Project Management Professional (PMP)

Section (8)
Project Quality Management

A H M E D
YOUSRY
C O N S U L T A N T

PMBOK 5th. Edition

Project Quality Management

□ 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.

□ Quality Management uses policies and procedures to implement:

- ◻ The organization's **quality management system**

- ◻ It supports continuous **process improvement activities** as undertaken on behalf of the performing organization.

- ◻ It works to <u>ensure</u> that the project requirements, including product requirements are met and validated.

Project Quality Management

- Project Quality Management processes, which include:
  - 8.1 Plan Quality Management
  - 8.2 Perform Quality Assurance
  - 8.3 Control Quality

Project Quality Management

☐ Project Quality Management processes:

- 8.1 Plan Quality Management
- 8.2 Perform Quality Assurance
- 8.3 Control Quality

Identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements.

Project Quality Management

☐ Project Quality Management processes, which include:

- ◻ 8.1 Plan Quality Management
- ◻ 8.2 Perform Quality Assurance
- ◻ 8.3 Control Quality

> The process of auditing the quality requirements & the results from quality control measurements to ensure that appropriate quality standards & operational definitions are used.

Project Quality Management

- Project Quality Management processes, which include:
    - 8.1 Plan Quality Management
    - 8.2 Perform Quality Assurance
    - 8.3 Control Quality

The process of <u>monitoring & recording</u> results of executing the quality activities to assess performance & recommend necessary changes.

Project Quality Management

- Project Quality Management addresses:

  - <u>The management of the project</u> and <u>the deliverables of the project</u>

  - <u>It applies to all projects</u>, regardless of the nature of their deliverables.

  - <u>Quality measures and techniques are specific to the type of deliverables</u> being produced by the project.

Project Quality Management

☐ Quality & Grade are not the same concepts, as follow:

- ◘ **Quality** as a delivered performance or result is "the degree to which a set of inherent characteristics fulfill requirements" (ISO 9000).

- ◘ **Grade** as a design intent is a category assigned to deliverables having the same functional use but different technical characteristics.

Project Quality Management

- The project manager & project team are responsible for:
  - Managing the tradeoffs associated with delivering the required levels of both quality and grade.
  - While a quality level that <u>fails</u> to meet quality requirements is always a <u>problem</u>
  - A low grade of quality may not be a <u>problem</u>.

Project Quality Management

□ These approaches recognize the importance of:

- ▫ Customer satisfaction
- ▫ Prevention over inspection
- ▫ Continuous improvement
- ▫ Management Responsibility
- ▫ Cost of quality (COQ)

Project Quality Management

☐ **These approaches recognize the importance of:**

- ▪ Customer satisfaction
- ▪ Prevention over inspection
- ▪ Continuous improvement
- ▪ Management Responsibility
- ▪ Cost of quality (COQ)

Understanding, evaluating, defining, and managing requirements so that customer expectations are met.

This requires a combination of conformance to requirements (to ensure the project produces what it was created to produce) and fitness for use (the product or service needs to satisfy the real needs).

Project Quality Management

□ **These approaches recognize the importance of:**

- ■ Customer satisfaction
- ■ Prevention over inspection
- ■ Continuous improvement
- ■ Management Responsibility
- ■ Cost of quality (COQ)

> Quality should be planned, designed & built into-not inspected into:
> - The project's management or
> - The project's deliverables.
>
> The <u>cost</u> of preventing mistakes is generally much less than the <u>cost</u> of correcting mistakes when they are found by inspection or during usage.

Project Quality Management

☐ These approaches recognize the importance of:

- ☐ Customer satisfaction
- ☐ Prevention over inspection
- ☐ Continuous improvement
- ☐ Management Responsibility
- ☐ Cost of quality (COQ)

The PDCA (plan-do-check-act) cycle is the basis for quality improvement as defined by Shewhart and modified by Deming.

Quality improvement initiatives such:
- Total Quality Management (TQM)
- Six Sigma
- Lean Six Sigma

That can Improve the quality of the project's management as well as the quality of the project's product.

Project Quality Management

☐ These approaches recognize the importance of:

- ◘ Customer satisfaction
- ◘ Prevention over inspection
- ◘ Continuous improvement
- ◘ Management Responsibility
- ◘ Cost of quality (COQ)

Success requires the participation of all members of the project team.

Nevertheless, management retains, within its responsibility for quality, a related responsibility to provide suitable resources at adequate capacities.

Project Quality Management

☐ These approaches recognize the importance of:

- ◼ Customer satisfaction

- ◼ Prevention over inspection

- ◼ Continuous improvement

- ◼ Management Responsibility

- ◼ Cost of quality (COQ)

> The COQ Refers to the total cost of conformance work & nonconformance work that should be done as a compensatory effort
>
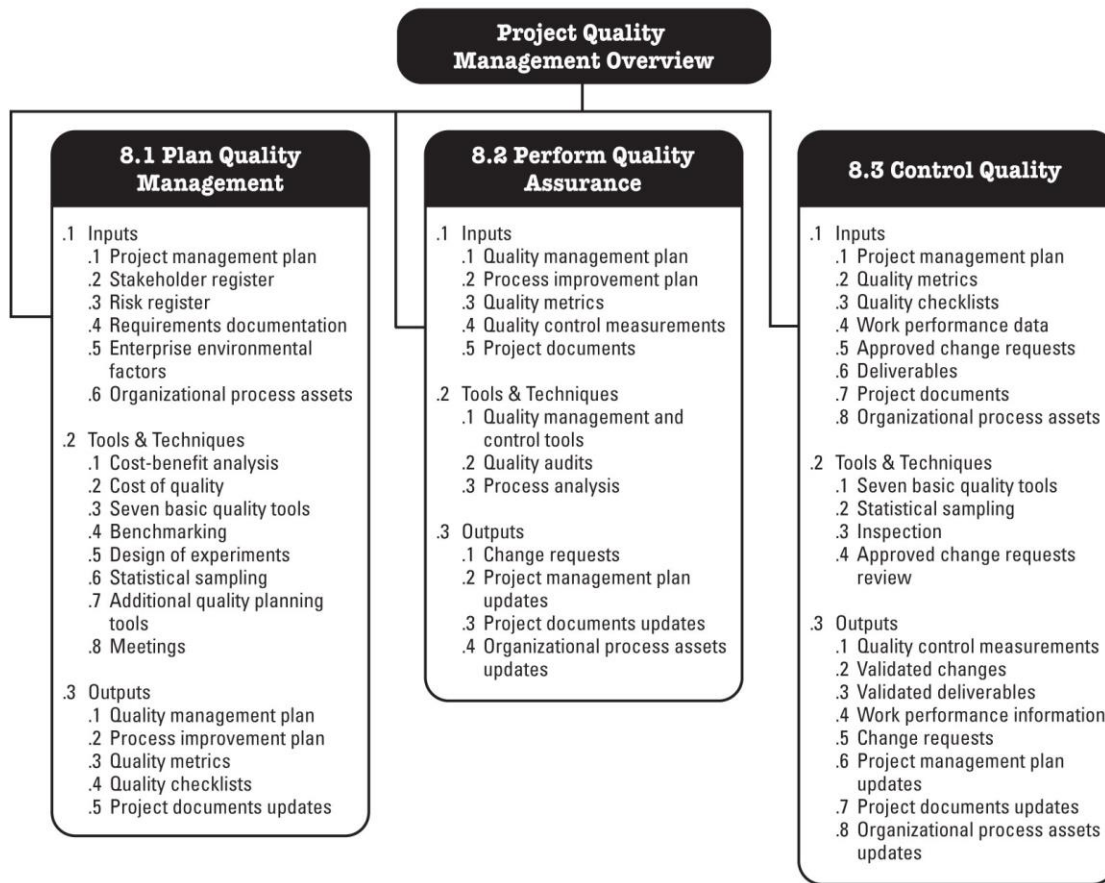> The COQ work may be incurred throughout the deliverable's life cycle.
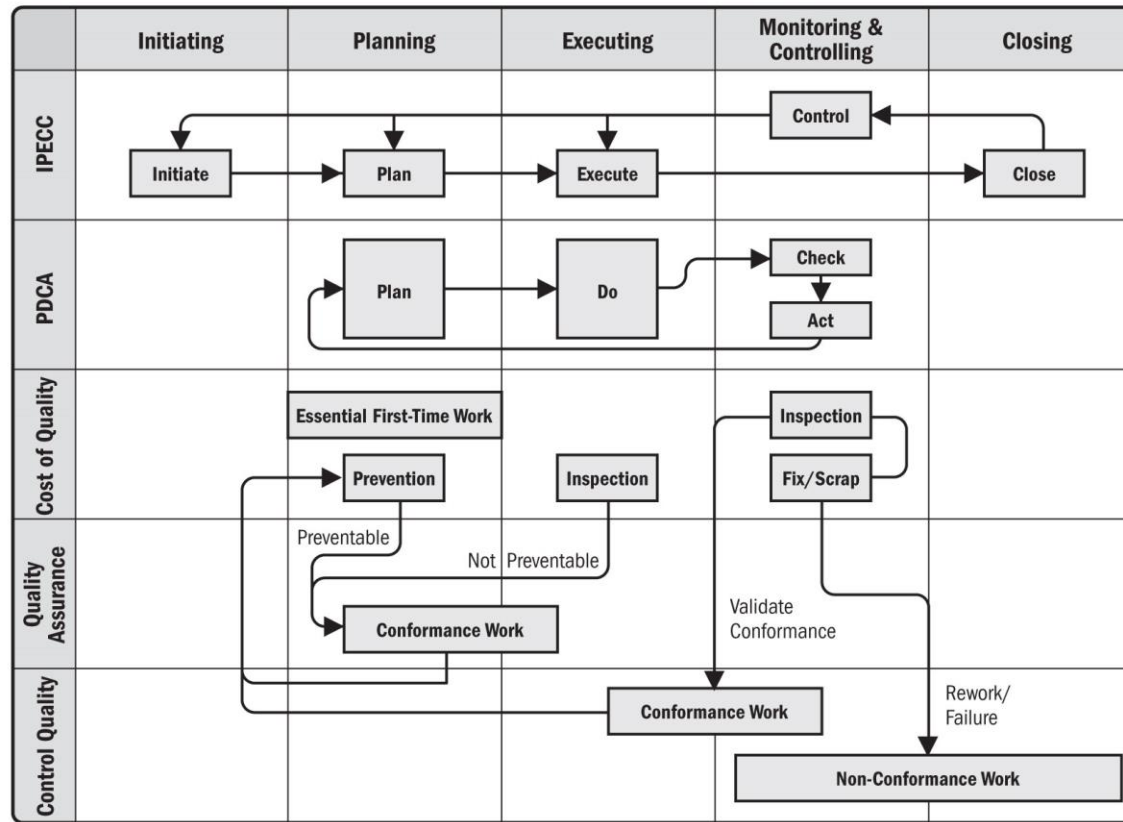
Project Quality Management Overview

8.1 Plan Quality Management

.1 Inputs
   .1 Project management plan
   .2 Stakeholder register
   .3 Risk register
   .4 Requirements documentation
   .5 Enterprise environmental factors
   .6 Organizational process assets

.2 Tools & Techniques
   .1 Cost-benefit analysis
   .2 Cost of quality
   .3 Seven basic quality tools
   .4 Benchmarking
   .5 Design of experiments
   .6 Statistical sampling
   .7 Additional quality planning tools
   .8 Meetings

.3 Outputs
   .1 Quality management plan
   .2 Process improvement plan
   .3 Quality metrics
   .4 Quality checklists
   .5 Project documents updates

8.2 Perform Quality Assurance

.1 Inputs
   .1 Quality management plan
   .2 Process improvement plan
   .3 Quality metrics
   .4 Quality control measurements
   .5 Project documents

.2 Tools & Techniques
   .1 Quality management and control tools
   .2 Quality audits
   .3 Process analysis

.3 Outputs
   .1 Change requests
   .2 Project management plan updates
   .3 Project documents updates
   .4 Organizational process assets updates

8.3 Control Quality

.1 Inputs
   .1 Project management plan
   .2 Quality metrics
   .3 Quality checklists
   .4 Work performance data
   .5 Approved change requests
   .6 Deliverables
   .7 Project documents
   .8 Organizational process assets

.2 Tools & Techniques
   .1 Seven basic quality tools
   .2 Statistical sampling
   .3 Inspection
   .4 Approved change requests review

.3 Outputs
   .1 Quality control measurements
   .2 Validated changes
   .3 Validated deliverables
   .4 Work performance information
   .5 Change requests
   .6 Project management plan updates
   .7 Project documents updates
   .8 Organizational process assets updates

Figure 8-1. Project Quality Management Overview

	Initiating	Planning	Executing	Monitoring & Controlling	Closing
IPECC	Initiate	Plan	Execute	Control	Close
PDCA		Plan	Do	Check / Act	
Cost of Quality		Essential First-Time Work / Prevention	Inspection	Inspection / Fix/Scrap	
Quality Assurance		Preventable / Conformance Work	Not Preventable	Validate Conformance	
Control Quality			Conformance Work	Rework/Failure / Non-Conformance Work	

Figure 8-2. Fundamental Relationships of Quality Assurance and Control Quality to the IPECC, PDCA, Cost of Quality Models and Project Management Process Groups

8.1 Plan Quality Management

☐ The process of identifying quality requirements and/or standards for the project and its deliverables & documenting how the project will demonstrate compliance with relevant quality requirements.

 ▫ The key benefit of this process is:

  ▪ It provides guidance and direction on how quality will be managed and validated throughout the project.

Inputs	Tools & Techniques	Outputs
.1 Project management plan .2 Stakeholder register .3 Risk register .4 Requirements documentation .5 Enterprise environmental factors .6 Organizational process assets	.1 Cost-benefit analysis .2 Cost of quality .3 Seven basic quality tools .4 Benchmarking .5 Design of experiments .6 Statistical sampling .7 Additional quality planning tools .8 Meetings	.1 Quality management plan .2 Process improvement plan .3 Quality metrics .4 Quality checklists .5 Project documents updates

Figure 8-3. Plan Quality Management Inputs, Tools & Techniques, and Outputs
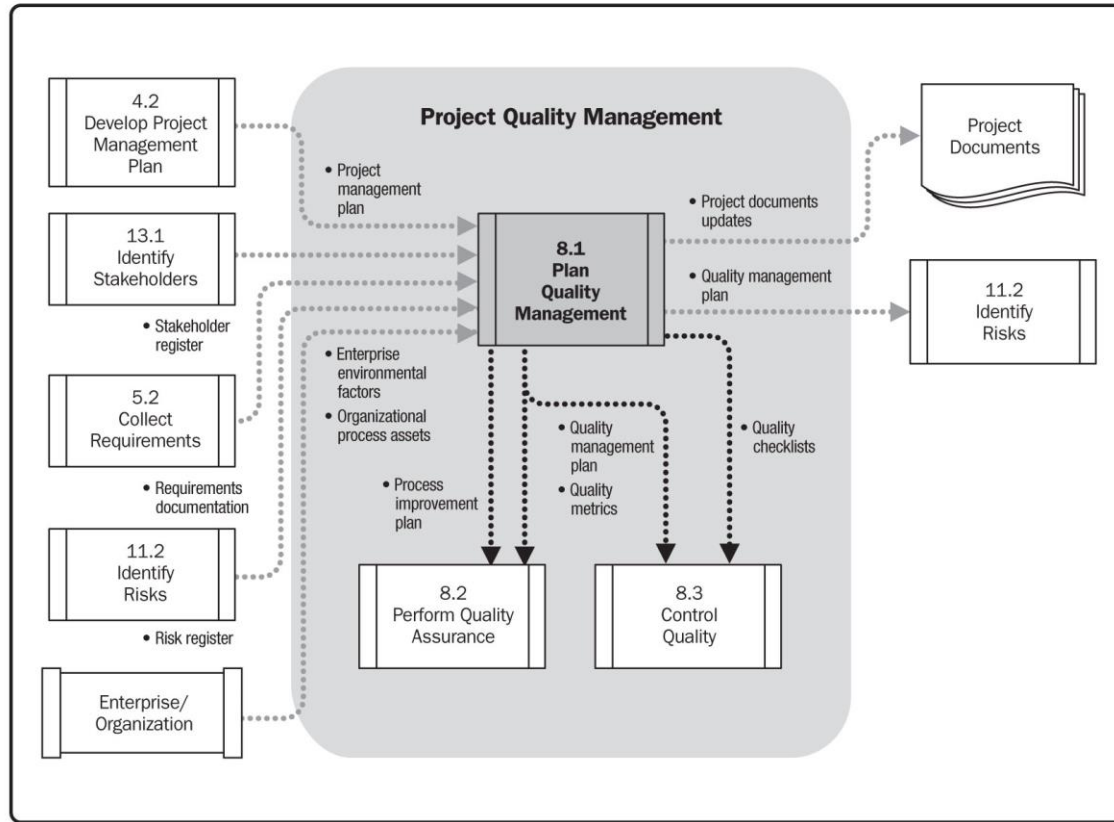
Figure 8-4. Plan Quality Management Data Flow Diagram

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

- The project management plan is used to develop the quality management plan, includes:
  - Scope baseline
    - Project scope statement
    - Work breakdown structure (WBS)
    - WBS dictionary
  - Schedule baseline
  - Cost baseline
  - Other management plans

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

- The PM plan is used to develop the quality plan, includes:
  - Scope baseline
    - Project scope statement
    - Work breakdown structure (WBS)
    - WBS dictionary
  - Schedule baseline
  - Cost baseline
  - Other management plans

- Project description, major project deliverables & acceptance criteria.

- The product scope often contains details of technical issues.

- Definition of acceptance criteria may significantly increase or decrease quality costs.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

- The PM plan is used to develop the quality plan, includes:
  - Scope baseline
    - Project scope statement
    - Work breakdown structure (WBS)
    - WBS dictionary
  - Schedule baseline
  - Cost baseline
  - Other management plans

> - The WBS identifies the deliverables & the work packages used to measure project performance.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

- The PM plan is used to develop the quality plan, includes:
  - Scope baseline
    - Project scope statement
    - Work breakdown structure (WBS)
    - WBS dictionary
  - Schedule baseline
  - Cost baseline
  - Other management plans

- The WBS dictionary provides detailed information for WBS elements.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

- ☐ The PM plan is used to develop the quality plan, includes:
  - Scope baseline
    - Project scope statement
    - Work breakdown structure (WBS)
    - WBS dictionary
  - Schedule baseline
  - Cost baseline
  - Other management plans

> • The schedule baseline documents the accepted schedule performance measures, including start and finish dates.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

 ▫ The PM plan is used to develop the quality plan, includes:
- Scope baseline
    - Project scope statement
    - Work breakdown structure (WBS)
    - WBS dictionary
- Schedule baseline
- Cost baseline
- Other management plans

- The cost baseline documents the accepted time interval being used to measure cost performance.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.1 Project Management Plan (Out: 4.2)

  ◻ The PM plan is used to develop the quality plan, includes:

  ■ Scope baseline
    ■ Project scope statement
    ■ Work breakdown structure (WBS)
    ■ WBS dictionary
  ■ Schedule baseline
  ■ Cost baseline
  ■ Other management plans

> • These plans contribute to the overall project quality and may highlight actionable areas of concern with regard to the project's quality.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.2 Stakeholder Register (Out: 13.1)

- The stakeholder register aids in identifying those stakeholders possessing a particular interest in, or having an impact on, quality.

☐ 8.1.1.3 Risk Register (Out: 11.2)

- The risk register contains information on threats and opportunities that may impact quality requirements.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.4 Requirements Documentation (Out: 5.2)

- ❑ Requirements documentation captures the requirements that the project shall meet pertaining to stakeholder expectations.

- ❑ The components of the requirements documentation include:
  - ■ Project (including product).
  - ■ Quality requirements.

- ❑ The requirements are used by the project team to help plan how quality control will be implemented on the project.

8.1.1 Plan Quality Management: Inputs

- 8.1.1.5 Enterprise Environmental Factors (Out: 2.15)
  - The enterprise environmental factors that influence the Plan Quality Management process include:
    - Governmental agency regulations.
    - Rules, standards, and guidelines specific to the application area.
    - Working or operating conditions of the project or its deliverables that may affect project quality.
    - Cultural perceptions that may influence expectations about quality.

8.1.1 Plan Quality Management: Inputs

☐ 8.1.1.6 Organizational Process Assets (Out: 2.1.4)

- The organizational process assets that influence the Plan Quality Management process include:
  - Organizational quality policies, procedures, and guidelines.
  - The performing organization's quality policy, as endorsed by senior management, sets the organization's intended direction on implementing its quality management approach.
  - Historical databases.
  - Lessons learned from previous phases or projects.

8.1.2 Plan Quality Management: Tools and Techniques

- ☐ 8.1.2.1 Cost-Benefit Analysis

- ☐ 8.1.2.2 Cost of Quality (COQ)

- ☐ 8.1.2.3 Seven Basic Quality Tools

- ☐ 8.1.2.4 Benchmarking

- ☐ 8.1.2.5 Design of Experiments

- ☐ 8.1.2.6 Statistical Sampling

- ☐ 8.1.2.7 Additional Quality Planning Tools

- ☐ 8.1.2.8 Meetings
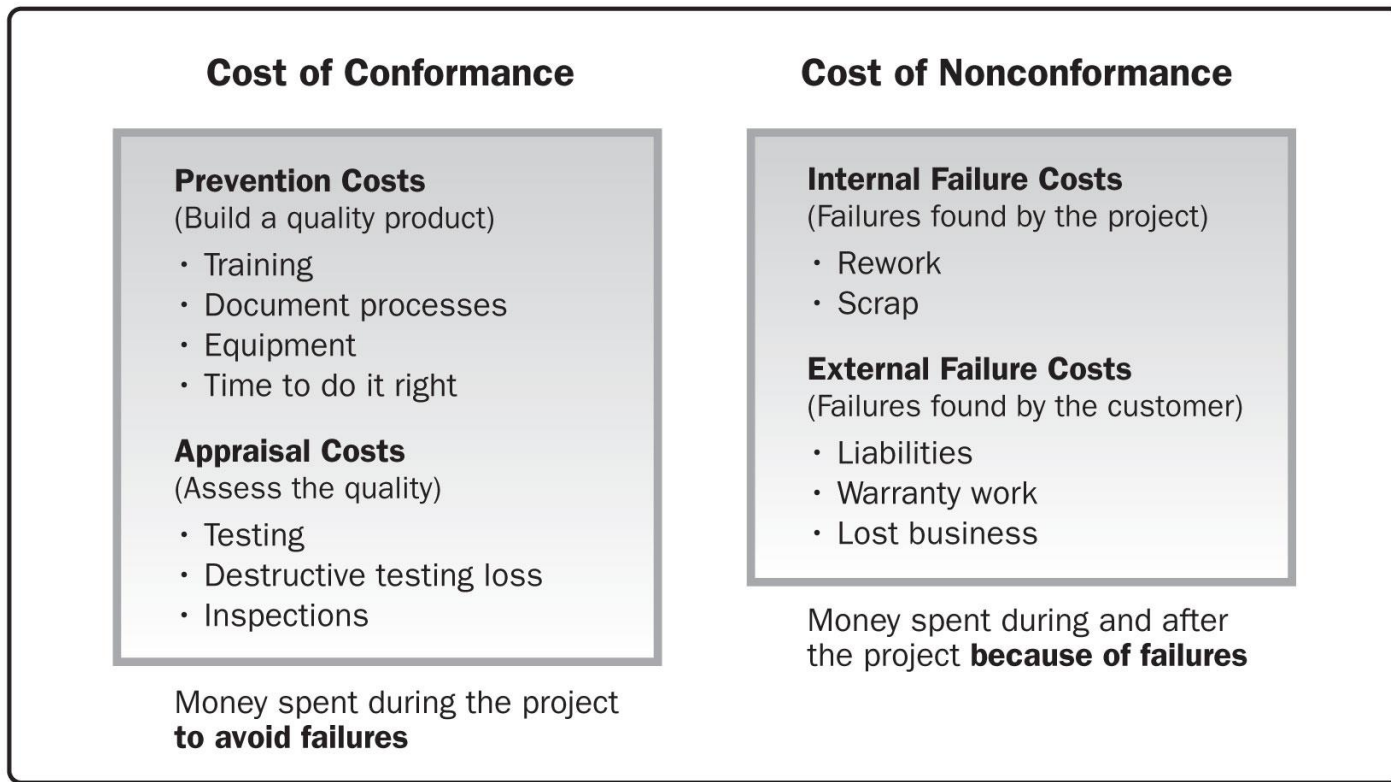
8.1.2 Plan Quality Management: Tools and Techniques

- **8.1.2.1 Cost-Benefit Analysis**
- 8.1.2.2 Cost of Quality (COQ)
- 8.1.2.3 Seven Basic Quality Tools
- 8.1.2.4 Benchmarking
- 8.1.2.5 Design of Experiments
- 8.1.2.6 Statistical Sampling
- 8.1.2.7 Additional Quality Planning Tools
- 8.1.2.8 Meetings

- The primary benefits of meeting quality requirements include:
  - Less rework.
  - Higher productivity.
  - Lower costs.
  - Increased stakeholder satisfaction.
  - Increased profitability.

- A cost-benefit analysis compares the cost of the quality step to the expected benefit

8.1.2 Plan Quality Management: Tools and Techniques

- ☐ 8.1.2.1 Cost-Benefit Analysis
- ☐ **8.1.2.2 Cost of Quality (COQ)**
- ☐ 8.1.2.3 Seven Basic Quality Tools
- ☐ 8.1.2.4 Benchmarking
- ☐ 8.1.2.5 Design of Experiments
- ☐ 8.1.2.6 Statistical Sampling
- ☐ 8.1.2.7 Additional Quality Planning Tools
- ☐ 8.1.2.8 Meetings

COQ includes all costs incurred over the life of the product by investment in:
- preventing nonconformance to requirements
- appraising the product or service for conformance to requirements
- failing to meet requirements (rework)

8.1.2 Plan Quality Management: Tools and Techniques

☐ 8.1.2.1 Cost-Benefit Analysis

☐ 8.1.2.2 Cost of Quality (COQ)

☐ 8.1.2.3 Seven Basic Quality Tools

☐ 8.1.2.4 Benchmarking

☐ 8.1.2.5 Design of Experiments

☐ 8.1.2.6 Statistical Sampling

☐ 8.1.2.7 Additional Quality Planning Tools

☐ 8.1.2.8 Meetings

Failure costs are often categorized into:
- Internal (found by the project)
- External (found by the customer)

Failure costs are also called cost of poor quality.

Cost of Conformance

Prevention Costs
(Build a quality product)

- Training
- Document processes
- Equipment
- Time to do it right

Appraisal Costs
(Assess the quality)

- Testing
- Destructive testing loss
- Inspections

Money spent during the project
to avoid failures

Cost of Nonconformance

Internal Failure Costs
(Failures found by the project)

- Rework
- Scrap

External Failure Costs
(Failures found by the customer)

- Liabilities
- Warranty work
- Lost business

Money spent during and after
the project **because of failures**

Figure 8-5. Cost of Quality

8.1.2 Plan Quality Management: Tools and Techniques

- ☐ 8.1.2.1 Cost-Benefit Analysis

- ☐ 8.1.2.2 Cost of Quality (COQ)

- ☐ 8.1.2.3 Seven Basic Quality Tools

- ☐ 8.1.2.4 Benchmarking

- ☐ 8.1.2.5 Design of Experiments

- ☐ 8.1.2.6 Statistical Sampling

- ☐ 8.1.2.7 Additional Quality Planning Tools

- ☐ 8.1.2.8 Meetings

Known as 7QC Tools, used within the context of the PDCA Cycle to solve quality-related problems.

7QC Tools are:
1. Cause-and-effect diagrams
2. Flowcharts
3. Checksheets
4. Pareto diagrams
5. Histograms
6. Control charts
7. Scatter diagrams

8.1.2 Plan Quality Management: Tools and Techniques

- 8.1.2.1 Cost-Benefit Analysis

- 8.1.2.2 Cost of Quality (COQ)

- 8.1.2.3 Seven Basic Quality Tools

- 8.1.2.4 Benchmarking

- 8.1.2.5 Design of Experiments

- 8.1.2.6 Statistical Sampling

- 8.1.2.7 Additional Quality Planning Tools

- 8.1.2.8 Meetings

Comparing actual or planned project practices to those of comparable projects to identify:
- best practices.
- generate ideas for improvement.
- provide a basis for measuring performance.

Benchmarked projects may exist within the performing organization or outside of it or can be within the same application area.

8.1.2 Plan Quality Management: Tools and Techniques

- ☐ 8.1.2.1 Cost-Benefit Analysis

- ☐ 8.1.2.2 Cost of Quality (COQ)

- ☐ 8.1.2.3 Seven Basic Quality Tools

- ☐ 8.1.2.4 Benchmarking

- ☐ 8.1.2.5 Design of Experiments (DOE)

- ☐ 8.1.2.6 Statistical Sampling

- ☐ 8.1.2.7 Additional Quality Planning Tools

- ☐ 8.1.2.8 Meetings

A statistical method for identifying which factors may influence specific variables of a product or process.

Used during the Plan Quality Management to determine the number & type of tests & their impact on cost of quality.

DOE also plays a role in optimizing products or processes.

DOE is used to reduce the sensitivity of product performance to sources of variations caused by environmental or manufacturing differences.

8.1.2 Plan Quality Management: Tools and Techniques

- ☐ 8.1.2.1 Cost-Benefit Analysis

- ☐ 8.1.2.2 Cost of Quality (COQ)

- ☐ 8.1.2.3 Seven Basic Quality Tools

- ☐ 8.1.2.4 Benchmarking

- ☐ 8.1.2.5 Design of Experiments

- ☐ 8.1.2.6 Statistical Sampling

- ☐ 8.1.2.7 Additional Quality Planning Tools

- ☐ 8.1.2.8 Meetings

Choosing part of a population of interest for inspection
- Ex: Selecting ten engineering drawings at random from a list of seventy-five.

Sample frequency & sizes should be determined during the Plan Quality Management process

8.1.2 Plan Quality Management: Tools and Techniques

- 8.1.2.1 Cost-Benefit Analysis

- 8.1.2.2 Cost of Quality (COQ)

- 8.1.2.3 Seven Basic Quality Tools

- 8.1.2.4 Benchmarking

- 8.1.2.5 Design of Experiments

- 8.1.2.6 Statistical Sampling

- 8.1.2.7 Additional Quality Planning Tools

- 8.1.2.8 Meetings

Used to define the quality requirements and to plan effective quality management activities:
- Brainstorming
- Force field analysis
- Nominal group technique
- Quality management and control tools

8.1.2 Plan Quality Management: Tools and Techniques

- ☐ 8.1.2.1 Cost-Benefit Analysis

- ☐ 8.1.2.2 Cost of Quality (COQ)

- ☐ 8.1.2.3 Seven Basic Quality Tools

- ☐ 8.1.2.4 Benchmarking

- ☐ 8.1.2.5 Design of Experiments

- ☐ 8.1.2.6 Statistical Sampling

- ☐ 8.1.2.7 Additional Quality Planning Tools

- ☐ 8.1.2.8 Meetings

Project teams may hold planning meetings to develop the quality management plan.

Attendees at these meetings may include:
- The project manager
- The project sponsor
- Selected project team members
- Selected stakeholders
- Anyone with responsibility for Project Quality Management activities
- Perform Quality Assurance
- Control Quality
- Others as needed.

8.1.3 Plan Quality Management: Outputs

- 8.1.3.1 Quality Management Plan

  - The quality management plan is a component of the project management plan that describes how the organization's quality policies will be implemented.

8.1.3 Plan Quality Management: Outputs

☐ 8.1.3.2 Process Improvement Plan

- A subsidiary or component of the project management plan.

- Details the steps for analyzing project management and product development processes to identify activities that enhance their value.

- Areas to consider include:

  - Process boundaries

  - Process configuration

  - Process metrics

  - Targets for improved performance

8.1.3 Plan Quality Management: Outputs

- ☐ 8.1.3.3 Quality Metrics

  - ☐ Describes **a project or product attribute & how the control quality process will measure it.**

    - A measurement is an <u>actual value</u>.

    - The **tolerance** defines the allowable variations to the metric.

    - Quality metrics are used in the perform quality assurance and control quality processes, Some examples of quality metrics include:

      - On-time performance

      - Cost control   Defect frequency

      - Failure rate   Availability

      - Reliability   Test coverage.

8.1.3 Plan Quality Management: Outputs

- ## 8.1.3.4 Quality Checklists

  - A checklist is a structured tool, usually component-specific, used to verify that a set of required steps has been performed.

    - Based on the project's requirements and practices, checklists may be simple or complex.

    - 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.

    - Quality checklists should incorporate the acceptance criteria included in the scope baseline.

8.1.3 Plan Quality Management: Outputs

- 8.1.3.5 Project Documents Updates
  - Project documents that may be updated include:
    - Stakeholder register.
    - Responsibility assignment matrix.
    - WBS and WBS Dictionary.

□ The process of **auditing the quality requirements** and **the results from quality control measurements** to ensure that appropriate quality standards and operational definitions are used.

▫ The key benefit of this process is:

■ It facilitates the improvement of quality processes.

Inputs	Tools & Techniques	Outputs
.1 Quality management plan .2 Process improvement plan .3 Quality metrics .4 Quality control measurements .5 Project documents	.1 Quality management and control tools .2 Quality audits .3 Process analysis	.1 Change requests .2 Project management plan updates .3 Project documents updates .4 Organizational process assets updates

Figure 8-8. Perform Quality Assurance: Inputs, Tools & Techniques, and Outputs
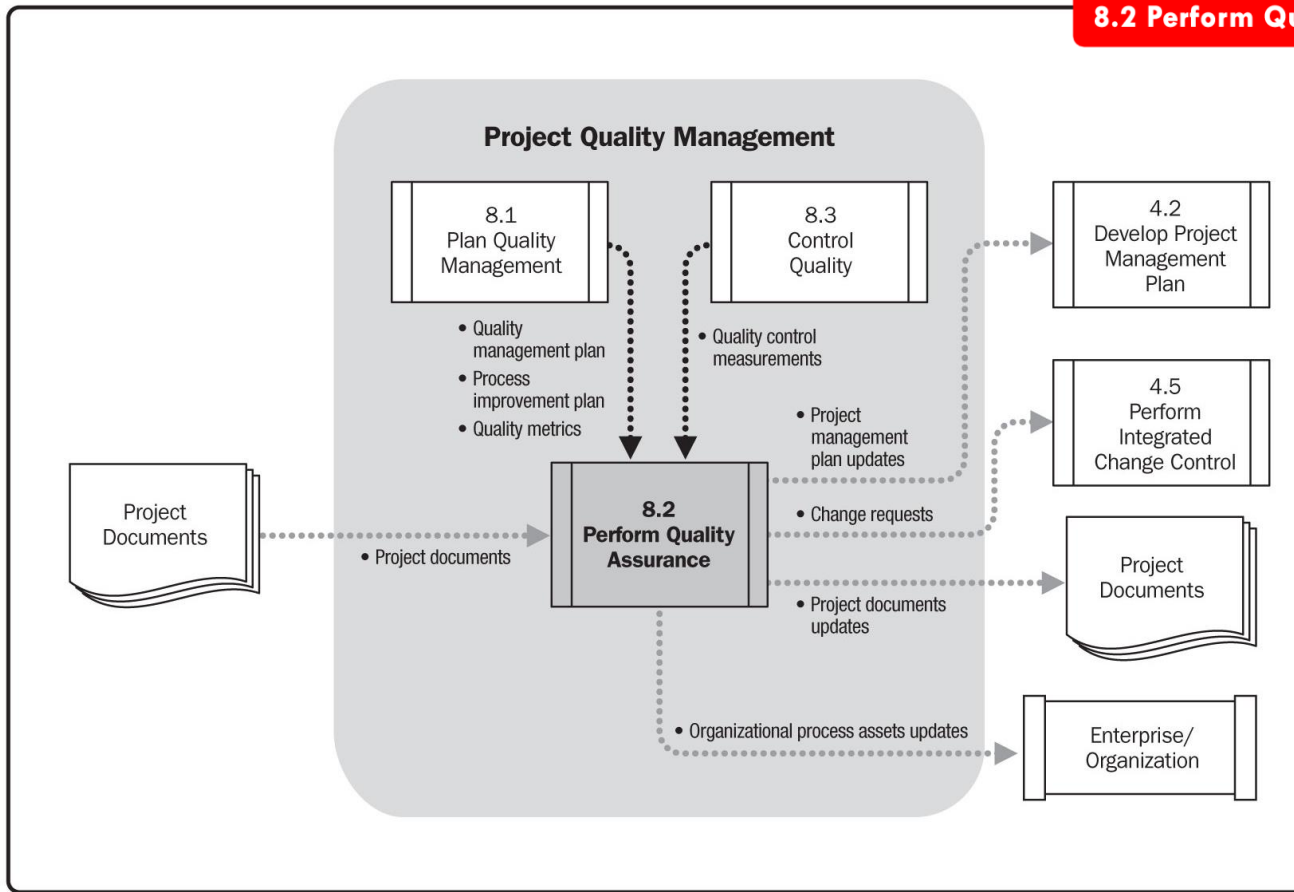
Figure 8-9. Perform Quality Assurance Data Flow Diagram

Project Quality Management

8.1 Plan Quality Management

8.3 Control Quality

4.2 Develop Project Management Plan

4.5 Perform Integrated Change Control

• Quality management plan
• Process improvement plan
• Quality metrics

• Quality control measurements

• Project management plan updates

Project Documents

• Project documents

8.2 Perform Quality Assurance

• Change requests

• Project documents updates

Project Documents

• Organizational process assets updates

Enterprise/ Organization

☐ 8.2.1.1 Quality Management Plan (Out: 8.1)

☐ 8.2.1.2 Process Improvement Plan (Out: 8.1)

☐ 8.2.1.3 Quality Metrics (Out: 8.1)

☐ 8.2.1.4 Quality Control Measurements (Out: 8.3)

☐ 8.2.1.5 Project Documents

- **8.2.1.1 Quality Management Plan (Out: 8.1)**

- 8.2.1.2 Process Improvement Plan (Out: 8.1)

- 8.2.1.3 Quality Metrics (Out: 8.1)

- 8.2.1.4 Quality Control Measurements (Out: 8.3)

- 8.2.1.5 Project Documents

The quality management plan describes the quality assurance and continuous process improvement approaches for the project.

- 8.2.1.1 Quality Management Plan (Out: 8.1)

- 8.2.1.2 Process Improvement Plan (Out: 8.1)

- 8.2.1.3 Quality Metrics (Out: 8.1)

- 8.2.1.4 Quality Control Measurements (Out: 8.3)

- 8.2.1.5 Project Documents

The project's quality assurance activities should be supportive of and consistent with the performing organization's process improvement plans.

- ☐ 8.2.1.1 Quality Management Plan (Out: 8.1)

- ☐ 8.2.1.2 Process Improvement Plan (Out: 8.1)

- ☐ 8.2.1.3 Quality Metrics (Out: 8.1)

- ☐ 8.2.1.4 Quality Control Measurements (Out: 8.3)

- ☐ 8.2.1.5 Project Documents

The quality metrics provide the attributes that should be measured and the allowable variations.

☐ 8.2.1.1 Quality Management Plan (Out: 8.1)

☐ 8.2.1.2 Process Improvement Plan (Out: 8.1)

☐ 8.2.1.3 Quality Metrics (Out: 8.1)

☐ 8.2.1.4 Quality Control Measurements (Out: 8.3)

☐ 8.2.1.5 Project Documents

The results of control quality activities.

Used to analyze and evaluate the quality of the processes of the project against the standards of the performing organization or the requirements specified.

Also compare the processes used to create the measurements, and validate actual measurements to determine their level of correctness.

- 8.2.1.1 Quality Management Plan (Out: 8.1)

- 8.2.1.2 Process Improvement Plan (Out: 8.1)

- 8.2.1.3 Quality Metrics (Out: 8.1)

- 8.2.1.4 Quality Control Measurements (Out: 8.3)

- 8.2.1.5 Project Documents

Project documents may influence quality assurance work and should be monitored within the context of a system for configuration management.

- 8.2.2.1 Quality Management and Control Tools

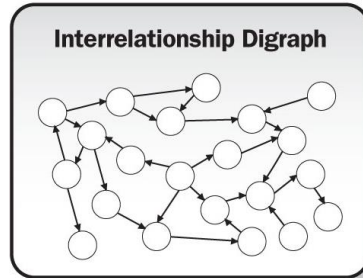- 8.2.2.2 Quality Audits

- 8.2.2.3 Process Analysis

☐ **8.2.2.1 Quality Management and Control Tools**

- ❏ The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

- ❏ Other tools that are available include:

  - ■ Affinity diagrams

  - ■ Process decision program charts (PDPC).

  - ■ Interrelationship digraphs

  - ■ Tree diagrams

  - ■ Prioritization matrices

  - ■ Activity network diagrams

  - ■ Matrix diagrams

8.2.2.1 Quality Management and Control Tools

- The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

- Other tools that are available include:
  - Affinity diagrams
  - Process decision program charts (PDPC).
  - Interrelationship digraphs
  - Tree diagrams
  - Prioritization matrices
  - Activity network diagrams
  - Matrix diagrams
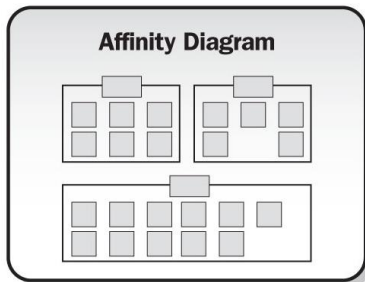
The affinity diagram is similar to mind-mapping techniques in that they are used to generate ideas that can be linked to form organized patterns of thought about a problem.

In project management, the creation of the WBS may be enhanced by using the affinity diagram to give structure to the decomposition of scope.
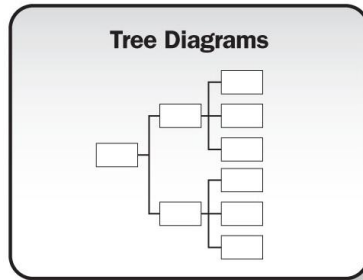

Affinity Diagram

8.2.2.1 Quality Management and Control Tools

- The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

- Other tools that are available include:
  - Affinity diagrams
  - Process decision program charts (PDPC).
  - Interrelationship digraphs
  - Tree diagrams
  - Prioritization matrices
  - Activity network diagrams
  - Matrix diagrams
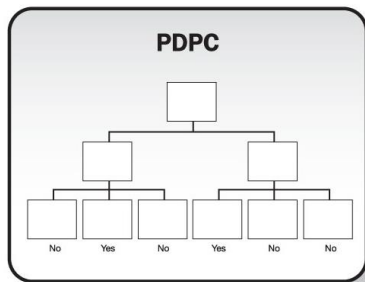
Used to understand a goal in relation to the steps for getting to the goal.

The PDPC is useful as a method for contingency planning because it aids teams in anticipating intermediate steps that could derail achievement of the goal.
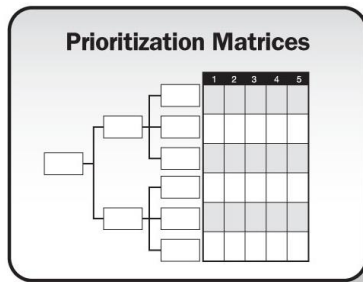

PDPC

8.2.2.1 Quality Management and Control Tools

- The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

- Other tools that are available include:
  - Affinity diagrams
  - Process decision program charts (PDPC).
  - Interrelationship digraphs
  - Tree diagrams
  - Prioritization matrices
  - Activity network diagrams
  - Matrix diagrams

An adaptation of relationship diagrams. The interrelationship digraphs provide a process for creative problem solving in moderately complex scenarios that possess intertwined logical relationships for up to 50 relevant items.

The interrelationship digraph may be developed from data generated in other tools such as the affinity diagram, the tree diagram, or the fishbone diagram.
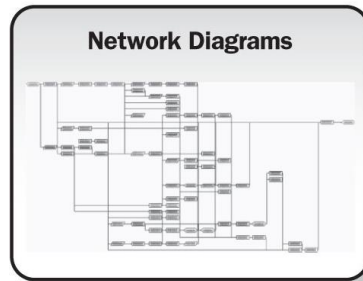

Interrelationship Digraph

□ 8.2.2.1 Quality Management and Control Tools

■ The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

■ Other tools that are available include:

- Affinity diagrams
- Process decision program charts (PDPC).
- Interrelationship digraphs
- **Tree diagrams**
- Prioritization matrices
- Activity network diagrams
- Matrix diagrams

Tree Diagrams

Known as systematic diagrams & may be used to represent decomposition hierarchies such as the WBS, RBS (risk breakdown structure) & OBS (organizational breakdown structure).

Tree diagrams are useful in visualizing the parent-to-child relationships in any decomposition hierarchy that uses a systematic set of rules that define a nesting relationship.

Tree diagrams can be depicted horizontally (such as a risk breakdown structure) or vertically (such as a team hierarchy or OBS).

□ 8.2.2.1 Quality Management and Control Tools

◻ The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

◻ Other tools that are available include:

- Affinity diagrams
- Process decision program charts (PDPC).
- Interrelationship digraphs
- Tree diagrams
- Prioritization matrices
- Activity network diagrams
- Matrix diagrams

Identify the key issues and the suitable alternatives to be prioritized as a set of decisions for implementation.

Criteria are prioritized and weighted before being applied to all available alternatives to obtain a mathematical score that ranks the options.


Prioritization Matrices

□ **8.2.2.1 Quality Management and Control Tools**

▪ The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

▪ Other tools that are available include:
  - Affinity diagrams
  - Process decision program charts (PDPC).
  - Interrelationship digraphs
  - Tree diagrams
  - Prioritization matrices
  - Activity network diagrams
  - Matrix diagrams

Network Diagrams

> Previously known as arrow diagrams. They include both the AOA (Activity on Arrow) and, most commonly used, AON (Activity on Node) formats of a network diagram.
>
> Activity network diagrams are used with project scheduling methodologies such as program evaluation and review technique (PERT), critical path method (CPM), and precedence diagramming method (PDM).

8.2.2.1 Quality Management and Control Tools

- The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes.

- Other tools that are available include:

  - Affinity diagrams

  - Process decision program charts (PDPC).

  - Interrelationship digraphs

  - Tree diagrams

  - Prioritization matrices

  - Activity network diagrams
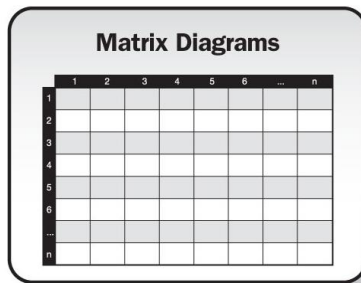
  - Matrix diagrams

A quality management and control tool used to perform data analysis within the organizational structure created in the matrix.

The matrix diagram seeks to show the strength of relationships between factors, causes, and objectives that exist between the rows and columns that form the matrix.

Matrix Diagrams

Affinity Diagram

PDPC

No   Yes   No   Yes   No   No

Interrelationship Digraph

Tree Diagrams

Prioritization Matrices

Network Diagrams

Matrix Diagrams
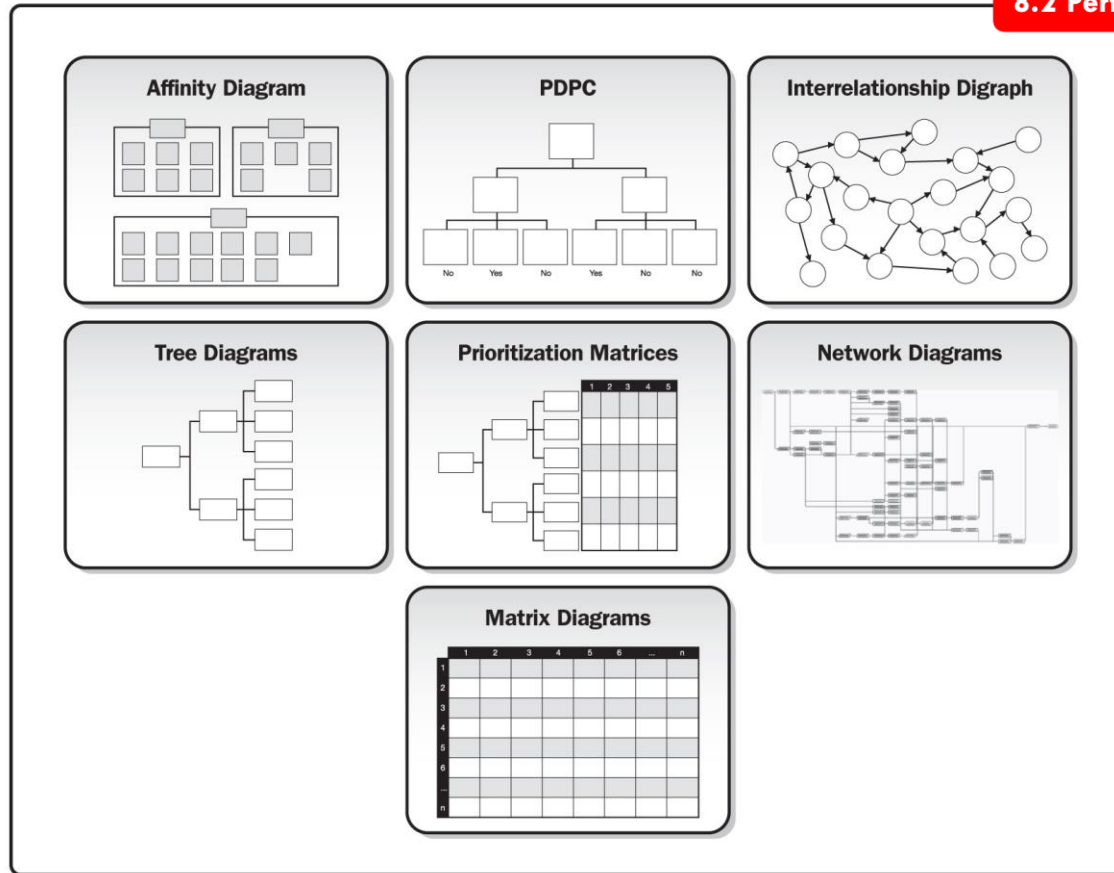
Figure 8-10. Storyboard Illustrating the Seven Quality Management and Control Tools

☐ 8.2.2.2 Quality Audits

▪ A quality audit is a **structured, independent** process to <u>determine if project activities comply with organizational and project policies, processes, and procedures</u>.

▪ The objectives of a quality audit may include:

- Identify all good and best practices being implemented.

- Identify all nonconformity, gaps, and shortcomings.

- Share good practices introduced or implemented in similar projects in the organization and/or industry.

- Proactively offer assistance in a positive manner to improve implementation of processes to help the team raise productivity.

- Highlight contributions of each audit in the lessons learned repository of the organization.

☐ 8.2.2.3 Process Analysis

  ◻ Process analysis follows the steps outlined in the process improvement plan to identify needed improvements.

- 8.2.3.1 Change Requests

- 8.2.3.2 Project Management Plan Updates

- 8.2.3.3 Project Documents Updates

- 8.2.3.4 Organizational Process Assets Updates

□ 8.2.3.1 Change Requests

   ■ Change requests are created and used as input into the Perform Integrated Change Control process (Section 4.5) to allow full consideration of the recommended improvements.

   ■ Change requests are used to take corrective action, preventive action, or to perform defect repair.

☐ 8.2.3.2 Project Management Plan Updates

◘ Elements of the project management plan that may be updated include, but are not limited to:

■ Quality management plan (Section 8.1.3.1).

■ Scope management plan (Section 5.1.3.1).

■ Schedule management plan (Section 6.1.3.1).

■ Cost management plan (7.1.3.1).

☐ 8.2.3.3 Project Documents Updates

▪ Project documents that may be updated include, but are not limited to:

- Quality audit reports.
- Training plans.
- Process documentation.

☐ 8.2.3.4 Organizational Process Assets Updates

▪ Elements of the organizational process assets that may be updated include:

- The organization's quality standards
- The quality management system.

- Control Quality is **the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.**

  - The key benefits of this process include:
    - Identifying the causes of poor process or product quality and recommending and/or taking action to eliminate them.
    - Validating that project deliverables and work meet the requirements specified by key stakeholders necessary for final acceptance.

- ☐ 8.3.1.1 Project Management Plan (Out: 4.2)

- ☐ 8.3.1.2 Quality Metrics (Out: 8.1)

- ☐ 8.3.1.3 Quality Checklists (Out: 8.1)

- ☐ 8.3.1.4 Work Performance Data (Out: 4.3)

- ☐ 8.3.1.5 Approved Change Requests (Out: 4.5)

- ☐ 8.3.1.6 Deliverables (Out: 4.3)

- ☐ 8.3.1.7 Project Documents

- ☐ 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

- **8.3.1.1 Project Management Plan (Out: 4.2)**

- 8.3.1.2 Quality Metrics (Out: 8.1)

- 8.3.1.3 Quality Checklists (Out: 8.1)

- 8.3.1.4 Work Performance Data (Out: 4.3)

- 8.3.1.5 Approved Change Requests (Out: 4.5)

- 8.3.1.6 Deliverables (Out: 4.3)

- 8.3.1.7 Project Documents

- 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

The project management plan contains the quality management plan, which is used to control quality.

The quality management plan describes how quality control will be performed within the project.

- ☐ 8.3.1.1 Project Management Plan (Out: 4.2)

- ☐ **8.3.1.2 Quality Metrics (Out: 8.1)**

- ☐ 8.3.1.3 Quality Checklists (Out: 8.1)

- ☐ 8.3.1.4 Work Performance Data (Out: 4.3)

- ☐ 8.3.1.5 Approved Change Requests (Out: 4.5)

- ☐ 8.3.1.6 Deliverables (Out: 4.3)

- ☐ 8.3.1.7 Project Documents

- ☐ 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

A quality metric describes a project or product attribute and how it will be measured.

Examples of quality metrics include:
- Function points
- Mean time between failure (MTBF)
- Mean time to repair (MTTR)

☐ 8.3.1.1 Project Management Plan (Out: 4.2)

☐ 8.3.1.2 Quality Metrics (Out: 8.1)

☐ **8.3.1.3 Quality Checklists (Out: 8.1)**

☐ 8.3.1.4 Work Performance Data (Out: 4.3)

☐ 8.3.1.5 Approved Change Requests (Out: 4.5)

☐ 8.3.1.6 Deliverables (Out: 4.3)

☐ 8.3.1.7 Project Documents

☐ 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

> Quality checklists are structured lists that help to verify that the work of the project and its deliverables fulfill a set of requirements

- 8.3.1.1 Project Management Plan (Out: 4.2)

- 8.3.1.2 Quality Metrics (Out: 8.1)

- 8.3.1.3 Quality Checklists (Out: 8.1)

- 8.3.1.4 Work Performance Data (Out: 4.3)

- 8.3.1.5 Approved Change Requests (Out: 4.5)

- 8.3.1.6 Deliverables (Out: 4.3)

- 8.3.1.7 Project Documents

- 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

Work performance data can include:
- Planned vs. actual technical performance.
- Planned vs. actual schedule performance.
- Planned vs. actual cost performance.

- 8.3.1.1 Project Management Plan (Out: 4.2)

- 8.3.1.2 Quality Metrics (Out: 8.1)

- 8.3.1.3 Quality Checklists (Out: 8.1)

- 8.3.1.4 Work Performance Data (Out: 4.3)

- 8.3.1.5 Approved Change Requests (Out: 4.5)

- 8.3.1.6 Deliverables (Out: 4.3)

- 8.3.1.7 Project Documents

- 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

As part of the Perform Integrated Change Control process, a change log update indicates that some changes are approved and some are not.

Approved change requests may include modifications such as defect repairs, revised work methods, and revised schedule. The timely implementation of approved changes needs to be verified.

- 8.3.1.1 Project Management Plan (Out: 4.2)

- 8.3.1.2 Quality Metrics (Out: 8.1)

- 8.3.1.3 Quality Checklists (Out: 8.1)

- 8.3.1.4 Work Performance Data (Out: 4.3)

- 8.3.1.5 Approved Change Requests (Out: 4.5)

- 8.3.1.6 Deliverables (Out: 4.3)

- 8.3.1.7 Project Documents

- 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

A deliverable is any unique and verifiable product, result, or capability that results in a validated deliverable required by the project.

- ☐ 8.3.1.1 Project Management Plan (Out: 4.2)

- ☐ 8.3.1.2 Quality Metrics (Out: 8.1)

- ☐ 8.3.1.3 Quality Checklists (Out: 8.1)

- ☐ 8.3.1.4 Work Performance Data (Out: 4.3)

- ☐ 8.3.1.5 Approved Change Requests (Out: 4.5)

- ☐ 8.3.1.6 Deliverables (Out: 4.3)

- ☐ 8.3.1.7 Project Documents

- ☐ 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

Project documents may include:
- Agreements.
- Quality audit reports and change logs supported with corrective action plans.
- Training plans and assessments of effectiveness.
- Process documentation such as those obtained using either the seven basic quality tools or the quality management and control tools

- ☐ 8.3.1.1 Project Management Plan (Out: 4.2)

- ☐ 8.3.1.2 Quality Metrics (Out: 8.1)

- ☐ 8.3.1.3 Quality Checklists (Out: 8.1)

- ☐ 8.3.1.4 Work Performance Data (Out: 4.3)

- ☐ 8.3.1.5 Approved Change Requests (Out: 4.5)

- ☐ 8.3.1.6 Deliverables (Out: 4.3)

- ☐ 8.3.1.7 Project Documents

- ☐ 8.3.1.8 Organizational Process Assets (Out: 2.1.4)

The organizational process assets that influence the Control Quality process include:
- The organization's quality standards and policies.
- Standard work guidelines.
- Issue and defect reporting procedures and communication policies.

- 8.3.2.1 Seven Basic Quality Tools

- 8.3.2.2 Statistical Sampling

- 8.3.2.3 Inspection

- 8.3.2.4 Approved Change Requests Review

- **8.3.2.1 Seven Basic Quality Tools**

- 8.3.2.2 Statistical Sampling

- 8.3.2.3 Inspection

- 8.3.2.4 Approved Change Requests Review

Described in Section 8.1.2.3.

The seven basic quality tools are illustrated conceptually in Figure 8-7.

- ☐ 8.3.2.1 Seven Basic Quality Tools

- ☐ **8.3.2.2 Statistical Sampling**

- ☐ 8.3.2.3 Inspection

- ☐ 8.3.2.4 Approved Change Requests Review

Described in Section 8.1.2.6

Samples are selected and tested as defined in the quality management plan.

- 8.3.2.1 Seven Basic Quality Tools

- 8.3.2.2 Statistical Sampling

- **8.3.2.3 Inspection**

- 8.3.2.4 Approved Change Requests Review

An inspection is the examination of a work product to determine if it conforms to documented standards.

The results of an inspection generally include measurements and may be conducted at any level.

Example, the results of a single activity can be inspected, or the final product of the project can be inspected. Inspections may be called reviews, peer reviews, audits, or walkthroughs. In some application areas, these terms have narrow and specific meanings. Inspections also are used to validate defect repairs.

- 8.3.2.1 Seven Basic Quality Tools

- 8.3.2.2 Statistical Sampling

- 8.3.2.3 Inspection

- 8.3.2.4 Approved Change Requests Review

All approved change requests should be reviewed to verify that they were implemented as approved.

- ☐ 8.3.3.1 Quality Control Measurements

- ☐ 8.3.3.2 Validated Changes

- ☐ 8.3.3.3 Verified Deliverables

- ☐ 8.3.3.4 Work Performance Information

- ☐ 8.3.3.5 Change Requests

- ☐ 8.3.3.6 Project Management Plan Updates

- ☐ 8.3.3.7 Project Documents Updates

- ☐ 8.3.3.8 Organizational Process Assets Updates

- ☐ **8.3.3.1 Quality Control Measurements**

- ☐ 8.3.3.2 Validated Changes

- ☐ 8.3.3.3 Verified Deliverables

- ☐ 8.3.3.4 Work Performance Information

- ☐ 8.3.3.5 Change Requests

- ☐ 8.3.3.6 Project Management Plan Updates

- ☐ 8.3.3.7 Project Documents Updates

- ☐ 8.3.3.8 Organizational Process Assets Updates

Quality control measurements are the **documented results of control quality activities.**

They should be captured in the format that was specified through the Plan Quality Management process.

- 8.3.3.1 Quality Control Measurements

- **8.3.3.2 Validated Changes**

- 8.3.3.3 Verified Deliverables

- 8.3.3.4 Work Performance Information

- 8.3.3.5 Change Requests

- 8.3.3.6 Project Management Plan Updates

- 8.3.3.7 Project Documents Updates

- 8.3.3.8 Organizational Process Assets Updates

Any changed or repaired items are inspected and will be either accepted or rejected before notification of the decision is provided. Rejected items may require rework.

- ☐ 8.3.3.1 Quality Control Measurements

- ☐ 8.3.3.2 Validated Changes

- ☐ **8.3.3.3 Verified Deliverables**

- ☐ 8.3.3.4 Work Performance Information

- ☐ 8.3.3.5 Change Requests

- ☐ 8.3.3.6 Project Management Plan Updates

- ☐ 8.3.3.7 Project Documents Updates

- ☐ 8.3.3.8 Organizational Process Assets Updates

A goal of the Control Quality process is to determine the correctness of deliverables.

The results of performing the Control Quality process are verified deliverables.

Verified deliverables are an input to Validate Scope (5.5.1.4) for formalized acceptance.

- 8.3.3.1 Quality Control Measurements

- 8.3.3.2 Validated Changes

- 8.3.3.3 Verified Deliverables

- **8.3.3.4 Work Performance Information**

- 8.3.3.5 Change Requests

- 8.3.3.6 Project Management Plan Updates

- 8.3.3.7 Project Documents Updates

- 8.3.3.8 Organizational Process Assets Updates

Work performance information is the performance data collected from various controlling processes, analyzed in context and integrated based on relationships across areas.

Examples include information about the project requirements fulfillment such as causes for rejections, rework required, or the need for process adjustments.

☐ 8.3.3.1 Quality Control Measurements

☐ 8.3.3.2 Validated Changes

☐ 8.3.3.3 Verified Deliverables

☐ 8.3.3.4 Work Performance Information

☐ **8.3.3.5 Change Requests**

☐ 8.3.3.6 Project Management Plan Updates

☐ 8.3.3.7 Project Documents Updates

☐ 8.3.3.8 Organizational Process Assets Updates

If the recommended corrective or preventive actions or a defect repair requires a change to the project management plan, a change request (Section 4.4.3.1) should be initiated in accordance with the defined Perform Integrated Change Control (4.5) process.

- ☐ 8.3.3.1 Quality Control Measurements

- ☐ 8.3.3.2 Validated Changes

- ☐ 8.3.3.3 Verified Deliverables

- ☐ 8.3.3.4 Work Performance Information

- ☐ 8.3.3.5 Change Requests

- ☐ **8.3.3.6 Project Management Plan Updates**

- ☐ 8.3.3.7 Project Documents Updates

- ☐ 8.3.3.8 Organizational Process Assets Updates

Elements of the project management plan that may be updated include:
- Quality management plan
- Process improvement plan

- 8.3.3.1 Quality Control Measurements

- 8.3.3.2 Validated Changes

- 8.3.3.3 Verified Deliverables

- 8.3.3.4 Work Performance Information

- 8.3.3.5 Change Requests

- 8.3.3.6 Project Management Plan Updates

- 8.3.3.7 Project Documents Updates

- 8.3.3.8 Organizational Process Assets Updates

Project documents that may be updated include:
- Quality standards.
- Agreements.
- Quality audit reports and change logs supported with corrective action plans;
- Training plans and assessments of effectiveness.
- Process documentation, such as information obtained using the seven basic quality tools or the quality management and control tools.

☐ 8.3.3.1 Quality Control Measurements

☐ 8.3.3.2 Validated Changes

☐ 8.3.3.3 Verified Deliverables

☐ 8.3.3.4 Work Performance Information

☐ 8.3.3.5 Change Requests

☐ 8.3.3.6 Project Management Plan Updates

☐ 8.3.3.7 Project Documents Updates

☐ 8.3.3.8 Organizational Process Assets Updates

Elements of the organizational process assets that may be updated include:
- Completed checklists.
- Lessons learned documentation.

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