# Chapter 7

# Project Quality Management

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# Hand Out # 7

# Learning Objectives

After reading this chapter you will be able to:

1. Understand the importance of project quality management and the role of the project manager in assuring quality
2. Define quality and how it relates to various aspects of information technology projects
3. Discuss quality experts’ view of modern quality management
4. Describe what is involved in quality planning, quality assurance, and quality control on projects
5. Explain quality control tool and techniques such as Pareto charts, statistical sampling, quality control charts, six sigma, and the seven run rule
6. Compare the different types of testing for information technology projects and how they relate to quality
7. Describe key issues relating to improving quality in information technology projects

# Chapter Outline

**Quality of Information Technology Projects**

**What is Project Quality Management?**

**Modern Quality Management**

Deming, Juran, Crosby

Ishikawa,Taguchi, Feigenbaum

Malcolm Baldrige Award and ISO 9000

**Quality Planning**

**Quality Assurance**

**Quality Control**

**Tools and Techniques for Quality Control**

Pareto Analysis

Statistical Sampling and Standard Deviation

Quality Control Charts, Six sigma, and the Seven Run Rule

Testing

**Improving Information Technology Project Quality**

Leadership

The Cost of Quality

Organizational Influences, Workplace Factors, and Quality

Maturity Models

Software Quality Function Deployment Model

Capability Maturity Model

Project Management Maturity Model

# Lecture Notes

## Quality of IT Projects

Quality definition; **the totality of characteristics of an entity that bears on its ability to satisfy stated or implied needs (ISO 8042:1994),** second definition; **the degree to which a set of inherent characteristics fulfils requirements (ISO 9000:2000).**

## What is Project Quality Management?

The key terms that are used in quality are:

**Conformance to requirements** (means the project’s processes and products meet written specifications),

**Fitness for use** (means a product can be used as it was intended),

**Quality planning**, **quality assurance** and **quality control**, for example, you may have worked on a project that the project team thought was of high quality, but it was not what the customer wanted. Project quality management emphasizes meeting or exceeding customer needs and expectations, so it important to understanding the customer's view of quality.

## Modern Quality Management

The main contributions made by Deming, Juran, Crosby, Ishikawa, Taguchi, and Feigenbaum. Many have heard of Deming and Juran. These experts work on quality management.

## Quality Planning

The key terms ⎯ **design of experiments** (is a quality planning technique that helps in identifying which variables have the most influence on the overall outcome of a process), **functionality** (is the degree to which a system performs its intended functions), **features** (are the system’s special characteristics that appeals to the user), **system outputs** (are the screens and reports the system generates), **performance** (addresses how well a product or service performs the customers intended use), **reliability** (is the ability of a product to perform as expected under normal conditions), and **maintainability** (addresses the ease of performing maintenance on a product).

## Quality Assurance

The PMBOK Guide refers to quality assurance as the management section of quality management. The project manager and senior management can have the greatest impact on the quality of projects by establishing a good quality assurance system.

## Quality Control

The quality control, is to improve the quality, the main outcomes of this process are **acceptance decisions** (determine if the products or services produced as part of the project will be accepted or rejected), **proper planning** for quality assurance to avoid too much need for rework (is action taken to bring rejected items into compliance with product requirements or specifications or other stakeholder expectations) and **process adjustments** (corrects or prevents further quality problems based on quality control measurements).

## Tools and Techniques for Quality Control

The examples of fishbone, **Pareto analysis**; quality control charts, and testing programs. In fishbone or Ishikawa diagram below in Figure 7.1, lists the main area that could be the cause of the problem of users not being able to log in to the EIS (executive information system).

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**Six Sigma**

**Six Sigma** is defined as “**a comprehensive and flexible system for achieving, sustaining and maximizing business success**”. Six Sigma principles to **improve quality, decrease costs and better meet customers’ needs**. Six Sigma principles for quality control normally follows a five phase improvement process called DMAIC (define, measure, analyze, improve, and control). The following are brief description of DMAIC:

1. Define: the problem /opportunity, process and customer requirements. Important tools are; project charter, a description of customers’ requirements, process maps and voice of the customers’ data.
2. Measure: define measures, then collect, compile, and display data.
3. Analyze: Scrutinize process details to find improvement opportunities.
4. Improve: Generate solutions and ideas for improving the problem.
5. Control: Track and verify the stability of the improvements and the predictability of the solution.

**Six Sigma and Statistics:**

Six Sigma concepts is improving quality by reducing variation. The term sigma means standard deviation. Standard deviation measures how much variation exits in a distribution of data. Figure 7.3 provides an example of a normal distribution. In any normal distribution, 68.3% of the population is within one standard deviation (1σ) of the mean, 95.5% of the population is within the two standard deviation (2σ), and 99.7% of the population is within three standard deviation (3σ) of the mean.

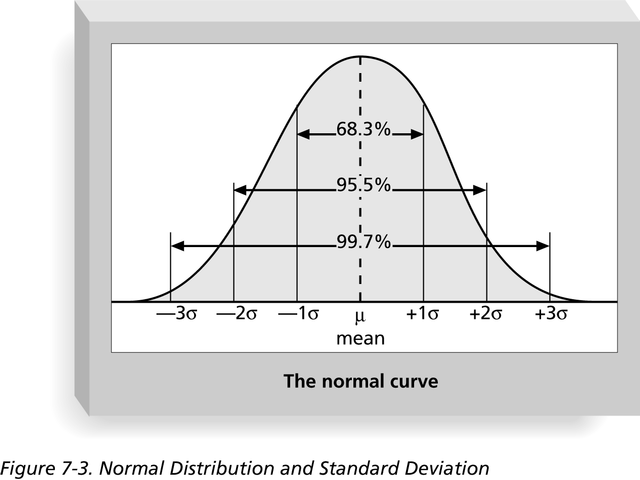


Table 7.2 illustrates the relationship between sigma, the percentage of the population within that sigma range and the number of defective units per billion. In this table shows that being plus or minus six sigma in pure statistical terms means only two defective units per billion.

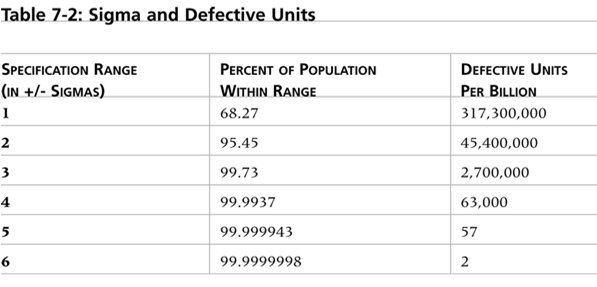
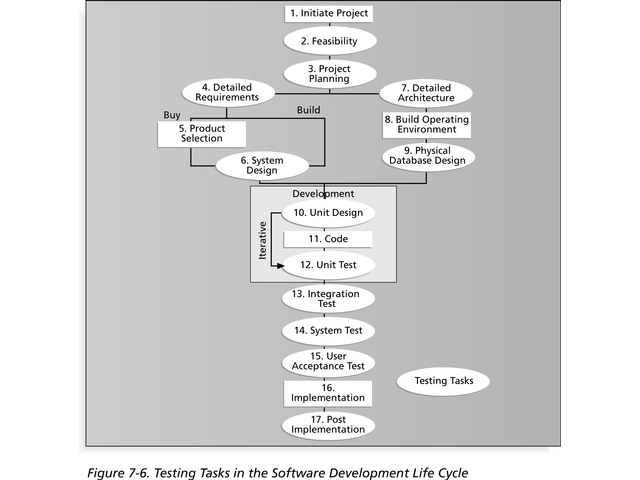


Figure 7.4 illustrates an example of a control chart for a process that manufactures 12 inch rulers. The scale on the vertical axis goes from 11.90 to 12.10. These numbers represents the lower and upper specification limits for the ruler. The lower and upper control limits on the quality control chart are 11.91 and 12.09 inches, respectively.

Based on the statistical definition of ±3σ described earlier, 99.73% of the manufactured rulers should come off the assembly line with a measurement between 11.91 and 12.09 inches, if the manufacturing process is operating in control.

**Testing:**

Testing needs to be done during almost every phase of the systems development life cycle, not just before the organization ships or hands over a product to the customers. Figure 7.5 includes 17 main tasks involved in a software development project and shows their relationship to each other. All phases include specific work related to testing.

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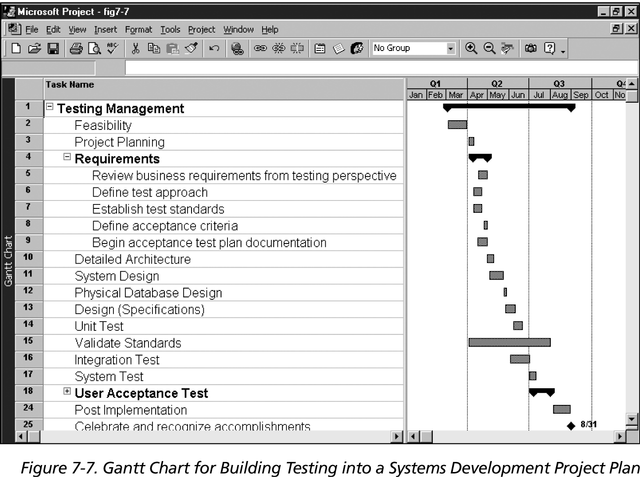
**Unit test** is done to test each individual component to ensure that it is as defect free as possible.

**Integration testing** occurs between unit and system testing to test functionality grouped components. It ensures a subset of the entire system works together.

**System testing** tests the entire system as one entity. It focuses on the big picture to ensure that the entire system is working properly.

**User acceptance testing** is an independent test performed by end users prior to accepting the delivered system. It focuses on the business fits of the system to the organization, rather than technical issues.

Figure 7.7 presents a Gantt chart that shows testing tasks that are appropriate for different phases of the systems development life cycle.



This is simplified version of a detailed testing management plan used by a consulting firm. To help improve the quality of software development projects, it is important to follow a thorough and disciplined testing methodology.

## Cost of Quality

The cost of quality is the cost of conformance plus the cost of nonconformance. Conformance means delivering products that meets requirements and fitness for use. The cost of nonconformance means taking responsibilities for failure or not meeting quality expectations. Table 7.3 summarizes the net costs per hour of down time caused by software defects for different business.

