

Information Technology Project Management – Fifth Edition

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Managing Project Quality

Chapter 9

Learning Objectives

- ▶ Describe project quality management (PQM) in terms of planning for quality, quality assurance, and quality control to continuously improve the project's products and supporting processes.
- ▶ Identify several quality gurus or founders of the quality movement, and their role in shaping quality philosophies that can be applied to project management.
- ▶ Define process capability and maturity defined under a quality management system called the capability maturity model integrated (CMMI).
- ▶ Distinguish between validation and verification activities and how these activities support project quality management.
- ▶ Apply the quality concepts, methods, and tools introduced in this chapter to develop a project quality plan.

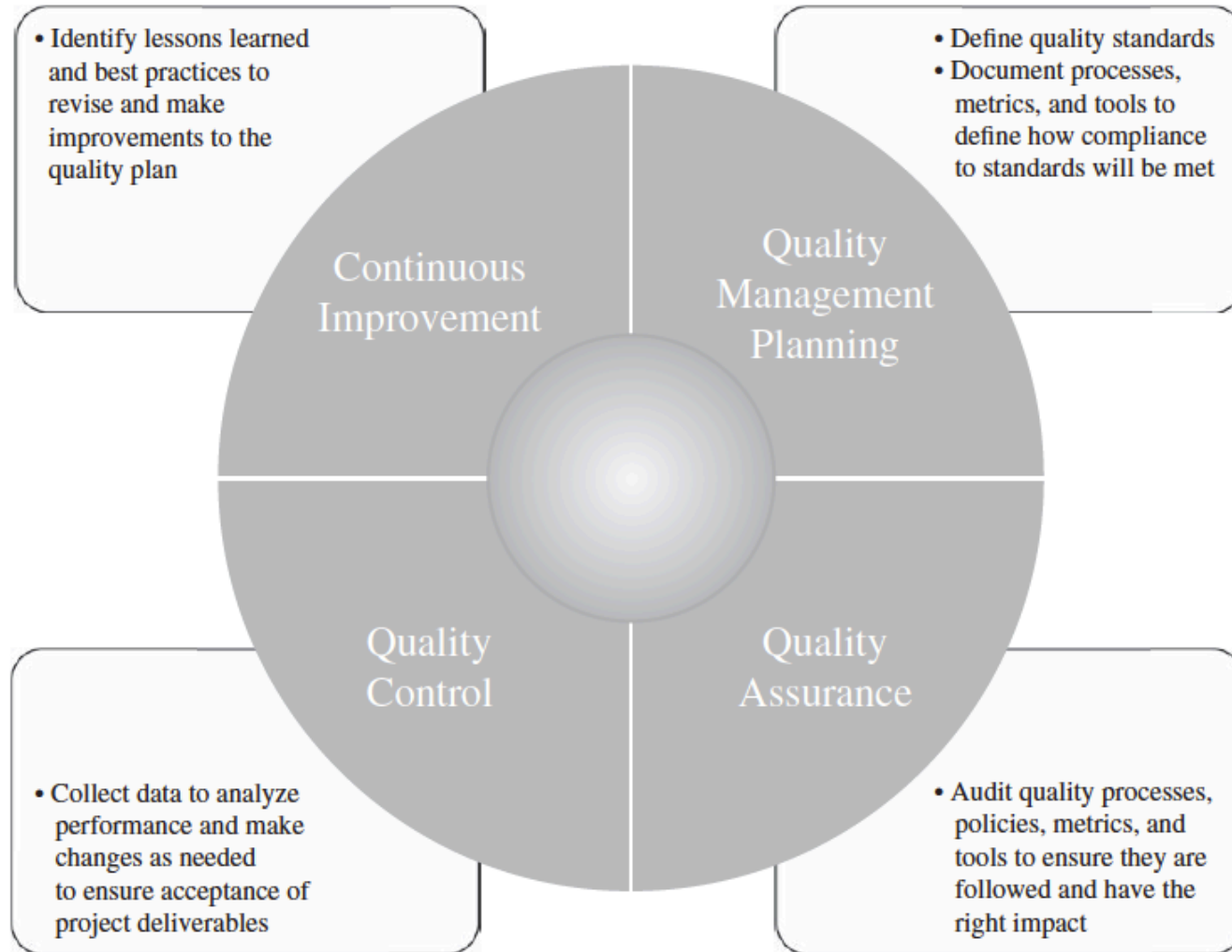
What is Quality?

- ▶ “an inherent or distinguishing characteristic; a property,” or “having a high degree of excellence.”
- ▶ Features & functionality
 - ▶ “fitness for use”
 - ▶ “conformance to requirements” or fulfilling requirements

Project Quality Management (PQM – PMBOK® Guide)

- ▶ The PMBOK® Guide defines PQM as “... the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.”

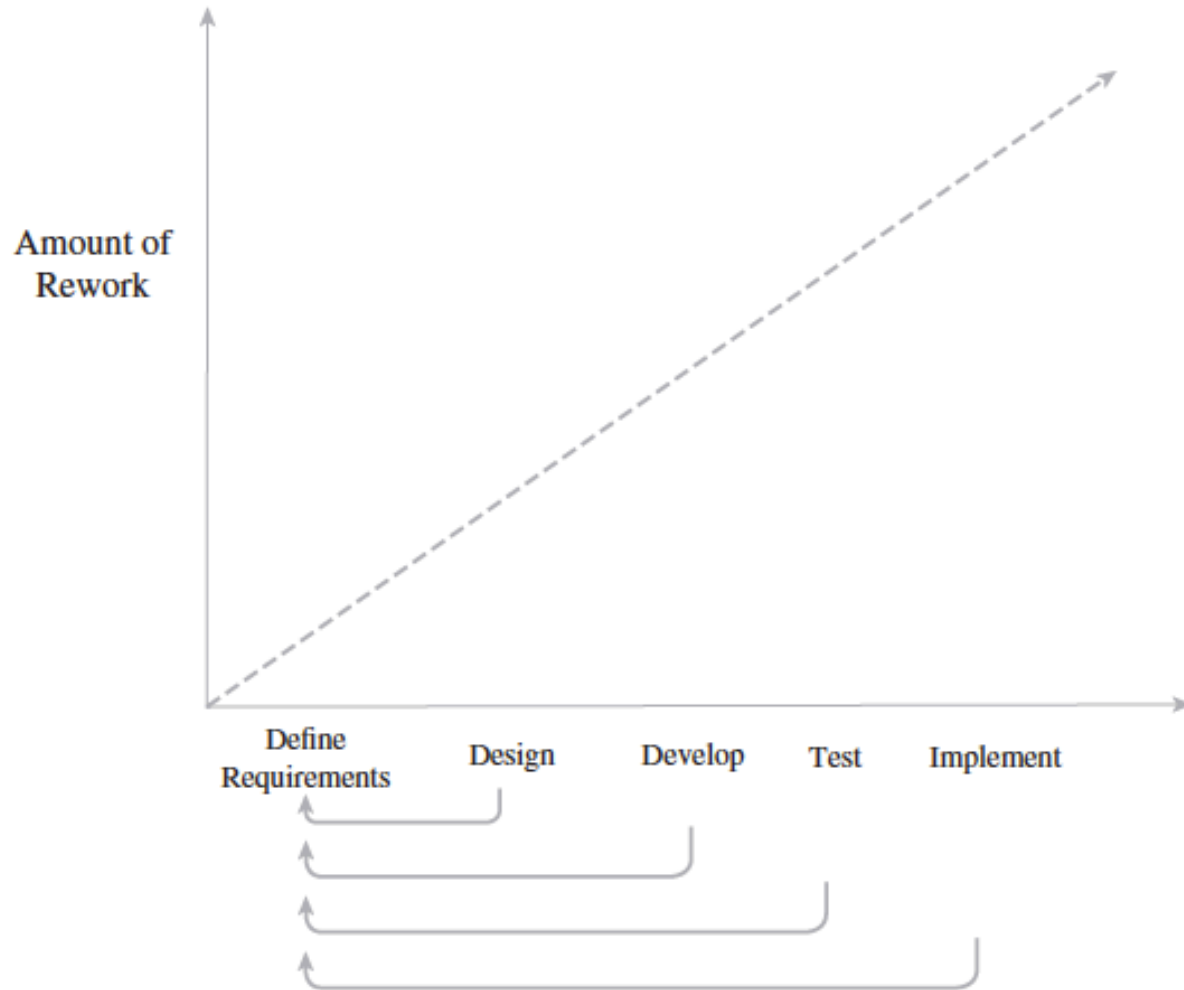
Project Quality Management



PQM Focuses on

- ▶ The project's **deliverables**
 - ▶ Business Case
 - ▶ Project Plan
 - ▶ The IT Solution
 - ▶ Etc.
- ▶ And the project's **processes**
 - ▶ Scope management
 - ▶ Risk management
 - ▶ Requirements Analysis
 - ▶ Design
 - ▶ Implementation
 - ▶ Etc.

The Impact of Rework



Quality Philosophies

- ▶ Craftsmanship – deep knowledge of craft, high standards, attention to detail, work done using best materials available
- ▶ Scientific Management - Frederic W. Taylor (see following slide)
- ▶ The Total Quality Management (TQM) Gurus
 - ▶ W. Edwards Deming – [14 Points](#) – emphasize value and importance of people
 - ▶ Joseph Juran – Quality trilogy: quality planning, quality improvement, and quality control
 - ▶ Phillip Crosby – top-down approach, management's responsibility to set the quality example for others to follow. Quality defined as conformance to requirements based on the customer's needs.

Scientific Management

- ▶ Fredrick W. Taylor (1856 – 1915)
 - ▶ Management would set arbitrary rules of thumb
 - ▶ Workers produced so much each day – no more, no less
 - ▶ Believed the production process could be more efficient
 - Break a task down into smaller tasks & study it to find the best and most efficient way of doing it
 - Time – motion studies
 - ▶ Many ignored the human factors & believed profits could be increased by speeding up the workers
 - ▶ Some think dehumanizing of the workers led to the foundation of labor unions

The Capability Maturity Model Integration (CMMI)

- ▶ Developed by the Software Engineering Institute at Carnegie Mellon University in 1986
- ▶ Mitre Corporation and Watts Humphrey developed a framework to assess and evaluate the capability of software processes and their maturity
 - ▶ Called the Capability Maturity Model (CMM), but has evolved to the CMMI which is not limited to a specific area but can be used across different disciplines

CMMI Concepts

▶ **Process**

- ▶ A set of activities, methods, or practices and transformations used by people to develop and maintain a product or system and the deliverables associated with project. Included are such things as project plans, design documents, code, test cases, user manuals, and so forth.

▶ **Process capability**

- ▶ The *expected* results that can be achieved by following a particular software process. More specifically, the capability of an organization's processes provides a way of predicting the outcomes that can be expected if the same processes are used from one project to the next.

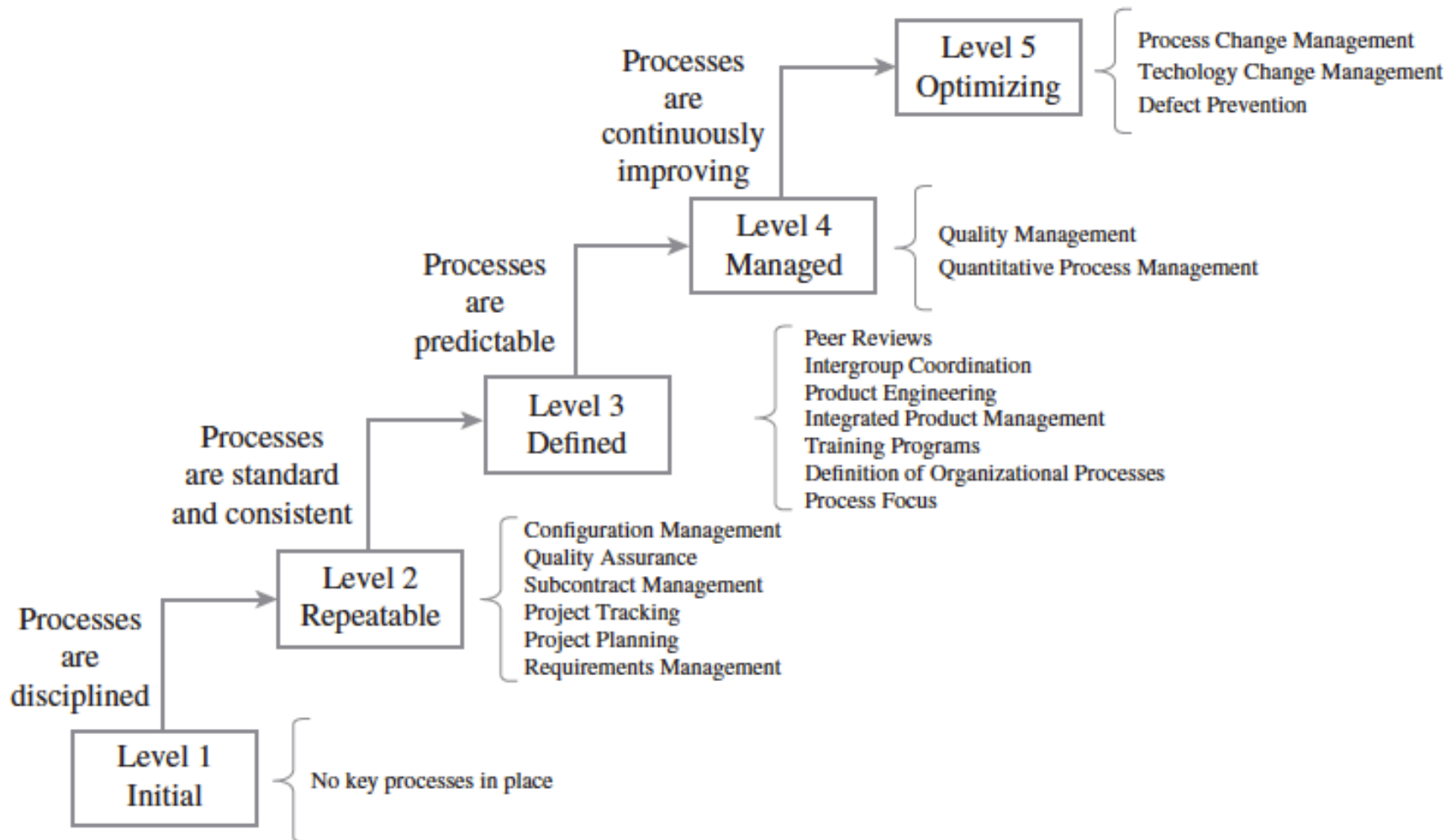
▶ **Process performance**

- ▶ The actual results that are achieved by following a particular process. Therefore, the actual results achieved through process performance can be compared to the expected results achieved through process capability.

▶ **Process maturity**

- ▶ The extent to which a particular process is explicitly and consistently defined, managed, measured, controlled, and effectively used throughout the organization.

CMMI Process Maturity and Key Process Areas



CMMI – Level 1: Initial

- ▶ Characterized by an immature organization in which the project process is ad hoc and often reactive to crises. Does not have a stable environment for projects, and success of a project rests largely with the people on the project and not the processes that they follow.
- ▶ **Key Process Area**
 - ▶ no key process areas are in place

CMMI – Level 2: Repeatable

- ▶ **Repeatable** - Basic policies, processes, and controls for managing a software project are in place. Previous project successes can be repeated by other project teams on other projects.
- ▶ **Key Process Area**
 - ▶ Software Configuration Management
 - ▶ Software Quality Assurance
 - ▶ Software Subcontract Management
 - ▶ Software Project Tracking and Oversight
 - ▶ Software Project Planning
 - ▶ Requirements Management

CMMI – Level 3: Defined

- ▶ **Defined** - Software engineering and management processes are documented and standardized throughout the organization and become the organizations standard process.

- ▶ **Key Process Area**
 - ▶ Peer Reviews
 - ▶ Intergroup Coordination
 - ▶ Software Product Engineering
 - ▶ Integrated Software Management
 - ▶ Training Programs
 - ▶ Organization Process Definition
 - ▶ Organization Process Focus

CMMI –Level 4: Managed

- ▶ **Managed** - Quantitative metrics for measuring and assessing productivity and quality are established for both software products and processes which are characterized as being quantifiable and predictable.
- ▶ **Key Process Areas**
 - ▶ Software Quality Management
 - ▶ Quantitative Process Management

CMMI – Level 5: Optimizing

- ▶ **Optimizing** – at the highest level of software process maturity, the whole organization is focused on continuous process improvement.
- ▶ **Key Process Areas**
 - ▶ Process Change Management
 - ▶ Technology Change Management
 - ▶ Defect Prevention

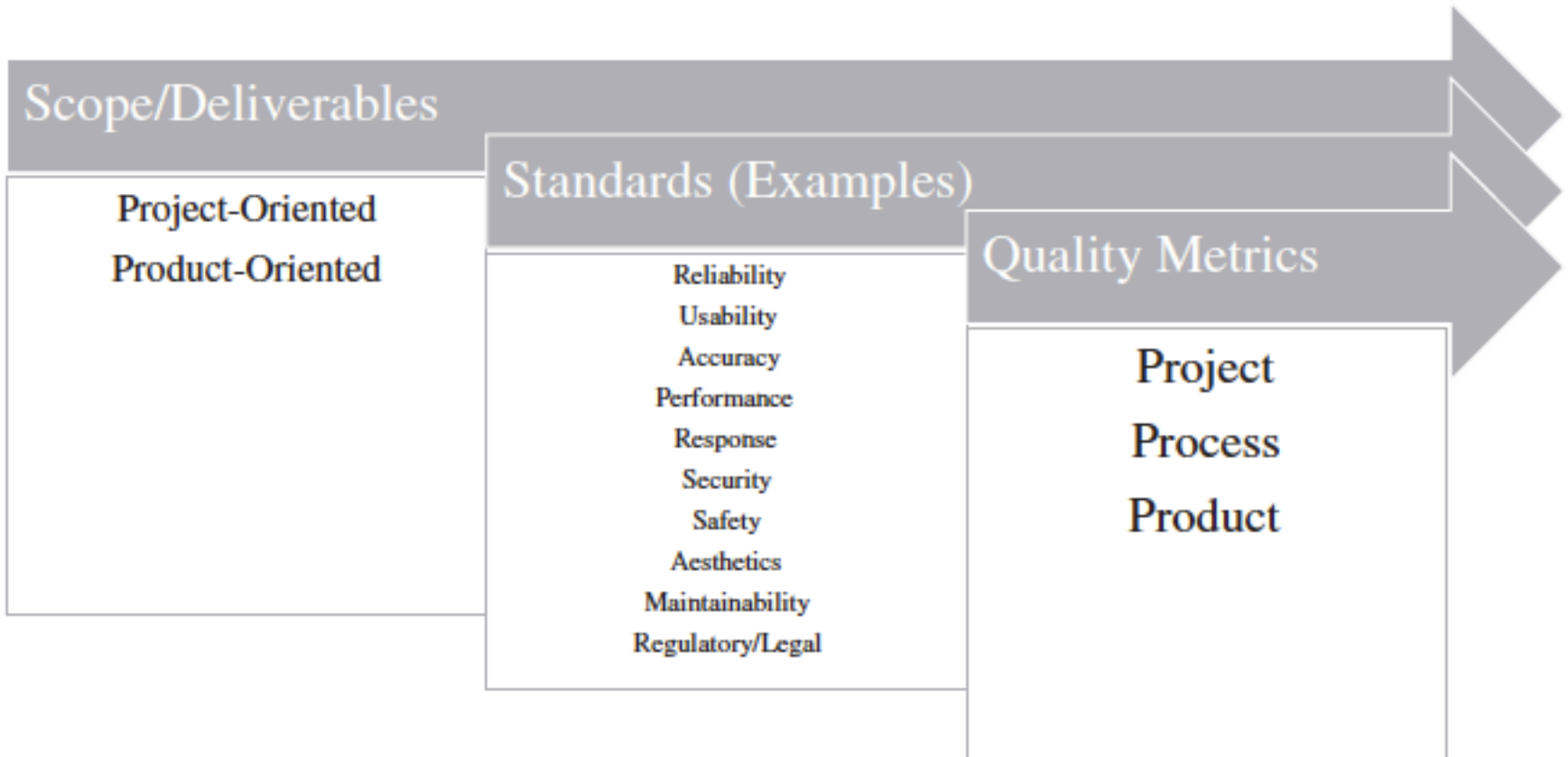
A Framework for the Project Quality Management Plan



Quality Philosophies and Principles

1. Focus on Customer Satisfaction
2. Prevention, not Inspection
3. Improve the Process to Improve the Product (project's deliverables)
4. Quality is Everyone's Responsibility
5. Fact-based Management

Project Standards and Metrics



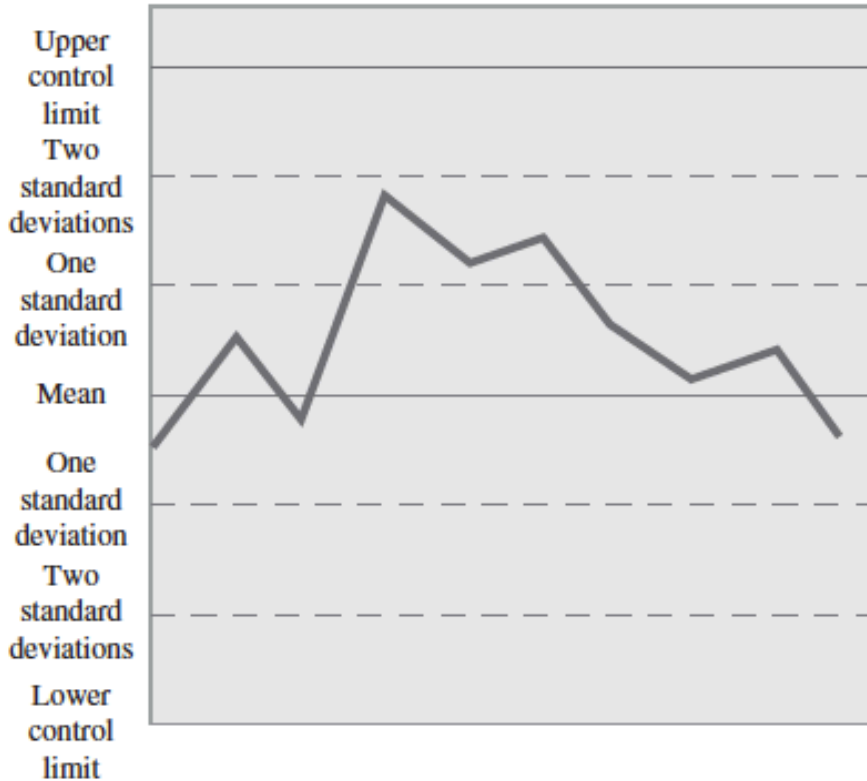
Quality Assurance (QA)

- ▶ **Verification** – focuses on process-related activities of the project –
 - ▶ Technical reviews including “walk-throughs”
 - ▶ Business Reviews
 - ▶ Management Reviews
- ▶ **Validation** – product oriented activity – focused on fitness and suitability of project deliverables
- ▶ **Testing** – basis for ensuring that the product or system functions as intended and has all the capabilities and features defined in the project’s scope document.

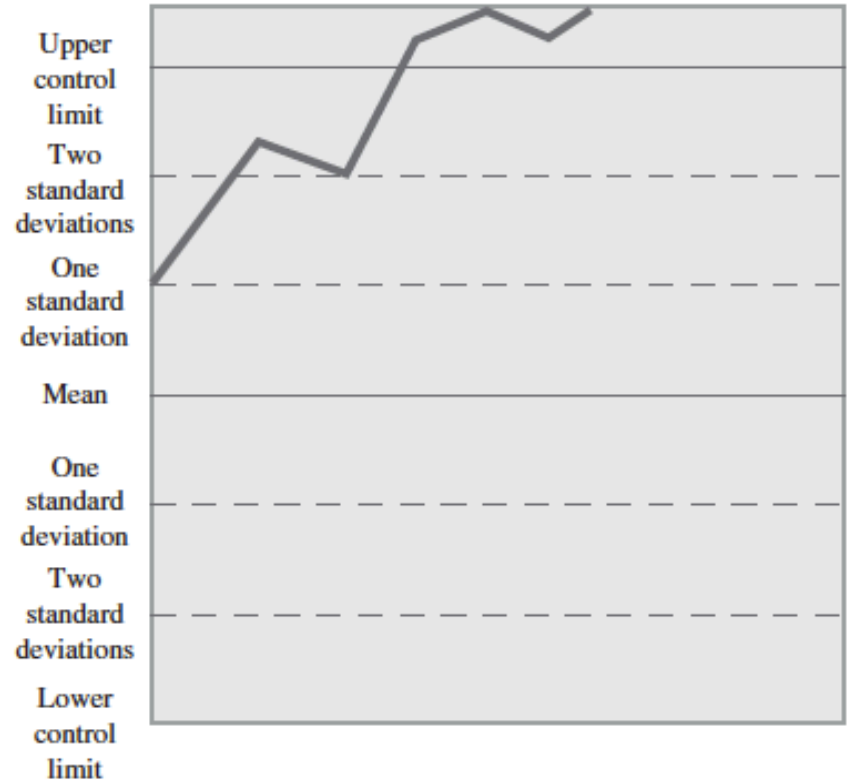
Quality Control (QC)

- ▶ **Control Charts – Walter Shewart – See Figure 9.6**
- ▶ **Cause and Effect Diagrams – Kaoru Ishikawa – See Figure 9.7**
- ▶ **Testing** – basis for ensuring that the product or system functions as intended and has all the capabilities and features defined in the project' s scope document.

Control Charts for Statistical Control

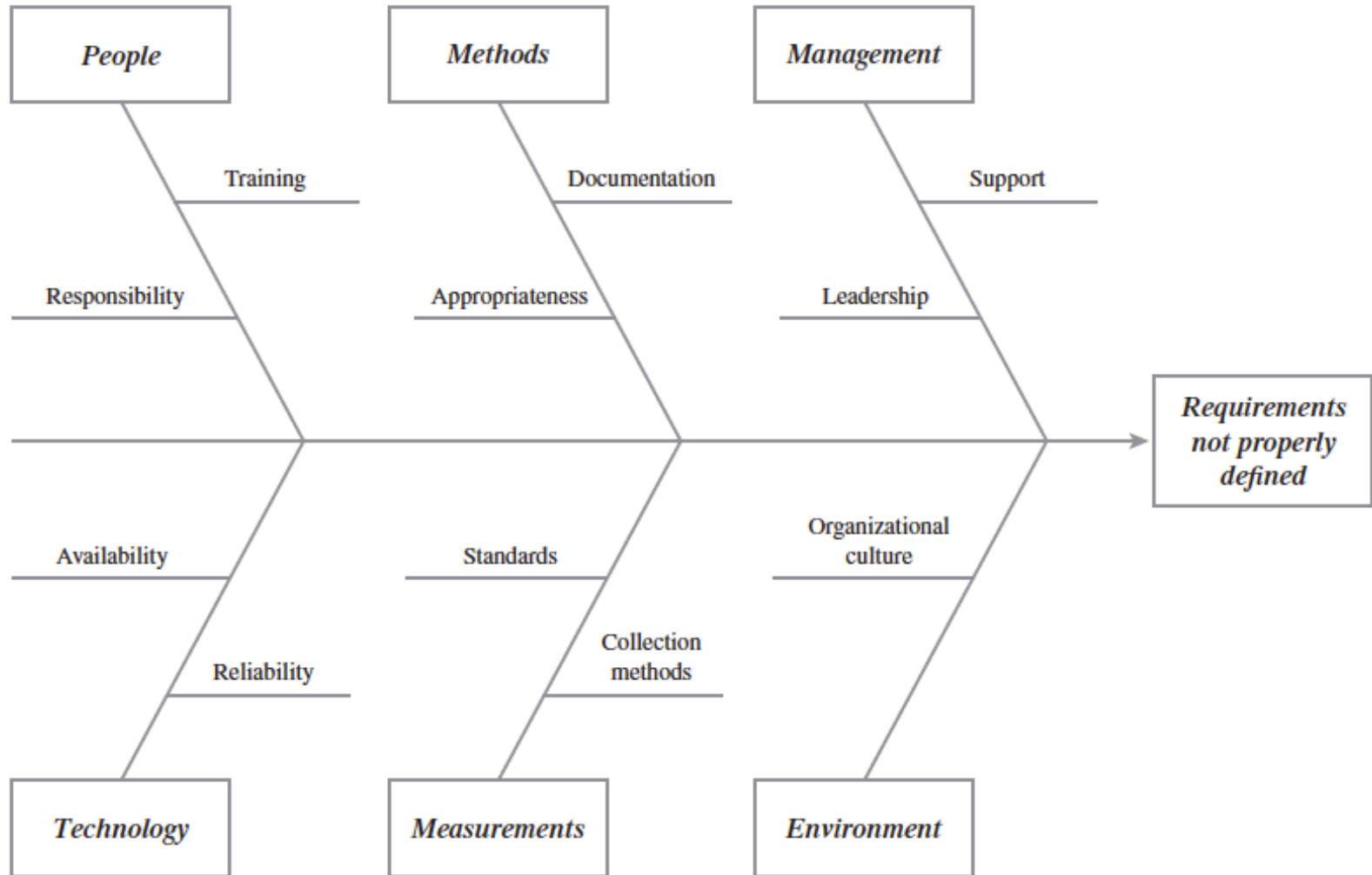


A process within statistical control

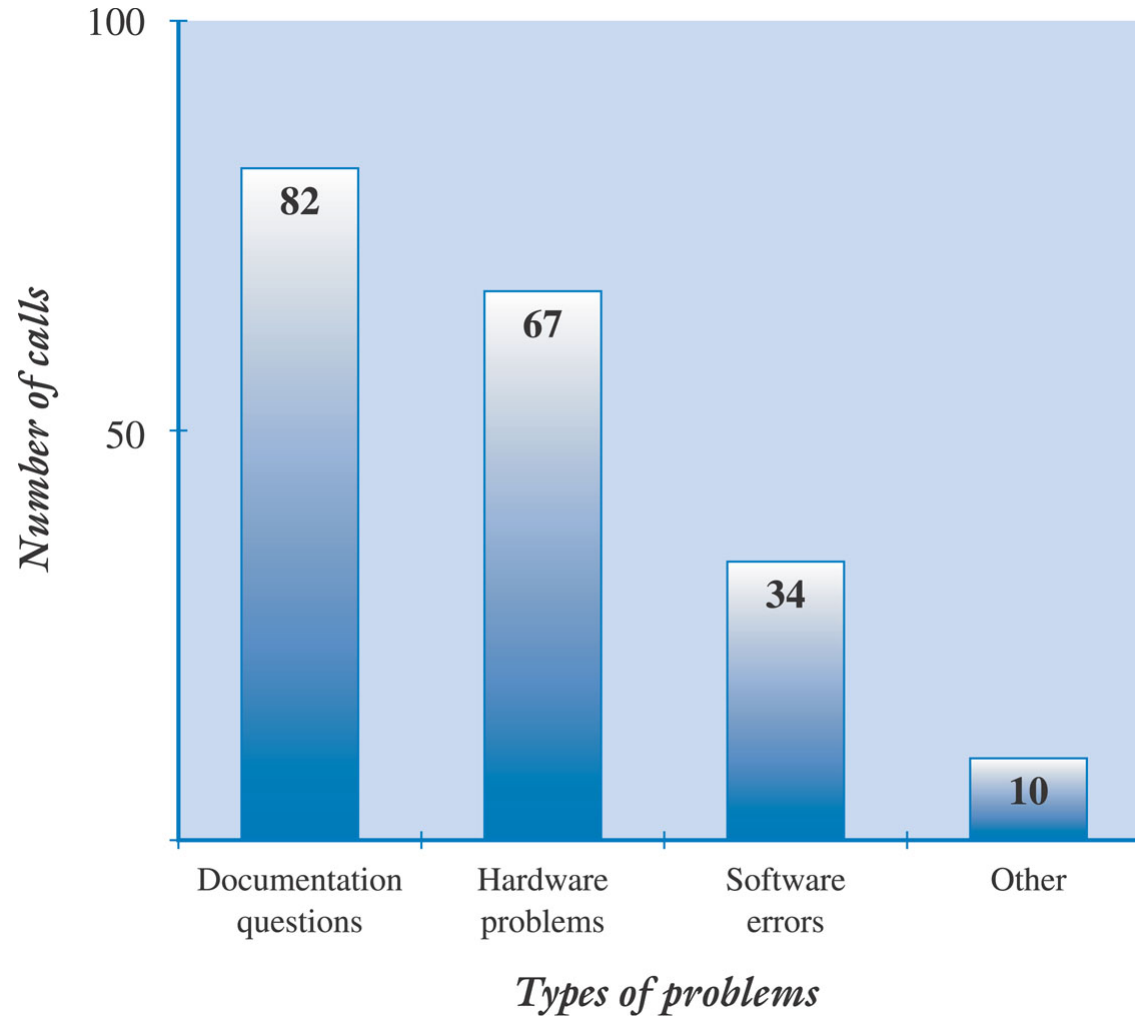


A process not within statistical control

Ishikawa (aka Fishbone or Cause and Effect) Diagram

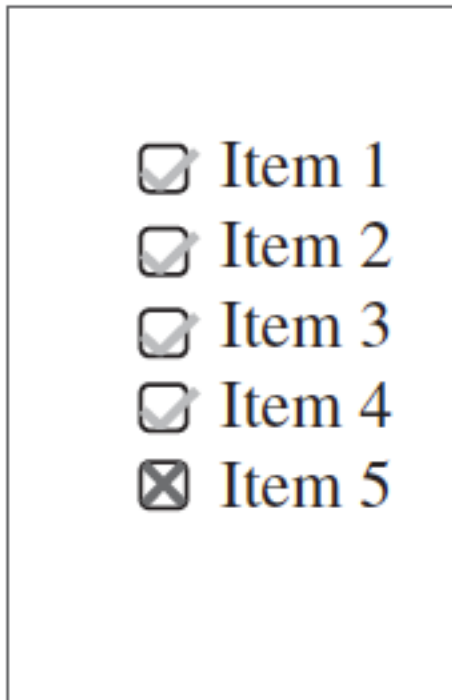


Pareto Chart

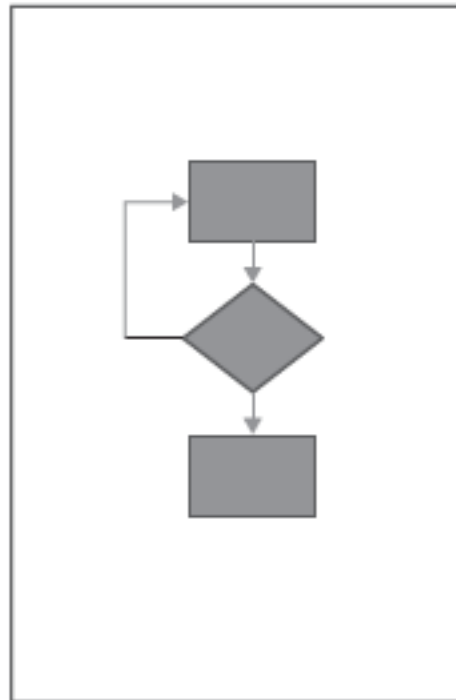


Some Additional Quality Control Tools

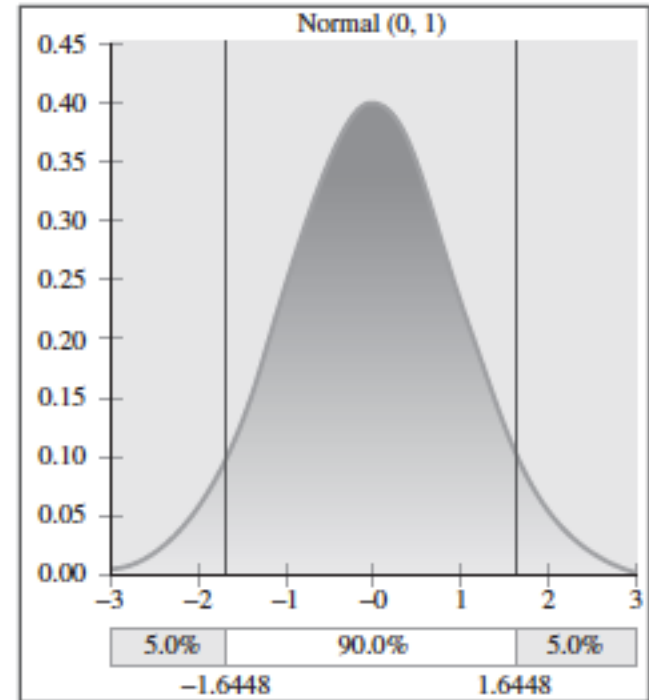
Checklists



Flowcharts/
Process Maps



Statistical
Analysis



Continuous Improvement

- ▶ Use knowledge management as a tool for organizational and team learning and identifying best practices.
- ▶ Document and disseminate lessons learned.
- ▶ Continual improvement – incremental way make a process more efficient, effective, stable, mature, and adaptable.
- ▶ Project Quality plan should support the organization in searching for ways to build a *better* product or system.