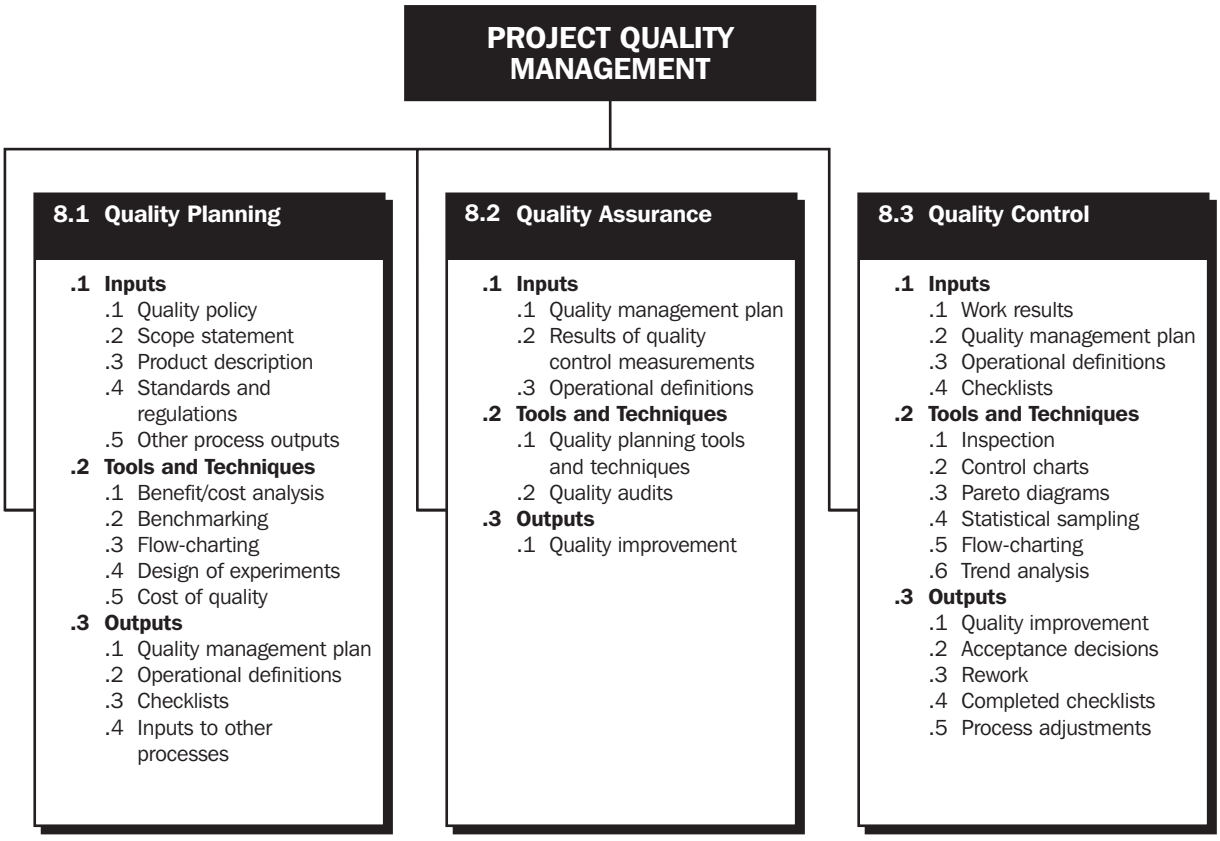


Figure 8–1. Project Quality Management Overview

- Meeting customer requirements by overworking the project team may produce negative consequences in the form of increased employee attrition.
- Meeting project schedule objectives by rushing planned quality inspections may produce negative consequences when errors go undetected.

Quality is "the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs" (2). Stated and implied needs are the inputs to developing project requirements. A critical aspect of quality management in the project context is the necessity to turn implied needs into requirements through project scope management, which is described in Chapter 5.

The project management team must be careful not to confuse *quality* with *grade*. Grade is "a category or rank given to entities having the same functional use but different technical characteristics" (3). Low quality is always a problem; low grade may not be. For example, a software product may be of high quality (no obvious bugs, readable manual) and low grade (a limited number of features), or of low quality (many bugs, poorly organized user documentation) and high grade (numerous features). Determining and delivering the required levels of both quality and grade are the responsibilities of the project manager and the project management team.

The project management team should also be aware that modern quality management complements project management. For example, both disciplines recognize the importance of:

- Customer satisfaction—understanding, managing, and influencing needs so that customer expectations are met. This requires a combination of *conformance to requirements* (the project must produce what it said it would produce) and *fitness for use* (the product or service produced must satisfy real needs).
- Prevention over inspection—the cost of preventing mistakes is always much less than the cost of correcting them, as revealed by inspection.
- Management responsibility—success requires the *participation* of all members of the team, but it remains the *responsibility* of management to provide the resources needed to succeed.
- Processes within phases—the repeated plan-do-check-act cycle described by Deming and others is highly similar to the combination of phases and processes discussed in Chapter 3, Project Management Processes.

In addition, quality improvement initiatives undertaken by the performing organization (e.g., TQM, Continuous Improvement, and others) can improve the quality of the project's management as well as the quality of the project's product.

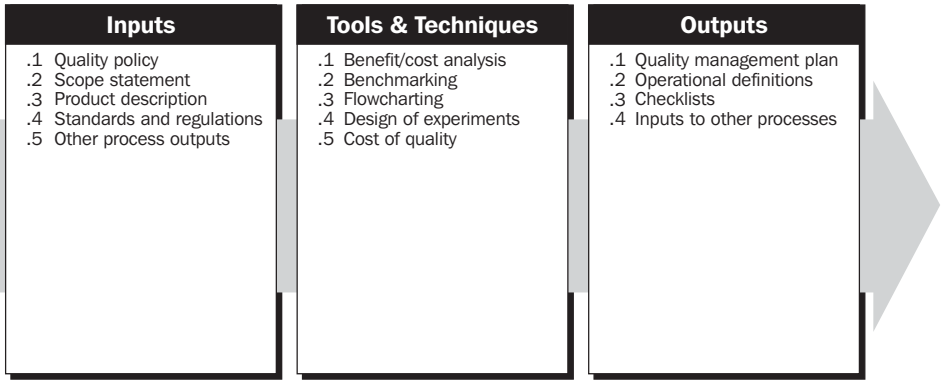
However, there is an important difference of which the project management team must be acutely aware—the temporary nature of the project means that investments in product quality improvement, especially defect prevention and appraisal, must often be borne by the performing organization since the project may not last long enough to reap the rewards.

8.1 QUALITY PLANNING

Quality planning involves identifying which quality standards are relevant to the project and determining how to satisfy them. It is one of the key facilitating processes during project planning (see Section 3.3.2, Planning Processes) and should be performed regularly and in parallel with the other project planning processes. For example, the changes in the product of the project required to meet identified quality standards may require cost or schedule adjustments, or the desired product quality may require a detailed risk analysis of an identified problem. Prior to development of the ISO 9000 Series, the activities described here as *quality planning* were widely discussed as part of *quality assurance*.

The quality planning techniques discussed here are those most frequently used on projects. There are many others that may be useful on certain projects or in some application areas.

The project team should also be aware of one of the fundamental tenets of modern quality management—quality is planned in, not inspected in.



8.1.1 Inputs to Quality Planning

.1 *Quality policy.* Quality policy is "the overall intentions and direction of an organization with regard to quality, as formally expressed by top management" (4). The quality policy of the performing organization can often be adopted "as is" for use by the project. However, if the performing organization lacks a formal quality policy, or if the project involves multiple performing organizations (as with a joint venture), then the project management team will need to develop a quality policy for the project.

Regardless of the origin of the quality policy, the project management team is responsible for ensuring that the project stakeholders are fully aware of it (e.g., through appropriate information distribution, as described in Section 10.2).

.2 *Scope statement.* The scope statement (described in Section 5.2.3.1) is a key input to quality planning since it documents major project deliverables, as well as the project objectives that serve to define important stakeholder requirements.

.3 *Product description.* Although elements of the product description (described in Section 5.1.1.1) may be embodied in the scope statement, the product description will often contain details of technical issues and other concerns that may affect quality planning.

.4 *Standards and regulations.* The project management team must consider any application area-specific standards or regulations that may affect the project. Section 2.5.1 discusses standards and regulations.

.5 *Other process outputs.* In addition to the scope statement and product description, processes in other knowledge areas may produce outputs that should be considered as part of quality planning. For example, procurement planning (described in Section 12.1) may identify contractor quality requirements that should be reflected in the overall quality management plan.

8.1.2 Tools and Techniques for Quality Planning

.1 *Benefit/cost analysis.* The quality planning process must consider benefit/cost tradeoffs, as described in Section 5.2.2.2. The primary benefit of meeting quality requirements is less rework, which means higher productivity, lower costs, and increased stakeholder satisfaction. The primary cost of meeting quality requirements is the expense associated with project quality management activities. It is axiomatic of the quality management discipline that the benefits outweigh the costs.

.2 *Benchmarking.* Benchmarking involves comparing actual or planned project practices to those of other projects to generate ideas for improvement and to provide a standard by which to measure performance. The other projects may be within the performing organization or outside of it, and may be within the same application area or in another.

.3 *Flowcharting.* A flow chart is any diagram that shows how various elements of a system relate. Flowcharting techniques commonly used in quality management include:

- *Cause-and-effect diagrams*, also called *Ishikawa diagrams* or *fishbone diagrams*, which illustrate how various factors might be linked to potential problems or effects. **Figure 8-2** is an example of a generic cause-and-effect diagram.
- *System* or *process flow charts*, which show how various elements of a system interrelate. **Figure 8-3** is an example of a process flow chart for design reviews.

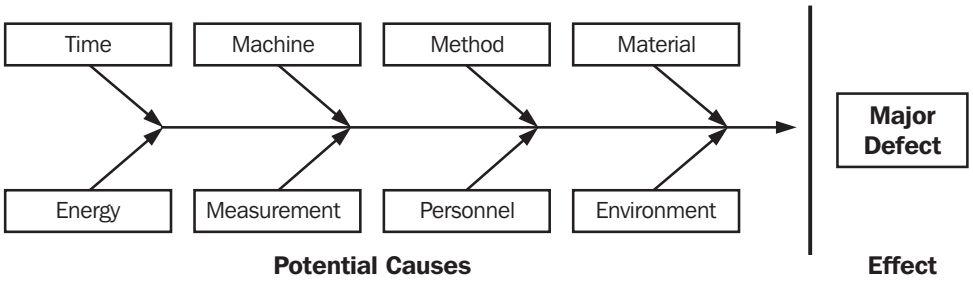


Figure 8–2. Cause-and-Effect Diagram

Flowcharting can help the project team anticipate what and where quality problems might occur, and thus can help develop approaches for dealing with them.

.4 *Design of experiments.* Design of experiments is a statistical method that helps identify which factors might influence specific variables. The technique is applied most frequently to the product of the project (e.g., automotive designers might wish to determine which combination of suspension and tires will produce the most desirable ride characteristics at a reasonable cost).

However, it can also be applied to project management issues, such as cost and schedule tradeoffs. For example, senior engineers will cost more than junior engineers, but can also be expected to complete the assigned work in less time. An appropriately designed "experiment" (in this case, computing project costs and durations for various combinations of senior and junior engineers) will often allow determination of an optimal solution from a relatively limited number of cases.

.5 *Cost of quality.* Cost of quality refers to the total cost of all efforts to achieve product/service quality, and includes all work to ensure conformance to requirements, as well as all work resulting from nonconformance to requirements. There are three types of costs that are incurred: prevention costs, appraisal costs, and failure costs, where the latter is broken down into internal and external costs.

8.1.3 Outputs from Quality Planning

.1 *Quality management plan.* The quality management plan should describe how the project management team will implement its quality policy. In ISO 9000 terminology, it should describe the *project quality system*: "the organizational structure, responsibilities, procedures, processes, and resources needed to implement quality management" (5).

The quality management plan provides input to the overall project plan (described in Section 4.1, Project Plan Development), and must address quality control, quality assurance, and quality improvement for the project.

The quality management plan may be formal or informal, highly detailed, or broadly framed, based on the requirements of the project.

Figure 8–3 | 8.2.2.2

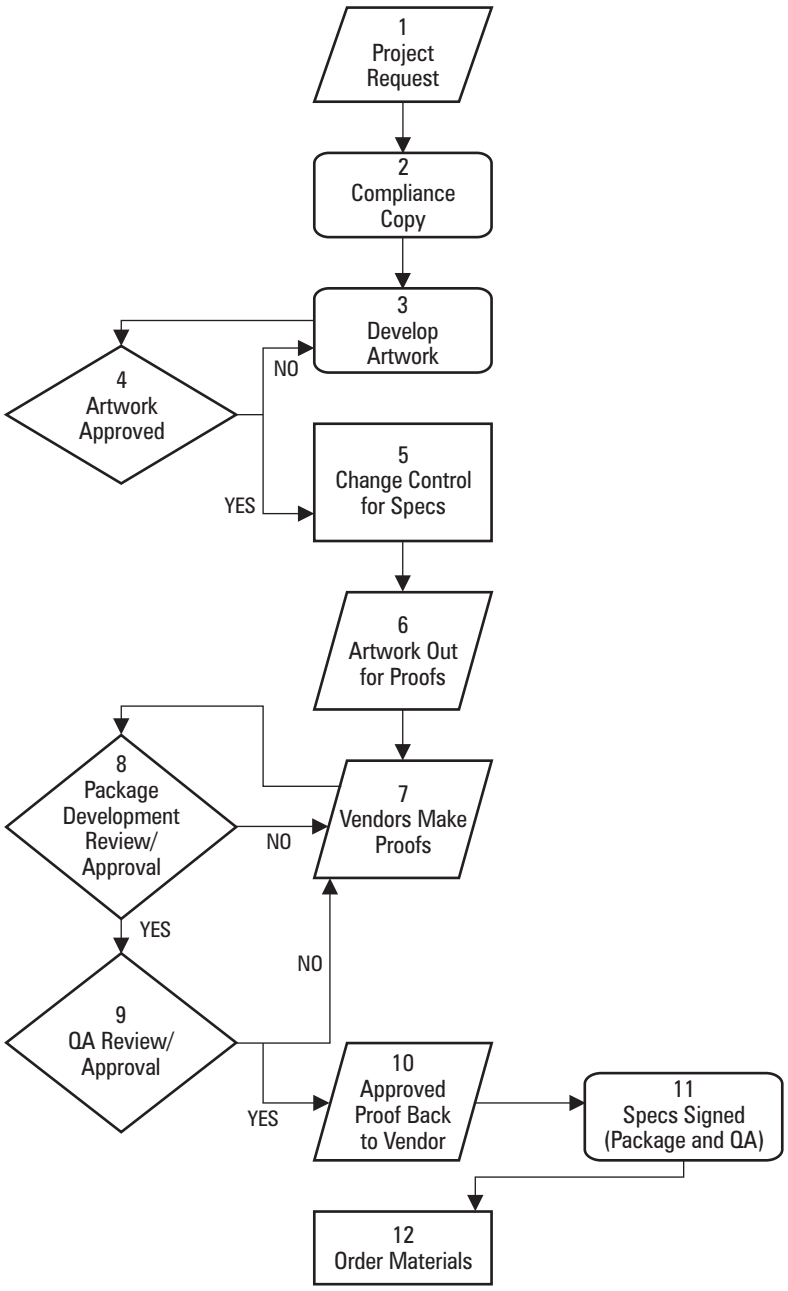


Figure 8–3. Sample Process Flowchart

.2 *Operational definitions.* An operational definition describes, in very specific terms, what something is and how it is measured by the quality control process. For example, it is not enough to say that meeting the planned schedule dates is a measure of management quality; the project management team must also indicate whether every activity must start on time or only finish on time; whether individual activities will be measured, or only certain deliverables, and if so, which ones. Operational definitions are also called *metrics* in some application areas.

.3 *Checklists.* A checklist is a structured tool, usually item specific, used to verify that a set of required steps has been performed. Checklists may be simple or complex. They are usually phrased as imperatives ("Do this!") or interrogatories ("Have you done this?"). Many organizations have standardized checklists available to ensure consistency in frequently performed tasks. In some application areas, checklists are also available from professional associations or commercial service providers.

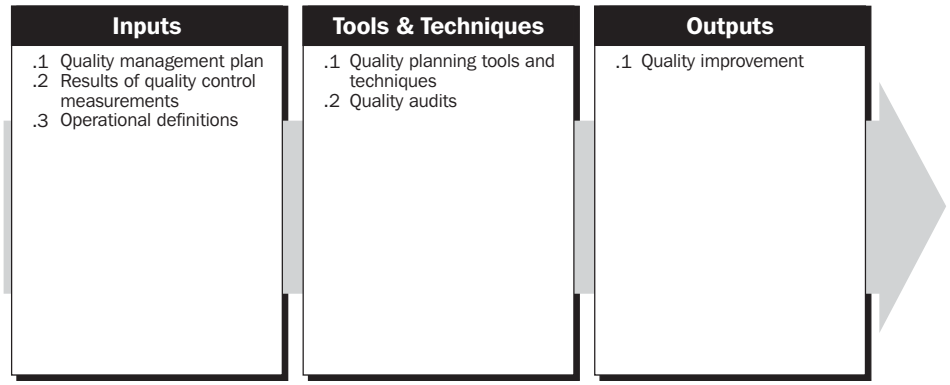
.4 *Inputs to other processes.* The quality planning process may identify a need for further activity in another area.

8.2 QUALITY ASSURANCE

Quality assurance is all the planned and systematic activities implemented within the quality system to provide confidence that the project will satisfy the relevant quality standards (6). It should be performed throughout the project. Prior to development of the ISO 9000 Series, the activities described under quality planning were widely included as part of quality assurance.

Quality assurance is often provided by a Quality Assurance Department or similarly titled organizational unit, but it does not have to be.

Assurance may be provided to the project management team and to the management of the performing organization (internal quality assurance), or it may be provided to the customer and others not actively involved in the work of the project (external quality assurance).



8.2.1 Inputs to Quality Assurance

.1 *Quality management plan.* The quality management plan is described in Section 8.1.3.1.

.2 *Results of quality control measurements.* Quality control measurements are records of quality control testing and measurement in a format for comparison and analysis.

.3 *Operational definitions.* Operational definitions are described in Section 8.1.3.2.

8.2.2 Tools and Techniques for Quality Assurance

.1 *Quality planning tools and techniques.* The quality planning tools and techniques described in Section 8.1.2 can be used for quality assurance as well.

.2 *Quality audits.* A quality audit is a structured review of other quality management activities. The objective of a quality audit is to identify lessons learned that can improve performance of this project or of other projects within the performing

organization. Quality audits may be scheduled or random, and they may be carried out by properly trained in-house auditors or by third parties, such as quality system registration agencies.

8.2.3 Outputs from Quality Assurance

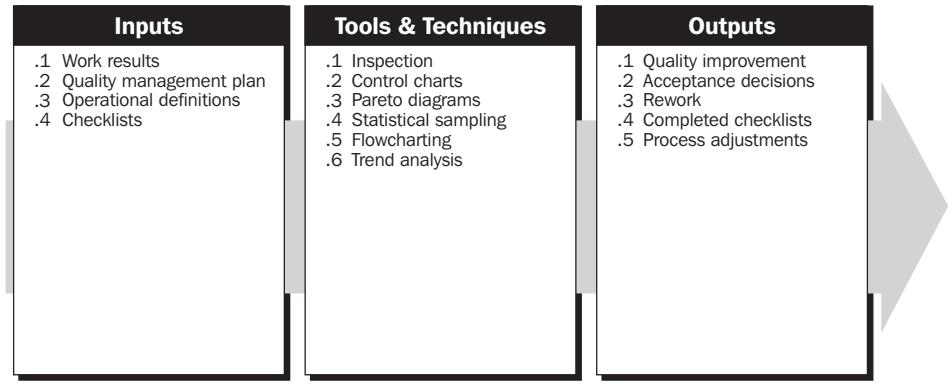
.1 Quality improvement. Quality improvement includes taking action to increase the effectiveness and efficiency of the project to provide added benefits to the project stakeholders. In most cases, implementing quality improvements will require preparation of change requests or taking of corrective action, and will be handled according to procedures for integrated change control, as described in Section 4.3.

8.3 QUALITY CONTROL

Quality control involves monitoring specific project results to determine if they comply with relevant quality standards, and identifying ways to eliminate causes of unsatisfactory results. It should be performed throughout the project. Project results include both *product* results, such as deliverables, and *project management* results, such as cost and schedule performance. Quality control is often performed by a Quality Control Department or similarly titled organizational unit, but it does not have to be.

The project management team should have a working knowledge of statistical quality control, especially sampling and probability, to help it evaluate quality control outputs. Among other subjects, the team may find it useful to know the differences between:

- Prevention (keeping errors out of the process) and inspection (keeping errors out of the hands of the customer).
- Attribute sampling (the result conforms, or it does not) and variables sampling (the result is rated on a continuous scale that measures the degree of conformity).
- Special causes (unusual events) and random causes (normal process variation).
- Tolerances (the result is acceptable if it falls within the range specified by the tolerance) and control limits (the process is in control if the result falls within the control limits).



8.3.1 Inputs to Quality Control

.1 *Work results.* Work results (described in Section 4.2.3.1) include both *process* results and *product* results. Information about the planned or expected results (from the project plan) should be available along with information about the actual results.

.2 *Quality management plan.* The quality management plan is described in Section 8.1.3.1.

.3 *Operational definitions.* Operational definitions are described in Section 8.1.3.2.

.4 *Checklists.* Checklists are described in Section 8.1.3.3.

8.3.2 Tools and Techniques for Quality Control

.1 *Inspection.* Inspection includes activities such as measuring, examining, and testing undertaken to determine whether results conform to requirements. Inspections may be conducted at any level (e.g., the results of a single activity may be inspected, or the final product of the project may be inspected). Inspections are variously called *reviews*, *product reviews*, *audits*, and *walkthroughs*; in some application areas, these terms have narrow and specific meanings.

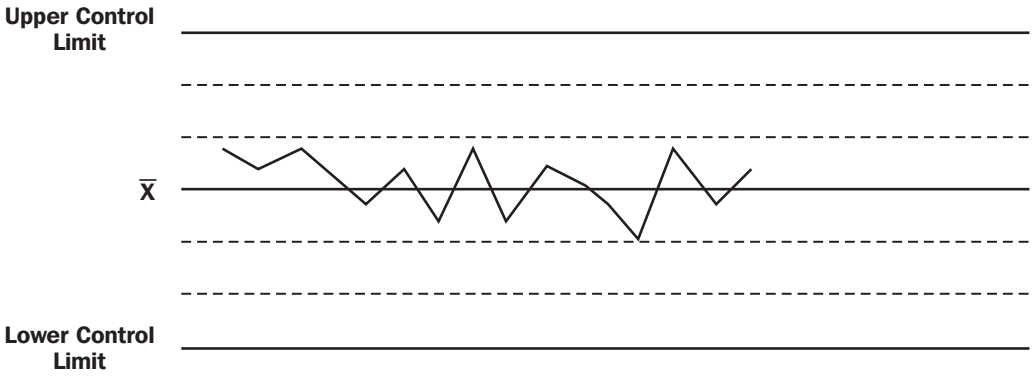
.2 *Control charts.* Control charts are a graphic display of the results, over time, of a process. They are used to determine if the process is "in control" (e.g., are differences in the results created by random variations, or are unusual events occurring whose causes must be identified and corrected?). When a process is in control, the process should not be adjusted. The process may be *changed* to provide improvements, but it should not be adjusted when it is in control.

Control charts may be used to monitor any type of output variable. Although used most frequently to track repetitive activities, such as manufactured lots, control charts can also be used to monitor cost and schedule variances, volume and frequency of scope changes, errors in project documents, or other management results to help determine if the *project management process* is in control. **Figure 8-4** is a control chart of project schedule performance.

.3 *Pareto diagrams.* A Pareto diagram is a histogram, ordered by frequency of occurrence, that shows how many results were generated by type or category of identified cause (see **Figure 8-5**). Rank ordering is used to guide corrective action—the project team should take action to fix the problems that are causing the greatest number of defects first. Pareto diagrams are conceptually related to Pareto's Law, which holds that a relatively small number of causes will typically produce a large majority of the problems or defects. This is commonly referred to as the *80/20 principle*, where 80 percent of the problems are due to 20 percent of the causes.

.4 *Statistical sampling.* Statistical sampling involves choosing part of a population of interest for inspection (e.g., selecting ten engineering drawings at random from a list of seventy-five). Appropriate sampling can often reduce the cost of quality control. There is a substantial body of knowledge on statistical sampling; in some application areas, it is necessary for the project management team to be familiar with a variety of sampling techniques.

Figure 8–4 | Figure 8–5



The x axis of all control charts consists of sample numbers (usually the time of the sample). Control charts have three common lines:

I. A center line, designated with an "$\bar{x}$," which provides the average (x) of the process data.

II. An upper line designating the upper control limit (UCL), drawn at a calculated distance above the center line, showing the upper range of data.

III. The lower line designating the lower control limit (LCL), which shows the lower range of data. Points outside of the UCL and LCL are indicative that the process is out of control and/or unstable.

Figure 8–4. Control Chart of Project Schedule Performance

.5 *Flowcharting.* Flowcharting is described in Section 8.1.2.3. Flowcharting is used in quality control to help analyze how problems occur.

.6 *Trend analysis.* Trend analysis involves using mathematical techniques to forecast future outcomes based on historical results. Trend analysis is often used to monitor:

- Technical performance—how many errors or defects have been identified, how many remain uncorrected.
- Cost and schedule performance—how many activities per period were completed with significant variances.

8.3.3 Outputs from Quality Control

.1 *Quality improvement.* Quality improvement is described in Section 8.2.3.1.

.2 *Acceptance decisions.* The items inspected will be either accepted or rejected. Rejected items may require rework (described in Section 8.3.3.3).

.3 *Rework.* Rework is action taken to bring a defective or nonconforming item into compliance with requirements or specifications. Rework, especially unanticipated rework, is a frequent cause of project overruns in most application areas. The project team should make every reasonable effort to minimize rework.

.4 *Completed checklists.* See Section 8.1.3.3. When checklists are used, the completed checklists should become part of the project's records.

.5 *Process adjustments.* Process adjustments involve immediate corrective or preventive action as a result of quality control measurements. In some cases, the process adjustment may need to be handled according to procedures for integrated change control, as described in Section 4.3.

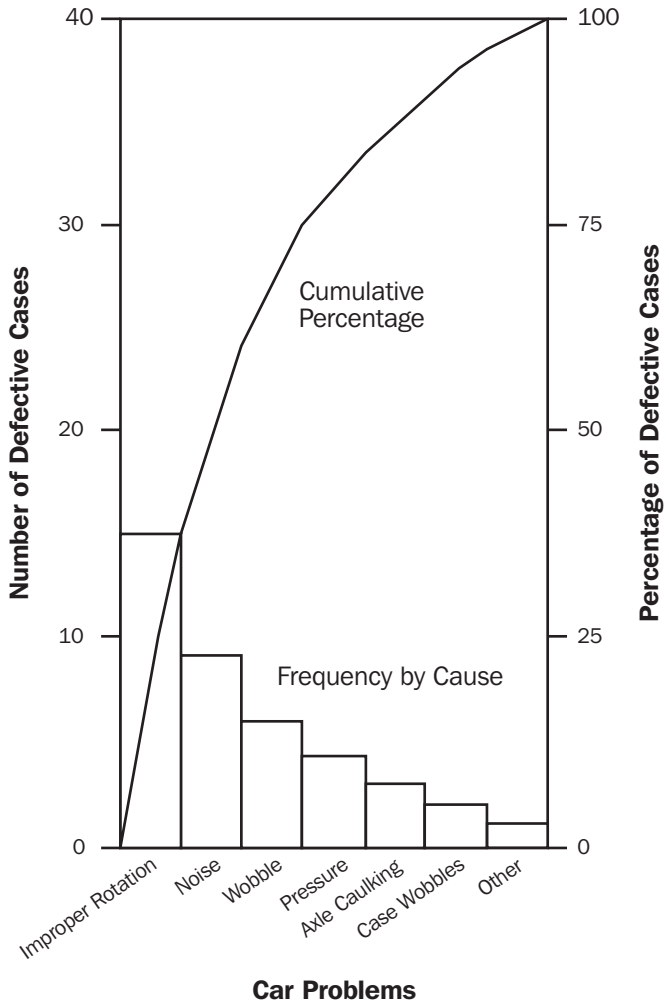


Figure 8–5. Pareto Diagram

ensure that the project will satisfy the needs for which it was undertaken. It includes "all activities of the overall management function that determine the quality policy, objectives, and responsibilities and implements them by means such as quality planning, quality assurance, quality control, and quality improvement, within the quality system".

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8.1 Quality Planning-identifying which quality standards are relevant to the project and determining how to satisfy them.
8.2 Quality Assurance-evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.
8.3 Quality Control-monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes o unsatisfactory performance.

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Figure 8-1. Project Quality Management Overview

8.1 Quality Planning

8.1.1 Inputs
8.1.1.1 Quality policy
8.1.1.2 Scope statement
8.1.1.3 Product description
8.1.1.4 Standards and regulations
8.1.1.5 Other process outputs

8.1.2 Tools and Techniques
8.1.2.1 Benefit/cost analysis
8.1.2.2 Benchmarking
8.1.2.3 Flow-charting
8.1.2.4 Design of experiments
8.1.2.5 Cost of quality

8.1.3 Outputs
8.1.3.1 Quality management plan
8.1.3.2 Operational definitions
8.1.3.3 Checklists
8.1.3.4 Inputs to other processes

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

8.2 Quality Assurance

8.2.1 Inputs
8.2.1.1 Quality management plan
8.2.1.2 Results of quality control measurements
8.2.1.3 Operational definitions

8.2.2 Tools and Techniques
8.2.2.1 Quality planning tools and techniques
8.2.2.2 Quality audits

8.2.3 Outputs
8.2.3.1 Quality improvement

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

8.3 Quality Control

8.3.1 Inputs
8.3.1.1 Work results
8.3.1.2 Quality management plan
8.3.1.3 Operational definitions
8.3.1.4 Checklists

8.3.2 Tools and Techniques
8.3.2.1 Inspection
8.3.2.2 Control charts
8.3.2.3 Pareto diagrams
8.3.2.4 Statistical sampling
8.3.2.5 Flow-charting
8.3.2.6 Trend analysis

8.3.3 Outputs
8.3.3.1 Quality improvement
8.3.3.2 Acceptance decisions
8.3.3.3 Rework
8.3.3.4 Completed checklists
8.3.3.5 Process adjustments

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p 95
- project QM must address both the management of the project and the product of the project
- generic term product is occasionally used, in literature regarding quality, to refer to both goods and services

p 96
- Q = "the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs"
  - Stated and implied needs are the inputs to developing project requirements
- critical aspect of QM in the project context is the necessity to turn implied needs into requirements through project scope mgt, which is described in Chapter 5
- don't confuse quality with grade.
  - Grade is "a category or rank given to entities having the same functional use but different technical characteristics"
  - Low quality is always a problem; low grade may not be.
  - ex. a software product may be:
    - high quality (no obvious bugs, readable manual) and low grade (a limited number of fea-tures)
    - low quality (many bugs, poorly organized user documentation) and high grade (numerous features)
  - Determining and delivering the required levels of both quality and grade are responsibilities of the PM and the PM team

- modern QM complements PM
  - ex both disciplines recognize the importance of:
    ^ Customer satisfaction
      - understanding, managing, and influencing needs so that customer expectations are met
      - combination of:
        - conformance to requirements (the project must produce what it said it would produce)
        - fitness for use (the product or service produced must satisfy real needs)
    ^ Prevention over inspection
      - cost of preventing mistakes < cost of correcting them, as revealed by inspection
    ^ mgt responsibility
      - success requires participation of all team members
      - remains responsbility of mgt to provide resources needed to succeed
    ^ Processes within phases
      - plan-do-check-act cycle described by Deming
      - similar to combination of phases and processes from chapter 3

- temporary nature of project means that investments in product QI, especially defect prevention and appraisal, must often be borne by the performing org since the project may not last long enough to reap the rewards

p 97 8.1 Quality Planning
- involves identifying which quality standards are relevant to the project and determining how to satisfy them
- facilitating process during project planning
- should be performed regularly and in parallel with the other project planning processes
- quality is planned in, not inspected in

p 98
- inputs to QP 8.1.1
  ^ quality policy 8.1.1.1
    - the overall intentions and direction of an org w/regard to Q, as formally expressed by top mgt
    - PM team responsible for ensuring that project stakeholders are fully aware of quality policy
  ^ scope statement 8.1.1.2 (from 5.2.3.1)
    - documents major project deliverables
    - documents project objectives (define important stakeholder requirements)
  ^ product description 8.1.1.3
    - will often contain details of technical issues and other concerns that may affect quality planning
  ^ standards and regulations 8.1.1.4
    - application area-specific standards or regulations that may affect the project
  ^ other process inputs 8.1.1.5

- Tools and Techniques for Quality Planning 8.1.2
  ^ Benefit/cost analysis 8.1.2.1
    - consider benefit/cost tradeoffs
    - benefit = less rework (high productivity, lower costs, increased stakeholder satisfaction)
    - cost = expense associated w/project QM activities
  ^ Benchmarking 8.1.2.2
    - compare actual or planned project practices to those of other projects
    - generate ideas for improvement and provide standard for measuring performance
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

^ Flowcharting 8.1.2.3
- diagram that shows how various elements of a system relate
- ex. Cause-and-effect diagrams, also called Ishikawa diagrams or fishbone diagrams
- ex. System or process flow charts, which show how various elements of a system interrelate (regular flow chart)

^ Design of experiments 8.1.2.4
- statistical method that helps ID which factors might influence specific variables
- ex. which suspension/tires produce most desirable ride
- ex. sr programmer costs more than jr programmer, but can do work faster

^ Cost of quality 8.1.2.5
- total cost of all efforts to achieve product/svc Q
- includes all work to ensure conformance to reqs, as well as all work resulting from nonconformance to reqs
- three types of costs
  - prevention costs
  - appraisal costs
  - failure costs
    - broken down into internal and external costs

- Outputs from Quality Planning 8.1.3

^ quality management plan 8.1.3.1
- describe how PM team will implement quality policy
- should describe "project quality system":
  - org structure, responsibilities, procedures, processes and resources needed to implement QM
- provides input to overall project plan
- must address QC, QA and QI for project

^ operational definitions 8.1.3.2
- describes, in very specific terms, what something is and how it is measured by QC process
- also called metrics

^ checklists 8.1.3.3
- structured tool, usually item specific
- verifies that a set of required steps has been performed

^ inputs to other processes 8.1.3.4
- may ID need for further activity in another area

p 101 8.2 quality assurance
- planned and systematic activities implemented within Q system to provide confidence that project will satisfy relevant Q standards
- should be performed throughout the project
- may be internal QA (provided to project team and mgt) or external QA (provided to customer and others not working on project)

- inputs to QA 8.2.1

^ quality management plan 8.2.1.1: see 8.1.3.1

^ results of quality control measurements 8.2.1.2
- records of QC testing and measurement for comparison and analysis

^ operational definitions 8.2.1.3: see 8.1.3.2

- tools and techniques for QA 8.2.2

^ quality planning tools and techniques 8.2.2.1: see 8.1.2

^ quality audits 8.2.2.3
- structured review of other QM activities
- objective = ID lessons learned that can improve performance of project or of other projects w/in performing org
- may be scheduled or random
- may be carried out by in-house auditors or by 3rd parties (ex. Q system registration agencies)

- outputs from QA 8.2.3

^ quality improvement 8.2.3.1
- includes taking action to increase effectiveness and efficiency of project to provide added benefits to project stakeholders
- implementing will usually require preparation of change requests or taking corrective action
- usually handled according to procedures for integrated change control; see 4.3

p 102 8.3 quality control
- involves monitoring specific project results to determine if they comply with relevant quality standards
- involves identifying ways to eliminate causes of unsatisfactory results
- should be performed throughout the project
- Project results include
  - product results, such as deliverables
  - project management results, such as cost and schedule performance
- PM team should have a working knowledge of statistical QC, especially sampling and probability, to help it evaluate QC outputs
- PM team team may find it useful to know the differences between:
  - Prevention (keeping errors out of the process) and inspection (keeping errors out of the hands of the customer).
  - Attribute sampling (the result conforms, or it does not) and variables sampling (the result is rated on a continuous scale that measures the degree of conformity).
  - Special causes (unusual events) and random causes (normal process variation).
  - Tolerances (the result is acceptable if it falls within the range specified by the tolerance)
  - control limits (the process is in control if the result falls within the control limits)

- Inputs to quality control 8.3.1
  ^ Work results 8.3.1.1: see 4.2.3.1
    - includes process results and product results
    - info about planned or expected results (from project plan) should be available along w/info about actual results
  ^ Quality management plan 8.3.1.2: see 8.1.3.1
  ^ Operational definitions 8.3.1.3: see 8.1.3.2
  ^ Checklists 8.3.1.4: see 8.1.3.3

- Tools and Techniques for Quality Control 8.3.2
  ^ Inspection 8.3.2.1
    - includes activities such as measuring, examining, and testing
    - undertaken to determine whether results conform to reqs
    - AKA reviews, product reviews, audits, walkthroughs
  ^ Control charts 8.3.2.2
    - graphic display of results over time of a process
    - used to determine if process is "in control"
      - are variances created by random variations, or unusual events whose causes must be identified and corrected
    - when a process is in control then the process should not be adjusted
      - process may be changed to provide improvements, but should not be adjusted when it is in control
  ^ Pareto diagrams 8.3.2.3
    - histogram
    - ordered by frequency or occurance
    - shows how many results were generated by type or category of identified cause
    - rank ordering is used to guide corrective action (fix the biggest problems first)
    - pareto's law: relatively small number of causes will typically cause large majority of problems
      - 80/20 principle
  ^ Statistical sampling 8.3.2.4
    - choosing part of population of interest for inspection
  ^ Flow-charting 8.3.2.5: see 8.1.2.3
    - used in QC to help analyze how problems occur
  ^ Trend analysis 8.3.2.6
    - using math techniques to forecase future outcomes based on historical results
    - often used to monitor:
      - technical performance: how many errors have been identified, how many remain uncorrected
      - cost/schedule performance: how many activities per period were completed w/significant variances

- Outputs from Quality Control 8.3.3
  ^ Quality improvement 8.3.3.1: see 8.2.3.1
  ^ Acceptance decisions 8.3.3.2
    - items inspected will either be accepted or rejected
    - rejected items may require rework (see 8.3.3.3)
  ^ Rework 8.3.3.3
    - action taken to bring defective or noncomforming item into compliance w/req or spec
    - rework, especially unanticipated rework, is frequent cause of project overruns in most application areas
  ^ Completed checklists 8.3.3.4
    - completed checklists become part of project's records
  ^ Process adjustments 8.3.3.5
    - involve immediate corrective or preventative action as a result of QC measurements

WhichBook r ChapterNum 7 ChapterDesc Quality Management

PMBOK chapter 8

r 123
- questions can be confusing because PMI may have Q philosophy different from that of your company
  - read PMBOK Q chapter and this chapter carefully
  - memorize definitions provided
  - definitions are extremely important for the exam
  - may be 15 questions that relate to control charts and definitions

- Q philosophy
  - understand PMI's approached two Q because it is different from what most people have learned
  - PMI's philosophy can be illustrated in the definitions of quality, gold plating, and prevention over inspection

- definition of Q
  - "conformance to requirements and fitness of use"
  - memorize this phrase; should help you answer about four questions
  - project must produce what it said it would produce
  - what it produces must satisfy real needs
  - PM should perform careful and accurate needs analysis at the beginning of the project to ensure stakeholder satisfaction
    - these requirements become the foundation of the scope of work
  - PM's role during project = complete what has been committed
    - quality is NOT giving the customer extra
    - PMI says Q is doing what you said you were going to do

- gold plating
  - PMI does not recommend giving the customer extras
    - extra functionality, higher-quality components, extra scope of work, better performance
  - adds no value to the project
  - often such additions are included based on the project team's impression of what the customer would like
    - this impression may not be accurate
  - considering that only 26% of all projects succeed, PMs would be better off spending their time conforming to requirements

- marginal analysis
  - optimal Q is reached at the point where the incremental revenue from improvement equals the incremental cost to secure

r 124
- definition of QM (p 95)
  - "process required to ensure that the project will satisfy the needs for which it was undertaken"
  - can also mean completing the project with no deviations from the project requirements
  - in PMBOK QM includes Q planning, QA and QC

- continuous improvement / kaizen
  - small improvements in products or processes to reduce costs and ensure consistency of performance of products or services
  - on exam: continuous improvement and Kaizen mean the same thing
    - in Japan this is just a word; not a Q movement
    - Kaizen: Kai (alter), Zen (make better or improve)
    - in US: improvements are thought of as BIG improvements
    - in Japan: improvements are thought of as small improvements

- just in time (jit)
  - decrease amount of inventory a company carries, thereby decreasing investment in inventory
  - directs our company to improve quality (forces attention to quality) because extra materials are not available

- ISO 9000
  - standard created by the Intl Standards Org (ISO)
  - helps ensure that orgs have Q procedures and that they follow them
  - IS NOT what Q should be or describes a recommended Q system

- TQM
  - encourages companies and their employees to focus on finding ways to continuously improve Q of their business practices and products

- prevention over inspection
  - prevention over inspection and the Q philosophy flow through many of the questions on the exam
  - years ago main focus of Q was on inspection
    - ex. check production after items are produced
  - cost of doing so (cost of nonconformance) is so high that it is better to spend money preventing problems
  - QUALITY MUST BE PLANNED IN, NOT INSPECTED IN
  - this is part of PMI's Q philosophy and frequently comes up on the exam

- mutually exclusive
  - two events that cannot both occur in a single trial
  - ex. flipping a coin once cannot result in both a head and tail

- statistical independence
  - probability of one event occurring is not a fact the probability of another event occurring
  - ex. rolling 6 on a die is statistically independent from the probability of rolling a 5 on the next roll

r 125
- normal distribution
  - most common probability density distribution chart that is in the shape of a bell curve and is used to measure variations

- standard deviation / sigma
  - measure of how far you are from the mean, not the median
  - P - O/6 is the formula for standard deviation unit optimistic, pessimistic, and most likely estimates

- 3 or 6 Sigma
  - sigma = another name for standard deviation
  - 3 or 6 Sigma represents the level of Q that a company has decided to try to achieve
  - 6 sigma: 1 out of 10,000 items have a problem
  - 3 sigma: 27 out of 10,000 items have a problem
  - also used to calculate the upper and lower control limits in a control chart

- MEMORIZE
  - half of curve is above the mean (with a positive value), half of curve is below the mean (with a negative value)
  - left side of the mean is negative; right side is positive
  - +/- 1 sigma = 68.26%
  - +/- 2 sigma = 95.46%
  - +/- 3 sigma = 99.73%
  - +/- 6 sigma = 99.99%

- population: entire universe

- sample
  - part of the population
  - taking sample of the population if studying the entire population would
    - take too long
    - cost too much
    - be too destructive
    - when the cost of 100% inspection is too high
    - when we believe there are not many defects

r 126
- variable: characteristic you want to measure (ex. size, shape, weight)

- attributes: measurement (inches, pounds) that will tell if a sample is acceptable
  - can be subjective or objective
  - specific characteristics for which a product is built

- probability: likelihood that something will occur
  - usually expressed as a %

- responsibility for quality
  - entire org as responsibilities relating to quality
  - read questions on this topic carefully to interpret about whom in the org the question is asking
  - PMI is notorious for questions that seem ambiguous
  - REMEMBER THE FOLLOWING:
    - who has the ULTIMATE responsibility for Q: the employee
    - who has the OVERALL or PRIMARY responsibility for Q: PM
    - who has the PRIMARY RESPONSIBILITY FOR ESTABLISHING DESIGN AND TEST SPECS: the engineer; remember this is a PM exam, not a Q professional exam.
      - only once has Rita heard about a question on the exam that referred to the Q specialist or engineer, not a common member of the project team or stakeholders

- impact of poor quality
  - some questions are easy to answer, such as this one
  - if you have poor Q, you have:
    - increased costs
    - low morale
    - lower customer satisfaction
    - increased risk
  - increases in Q can result in increased productivity and cost-effectiveness, decreasde cost risk

- cost of conformance and cost of nonconformance
  - PMI and Deming (expounder of Q philosophy) say that 85% of the costs of Q are the direct responsibility of mgt
  - specifically these costs are
    - cost of conformance
      - quality training

- studies
- surveys
- cost of nonconformance
- rework
- scrap
- inventory costs
- warranty costs

r 127
- QM planning (p 97), QA (p 101), QC (p 102)
- usually many questions on the exam that require you to understand the differences between these components of Q
- refer to the PMBOK
- many people find it hard to understand the difference
- following table includes some tricks to tell them apart
- tricks to understand the difference
- QM planning: plan
- QA: implement
- QC: check
- QM planning: determine what will be Q on the project and how Q will be measured
- QA: determine if your measurements of Q are still appropriate
- QC: perform the measurement and compare to the QM plan
- QM planning: plan it
- QA: assure ourselves we have an appropriate plan
- QC: inspect how Q is going on the project
- mostly done during
- QM planning: planning
- QA: execution
- QC: control

- QM planning (p 97)
- QM planning done concurrently with other project planning includes:
- identifying Q standards relevant to the project in determining how to satisfy them
- benchmarking (p 98): looking at past projects to determine ideas for improvement and to provide a measure of Q performance
- benefit/cost analysis (p 98): considering the benefits vs costs of Q requirements
- flowchart (p 99, 100):
- showing how a process or system flows from beginning to and, how elements interrelate
- used in QM planning to analyze potential future Q problems and determine Q standards
- used in QC to analyze Q problems
- fishbone diagram is also an example of flowchart
- design of experiments (p 99)
- use of experimentation or "what if" to determine what variables will improve Q
- cost of quality (p 99)
- comparing cost of conformance and cost of nonconformance
- creating appropriate balance between these costs
- costs of quality include prevention costs, appraisal costs, failure costs
- fishbone diagram (cause and effect, Ishikawa, p 98)
- QM planning tool if used to determine what will define Q on the project (ex. look toward the future)
- see also QC

- QA (p 101)
- primarily done during execution phase
- includes:
- process of evaluating overall performance on a regular basis to provide confidence that project will satisfy relevant Q standards
- reevaluating Q standards, methods and procedures used on the project
- Q audits (p 101): structured review of Q activities that identifies lessons learned

r 128
- QC (p 102)
^ done during the control phase
^ includes:
- process of monitoring specific project results to determine if they comply with relevant Q standards, and identify ways to eliminate causes of unsatisfactory performance
- performance of the measurement or process, using QC tools or check in the work
- QC tools:
- inspection: checking quality after work is completed
- Pareto diagram
- statistical sampling
- flowcharting (described under QM planning)
- trend analysis: examining project results over time to evaluate performance
- fishbone diagram: if used to investigate the root cause of a quality problem then this is a QC tool
^ TRICK
- easier to determine if something is part of QC (ex relates to one of the QC tools) then to determine if it is part of QA
- if the question asks, "which of the following is done during QA"
- determine if the item relates to a QC tool

- if it does not then it is part of QA
^ fishbone diagram (cause and effect, ishikawa) (p 98)
- diagram illustrates how various causes and sub causes relate to create potential symptoms (problems)
- looks like the bones of a finish
- an example of one form of flowchart
- exam has used the following three phases to describe this diagram (MEMORIZE THESE)
- creative way to look at the causes or potential causes of a symptom (problem)
- helps stimulate thinking, organizes thoughts and generates discussions
- can be used to explore a desired future outcome and the factors to which it relates
^ checklist: contains list of items to inspect or picture of the item to be inspected with space to note any defects found
^ Pareto diagram (p 103, 105)
- resolving each symptom (problem) that arises may not be best use of PM's time
- might be worthwhile to graph types of symptoms (problems) and frequency of occurrence
- figure out which problem occurs more frequently and should be prevented
- based on the 80/20 rule
- 80% of the symptoms (problems) will come from 20% of the work
- p 105 has a picture
- understand the following phrases:
- chart presents information being examined in its order of priority
- chart helps focus attention on the most critical issues
- prioritizes potential "causes" of symptoms (problems)
- separates the critical few from the uncritical many
- aka vital few and useful many
^ control chart (p 103)
- PMI says control charts are "graphic displays of the results, overtime, of a process ... used to determine if the process is 'in control'"
- measurement of each item should be within range of normal and acceptable limits
- control chart helps monitor production and other processes to see if the process is within these limits and therefore if a problem exists
- to create: samples were taken, variables measured, attributes found
- attribute (ex. size) are plotted on the chart
- the following are found on the control chart
* upper and lower control limits
- acceptable range a variation of a process
- often shown as two dashed lines on a control chart
- every process is expected to have some variation
- acceptable range, between upper and lower control limits, determined by org's Q standard (ex. 3 or 6 sigma)
- data points within this range are generally thought of as "in control"
- excluding the rule of seven
- are an acceptable range a variation
- data points outside this range mean the process is out-of-control
* mean:
- line in the middle of the chart
- shows middle of the range of acceptable variation
* specification limit
- often shown as solid lines OUTSIDE upper and lower control limits on the chart
- represent the customer's expectations or contractual requirements for performance and Q
- characteristics of the measured process; are not inherent
- therefore they can be either inside or outside

r 130

* out-of-control data points
- processes is out of state of statistical control under two circumstances
1) data point falls outside upper or lower control limit
2) nonrandom data points that are still within upper and lower control limits (such as rule of seven)
* rule of seven
- rule of thumb; heuristic
- refers to nonrandom data points grouped together that total seven on either side of the mean
- tells you that although none of these points is outside the control limits, they are not random; process is out of control
- this situation should be investigated and a cause found
* assignable cause
- data point that requires investigation to determine the cause of the variation

- control charts exercise
- much of what is tested on control charts is not in the PMBOK
- questions on exam relating to control charts do not use pictures but may ask questions
- easier to answer it if you can picture a control chart in your mind
- see answer charts on r 132

r 7
In order of importance:
- QM planning
- QA
- QC
- control charts
  - control limits
  - assignable cause
  - rule of seven
  - specification limit
  - out of control
- definition of quality
- prevention over inspection
- quality philosophy
- Pareto diagram
- gold plating
- definition of QM
- TQM
- QC tools
- quality audits
- continuous improvement
- margin analysis
- responsibility for quality
- impact of poor quality
- cost of conformance and nonconformance
- normal distribution
- standard deviation
- 3 or 6 Sigma
- mean
- population
- sample
- variable
- attribute
- probability
- checklist
- ISO 9000
- statistical independence
- mutual exclusivity
- fishbone diagram
- benefit/cost analysis
- benchmarking
- flowchart
- just in time
- design of experiments

[p 8]

NOTES ON RITA'S CHAPTER 7 HOT TOPICS
- control charts
  - control limits: acceptable range; company's goal
  - assignable cause:
    - data point that requires investigation to identify cause of variation
    - known reason that data point fell outside control limits
  - rule of seven:
    - non-randome data points grouped together on one side of mean
    - still within control limits
    - process is out of control
  - specification limit: outside control limits (usually); customer's limit
  - out of control: only adjust processes that are out of control
- definition of quality:
  - characteristics of entity related to ability to satisfy stated or implied needs
  - conformance to requirements and fitness of use
- quality audits:
  - structured review of quality activities to identify lessons learned
  - used for process improvement
- margin analysis: revenue from improvements vs cost to get those improvements
- responsibility for quality:
  - employee has ultimate responsibility
  - PM has primary overall responsibility
  - engineer makes design/test specs
- cost of conformance and nonconformance
  - conform: quality training, studies, surveys
  - nonconform: rework, scrap, inventory costs, warranty costs
  - 85% of costs of quality are direct responsibility of management
- variable
  - characteristic to measure
  - variable sampling = measure degree of conformance on continuous scale
- attribute
  - measurement to tell if sample is acceptable
  - attribute sampling = result conforms or not
- ISO 9000: ensurest hat organizations have quality procedures and follow them
- flowchart: used in QC to help analyze how problems occur
- just in time: requires increase in quality because extra materials aren't available
- design of experiments:
  - statistical method
  - helps identify which factors might influence specific variables
  - ex. which suspension or tires produce best ride
  - tool/technique in quality planning

MY NOTES:
KNOW PMBOK DESCRIPTIONS FOR:
- quality management
- quality planning
- quality assurance
- quality control
- KNOW ALL INPUTS, TOOLS/TECHNIQUES AND OUTPUTS
  - THIS IS THE ONLY KNOWLEDGE AREA WHERE I SAY TO DO THIS

- key outputs:
  - quality planning: QM plan, operational definitions, checklists
    - operational definitions = what something is, how QC measures it, AKA metrics
  - quality assurance: QI
  - quality control: QI, acceptance decisions, rework, completed checklists, process adjustments

TRICK: easier to determine if something is part of QC than QA
- if it isn't part of QC tools then it's QA
- QC tools:
  - list 1:
    - inspection
    - pareto
    - statistical sampling
    - flow charting
    - trend analysis
    - ishikawa diagrams
  - list 2: "basic 7 tools"
    - flowchart
    - diagrams
    - pareto
    - ishikawa
    - graphs
    - control charts
    - checklists

- cost of quality: cost of conformance plus cost of non-conformance
- grade: category/rank; same functional use; different technical characteristics
  - not the same as quality
  - ex. software can have lots of features and be buggy = high grade, low quality
  - ex. software can have few features and no bugs = low grade, high quality
- customer satisfaction
  - specs are met
  - product/service meets real needs (fitness for use)
- most accurate measure of quality = cost of non-conformace
- PDCA
  - plan do check act
  - from Deming: Deming Wheel
  - 1) analyze problem
  - 2) develop/implement solutions
  - 3) test solutions
  - 4) widely implement solutions

#	Question		Answer	PM Process Group
1	What is Project Quality Management?		All the processes required to ensure that the project will satisfy the needs for which it was undertaken.	Planning, Controlling, Executing
2	Three standard deviations on either side of the mean of a normal distribution will contain approximately what percentage of the total population?		99.7 percent	Controlling
3	What are Control Limits as used in Control Charts?		Control Limits describe the natural variation of a process. Points within the limits generally indicate normal and expected variation. Points outside the limits generally indicate that something has occurred that requires special attention because it is outside of the natural variation in the process.	Controlling
4	What is the difference between Grade and Quality?		Grade is a category or rank given to entities having the same functional use but different requirements for quality.	Planning, Controlling
5	See Attachment			Controlling
6	Define KAIZEN.		It is the Japanese name for Continuous Improvement	Executing
7	How does the temporary nature of a project affect quality management?		Investments in product quality improvement, such as defect prevention and appraisal, must be borne by the performing organization because the project may not last long enough to realize awards.	Executing
8	What is Gold-Plating? Describe its value.		Giving the customer more than was required. It has no value; exceeding specified requirements is a waste of time and money with no value added to the project. The customer should expect and receive exactly what was specified - no more, no less.	Planning
9	What are Assignable Causes?		Known reasons why a data point fell outside the control limits.	Controlling
10	What is Quality Planning?		Identifying which quality standards are relevant to the project and determining how to satisfy them.	Planning
11	Is Quality Assurance a Managerial or Technical Function?		Managerial.	Executing

#	Question		Answer	PM Process Group
12	What should the project manager do if the performing organization does not have a quality policy?		Work with the project management team to develop a quality policy for the project, and ensure that project stakeholders are aware of the quality policy.	Planning
13	What is the purpose of a Flowchart?		To examine and understand relationships in a process or project. Flowcharts provide a step-by-step schematic or picture that serves to create a common language, ensure common understanding about sequence, and focus collective attention on shared concerns.	Controlling
14	What is the effect of Sample Size on the Standard Deviation?		Whenever sample size increases, the standard deviation decreases.	Controlling
15	Why is the Scope Statement a key INPUT to Quality Planning?		It documents major project deliverables and the project objectives, both of which serve to define critical stakeholder requirements.	Planning
16	What is the Rule of Seven?		It states that if seven or more observations in a row occur on the same side of the mean or if they trend in the same direction - even though they may be within the control limits - they should be investigated as though they had an assignable cause.	Controlling
17	How does the product description affect quality planning?		It often contains details of technical issues and other concerns that affect quality planning.	Planning
18	What is Rework?		Action taken to bring a defective or nonconforming item into compliance with requirements or specifications	Controlling
19	What is Benchmarking?		Comparing actual or planned project practices to those of other projects to generate ideas for improvement and to provide a standard by which to measure performance.	Planning
20	Define Quality		The totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs; Conformance to requirements/specifications and fitness of use.	Planning, Executing, Controlling
21	Give examples of Costs of Nonconformance.		Scrap Rework and Repair Additional material or inventory Warranty repairs and service Complaint handling Liability judgments Product recalls	Controlling

#	Question		Answer	PM Process Group
			Field Service	
			Expediting	
22	List 2 flowcharting techniques commonly used in Project Quality Management.		Cause-and-effect diagrams (Ishikawa diagrams or fishbone diagrams)	Controlling
			System or process flowcharts	
23	What is meant by Cost of Quality?		The cost of conformance and the cost of nonconformance	Controlling
24	How are cause-and-effect diagrams used in Project Quality Management?		They show how various causes and subcauses relate to create potential problems or effects. After these are identified, corrective action can be taken.	Controlling
25	What is the most accurate measurement of quality?		Cost of Nonconformance.	Controlling
26	What is meant by design of experiments?		An analytical technique that helps identify which variables have the most influence on the overall outcome.	Planning
	Where is it most frequently applied?		To project product issues.	
27	What is a Quality Attribute?		A quality characteristic that is classified as either conforming or nonconforming to specifications or requirements, resulting in a "go" or a "no-go" decision.	Controlling
28	What is the principal purpose of the Quality Management Plan?		To describe how the project management team will implement its quality policy.	Planning
29	What are checklists?		Structured tools, usually industry- or activity-specific	Planning
	How are they used?		To verify that a set of required steps has been performed.	
30	What is a Probability Distribution		A measurement of the occurrences of an event or characteristics, and the distribution of the occurrence over the entire range of the occurrences.	Controlling
31	Define Quality Assurance.		All planned and systematic activities implemented within the quality system to provide confidence that the project will satisfy the relevant quality standards.	Executing
32	What is a Quality Audit?		A structured review of all Quality Management activities associated with the project.	Controlling
	What is its Primary Objective?		To identify lessons learned to improve performance of the current and/or future projects.	

#	Question		Answer	PM Process Group
33	Who is ultimately responsible for quality?		The individual employee performing the task.	Executing
34	What is Quality Control?		Monitoring specific project results to determine whether they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results.	Controlling
35	Give examples of Costs of Conformance		Planning	Controlling
			Training and Indoctrination	
			Process Control	
			Product Design Validation	
			Process Validation	
			Test and Evaluation	
			Quality Audits	
			Maintenance and calibration	
			Inspection	
			Field Testing	
36	In which project phase is quality control performed?		Quality control is performed throughout all phases of the project life cycle.	Controlling
37	What is a Pareto Diagram?		A bar chart in which data are arranged in descending order of importance, generally by the magnitude of:	Controlling
	How does it aid the decision process?		Frequency	
			Cost	
			Time	
			or a similar parameter	
			It puts issues into an easily understood framework in which relationships and relative contributions are clearly evident.	
38	When is a process "in control"		When measurements taken from items coming out of the process follow an expected pattern (the normal distribution)	Controlling
39	What is the difference between prevention and inspection?		Prevention involves keeping errors out of the process;	Controlling
			Inspection involves keeping errors out of the hands of the customer.	

#	Question		Answer	PM Process Group
40	What is the difference between ATTRIBUTE SAMPLING and VARIABLE SAMPLING?		Attribute Sampling determines whether the result does or does not conform to the specifications	Controllling
			Variable Sampling - the result is rated on a continuous scale that measures the degree of conformance within a preestablished acceptable range.	
41	What is the difference between a Special Cause and a Random Cause?		A SPECIAL CAUSE is an unusual event	Controlling
			A RANDOM CAUSE is Normal Process Variation	
42	What are the 7 main Quality Control Tools, often called the BASIC SEVEN TOOLS?		Flow Charts	Controlling
			Diagrams	
			Pareto Charts	
			Cause-and-Effect Diagrams	
			Graphs	
			Control Charts	
			Checklists	

#	Question		Answer	PM Process Group
43	What is the difference between a TOLERANCE and a CONTROL LIMIT?		A TOLERANCE establishes the range of acceptable results. A CONTROL LIMIT is computed based on the results themselves. One could have a process that is in control, that is, the results fall within the computed control limits - but outside the acceptable tolerances, which results in an unacceptable outcome.	Controlling
44	What is INSPECTION? Why is it done?		Activities such as Measuring, Examining, and Testing. To determine whether results conform to requirements.	Controlling
45	What are Control Charts? How are they Used?		Control Charts are graphic displays of a process over time. They are used to determine whether the process is "in control" (to see whether differences in the results are created by random variations or are unusual events whose causes must be identified and corrected.	Controlling
46	What is the underlying concept of a Pareto Diagram?		A relatively small number of causes (20 percent) will typically produce a large majority of the problems or defects (80 percent)	Controlling
47	How is TREND ANALYSIS used in Quality Control?		Trend Analysis uses mathematical techniques to forecast future outcomes based on historical results. It is used to monitor technical performance (errors or defects identified and the number that remain uncorrected) and cost and schedule performance (activities per period that were completed with significant variances)	Controlling
48	What is an Acceptance Decision in terms of Quality Control?		The items inspected either will be accepted or rejected. Rejected items may require rework.	Controlling
49	SEE ATTACHMENT			Controlling
50	See ATTACHMENT			Controlling

#	Question		Answer	PM Process Group
51	Modern Quality Management emphasizes some of the same basic practices and principles as project management.		Customer Satisfaction	Planning, Controlling, Executing
	Provide 4 examples.		Prevention over Correction	
			Management Responsibility	
			Processes within Phases	
52	What is quality funciton deployment?		A structured, systematic process used to integrate customer requirements into every aspect of the design and delivery of products and services.	Planning
53	How is the House of Quality used?		As a tool in quality function deployment to identify and prioritize design characteristics in terms of both customer and competitive requirements	Planning
54	What is the primary benefit of meeting quality requirements?		The primary benefit is less rework, which translates into higher productivity, lower costs, and increased stakeholder satisfaction.	Planning
	What is the primary cost?		The primary cost is the expense associated with project quality management activities	
55	What is needed to make a process adjustment?		Immediate corrective or preventive action as a result of quality contorl measurements. A process adjustment may need to be handled according to procedures for integrated change control	Controlling
56	How are quality control measurements used in quality assurance?		They are records of quality control testing and measurement and as such may be used for comparison and analysis.	Executing
57	In which project phase is quality assurance performed?		Throughout all phases of the project life cycle	Executing
58	What is the difference between standards and regulations?		Standards are documents that are approved by a recognized body and provide procedures, practices, rules, guidelines, or characteristics with which compliance is not mandatory.	Planning
			Regulations describe characteristics and applicable administrative provisions for which compliance is mandatory.	
	How are they used in quality management?		Both are inputs to quality planning	
59	Define "fitness for use."		The product satisfies the real needs of the customer	Planning

#	Question		Answer	PM Process Group
60	If a project is experiencing quality problems, should the project manager devote more project resources to inspection or to prevention?		Prevention, because preventing a problem is far less costly, in the long run, than fixing one, especially if the customer finds the problem.	Planning
EC	When is Customer Satisfaction achieved?		When the SPECIFICATIONS are MET and the product or service SATISFIES real needs (fitness for use)	Executing
EC	What is the Just-in-Time Concept?		An inventory control approach that attempts to reduce work-in-process inventory to zero stock; There is no extra or "buffer" stock kept in reserve in this process.	Planning
EC	List the 3 benefits of Avoiding Rework.		Higher Productivity Lower Costs Increased Stakeholder Satisfaction	Controlling
EC	What is Formative Quality Evaluation?		The process of reviewing specific data at key points in the project life cycle to determine how the project is proceeding and make necessary corrections.	Controlling
EC	What is the purpose of the Kanban System?		It prevents unplanned overproduction by allowing work to move forward only when the next work area is ready to receive it.	Controlling
EC	What is a Summative Quality Evaluation? Its purpose?		The process of determining lessons learned after a project has been completed. To apply those lessons to future projects.	Controlling
EC	What is a Work-Flow Diagram?		A graphic representation of how work actually flows through a physical space or facility.	Controlling
EC	How is Probability applied to Quality Attributes?		It is segregated into a "yes - no" outcome. Example: When flipping a coin there is a 50 percent probability of getting heads (or tails) on one toss.	Controlling

1. A project manager is using a cause-and-effect diagram with the team to determine how various factors might be linked to potential problems. In what step of the quality management process is the project manger involved?

   a. Quality Analysis
   b. Quality Assurance
   c. Quality Control
   d. Quality Planning

2. A project manager and team from a firm that designs railroad equipment are tasked to design a machine to load stone onto railroad cars. The design allows for 2% spillage, amounting to over two tons of spilled rock per day. In which of the following does the project manager document quality control, quality assurance, and quality improvements for this project?

   a. Quality management plan
   b. Quality policy
   c. Control charts
   d. Project plan

3. The project team has created a plan describing how they will implement the quality policy. It addresses the organizational structure, responsibilities, procedures, and other information about plans for quality. If this changes during the project, WHICH of the following plans will also change?

   a. Quality Assurance
   b. Quality Management
   c. Project
   d. Quality Control

4. You are a project manager for a major information systems project when someone from the quality department comes to see you about beginning a quality audit of your project. The team, already under pressure to complete the project as soon as possible, objects to the audit. You should explain to the team that the purpose of a quality audit is:

   a. Part of an ISO 9000 investigation
   b. To check if customer is following its quality process
   c. To identify lessons learned that can improve performance on project
   d. To check accuracy of costs submitted by the team

5. You are in the middle of a major new facility construction project. The structural steel is in place, and the heating conduits are going into place when the project sponsor informs you that he is worried the project will not meet the quality standards. What should you do in this situation?

   a. Assure the sponsor that during planning it was determined the project would meet the quality standards.
   b. Inspect the results so far and use them to determine future results
   c. Perform a quality audit
   d. Check the results from the last quality management plan

6. You are asked to select tools and techniques to implement a quality assurance program to supplement existing quality control activities. Which of the following would you choose?

   a. Quality audits
   b. Statistical sampling
   c. Pareto diagrams
   d. Trend analysis

7. The new software installation project is in progress. The project manager is working with the quality assurance department to improve everyone's confidence that the project will satisfy the quality standards. Before they can begin this process, which of the following do they need?

   a. Quality problems
   b. Quality improvement
   c. Quality control measurements
   d. Rework

8. The project you are working on has an increase in cost effectiveness, increased productivity, and increased morale. What might be the reason for these changes?

   a. Project goals are in line with those of the company
   b. Increased quality
   c. Management's focus on cost containment
   d. Rewards presented for individual efforts

9. A project manager has just taken over the project from another project manager during the execution phase. The previous PM created the project budget and communication plan and went on to complete other tasks. What should the new project manager do NEXT?

   a. Coordinate performance of work packages
   b. Plan for quality
   c. Begin risk management
   d. Execute the project plan

10. A project is facing a major change to its project deliverables. If the project manager is involved in determining which quality standards are relevant to the change, the project manager must be involved in:

    a. Quality management
    b. Quality assurance
    c. Quality planning
    d. Quality control

11. A project team member comes to the project manager during project execution to tell him that they feel the project cannot meet its quality standards. The project manager calls a meeting of the affected stakeholders to work through the problem. Which step of the quality management process is the project manager in?

    a. Quality assurance
    b. Quality analysis
    c. Quality control
    d. Quality planning

12. At the end of a project, a project manager determines that the project has added four areas of functionality and three areas of performance. The customer has expressed satisfaction with the project. What does this mean in terms of the success of the project?

    a. The project is an unqualified success
    b. The project is unsuccessful because it was gold plated
    c. The project was unsuccessful because the customer being happy means they would have paid more for the work.
    d. The project was successful because the team had a chance to learn new areas of functionality and the customer was satisfied

1. A project manager is using a cause-and-effect diagram with the team to determine how various factors might be linked to potential problems. In what step of the quality management process is the project manger involved?

   a. Quality Analysis
   b. Quality Assurance
   c. Quality Control
   d. Quality Planning

   The topic has potential problems. They must, therefore, be in quality planning.
   PMBOK, 98

2. A project manager and team from a firm that designs railroad equipment are tasked to design a machine to load stone onto railroad cars. The design allows for 2% spillage, amounting to over two tons of spilled rock per day. In which of the following does the project manager document quality control, quality assurance, and quality improvements for this project?

   a. Quality management plan
   b. Quality policy
   c. Control charts
   d. Project plan

   B and C are components of a quality management plan. The quality plan is part of the project plan. The best answer is the quality management plan.
   PMBOK, 99

3. The project team has created a plan describing how they will implement the quality policy. It addresses the organizational structure, responsibilities, procedures, and other information about plans for quality. If this changes during the project, WHICH of the following plans will also change?

   a. Quality Assurance
   b. Quality Management
   c. Project
   d. Quality Control

   The plan described is the quality management plan. Changing this plan will also change the project plan as it is included as part of a project plan.
   PMBOK, 99

4. You are a project manager for a major information systems project when someone from the quality department comes to see you about beginning a quality audit of your project. The team, already under pressure to complete the project as soon as possible, objects to the audit. You should explain to the team that the purpose of a quality audit is:

   a. Part of an ISO 9000 investigation
   b. To check if customer is following its quality process
   c. To identify lessons learned that can improve performance on project
   d. To check accuracy of costs submitted by the team

   PMI's definition of an audit is different from what we are used to. An audit is a structured review of quality activities to identify lessons learned. These lessons are used for process improvement.

5. You are in the middle of a major new facility construction project. The structural steel is in place, and the heating conduits are going into place when the project sponsor informs you that he is worried the project will not meet the quality standards. What should you do in this situation?

a. Assure the sponsor that during planning it was determined the project would meet the quality standards.
b. Inspect the results so far and use them to determine future results
c. Perform a quality audit
d. Check the results from the last quality management plan

A quality audit helps to prove that quality standards will be met.
PMP Exam Prep, 127

6. You are asked to select tools and techniques to implement a quality assurance program to supplement existing quality control activities. Which of the following would you choose?

a. Quality audits
b. Statistical sampling
c. Pareto diagrams
d. Trend analysis

Choice A is a structured review of other quality management activities performed to identify lessons learned that can be applied to this and other projects. The other choices are tools and techniques that apply to quality control rather than quality assurance.

7. The new software installation project is in progress. The project manager is working with the quality assurance department to improve everyone's confidence that the project will satisfy the quality standards. Before they can begin this process, which of the following do they need?

a. Quality problems
b. Quality improvement
c. Quality control measurements
d. Rework

There's only one choice that makes sense, and that's an official input to Quality Assurance, C.
PMBOK, 96

8. The project you are working on has an increase in cost effectiveness, increased productivity, and increased morale. What might be the reason for these changes?

a. Project goals are in line with those of the company
b. Increased quality
c. Management's focus on cost containment
d. Rewards presented for individual efforts

As you increase quality there will be associated benefits for the project. Some of these benefits are increased productivity, increased cost effectiveness, decreased cost risk and improved morale.
PMP Exam Prep, 126

9. A project manager has just taken over the project from another project manager during the execution phase. The previous PM created the project budget and communication plan and went on to complete other tasks. What should the new project manager do NEXT?

a. Coordinate performance of work packages
b. Plan for quality
c. Begin risk management
d. Execute the project plan

Quality planning can occur during execution of the project. In this example, the previous project manager did not complete some of the planning activities. The new project manager needs to complete these planning activities.
PMP Exam Prep, 31

10. A project is facing a major change to its project deliverables. If the project manager is involved in determining which quality standards are relevant to the change, the project manager must be involved in:

a. Quality management
b. Quality assurance
c. Quality planning
d. Quality control

Although quality planning usually occurs during planning, it can occur during execution if there is a change.
PMP Exam Prep, 127

11. A project team member comes to the project manager during project execution to tell him that they feel the project cannot meet its quality standards. The project manager calls a meeting of the affected stakeholders to work through the problem. Which step of the quality management process is the project manager in?

a. Quality assurance
b. Quality analysis
c. Quality control
d. Quality planning

Determining if the quality standards are valid is part of the quality assurance process.
PMBOK, 101

12. At the end of a project, a project manager determines that the project has added four areas of functionality and three areas of performance. The customer has expressed satisfaction with the project. What does this mean in terms of the success of the project?

a. The project is an unqualified success
b. The project is unsuccessful because it was gold plated
c. The project was unsuccessful because the customer being happy means they would have paid more for the work.
d. The project was successful because the team had a chance to learn new areas of functionality and the customer was satisfied

Gold plating a project wastes time and probably cost. It makes the project unsuccessful.

8 Orange end

Practice Exam
Quality Management

	3rd Time	2nd Time	1st Time

1) When a product or service completely meets a customer's requirements:
   A. Quality is achieved
   B. The cost of quality is high
   C. The cost of quality is low
   D. The customer pays the minimum price

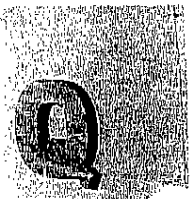
2) The concept that "optimal quality level is reached at the point where the incremental revenue from product improvement equals the incremental cost to secure it" refers to?
   A. Quality control analysis
   B. Marginal analysis
   C. Standard quality analysis
   D. Conformance analysis

3) Primary responsibility for quality management in the project rests with the:
   A. Project engineer
   B. Purchasing agent
   C. Quality manager
   D. Project manager

4) Primary responsibility for establishing design and test specifications rests with:
   A. Senior management
   B. Procurement
   C. Engineering
   D. Quality control

5) A team is using a fishbone diagram to help determine what quality standards will be used on the project. What part of the quality management process would they be in?
   A. Control
   B. Assurance
   C. Planning
   D. Variable analysis

6) A project sponsor is not comfortable with the quality level of the project. He instructs the project manager to come up with quality standards and to improve quality. The project manager, however, is concerned about the effect of quality improvements on the project. Which of the following best describes the results of an increase in quality?
   A. Increased productivity, increased cost effectiveness, decreased cost risk
   B. Increased productivity, decreased cost effectiveness, and increased cost risk
   C. Reduced productivity and no change to cost effectiveness and cost risk
   D. Reduced productivity and an increase in overall product or service cost



7) From the project perspective, quality attributes:
   A. Determine how effectively the performing organization supports the project
   B. Can be subjective or objective
   C. Are specific characteristics for which a product is designed and tested
   D. B and C

8) Quality is:
   A. Conformance to the customer's needs
   B. Adding extras to make the customer happy
   C. Conformance to requirements, specifications and fitness of use
   D. Conformance to management's requirements

9) During a team meeting the team determines that the customer would benefit from a specific area of extra work and they add it to the project. This is called:
   A. Gold plating
   B. Extra scope
   C. An approved change order
   D. A good idea

10) Which of the following is an example of quality assurance?
   A. Inspection
   B. Team training
   C. Pareto diagram
   D. Fishbone diagram

11) A Pareto diagram helps the project manager to:
   A. Focus on the most critical issues to improve quality
   B. Focus on stimulating thinking
   C. Explore a desired future outcome
   D. Determine if a process is out of control

12) During the executions phase the project manager's company begins to make use of control charts on all their projects. A control chart can help to:
   A. Focus on the most critical issues to improve quality
   B. Focus on stimulating thinking
   C. Explore a desired future outcome
   D. Determine if a process is out of control

13) A sample of a population is taken when testing the entire population would __:
   A. Take too long
   B. Be too inexpensive
   C. Be mutually exclusive
   D. Show many defects

14) Which of the following is an example of the cost of conformance to quality?
A. Rework
B. Quality training
C. Scrap
D. Warranty costs

15) What is the meaning of standard deviation?
A. A measure of how far you are from the average estimate
B. A measure of how far you are from the mean
C. A measure of how correct the sample is
D. A measure of how much time remains in the project

16) Three sigmas from the mean are equal to?
A. 68.26%
B. 99.9%
C. 95.4%
D. 99.7%

17) Which of the following is not an example of a variable?
A. Size
B. Shape
C. Pounds
D. Weight

18) A control chart shows seven data points on one side of the mean. What should be done?
A. Nothing, this is not a problem
B. Tell the customer
C. Investigate and find an assignable cause
D. This is just the rule of seven and can be ignored

19) What is the inventory on hand in a Just in Time (JIT) environment?
A. 45%
B. 10%
C. 12%
D. 0%

20) An Ishikawa diagram helps to _____:
A. Explore past outcomes
B. Stimulate thinking, organize thoughts and generate discussion
C. Show team responsibilities
D. Show functional responsibilities

21) In project management, the importance of quality compared to cost and schedule is:
A. Cost is most important, quality next, and then schedule
B. Quality is more important than either
C. Schedule is most important, quality next, and then cost
D. All three are equal

ANSWERS:

1. A
2. B
3. D
4. C
5. C
6. A
7. D
8. C
9. A
10. B
11. A
12. D
13. A
14. B
15. B
16. D
17. C
18. C
19. D
20. B
21. D

8 green

Practice Questions

INSTRUCTIONS: Note the most suitable answer for each multiple-choice question in the appropriate space on the answer sheet.

1. Quality seems to be your company motto. First the company obtained certification under ISO 9000. Now the CEO wants to win the Malcolm Baldrige Award. Each project has a quality statement that is consistent with the organization's vision and mission. Both internal and external quality assurance is provided on all projects to—

   a. Provide confidence that the project will satisfy relevant quality standards
   b. Monitor specific project results to note whether they comply with relevant quality standards
   c. Identify ways to eliminate causes of unsatisfactory results
   d. Use inspection to keep errors out of the process

2. Traditional thinking (before Crosby, Juran, Deming, and others) on quality performance standards held that error is—

   a. Beneficial because we all learn from our mistakes
   b. Inevitable
   c. Unlikely if a sufficient number of inspectors is used in the process
   d. More costly than the sophisticated design work required to prevent it

3. Your project team is working to design and manufacture a "smart zipper" that never jams. You established a project quality management system and are performing both quality assurance and quality control throughout the project. You recognize that some rework may be necessary. The term *rework,* however, is not used in your organization. You explain that rework is—

   a. Acceptable under certain circumstances
   b. An adjustment made that is based on quality control measurements
   c. Action taken to bring a nonconforming item into compliance
   d. Not a concern if errors are detected early

4. The quality function deployment process is used to—

   a. Provide better product definition and product development
   b. Help products succeed in the marketplace
   c. Help identify processes that are under way in other organizations that should be emulated
   d. Support production planning and the just-in-time approach

5. Kaoru Ishikawa led the Japanese Union of Scientists and Engineers in its efforts to introduce methods for quality control. In simplifying techniques so that workers could understand and apply them, he concentrated on seven tools. Which of the following is *not* one of the seven tools he made popular?

   a. Pareto chart
   b. Cause-and-effect diagram
   c. Control chart
   d. PERT chart

6. You are leading a research project, which is being conducted through a government grant, to determine the best way to manufacture blimps for personal transportation. You believe you will need between 10 and 20 aerospace engineers to support the project. Some senior-level aerospace engineers are available. They are more productive than junior-level engineers, but cost more. Many junior-level engineers are available as well. You want to determine the optimal combination of senior- and junior-level personnel. You also want to identify quality standards and determine how best to satisfy them. In this situation, the appropriate technique to use is to—

   a. Conduct a design of experiments
   b. Use the Ishikawa diagram to pinpoint the problem
   c. Prepare a control chart
   d. Analyze the process using a Pareto diagram

7. The purpose of the Taguchi method is to—

   a. Manage the flow of material for better visibility and control
   b. Use statistical techniques to compute a "loss function" to determine the cost of producing products that fail to achieve a target value
   c. Design, group, and manage production operations as self-contained flexible cells capable of start-to-finish processing of a family of items
   d. Regulate coordination and communication among process stages

8. Quality assurance promotes quality improvement. The quality "gurus" discuss the importance of making annual improvements in quality and annual reductions in quality-related costs. In fact, Joseph Juran states that a "breakthrough" is the accomplishment of any improvement that takes the organization to unprecedented levels of performance. In Deming's terms, a breakthrough attacks—

   a. Special causes of variation
   b. Common causes of variation
   c. Inspection over prevention
   d. Specific tolerances

9. Your company, a leading chain manufacturer for snowmobiles and chainsaws, is working to develop an interchangeable chain that can be used on both. To anticipate and help develop approaches to deal with potential quality problems, you want to use a variety of root-cause analysis techniques including all the following approaches *except*—

   a. Fishbone diagrams
   b. Ishikawa diagrams
   c. System or process flowcharts
   d. Checklists

10. Which of the following statements best describes attribute sampling versus variable sampling?

   a. Attribute sampling is concerned with prevention, whereas variable sampling is concerned with inspection.
   b. Attribute sampling is concerned with conformance, whereas variable sampling is concerned with the degree of conformity.
   c. Attribute sampling is concerned with special causes, whereas variable sampling is concerned with any causes.
   d. Both are the same concept.

11. Constancy of purpose is a core concept for continuous improvement. An organization displaying constancy of purpose must have all the following elements *except*—

   a. Documented and well-disseminated statements of purpose and vision
   b. A set of strategic and tactical plans
   c. An awareness by all members of the organization of the purpose, vision, goals, and objectives and their roles in achieving them
   d. Separate quality assurance and control departments reporting to senior management

12. Recently, your company, a chicken-parts processor, had several health scares with regard to its products. These were isolated incidents that occurred in different geographic locations but over the same 3-week period. The company has had no product safety concerns in the past and believes that there are no problems with its inspection system. However, a new processing system was recently introduced. You were the project manager for this system and now have been asked to lead a team to investigate the situation and implement any needed changes. To help you analyze the new process, you and your team have decided to use which of the following techniques?

    a. System flowcharts
    b. Design of experiments
    c. Pareto analysis
    d. Control charts

13. When a process is considered to be in control, it—

    a. Should not be adjusted
    b. May not be changed to provide improvements
    c. Shows differences caused by expected events or normal causes
    d. Should not be inspected or reworked for any reason

14. Project quality management was once thought to include only inspection or quality control. In recent years, the concept of project quality management has broadened. Which statement is *not* representative of the new definition of quality management?

    a. Quality is designed into the product or service, not inspected into it.
    b. Quality is the concern of the quality assurance staff.
    c. Customers require a documented and, in some cases, registered quality assurance system.
    d. National and international standards and guidelines for quality assurance systems are available.

15. The project team should have a working knowledge of statistical process control to help conduct quality control activities. Of all the topics involved, which of the following is the most important for the team to understand?

    a. Sampling and probability
    b. Attribute sampling and variable sampling
    c. Tolerances and control limits
    d. Special causes and random causes

16. Rank ordering of defects should be used to guide corrective action. This is the underlying principle behind—

    a. Trend analysis
    b. Inspections
    c. Control charts
    d. Pareto diagrams

17. Long-term contracting is an important aspect of project quality management because it—

    a. Provides incentives to vendors to make quality commitments
    b. Improves quality through the use of benefit-cost analysis
    c. Usually results in lower costs and increased productivity
    d. Provides for mandatory audits

18. Based on quality control measurements on your manufacturing project, management realizes that immediate corrective action is required to the material requirements planning (MRP) system to prevent future problems on other projects and to minimize rework. To implement the necessary changes you should follow—

    a. The organization's quality policy
    b. The quality management plan
    c. Established operational definitions and procedures
    d. Procedures for integrated change control

19. In order to monitor the number of errors or defects that have been identified and the number that remain undetected, you should—

    a. Design an experiment
    b. Use a checklist
    c. Conduct a trend analysis
    d. Perform an audit

20. Your quality assurance department recently performed a quality audit of your project and identified a number of findings and recommendations. One recommendation seems critical and should be implemented because it affects successful delivery of the product to your customer. If the recommendation is not implemented, the product will not conform to requirements. Your next step should be to—

    a. Call a meeting of your project team to see who is responsible for the problem
    b. Reassign the team member who had responsibility for oversight of the problem
    c. Perform product rework immediately
    d. Issue a change request to implement the needed corrective action

21. After a long and frustrating day, your company CEO found himself circling the attendant's booth at the adjacent parking garage in a futile attempt to find his way out of the building (his limousine driver had taken the day off). He approached the building manager the next day and said he would have his staff design an improved system for vehicle egress and ingress. You are the project manager for this project. You decide to use flowcharting to—

    a. Help analyze how problems occur
    b. Show dependencies between tasks
    c. Show the results of a process
    d. Forecast future outcomes

22. You are managing a major international project to organize offtrack betting in your client's hotels. Your client recently won the Malcolm Baldrige Award and emphasizes quality in all its endeavors. Your contract requires you to prepare both a project plan and a quality management plan. Your core team is preparing a project quality management plan. Your first step in developing this plan is to—

    a. Determine specific metrics to use in the quality management process
    b. Identify the quality standards for the project
    c. Develop a quality policy for the project
    d. Identify specific quality management roles and responsibilities for the project

23. Six sigma refers to the aim of setting tolerance limits at 6 standard deviations from the mean, whereas the normally expected deviation of a process is—

    a. 1 standard deviation
    b. 2 standard deviations
    c. 3 standard deviations
    d. Undeterminable because of the unique nature of every process

24. You recognize the importance of quality control on your project. However, you also know that quality control has costs associated with it and that the project has a limited budget. One way to reduce the cost of quality control is to—

    a. Work to ensure that the overall quality program is ISO compliant
    b. Use statistical sampling
    c. Conduct inspections throughout the process
    d. Use trend analysis

25. The continuous improvement process provides a way for an organization to create and sustain a culture of continuous improvement. As such, it should be directed by—

    a. The project manager
    b. Top management
    c. Employees participating in quality circles
    d. Stakeholders

26. An early version of one of W. Edward Deming's 14 points encouraged companies to "cease dependence on mass inspection by building quality into the product in the first place." Deming stated that, typically, products are inspected as they come off the line or at major stages. Defective products are either thrown out or reworked. Both options are expensive. This approach, in effect, meant that companies would pay workers to make defects and then correct them. Deming later recognized the value of inspections and revised the point to say that people should "understand the purpose of inspection." He said, "Inspections must be carried out in a professional way, not by lick-and-spit methods." This supports the PMBOK®, which indicates that inspections can be used to determine whether results conform to requirements. Inspections also may be called—

    a. Control tests
    b. Walk-throughs
    c. Statistical sampling
    d. Checklists

27. Your management has prescribed that a quality audit be conducted at the end of every phase in a project. This audit is part of the organization's—

    a. Quality assurance process
    b. Quality control process
    c. Quality improvement program
    d. Process adjustment program

28. Recently your company introduced a new set of "metal woods" to its established line of golfing equipment. The "metal woods" are made from a combination of titanium, uranium, and manganese. Your company claims the clubs will add 80 yards to any drive. The product launch was spectacular. Every major money-winner on the PGA tour bought a set. However, in the past weeks things have gone horribly wrong. The clubs are causing golfers to hook, slice, and hit the ball "fat." One golfer even claims they have given him the "yips." You decide to conduct a failure mode and criticality analysis to—

    a. Analyze the product development cycle after product release to determine strengths and weaknesses
    b. Evaluate failure modes and causes associated with the design and manufacture of an existing product
    c. Evaluate failure modes and causes associated with the design and manufacture of a new product
    d. Help management set priorities in its existing manufacturing processes to avoid failures

29. The "rule of seven" as applied to statistical process control charts means that—

    a. Seven rejects typically occur per thousand inspections
    b. Seven consecutive measurements are ascending, descending, or the same
    c. At least seven inspectors should be in place for every thousand employees
    d. A process is not out of control even though seven measurements fall outside the lower and upper control limits

30. You are a project manager for residential construction. As a project manager, you must be especially concerned with building codes—particularly in the quality planning process. You must ensure that building codes are reflected in your project plans because—

    a. Standards and regulations are an input to quality planning
    b. Quality audits serve to ensure there is compliance with regulations
    c. They are a cost associated with quality initiatives
    d. Compliance with standards is the primary objective of quality control

31. You work as a project manager in the largest hospital in the region. Studies have shown that patients have to wait for long periods before being treated. In fact, several have succumbed in the past few months while waiting to be attended by a physician. These incidents have become a public relations nightmare. You are leading a project team to identify problem areas and recommend and implement solutions. To assist in identifying the factors contributing to this problem, you and your team have decided to use which of the following techniques?

    a. Cause-and-effect diagrams
    b. Pareto analysis
    c. Scatter diagrams
    d. Control charts

32. The ISO 9000 standards provide—

    a. A description of how products should be produced
    b. Specifics for the implementation of quality systems
    c. A framework for quality systems
    d. The maximum process requirements necessary to ensure that customers receive a good product

33. To use statistical quality control effectively, the project team should know the differences between—

    a. Prevention and quality control
    b. Special causes and random causes
    c. Attribute sampling and statistical sampling
    d. Control limits and operational definitions

34. Having recently returned from a company-sponsored trip to Japan where you visited the world's largest soba noodle factory, you have become an ardent supporter of Imai-san's *kaizen* philosophy of quality. Even though your project, installing bunk beds in your company's executive offices so that senior management can rest on occasion, is vastly different from manufacturing noodles, the principles of *kaizen* will work well. The *kaizen* approach to continuous improvement emphasizes—

    a. The greater importance of customer satisfaction over cost
    b. Radical changes in operating practices
    c. Incremental improvement
    d. The use of quality circles to improve morale

35. Your company is establishing a cost-of-quality approach to determine the relative importance of its quality problems and to identify major opportunities for cost reduction. Your company believes this approach can help it evaluate its success in achieving quality objectives. When setting up this approach, you were asked to categorize four types of costs: prevention, appraisal, internal failure, and external failure. As you examine the cost of quality, however, you realize that training and its associated costs have become a major factor. Training costs are included in which one of the following areas?

    a. Prevention costs
    b. Appraisal costs
    c. Internal failure costs
    d. External failure costs

36. You recently completed a food service assessment project of the company dining facility. You found a number of problems, including empty vending machines, discourteous employees, slow lines, poor menu variety, and high prices. You decide to use a Pareto diagram to display your findings because it is an excellent way to—

    a. Show how many results were generated, by type or category of identified cause
    b. Forecast future outcomes based on historical results
    c. Show which variables have the most influence on the overall outcome
    d. Show how various causes and subcauses combine to create potential problems or effects

37. Results of quality control testing and measurement are used—

    a. As an input to quality planning
    b. To prepare an operational definition
    c. To prepare a control chart
    d. As an input to quality assurance

38. Statistical sampling is a method to determine the conformance to requirements for some component or product of a project. Its greatest advantage is that it—

    a. Does not require a large expenditure of resources
    b. Is accurate enough with a sampling of less than 1%
    c. Does not require 100% inspection of the components to achieve a satisfactory inference of the population
    d. Needs to be conducted only when a problem is discovered with the end product or when the customer has some rejects

39. The statistical control chart is a tool used primarily to help—

    a. Monitor process variation over time
    b. Measure the degree of conformance
    c. Determine whether results conform
    d. Determine whether results conform to requirements

40. The quality management plan describes all the following *except* the—

    a. Method for implementing the quality policy
    b. Project quality system
    c. Organizational structure, responsibilities, procedures, processes, and resources needed to implement project quality management
    d. Procedures used to conduct trade-off analyses among cost, schedule, and quality

Answer Key

1. a. **Provide confidence that the project will satisfy relevant quality standards**

   Quality assurance increases project effectiveness and efficiency and provides added benefits to project stakeholders. It is all the planned and systematic activities implemented within the quality system that provide confidence that the project will satisfy relevant quality standards. It should be performed throughout the project. [Executing]

   PMI®, PMBOK®, 2000, 101

2. b. **Inevitable**

   Traditional thinking on quality held that human beings make mistakes; accordingly, the cost to secure zero defects would be significantly greater than the value of achieving "perfection." [Controlling]

   Crosby 1985, 76

3. c. **Action taken to bring a nonconforming item into compliance**

   An output of the quality control process, rework is a frequent cause of project overruns in most application areas. The project team must make every reasonable effort to control and minimize rework. [Controlling]

   PMI®, PMBOK®, 2000, 104

4. a. **Provide better product definition and product development**

   Quality function deployment helps a design team to define, design, manufacture, and deliver a product or service to meet or exceed customer needs. Its main features are to capture the customer's requirements, ensure cross-functional teamwork, and link the main phases of product development—product planning, part deployment, process planning, and production planning. [Planning]

   Soin 1992, 42–43; Evans and Lindsay 1999, 405–406; PMI®, PMBOK®, 2000, 56

5. d. **PERT chart**

   A PERT chart is a graphical representation of the tasks or activities required to complete a project. It is an output of quality planning. [Controlling]

   Willborn and Cheng 1994, 49; PMI®, PMBOK®, 2000, 100

6. a. **Conduct a design of experiments**

This technique is used to identify which variables have the most influence on the overall outcome. It usually is applied to a product rather than to a service. For example, automotive designers might want to determine which combination of suspension and tires would produce the most desirable ride characteristics at a reasonable cost. This technique, however, can be applied to project management issues such as cost and schedule trade-offs. An appropriately designed "experiment" often will help project managers find an optimal solution from a relatively limited number of options. [Planning]

PMI®, PMBOK®, 2000, 99

7. b. **Use statistical techniques to compute a "loss function" to determine the cost of producing products that fail to achieve a target value**

The Taguchi method is used to estimate the loss associated with controlling or failing to control process variability. It is based on the principle that by carefully selecting design parameters to produce robust designs, an organization can produce products that are more forgiving and tolerant. The tool helps determine the value or break-even point of improving a process to reduce variability. [Controlling]

Mansir and Schacht 1988, 4-86 through 4-95; Evans and Lindsay 1999, 77–78

8. b. **Common causes of variation**

Quality improvement includes action taken to increase project effectiveness and efficiency in order to provide added benefits to stakeholders. A breakthrough attacks chronic losses, or in Deming's terminology, common causes of variation. [Executing]

Evans and Lindsay 1999, 422; PMI®, PMBOK®, 2000, 102

9. d. **Checklists**

Checklists are used to verify that a set of required steps has been performed in the quality control process. [Controlling]

PMI®, PMBOK®, 2000, 101

10. **b. Attribute sampling is concerned with conformance, whereas variable sampling is concerned with the degree of conformity.**

Attribute sampling determines whether a result does or does not conform. Variable sampling rates a result on a continuous scale to measure the degree of conformity. [Controlling]

PMI®, PMBOK®, 2000, 102

11. **d. Separate quality assurance and control departments reporting to senior management**

Top management should provide constancy of purpose so that it can be infused throughout the organization. Constancy of purpose also requires a shared belief among organization members that management's behavior clearly signals its commitment to and support of achievement of the vision. Quality assurance and control are functions that must be performed by everyone, not just those assigned to specific departments. [Executing]

Mansir and Schacht 1988, 3-4 and 3-5

12. **d. Control charts**

This function of control charts is achieved through graphical display of results over time to determine whether differences in the results are created by random variations or are unusual events. Although frequently used to track repetitive actions such as manufactured lots, control charts can also be used to monitor project management processes such as cost and schedule variances, volume and frequency of scope changes, and errors in project documents. [Controlling]

PMI®, PMBOK®, 2000, 103

13. **a. Should not be adjusted**

Processes may be changed only through established change procedures. An adjustment implies an informal change falling outside those procedures. [Controlling]

PMI®, PMBOK®, 2000, 103

14. **b. Quality is the concern of the quality assurance staff.**

Quality concerns all levels of management and staff. Responsibilities for quality are assigned to top management as well as to all workers. [Planning]

Willborn and Cheng 1994, 13 and 17

15. a. Sampling and probability

Sampling and probability form the basis of statistical process control, which helps the team monitor project results for compliance with relevant quality standards so that methods can be identified to eliminate causes of unsatisfactory results. [Controlling]

PMI®, PMBOK®, 2000, 102

16. d. Pareto diagrams

Pareto diagrams are histograms, ordered by frequency of occurrence, that show how many results were generated by type or category of identified cause. The project team should take action to fix the problems that are causing the greatest number of defects first. Pareto diagrams are conceptually related to Pareto's Law, which holds that a relatively small number of causes will typically produce a large majority of the problems or defects. [Controlling]

PMI®, PMBOK®, 2000, 103

17. a. Provides incentives to vendors to make quality commitments

Vendors that have long-term relationships with buyers are generally more inclined to invest in process and quality improvement because they have a higher probability of recovering their costs. The stability provided through long-term contracts permits better planning and encourages better communication between the buyer and seller. Long-term contracting with fewer vendors also reduces buyer-related costs by simplifying accounting, collections, and other administrative tasks. [Planning]

Mansir and Schacht 1988, 4-11; Evans and Lindsay 1999, 87–88

18. d. Procedures for integrated change control

Process adjustments consist of immediate corrective or preventive action as a result of quality control measurements. In some cases, these process adjustments should be handled according to procedures for integrated change control. [Controlling]

PMI®, PMBOK®, 2000, 104

19. c. **Conduct a trend analysis**

Trend analysis involves using mathematical techniques to forecast future outcomes based on historical results. It is used to monitor technical performance, as well as cost and schedule performance. [Controlling]

PMI®, PMBOK®, 2000, 104

20. d. **Issue a change request to implement the needed corrective action**

The information obtained from a quality audit can be used to improve quality systems and performance. In most cases, implementing quality improvements requires preparation of change requests. [Executing]

PMI®, PMBOK®, 2000, 102

21. a. **Help analyze how problems occur**

By showing how components of a system relate, flowcharts can help the project team anticipate where quality problems might occur and develop approaches for dealing with them. [Controlling]

PMI®, PMBOK®, 2000, 98 and 104

22. c. **Develop a quality policy for the project**

The quality policy includes the overall intentions and direction of the organization with regard to quality, as formally expressed by top management. If the performing organization lacks a formal quality policy or if the project involves multiple performing organizations, as in a joint venture, the project management team must develop a quality policy for the project as an input to its quality planning. [Planning]

PMI®, PMBOK®, 2000, 98

23. c. **3 standard deviations**

When the results of a sample of items measured falls within 3 standard deviations and that sample is representative of the entire population, you can assume that more than 99% of all items fall within that range. This generally accepted range of results has been used by quality control professionals through the years. Six sigma is a program started by Motorola that, from a statistical standpoint, indicates a quality standard of only 3.4 defects per million. [Executing]

Bicheno 1994, 57; Evans and Lindsay 1999, 42–43

24. b. Use statistical sampling

Because it involves choosing part of a population of interest for inspection, statistical sampling can significantly reduce the cost of quality control. [Controlling]

PMI®, PMBOK®, 2000, 103

25. b. Top management

Top management leads the effort to stimulate creativity, pride, teamwork, and the quest for knowledge. Top management should seek to create an integrated effort working toward improving performance at every level and in every activity. [Executing]

Mansir and Schacht 1988, 1-8

26. b. Walk-throughs

Inspections include those activities undertaken to determine whether results conform to requirements. Additional names for inspections are audits, reviews, or product reviews (in some application areas, these terms may have narrow and specific meanings). [Controlling]

PMI®, PMBOK®, 2000, 103

27. a. Quality assurance process

Quality assurance is a managerial function that establishes processes or procedures in an organization or project to assist in determining whether quality standards are being met. It includes all the planned and system activities implemented within the quality system and is performed throughout the life of the project. [Executing]

PMI®, PMBOK®, 2000, 101–102

28. c. Evaluate failure modes and causes associated with the design and manufacture of a new product

This technique is a method of analyzing design reliability. A list of potential failure modes is developed for each element, and then each mode is given a numeric rating for frequency of occurrence, criticality, and probability of detection. These data are used to assign a risk priority number for prioritizing problems and guiding the design effort. [Controlling]

Soin 1992, 157–159; Evans and Lindsay 1999, 768–769

29. b. **Seven consecutive measurements are ascending, descending, or the same**

Consecutive points on a process control chart that are ascending, descending, or the same indicate an abnormal trend in the process and must be investigated. [Controlling]

Ireland 1991, V-6; Evans and Lindsay 1999, 741

30. a. **Standards and regulations are an input to quality planning**

In quality planning, the project management team must consider any application-area specific standards or regulations that may affect the project. Building codes are an example of regulations. [Planning]

PMI®, PMBOK®, 2000, 26 and 98

31. a. **Cause-and-effect diagrams**

Cause-and-effect diagrams, also called Ishikawa diagrams or fishbone diagrams, illustrate how various causes and subcauses interact to create potential problems or effects. [Planning]

PMI®, PMBOK®, 2000, 98

32. c. **A framework for quality systems**

ISO 9000 provides a basic set of requirements for a quality system, without specifying the particulars for implementation. [Planning]

Schmauch 1994, 6–10; Evans and Lindsay 1999, 528 and 533

33. b. **Special causes and random causes**

Special causes are unusual events; random causes are normal process variations. The project team must be able to identify unusual events so that their causes can be identified and corrected. [Controlling]

PMI®, PMBOK®, 2000, 102

34. c. **Incremental improvement**

Imai, a Japanese engineer, coined the word *kaizen* to describe an approach to quality that means making small improvements every time a process is repeated. [Executing]

Imai 1986, 3; Evans and Lindsay 1999, 370–371

35. a. Prevention costs

Cost of quality refers to the total cost of all efforts to achieve product or service quality. Prevention costs are a category of quality costs. Prevention costs are investments made to keep nonconforming products from occurring and reaching the customer. They include quality planning costs, process control costs, information systems costs, and training and general management costs. [Planning]

PMI®, PMBOK®, 2000, 99; Evans and Lindsay 1999, 486–487

36. a. Show how many results were generated, by type or category of identified cause

A Pareto diagram is a histogram ordered by frequency of occurrence. Rank ordering is then used to guide corrective action. The Pareto diagram is conceptually related to Pareto's Law, which holds that a relatively small number of causes typically will produce a large majority of the problems or defects. [Controlling]

PMI®, PMBOK®, 2000, 103 and 105

37. d. As an input to quality assurance

Quality control measurements are records of quality control testing and measurement in a format for comparison and analysis. These measurements serve as an input to quality assurance, which consists of all the planned and systematic activities implemented within the quality system to provide confidence that the project will satisfy the relevant quality standards. [Executing]

PMI®, PMBOK®, 2000, 101

38. c. Does not require 100% inspection of the components to achieve a satisfactory inference of the population

The application of the statistical concept of probability has proven, over many years in many applications, that an entire population of products need not be inspected, if the sample selected conforms to a normal distribution of possible outcomes (the "bell" curve). [Controlling]

PMI®, PMBOK®, 2000, 103

39. a. **Monitor process variation over time**

Used to monitor process variation and to detect and correct changes in process performance, the statistical control chart helps people understand and control their processes and work. [Controlling]

Mansir and Schacht 1988, 4-73; PMI®, PMBOK®, 2000, 103

40. d. **Procedures used to conduct trade-off analyses among cost, schedule, and quality**

A part of the overall project plan, the quality management plan should address all aspects of how quality management will be implemented on the project rather than focusing on one or two specific areas of continuous improvement. Trade-off analyses are business judgments and, as such, are not procedural steps to be included in the quality management plan. [Planning]

PMI®, PMBOK®, 2000, 99

PMP Prep v 1.4 Splash Screen

To prevent this splash screen from appearing: open the Autoexec macro and remove the OpenReport line

This page has three sections:
1) high points of what is in this database so you don't miss the most important items
2) my suggestions for your study plan
3) additional information about what is in this database

Note: Much of the book highlights were entered using voice recognition software. This was much faster than typing. I tried to keep an eye on the software to make sure that it was understanding me correctly, but I feel confident that there are cases where it misinterpreted me. Please let me know if you find anything that doesn't make sense, and I can research if it was the software or if the highlights were entered correctly.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
SECTION 1: HIGH POINTS OF WHAT IS IN THIS DATABASE SO YOU DON'T MISS THE MOST IMPORTANT ITEMS
- all data is stored in tables; there are usually matching forms and reports for each table
  - forms are for entering or modifying data; reports are for printing data
- my formulas are in the Extra table (see the danielformula.txt entry)
- BookHighlights contains the information which you need to know from the PMBOK, Rita's test prep and PMP Certification for Dummies
- ComponentProcesses lists which page each component process is described on in each book to help you find information on any component process which you are researching (Dummies has a different order altogether)
- Hot Topics include the list of Rita's Hot Topics; these are the key topics (in order of importance) for each of her chapters
- DanielsNotes includes any notes that I made on Rita's Hot Topics as well as my own notes that I used at the very end of studying to make sure I had information on the key topics

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SECTION 2: MY SUGGESTIONS FOR YOUR STUDY PLAN
THROUGHOUT THIS PROCESS:
- make your own notes of information that you need to remember, or that is new to you
- make your own notes of information for practice test questions that you missed
- the act of writing the information down helps reinforce the learning
- having your own notes will help you find the information you need if you have a question or can't remember something
- having these notes in an electronic form will help you be able to search all of it easily
FOR EACH PMBOK CHAPTER
- read the PMBOK highlights
- read the Rita highlights
- make sure you know everything listed on the Hot Topics
- make sure you know everything from DanielsNotes
- take the chapter tests
- consider further study of areas where you had problems, and then retaking tests where you had difficulties or low scores
<<-- AFTER YOU HAVE COMPLETED ALL OF THE PMBOK/RITA CHAPTERS -->>
FOR EACH DUMMIES CHAPTER
- read the Dummies highlights
- take the chapter tests
- consider further study of areas where you had problems, and then retaking tests where you had difficulties or low scores
<<-- AFTER YOU HAVE COMPLETED ALL OF THE DUMMIES CHAPTERS -->>
- complete the 200 question "z" test
- complete the 300 questions from the Dummies Test Engine
- consider further study of areas where you had problems, and then retaking tests where you had difficulties or low scores
- TAKE THE PMP EXAM AND SCORE INCREDIBLY HIGH!!!!

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SECTION 3: ADDITIONAL INFORMATION ABOUT WHAT IS IN THIS DATABASE

BOOKHIGHLIGHTS TABLE AND HOW TO TELL WHICH BOOK HAS NOTED INFORMATION
- the book highlights are from three different books:
  - P indicates PMBOK
  - R indicates Rita's test prep book
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

PMP Prep v 1.4 Splash Screen

  - D indicates PMP Certification for Dummies
- these designations are used throughout the BookHighlights entries, examples:
  - r 21 is page 21 in Rita's book
  - d appendix A is appendix A in the Dummies book
  - p 51 is PMBOK page 51
- when one book is referenced in another, the book designator is always used
  - this most often happens when Rita or Dummies is talking about a page in the PMBOK
- this is a little confusing, but it seemed like the best way to integrate these three sources

WHERE IS WHAT INFORMATION IN WHICH BOOK
- PMBOK and Rita are grouped by 9 knowledge area; Rita's chapter numbers are usually one less than PMBOK (ex. PMBOK chapter 8 is Rita chapter 7)
- Dummies is grouped by the 5 process groups; see the tbl_ComponentProcesses to cross reference PMBOK, Rita and Dummies information

TBL_EXTRA
- this table has miscellaneous information; read the descriptions to see what information interested you
- MY FORMULA LIST/CHEAT SHEET IS HERE; this should be very helpful in determining what you need to know for all of the time and cost math

DUMMIES TEST ENGINE
- all questions from Dummies Test Engine (see DummiesTestEngine directory on the CD)
- graphics referenced in tbl_DummiesTestEngine are in the DummiesTestEngine\GRAPHICS folder
- some questions ask about graphics that don't seem to be in the DummiesTestEngine\GRAPHICS folder
  - those graphics should appear if you take the test through the test engine application
** NOTE: Question answers often refer to further information in the "PMP Certification For Dummies" book; having this book is needed if you want to access that information

IMPORTANT FIGURES
- important figures were noted in tbl_Figures for each book