

PROJECT QUALITY MANAGEMENT

Basics

- ISO 9000-Quality: “the degree to which a set of inherent characteristics fulfill requirements”
- The project management team should determine the appropriate levels of accuracy and precision for use in the quality management plan.
 - *Precision* is a measure of exactness.
 - *Accuracy* is an assessment of correctness.

Definition

- Project Quality Management includes 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 works to ensure that the project requirements, including product requirements, are met and validated.
- Every project should have a quality management plan. Project teams should follow the quality management plan and should have data to demonstrate compliance with the plan-ISO

Introduction

- In the context of achieving ISO compatibility, modern quality management approaches seek to minimize variation and to deliver results that meet defined requirements. These approaches recognize the importance of:
 - **Customer satisfaction.** Understanding, evaluating, defining, and managing requirements so that customer expectations are met.
 - **Prevention over inspection.** Quality should be planned, designed, and built into—not inspected into the project's management or the project's deliverables.
 - **Continuous improvement.** The PDCA (plan-do-check-act) cycle is the basis for quality improvement.
 - Total Quality Management (TQM)
 - Six Sigma
 - *Organizational Project Management Maturity Model (OPM3)*
 - Capability Maturity Model Integrated (CMMI_R).

Introduction

- **Management Responsibility.** Success requires the participation of all members of the project team
- **Cost of quality (COQ).** Cost of quality refers to the total cost of the conformance work and the nonconformance work that should be done as a compensatory effort because, on the first attempt to perform that work, the potential exists that some portion of the required work effort may be done or has been done incorrectly..

Project Quality Management processes

Project Quality Management processes, which include:

- **Plan Quality Management**—The process of identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements.
- **Perform Quality Assurance**—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.
- **Control Quality**—The process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes.

Quality Planning

- Expected Level of Quality can only be achieved through necessary quality planning during project initiation
- Attributes of Quality Requirements
 - Completeness Criteria
 - Correctness Criteria
 - Usefulness Criteria

Plan Quality Management

- provides guidance and direction on how quality will be managed and validated throughout the project

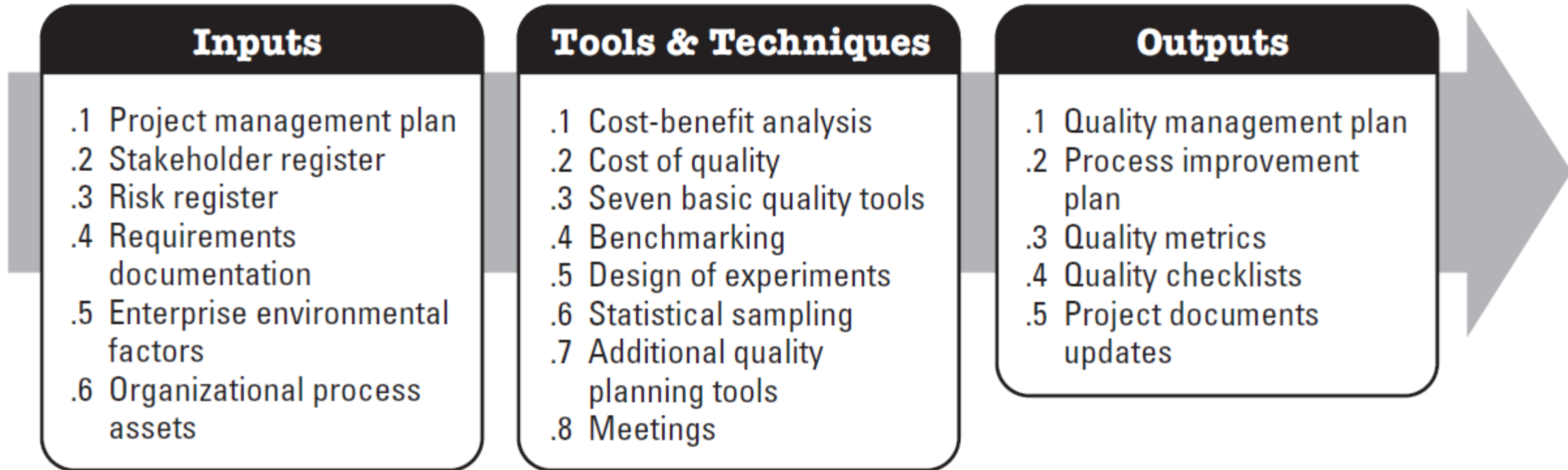


Figure 8-3. Plan Quality Management Inputs, Tools & Techniques, and Outputs

Plan Quality Management: Inputs

- **Project Management Plan:-** Scope baseline (*Project scope statement, Work breakdown structure (WBS), WBS dictionary*), Schedule baseline, Cost baseline, Other management plans, etc.
- **Stakeholder Register**
- **Risk Register**
- **Requirements Documentation**
- **Enterprise Environmental Factors**
- **Organizational Process Assets**

Plan Quality Management: Tools and Techniques- Cost of Quality (COQ)

- Cost of quality includes all costs incurred over the life of the product by investment in preventing non-conformance to requirements, appraising the product or service for conformance to requirements, and failing to meet requirements (rework).

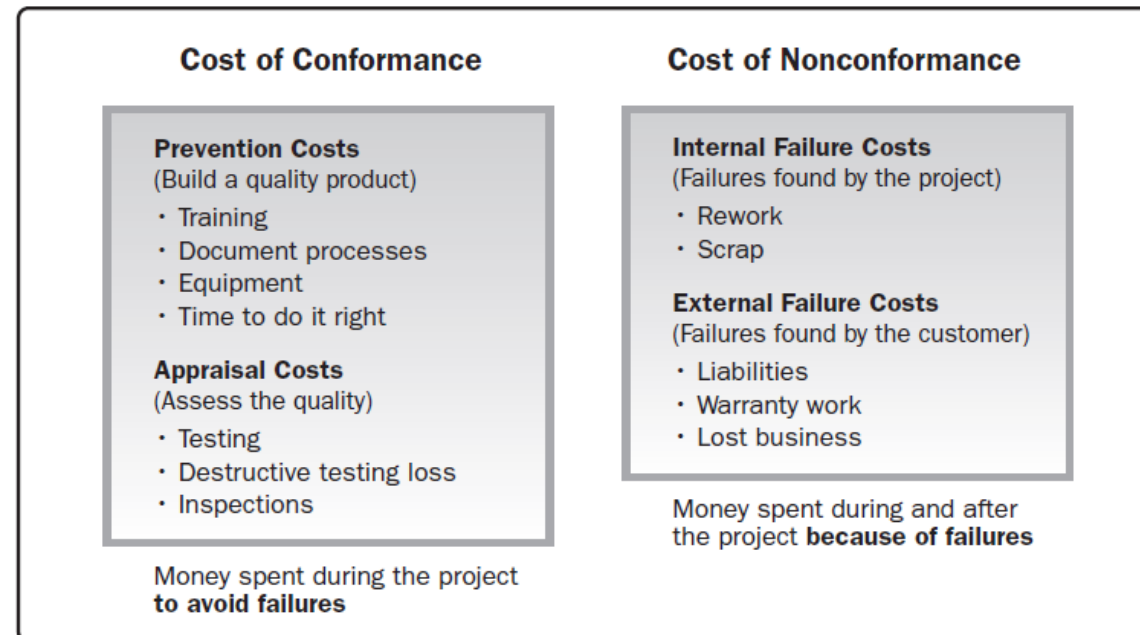
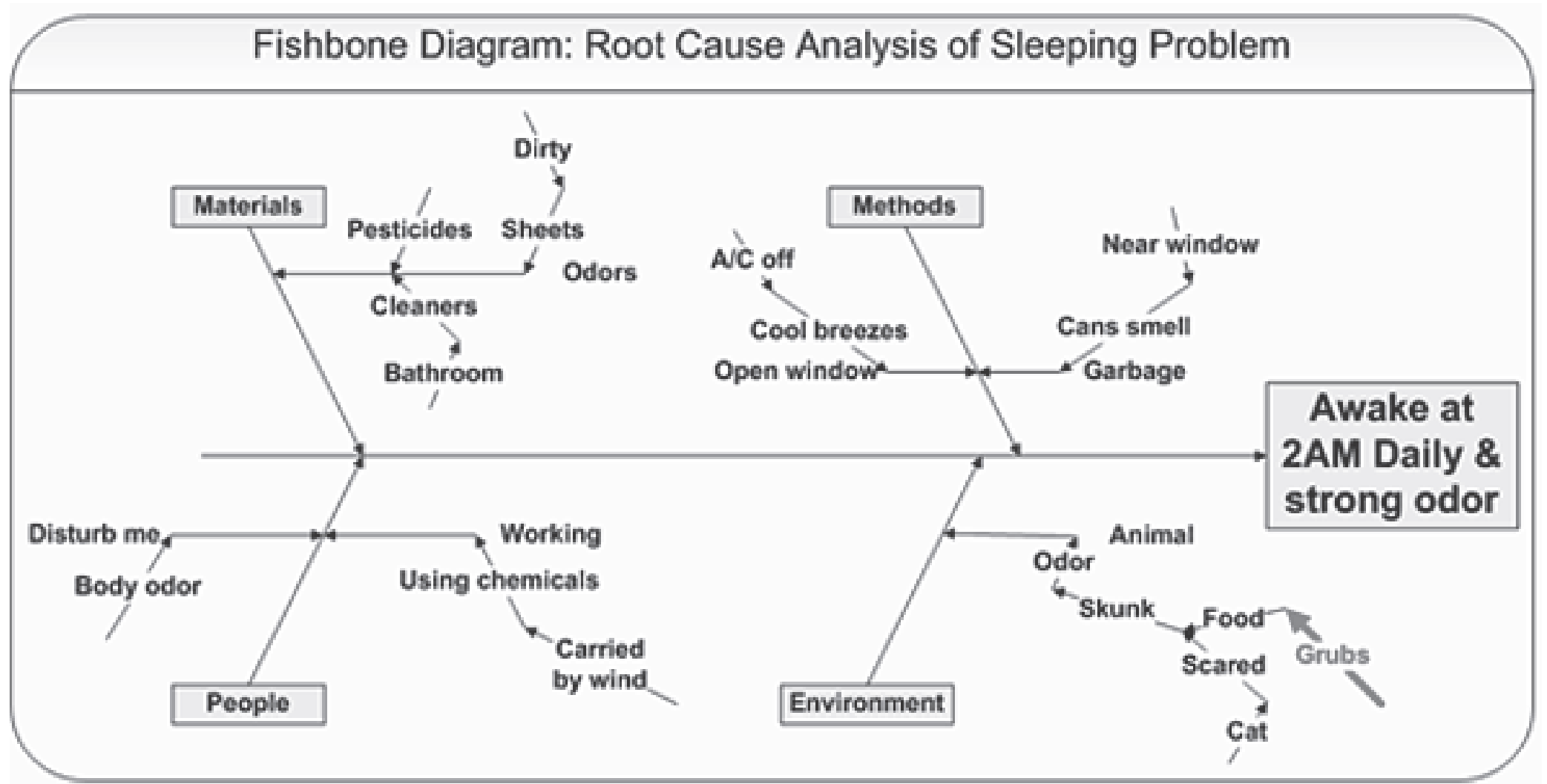


Figure 8-5. Cost of Quality

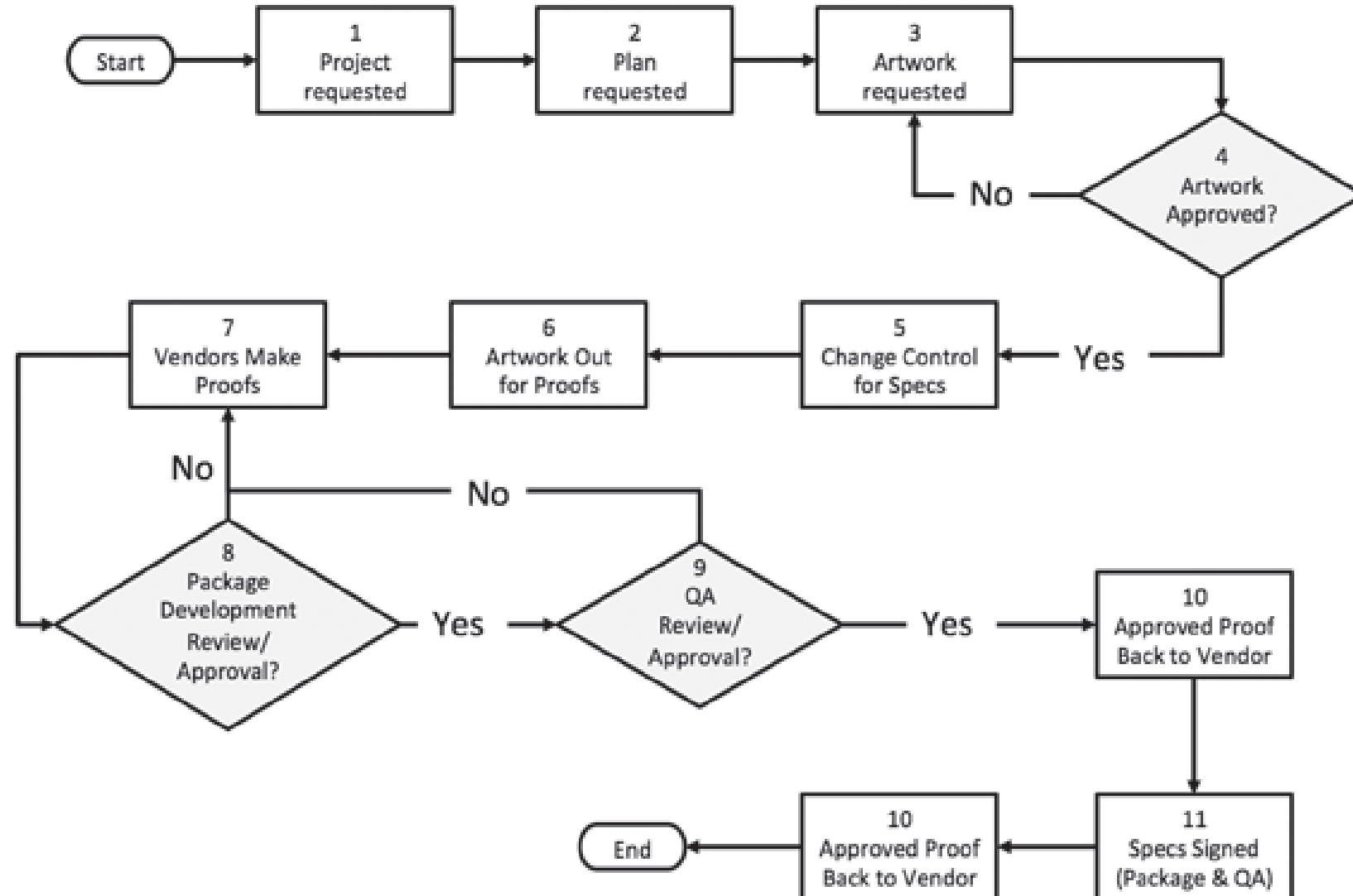
Seven Basic Quality Tools

- The seven basic quality tools, also known in the industry as 7QC Tools, are used within the context of the **PDCA** (plan-do-check-act, sometimes seen as plan-do-check-adjust) cycle to solve quality-related problems.
 - *Cause-and-effect diagrams*
 - *Flowcharts*
 - *Check sheet*
 - *Pareto diagrams*
 - *Histograms*
 - *Control charts*
 - *Scatter diagrams*

Cause & Effect Diagram



Flowcharts



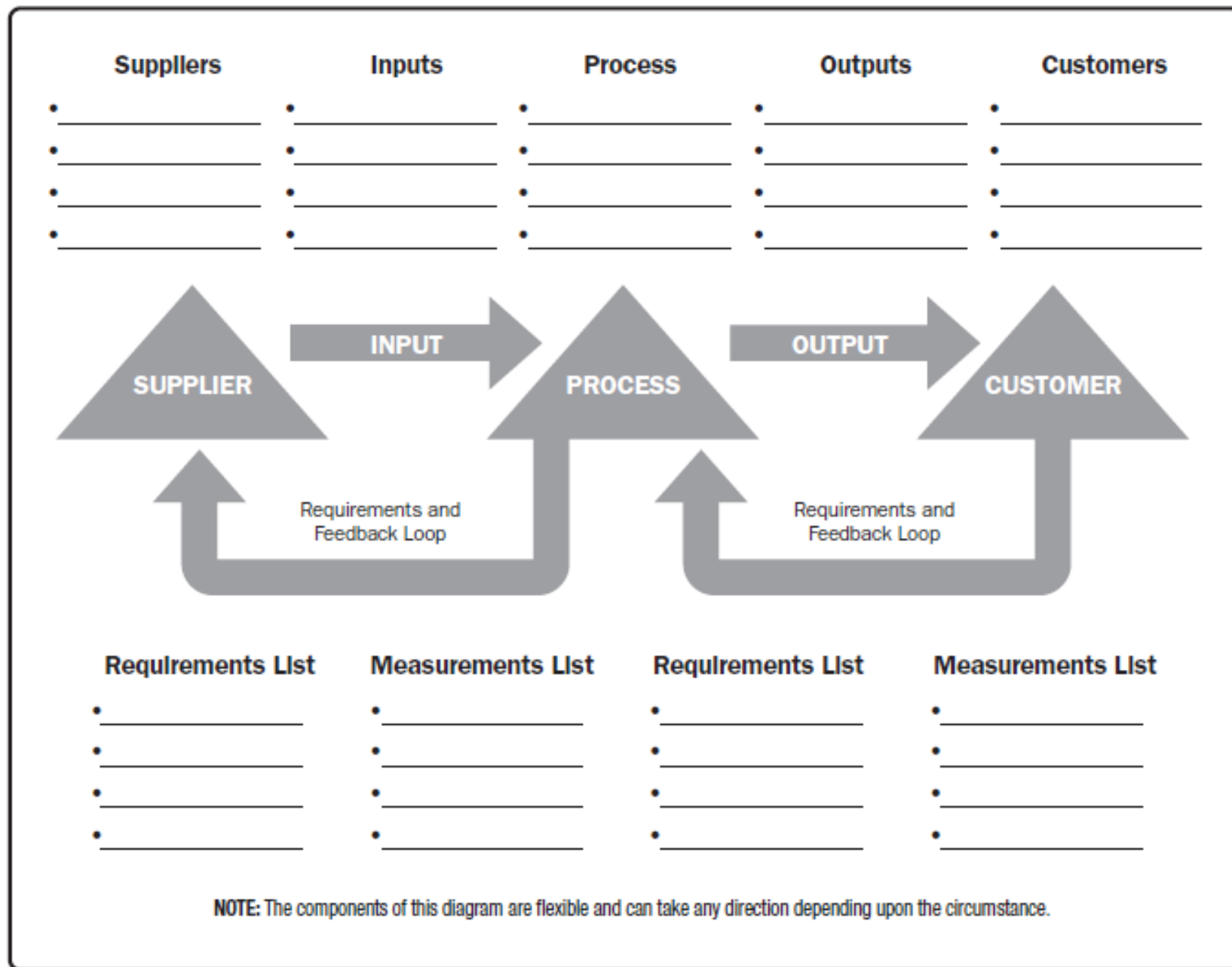
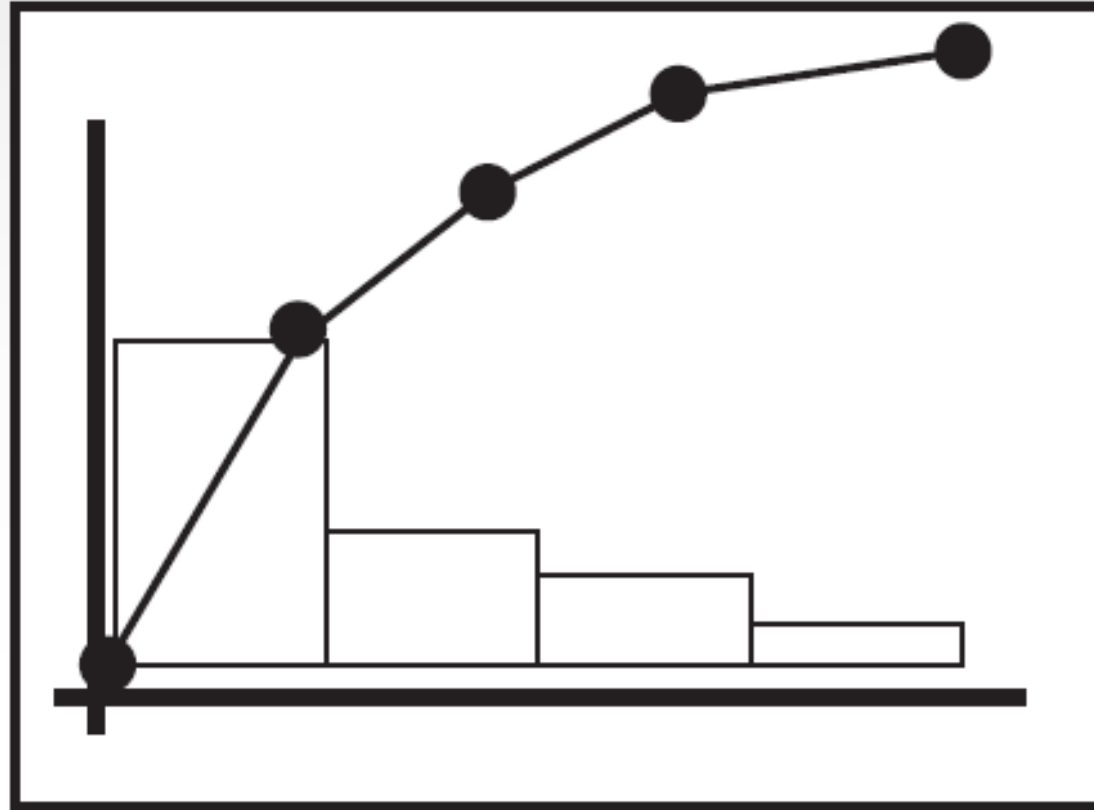


Figure 8-6. The SIPOC Model

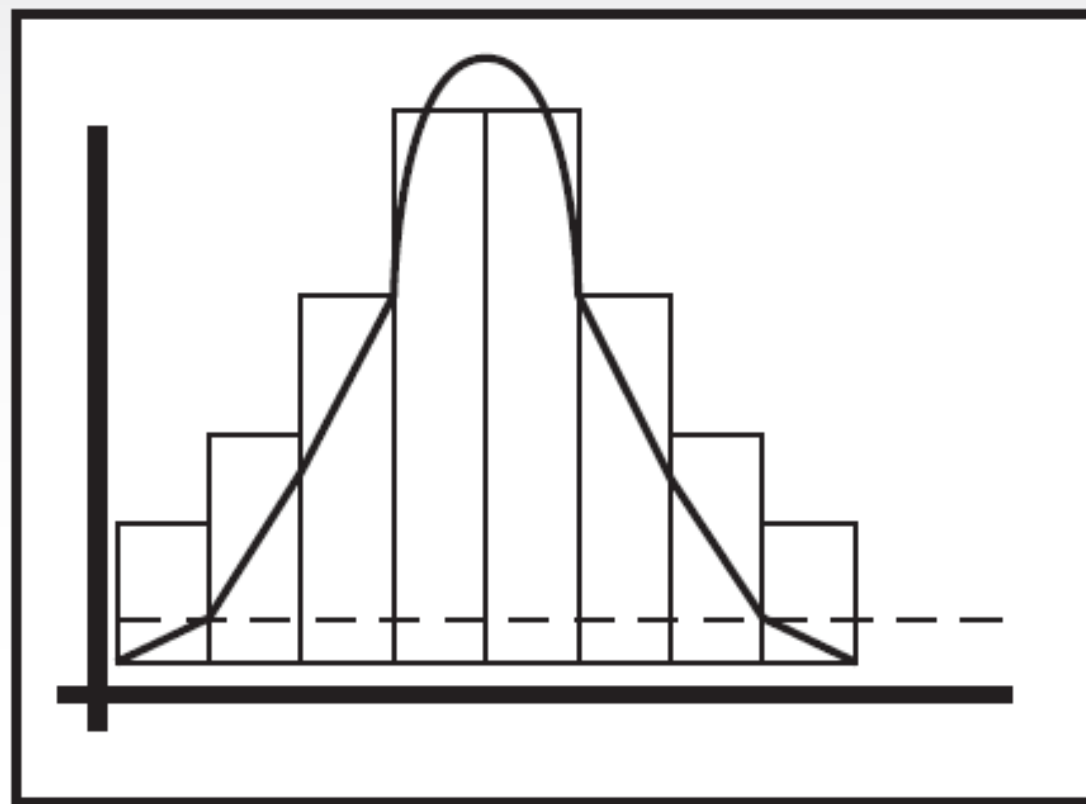
Checksheets

<i>Category</i>	<i>Strokes</i>	<i>Frequency</i>
Attribute 1		
Attribute 2		
Attribute ...		
Attribute n		

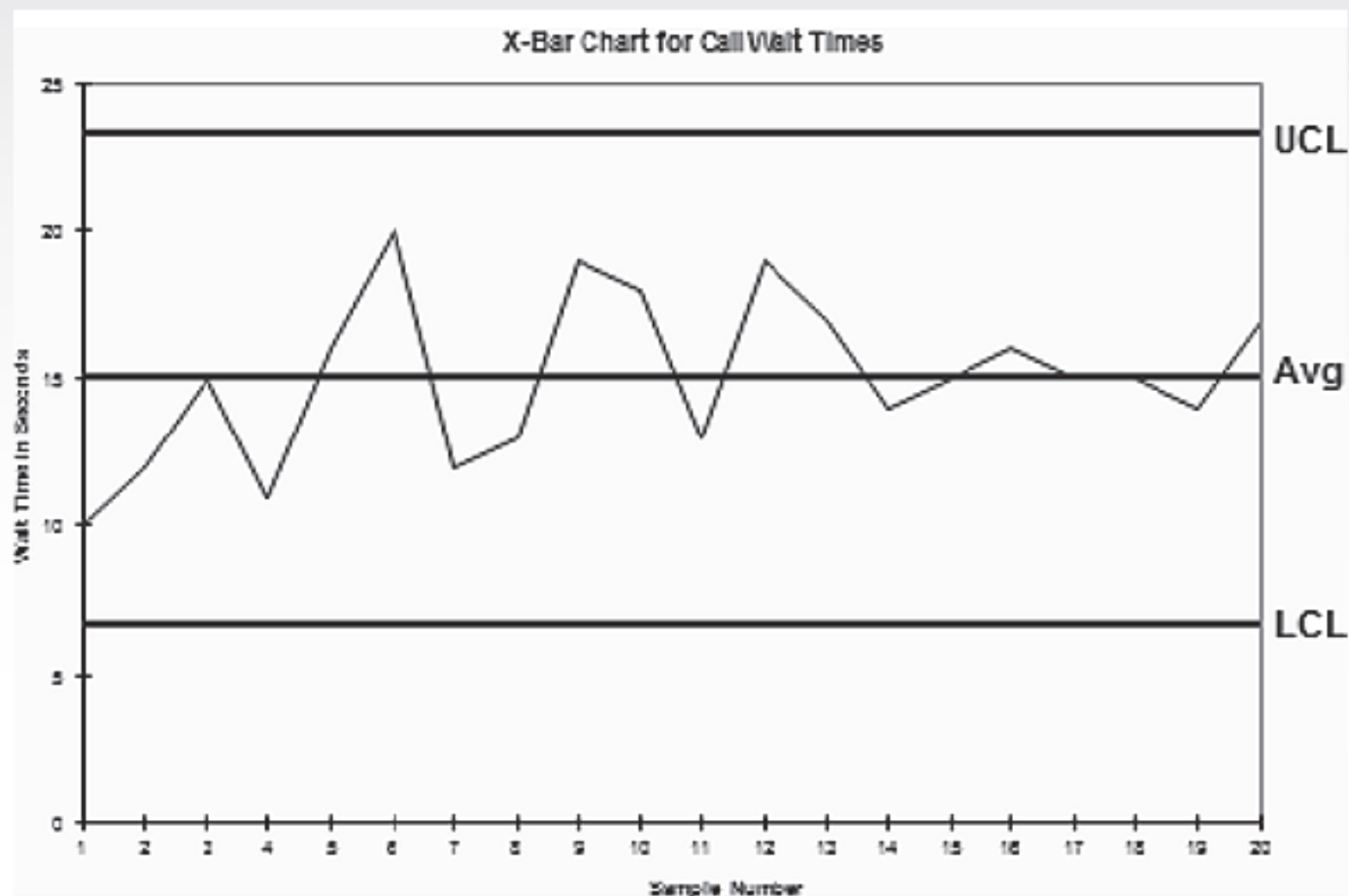
Pareto Diagrams



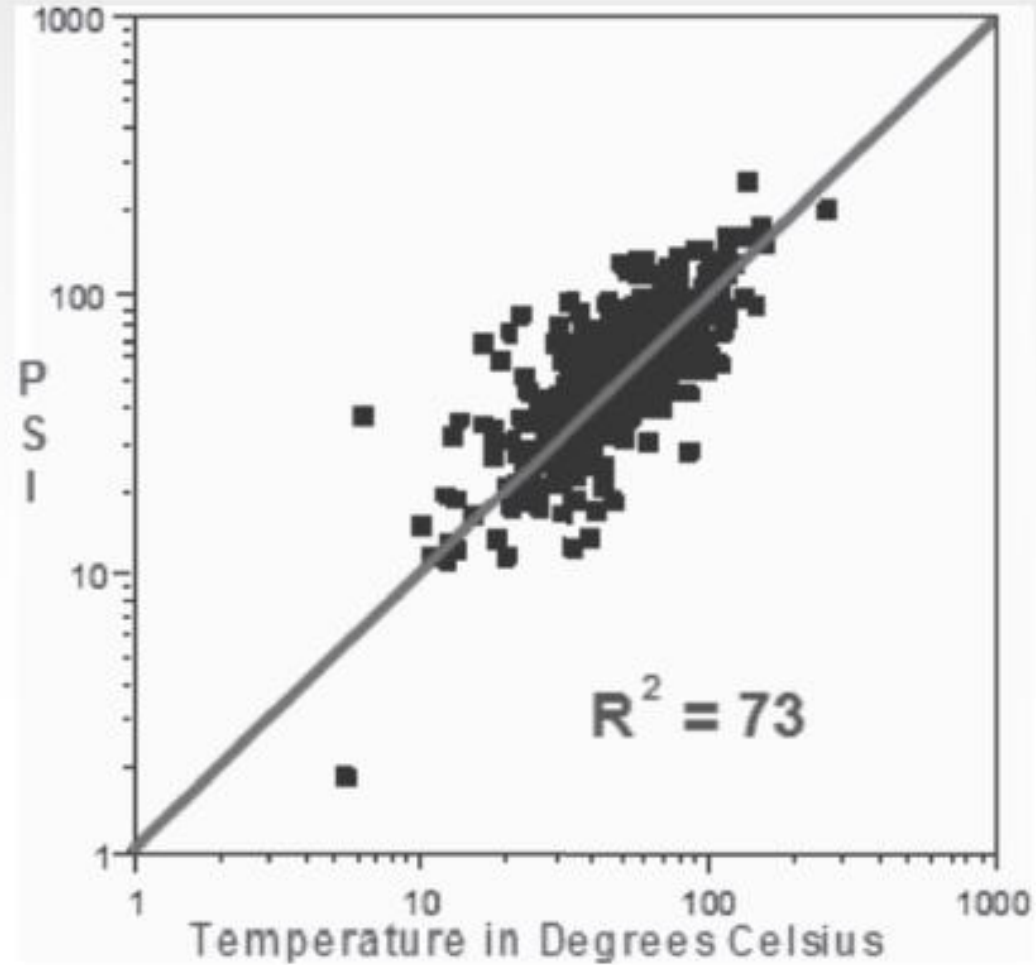
Histograms



Control Charts



Scatter Diagrams



Benchmarking

- Benchmarking involves comparing actual or planned project practices to those of comparable projects to identify best practices, generate ideas for improvement, and 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.

Design of Experiments

- Design of experiments (DOE) is a statistical method for identifying which factors may influence specific variables of a product or process under development or in production.
- DOE also plays a role in optimizing products or processes

Statistical Sampling

- Statistical sampling involves choosing part of a population of interest for inspection
- Sample frequency and sizes should be determined during the Plan Quality Management process

Additional Quality Planning Tools

- **Brainstorming.** This technique is used to generate ideas
- **Force field analysis.** These are diagrams of the forces for and against change.
- **Nominal group technique.** This technique is used to allow ideas to be brainstormed in small groups and then reviewed by a larger group.
- **Quality management and control tools.** These tools are used to link and sequence the activities identified

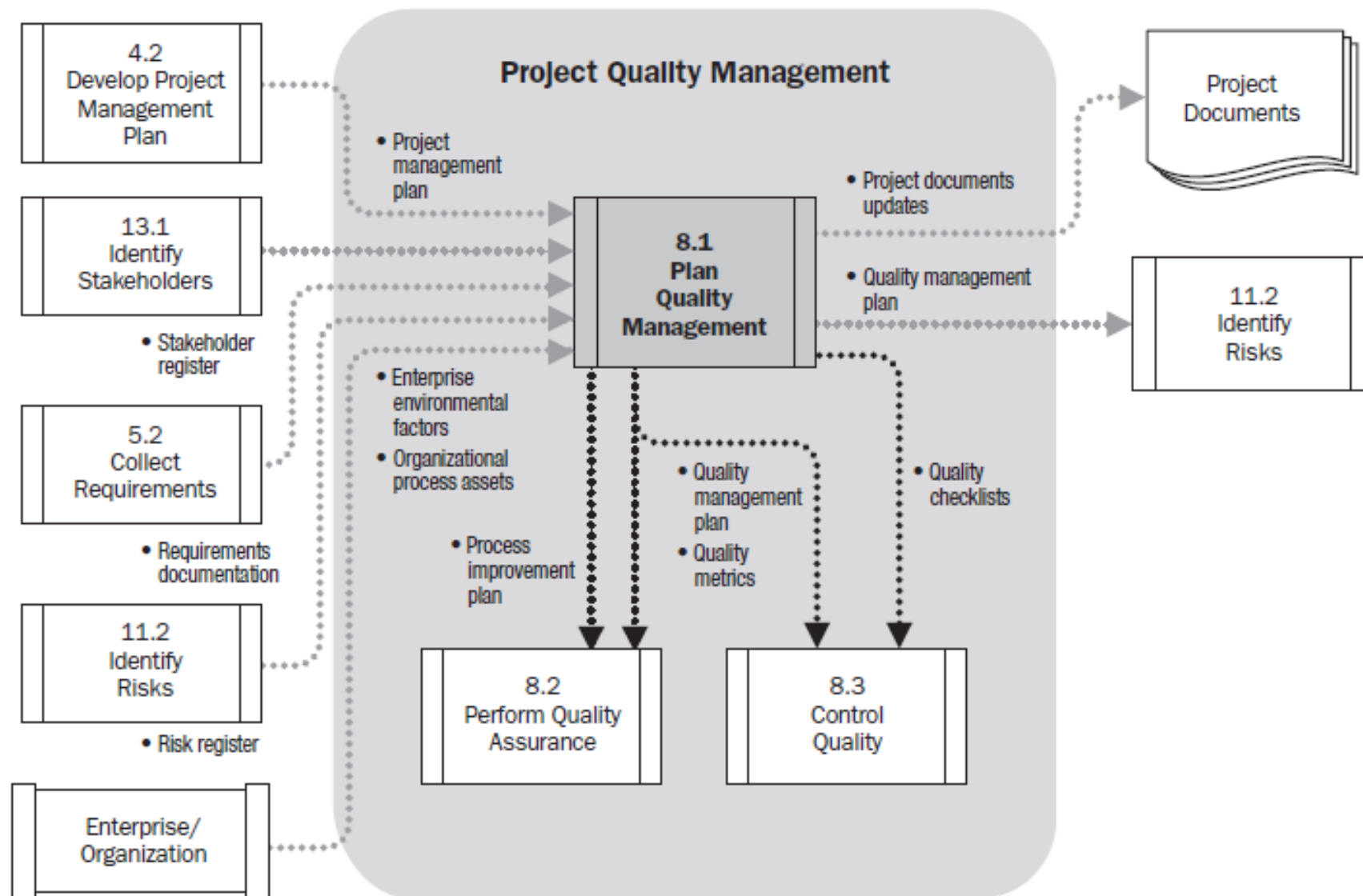


Figure 8-4. Plan Quality Management Data Flow Diagram

Perform Quality Assurance

- Perform Quality Assurance is 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 that it facilitates the improvement of quality processes.
- The quality assurance process implements a set of planned and systematic acts and processes defined within the project's quality management plan.
- Quality assurance seeks to build confidence that a future output or an unfinished output, also known as work in progress, will be completed in a manner that meets the specified requirements and expectations.

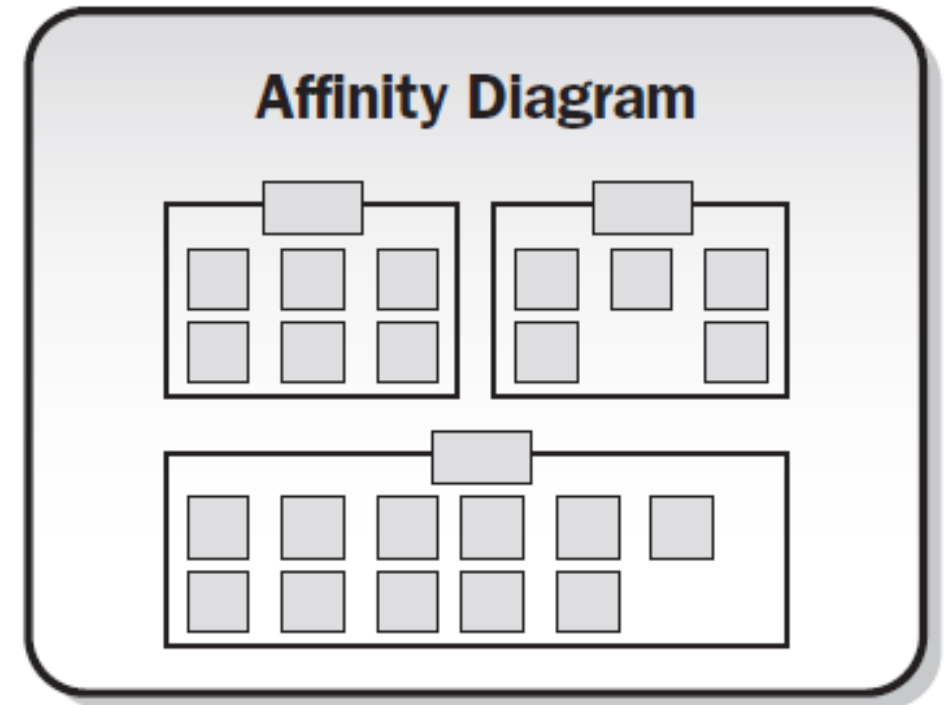
Perform Quality Assurance



Figure 8-8. Perform Quality Assurance: Inputs, Tools & Techniques, and Outputs

Perform Quality Assurance: Tools and Techniques- Quality Management and Control Tools

- **Affinity 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.

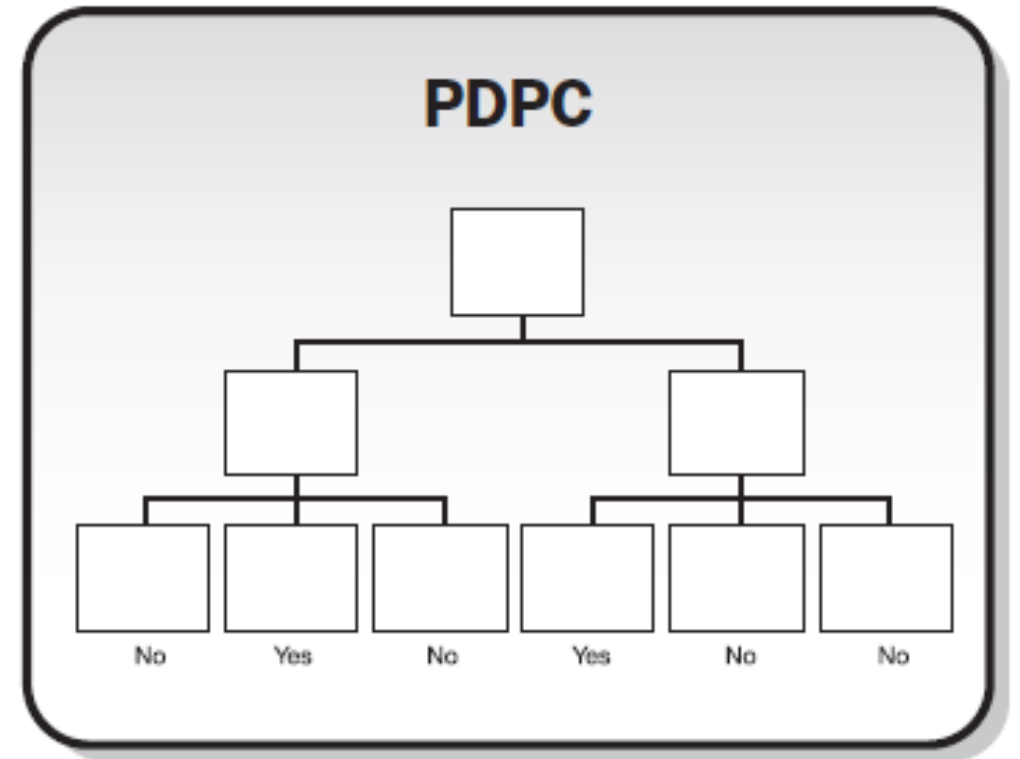


Perform Quality Assurance: Tools and Techniques-

Quality Management and Control Tools

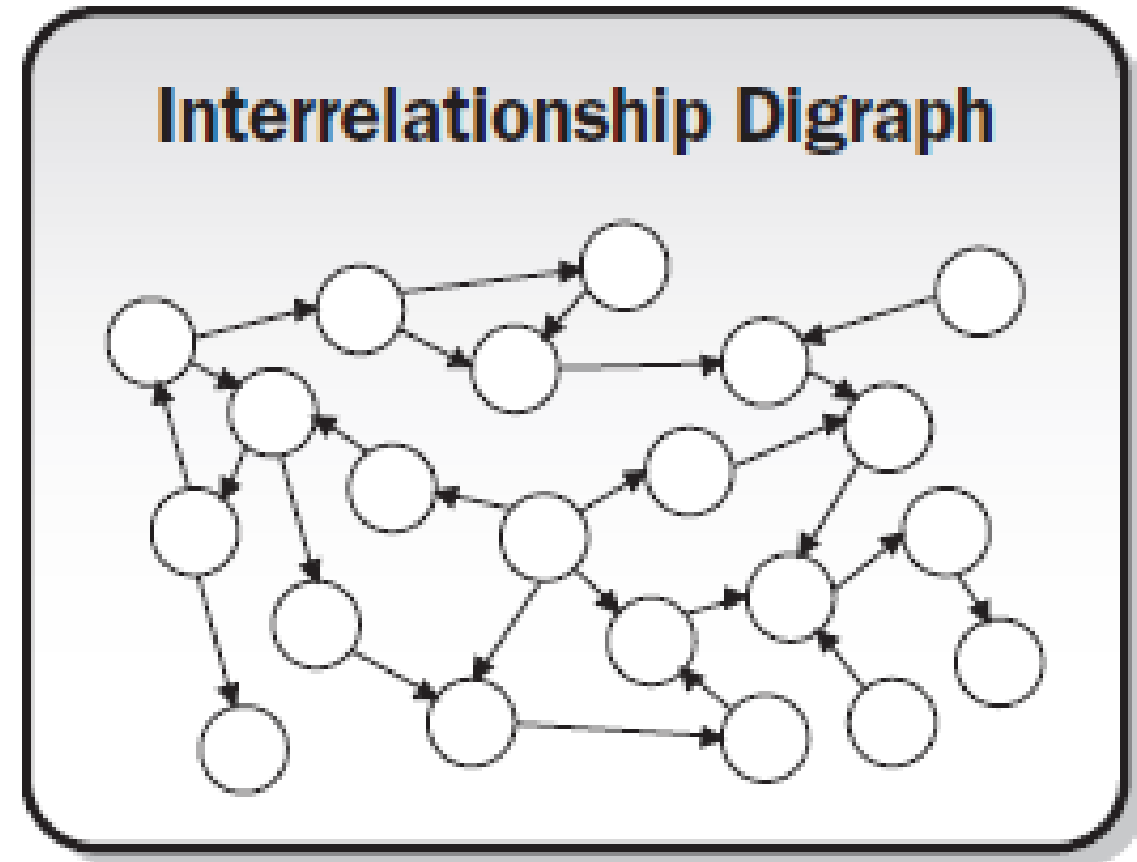
- **Process decision program charts (PDPC).**

- 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.



Perform Quality Assurance: Tools and Techniques- Quality Management and Control Tools

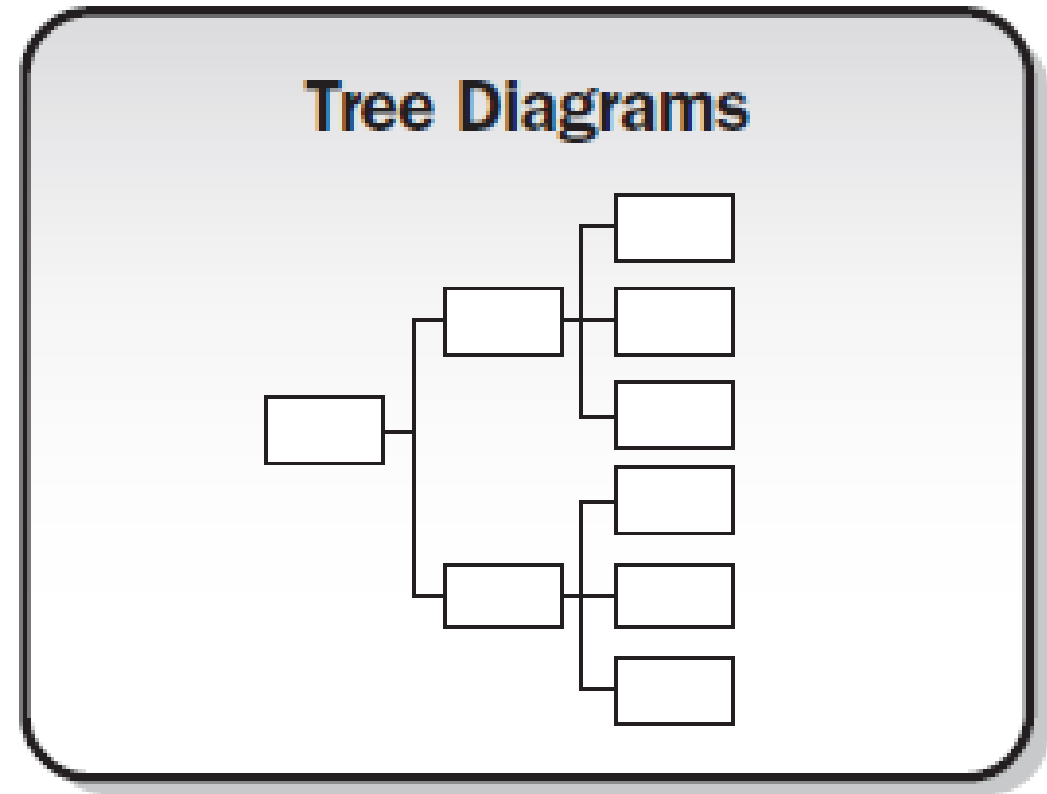
- **Interrelationship digraphs.**
 - An adaptation of relationship diagrams.
 - The interrelationship digraphs provide a process for creative problem solving



Perform Quality Assurance: Tools and Techniques- Quality Management and Control Tools

- **Tree diagrams.**

- Also known as systematic diagrams and may be used to represent decomposition hierarchies such as the WBS, RBS (risk breakdown structure), and OBS (organizational breakdown structure).
- Are useful in visualizing the parent-to-child relationships

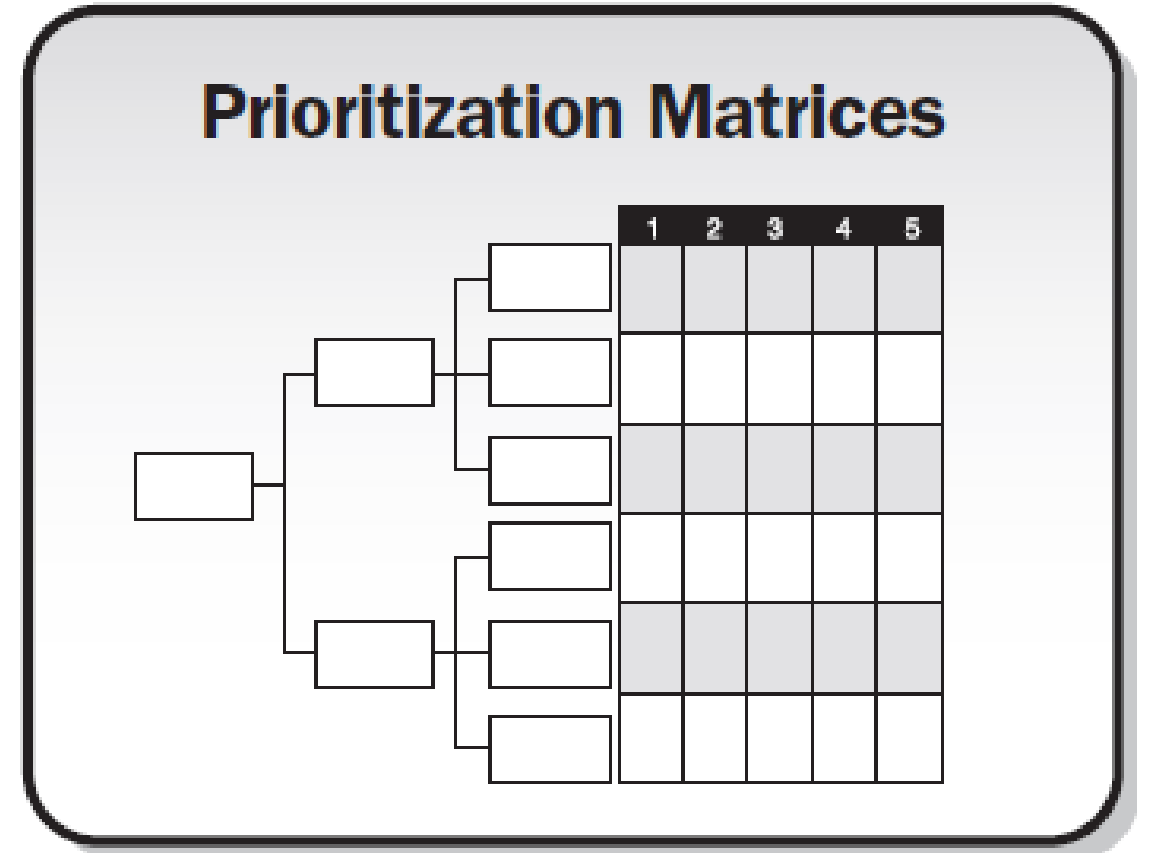


Perform Quality Assurance: Tools and Techniques-

Quality Management and Control Tools

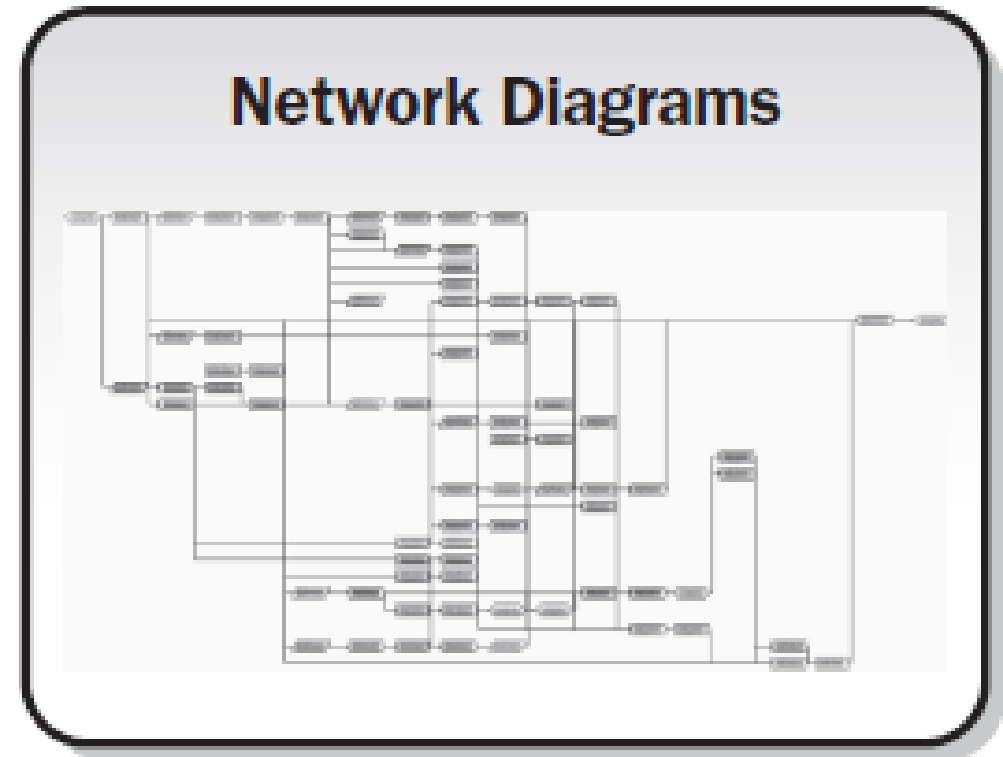
- **Prioritization matrices.**

- 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.



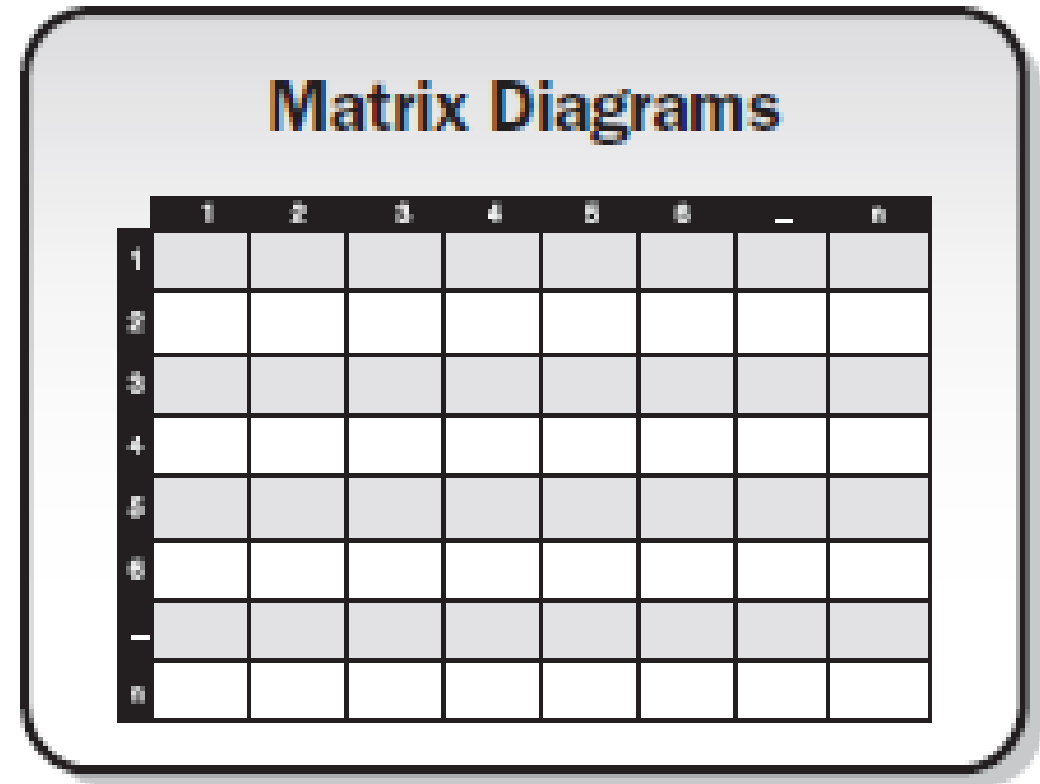
Perform Quality Assurance: Tools and Techniques- Quality Management and Control Tools

- **Activity 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).



Perform Quality Assurance: Tools and Techniques- Quality Management and Control Tools

- **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.



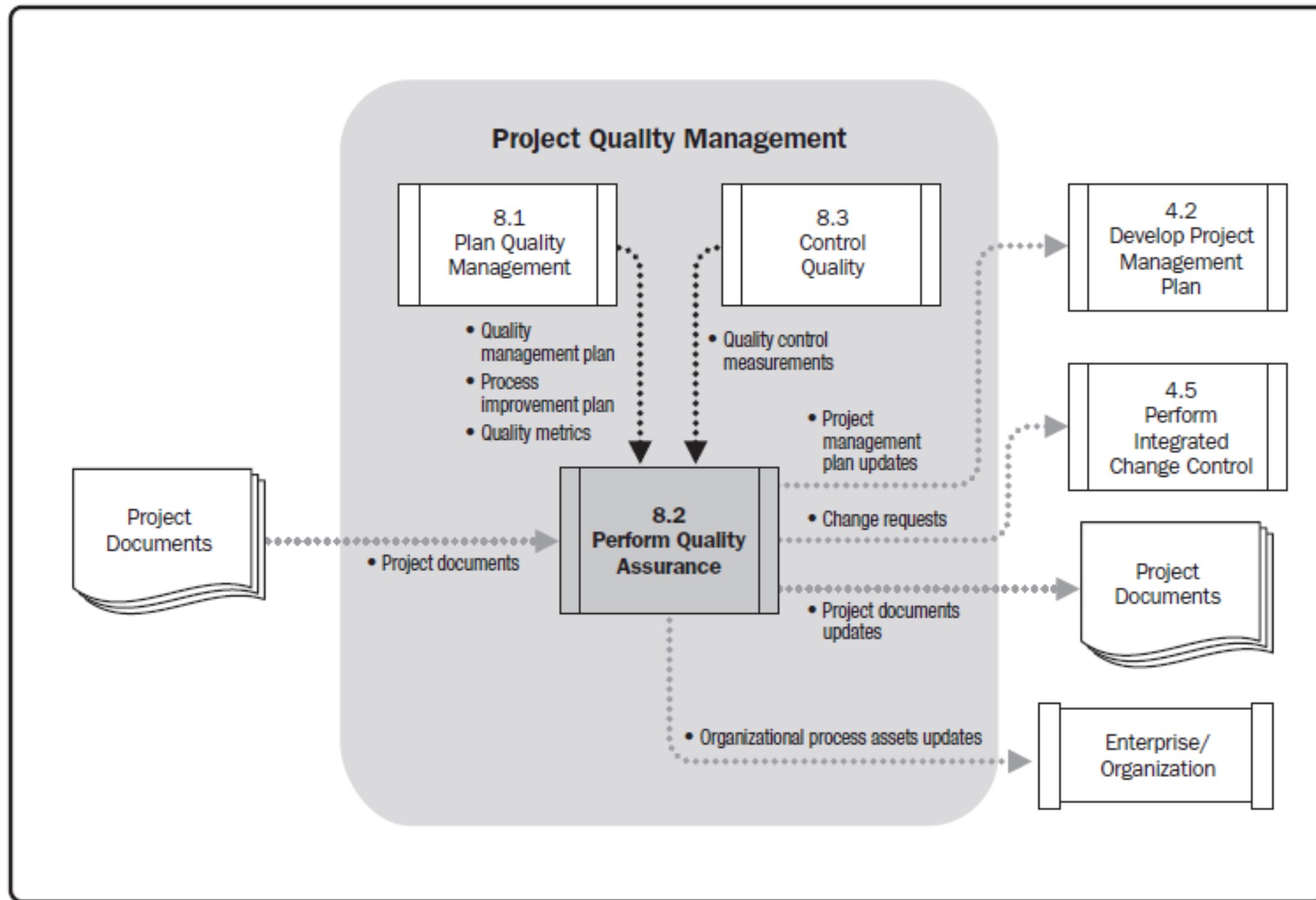


Figure 8-9. Perform Quality Assurance Data Flow Diagram

Control Quality

- 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.

- The Control Quality process uses a set of operational techniques and tasks to verify that the delivered output will meet the requirements.
- Quality assurance should be used during the project's planning and executing phases to provide confidence that the stakeholder's requirements will be met and quality control should be used during the project executing and closing phases to formally demonstrate, with reliable data, that the sponsor and/or customer's acceptance criteria have been met.

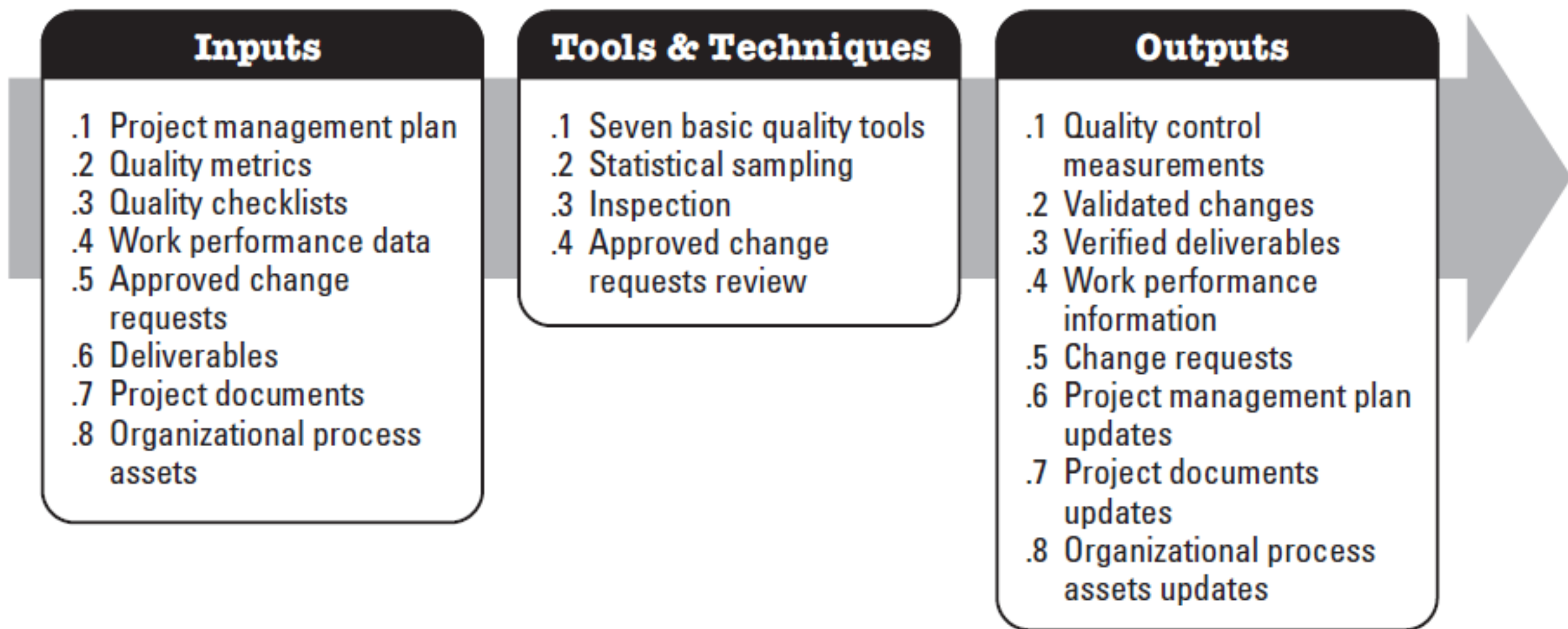


Figure 8-11. Control Quality: Inputs, Tools & Techniques, and Outputs

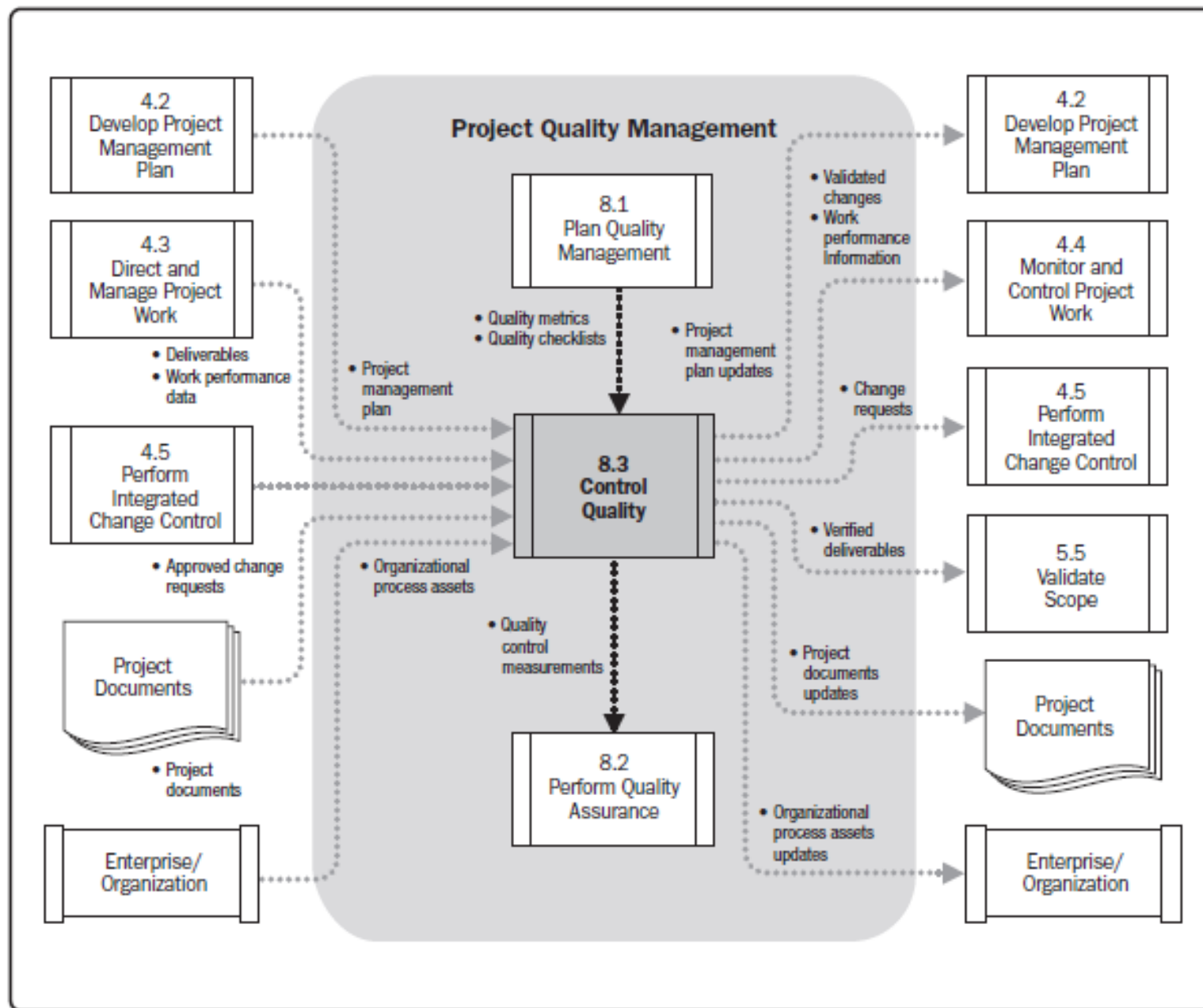


Figure 8-12. Control Quality Data Flow Diagram

Total Quality Management (TQM)

- Total—made up the whole
- Quality—Degree of excellence a product or service provides
- Management—Act, art or manner of handling, controlling, directing etc.

TQM Basic approach

1. A committed management
2. Focused on customer
3. Involvement and utilization of the total work force
4. Continuous improvement
5. Treating suppliers as partners
6. Establish performance measures for each components/ persons

TQM Tools and techniques

- Benchmarking
- Information technology
- Quality management systems
- Environment management system
- Quality function deployment (Customer requirements led design)
- Quality by design
- Failure mode analysis (Reliability)
- Product liability
- Total productive maintenance
- Management tools
- Statistical process control

Kaizen

- **Kaizen**, Japanese for "improvement", or "change for the better" refers to philosophy or practices that focus upon continuous improvement of processes in manufacturing, engineering, and business management.
- The cycle of kaizen activity can be defined as:
 - Standardize an operation and activities.
 - Measure the operation (find cycle time and amount of in-process inventory)
 - Gauge measurements against requirements
 - Innovate to meet requirements and increase productivity
 - Standardize the new, improved operations
 - Continue cycle *ad infinitum*

- Just In Time
 - Zero Inventory Cost
 - Beat the Cost
- Lean Production
 - An integrated view of TQM, Kaizen, JIT
 - Economical, Efficient and Not Wasteful, Effective and Defect Free Production
 - Lean means less head count, less space, less inventory, less cost, less defects and moderately agile management system