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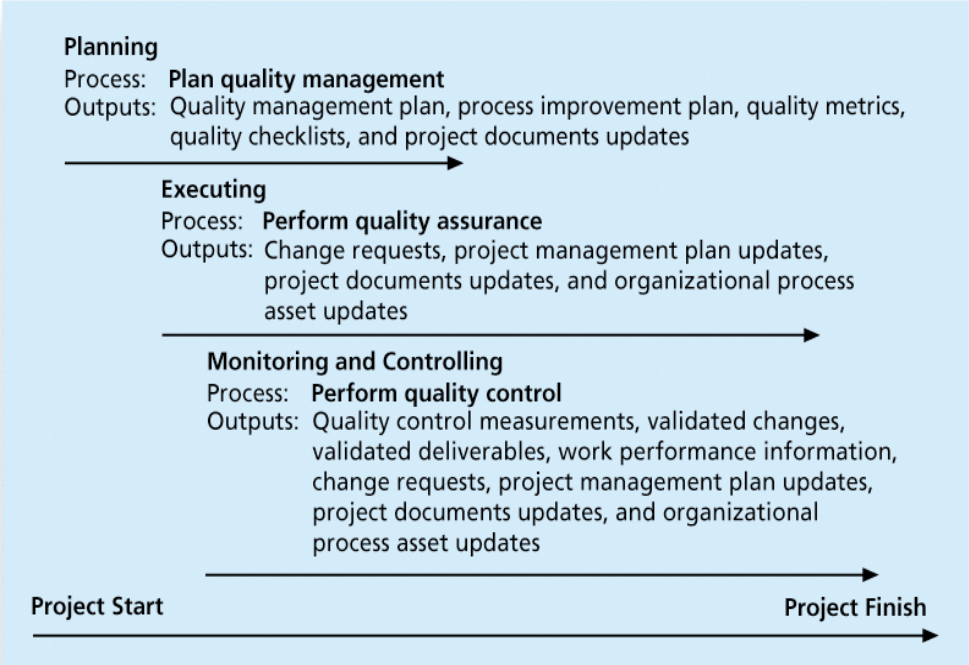
Project Quality Management

Project quality management ensures that the project will satisfy the needs for which it was undertaken. Many technical projects fail because the project team focuses only on meeting the written requirements for the main products being created and ignores other stakeholder needs and expectations for the project. Quality must be on an equal level with project scope, time, and cost.

Processes include:

- **Plan quality management**: Identifying which quality standards are relevant to the project and how to satisfy them; a **metric** is a standard of measurement
- **Perform quality assurance**: Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards
- **Control quality**: Monitoring specific project results to ensure that they comply with the relevant quality standards



Planning Quality Management

Implies the ability to anticipate situations and prepare actions that bring about the desired outcome. The current thrust in modern quality management :

- Prevention of defects through a program of selecting the proper materials
- training people in quality,
- planning a process that ensures the appropriate outcome.

It is important to identify relevant quality standards for each unique project and to design quality into the products of the project and the processes involved in managing the project.

- Organizational policies related to quality, the particular project's scope statement and product descriptions, and related standards and regulations are all important input to the quality planning process
- Tools for planning quality management:

  - Design of experiments is a technique that helps identify which variables have the most influence on the overall outcome of a process. Understanding which variables affect outcome is a very important part of quality planning.
  - Communicating the correct actions for ensuring quality in a format that is understandable and complete
- The main outputs of planning quality management are a quality management plan, a process improvement plan, quality metrics, quality checklists, and project documents updates.

Quality metrics

- A metric is a standard of measurement.
- Examples of common metrics include failure rates of products, availability of goods and services, and customer satisfaction ratings
- Metrics are used to guide project managers make the right decision about the project that they are handling or the organization as a whole.
- It is important to take note that different types of metrics should be used depending on the type of technologies and methodologies used by the project. This ensures that the true picture of the product or project is provided using the right metric.

Scope Aspects of IT Projects

- **Functionality** is the degree to which a system performs its intended function
- **Features** are the system's special characteristics that appeal to users
- **System outputs** are the screens and reports the system generates
- **Performance** addresses how well a product or service performs the customer's intended use
- **Reliability** is the ability of a product or service to perform as expected under normal conditions
- **Maintainability** addresses the ease of performing maintenance on a product

Who's Responsible for the Quality of Projects?

- Project managers and their teams need to consider all of the project scope issues in determining quality goals for the project.
- Project managers are ultimately responsible for quality management on their projects even though it is important for all project stakeholders to work together to balance the quality, scope, time, and cost dimensions of the project.
- Project managers should be familiar with basic quality terms, standards, and resources
- Several organizations and references can help project managers and their teams understand quality
  - International Organization for Standardization (www.iso.org)
  - IEEE (www.ieee.org)

Performing Quality Assurance

Quality assurance includes all of the activities related to satisfying the relevant quality standards for a project. Goal of quality assurance is continuous quality improvement. Important inputs for

performing quality assurance are the quality management plan, process improvement plan, quality metrics, quality control measurements, and project documents. Design of experiments, as described under quality planning, can also help ensure and improve product quality.

- **Benchmarking** generates ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organization
- A **quality audit** is a structured review of specific quality management activities that help identify lessons learned that could improve performance on current or future projects

Controlling Quality

- The main goals of quality control is to improve 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.
  - Rework is action taken to bring rejected items into compliance with product requirements, specifications, or other stakeholder expectations. Rework can be very expensive, so the project manager must strive to do a good job of quality planning and quality assurance
  - Process adjustments correct or prevent further quality problems based on quality control measurements. Process adjustments often result in updates to the quality baseline, organization process assets, and the project management plan

Seven Quality Control Tools

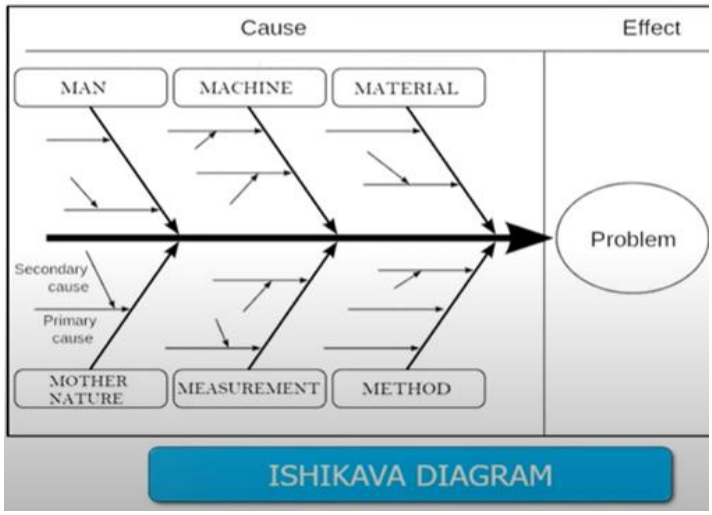
7 QC Tools or & Quality Control Tools are the " set/combination of 7 graphical and statistical techniques" for identifying and solving the issue related quality. These are originated from Japan. The tools were often referred as Seven Basic Tools of Quality because these tools could be implemented by any person with very basic training in statistics and were simple to apply to solve quality-related complex issues.
They are: Check Sheet, Cause and Effect Diagram, Pareto's Chart, Stratification, Scatter Diagram, Histogram, Control Charts

Check sheet

It is a form or document used to collect data in real time at the location where the data is generated. The data it captures can be quantitative or qualitative.
Used for:

- To quantify the types of problems that are occurring
- To quantify defects by type
- To quantify defects by location
- To keep track of the completion of steps in a multistep procedure.

DEFECT CHECKSHEET				Department: Administration Task: Typing	
Mistake	March 2020				Total
	1st Week	2nd Week	3rd Week	4th Week	
Centering	||	|||	|||	|	9
Spelling	|| 卌	| 卌 卌	卌	|| 卌	30
Punctuation	||| 卌 卌	|| 卌 卌	|| 卌	| 卌 卌	43
Missed Paragraph		|	||	|	4
Wrong number	|||	||	||||	|	10
Total	25	29	21	21	96



Cause and Effect Diagram

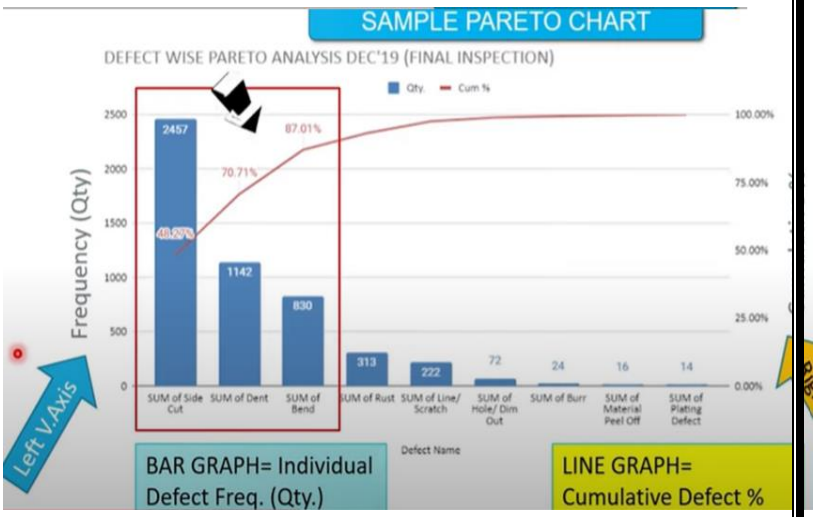
It is also known as the "**Fish Bone** Diagram" or "**Ishikawa Diagram**". It was introduced by Mr. Kaoru Ishikawa. It identifies many possible causes for and effect or problem and sorts ideas into useful categories (6M, 5M+1E).

Used for:

- Identify the possible root causes for any effect/problem;
- It is used to structure a brainstorming session.

Pareto-Chart

It is a type of chart that contains both bars and line graph, where individual values are represented in descending order by bars, and the cumulative total is represented by the line. The chart is named for the Pareto principle, which in turn derives its name from Vilfredo Pareto, a noted Italian economist. It revolves around the concept of **80-20 rule** which underlines that in any process, **80% of problem** or failure is just caused by **20% of few major** factors which are often referred as Vital Few, whereas remaining 20% of problem or failure is caused by 80% of many minor factors which are also referred as Trivial Many.



Used For:

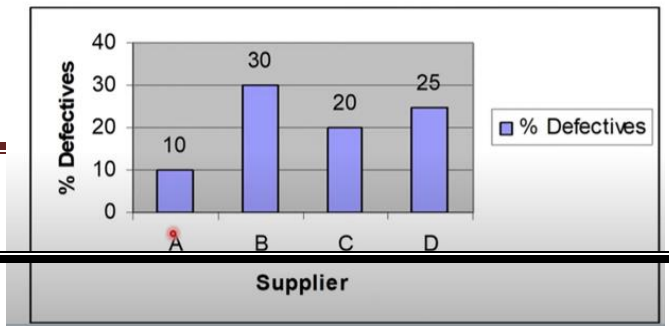
- Distinguish between vital few and trivial many.
- Displays relative importance of causes of a problem.
- Helps to focus on causes that will have the greatest impact when solved.

Stratification

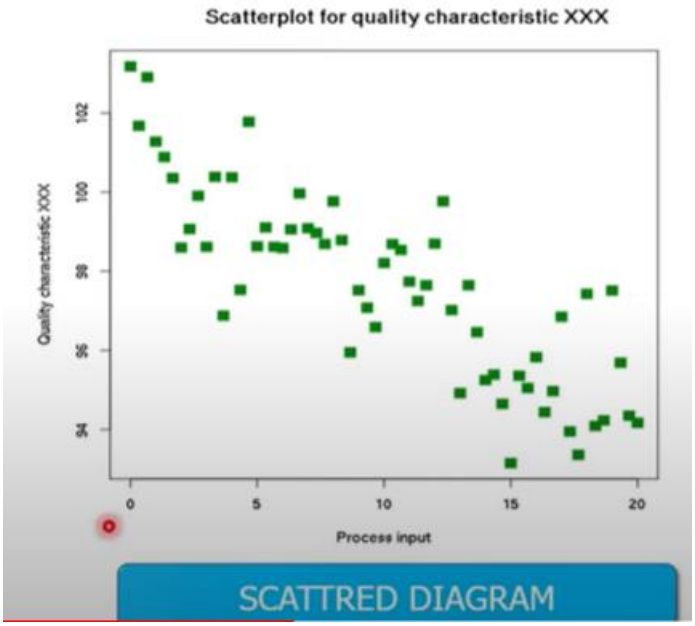
It is a method of dividing data into sub-categories and classify data based on group, division, class or levels that helps in deriving meaningful information to understand an existing problem. The very purpose of Stratification is to divide the data and conquer the meaningful information to solve a problem.

For example: Customer complaints may be segregated by:

(I) % defectives stratified supplier wise



Nature of complaints (eg: defective product, delayed delivery, short/excess quantity, damaged product, incorrect paperwork, incorrect shipment etc.)
Departments responsible (eg: design, manufacturing, distribution, quality assurance sales and service etc.)



Scattered Diagram

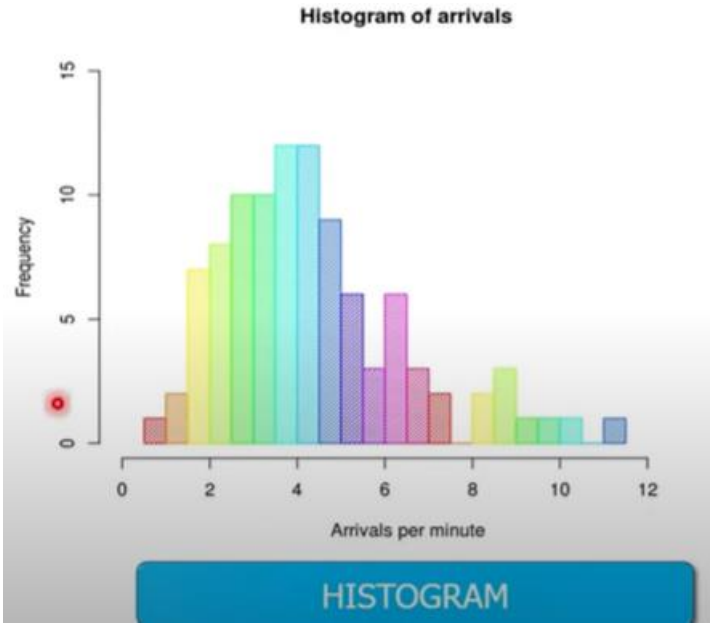
Scatter diagram, also called **'correlation diagram',** is a graphical representation between two variable (or between a cause and effect) or between two associated sets of data which occur in pair (e.g. x,y on from each set) using Cartesian coordinates. The scatter diagram displays the pair of data as a cloud of points. The strength of the relationship between the variables (or associated set of data) can be interred from the examination of the shape of the clouds.
Used For:

- To discover and display relationship between two associated sets of data.

Histogram

Histogram introduced by Karl Pearson is a bar graph representing the frequency distribution on each bars or how often each different value in a set of data occurs.
Used For:

- Measure the current pattern and extent of variations.
- Determine whether or not the process is in the state of control.
- Know the kind of action required to bring the process under control(ie. To shift mean or reduce variations of both)

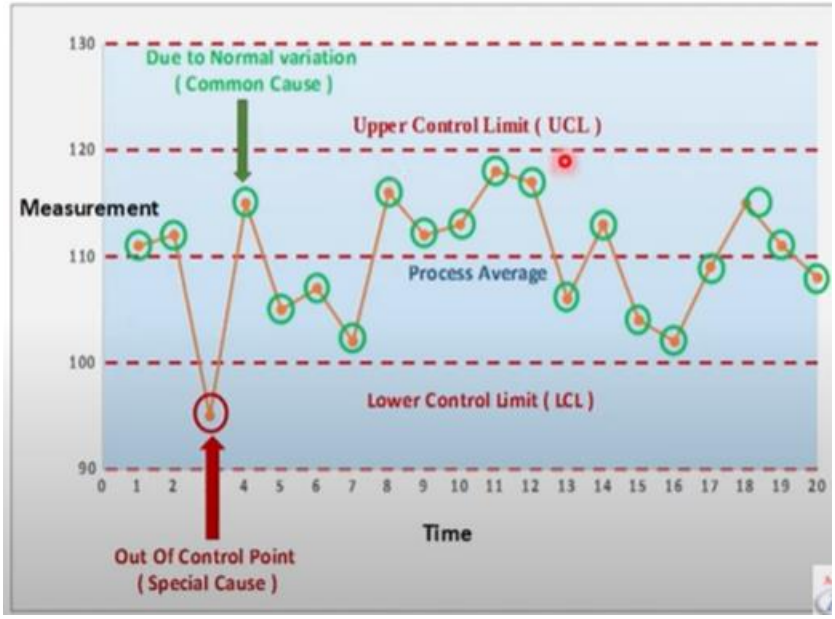


Control Chart

Control charts, also known as Shewhart charts (after Walter A. Shewhart) or process-behavior charts, are a statistical process control(SPC) tool used to determine if a manufacturing or business process is in a state of control. The very purpose of control chart is to determine if the process is stable and capable within current conditions. Control chart helps in predicting process performance, understand the various production patterns and study how a process changes or shift from normally specified control limits over a period of time.

In control chart, data are plotted against time in X-axis. Control chart will always have a central line (average or mean), an upper line for the upper control limit and the lower line for the lower control limit. These lines are determined from historical data.

UCL(Upper control limit)
CL(Control Limit)
LCL(Lower control limit)



Six Sigma

Six Sigma is "a comprehensive and flexible system for achieving, sustaining, and maximizing business success. Six Sigma is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes". Six Sigma principles are used to improve quality, decrease costs, and better meet customer needs. The target for perfection is the achievement of no more than **3.4 defects per million opportunities**

- The principles can apply to a wide variety of processes:
- Six Sigma projects normally follow a five-phase improvement process called DMAIC(pronounced de-MAY-ick), which stands for Define, Measure, Analyze, Improve, and Control. **DMAIC** is a systematic, closed-loop process for continued improvement that is scientific and fact based
- DMAIC stands for:
    - **D**efine: Define the problem/opportunity, process, and customer requirements
    - **M**easure: Define measures, then collect, compile, and display data
    - **A**nalyze: Scrutinize process details to find improvement opportunities
    - **I**mprove: Generate solutions and ideas for improving the problem
    - **C**ontrol: Track and verify the stability of the improvements and the predictability of the solution

How is Six Sigma Quality Control Unique?

It requires an organization-wide commitment. Training follows the "Belt" system. The Yellow Belt category receive the minimum level of training, Green Belt category usually participate in two to three full weeks of training and Black Belt category normally work on Six Sigma projects full-time and attend four to five full weeks of training. Six Sigma organizations have the ability and willingness to adopt contrary objectives, such as reducing errors and getting things done faster. It is an operating philosophy that is customer focused and strives to drive out waste, raise levels of quality, and improve financial performance at *breakthrough* levels

Six Sigma and Project Management

Joseph M. Juran stated, "All improvement takes place project by project, and in no other way". Organizations implement Six Sigma by selecting and managing projects. Well-selected and -defined improvement projects equal better, faster results. Poorly selected and defined projects equal delayed results and frustration. It's important to select projects carefully and apply higher quality where it makes sense; companies that use Six Sigma do not always boost their stock values. Six Sigma projects must focus on a quality problem or gap between the current and desired performance and not have a clearly understood problem or a predetermined solution

Why can't all companies benefit from Six Sigma?

Because minimizing defects does not matter if an organization makes a product that people do not want

What makes a project a potential Six Sigma project?

- There must be a quality problem or gap between the current and desired performance
- The project should not have a clearly understood problem.
- The solution should not be predetermined, and an optimal solution should not be apparent

Sigma and Defective Units

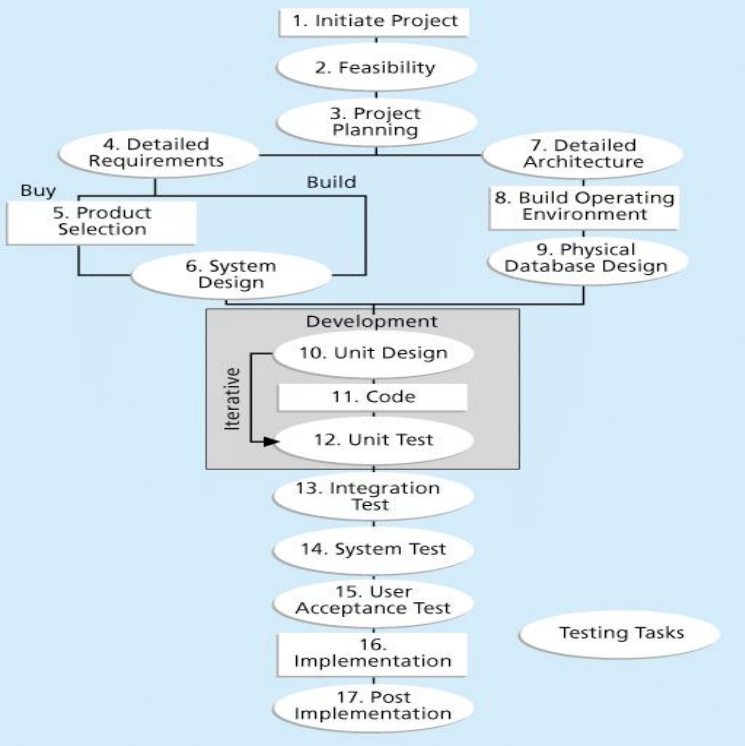
Sigma	Yield	Defects per Million Opportunities (DPMO)
1	31.0%	690,000
2	69.2%	308,000
3	93.3%	66,800
4	99.4%	6,210
5	99.97%	230
6	99.99966%	3.4

Sigma Conversion Table

Specification Range (in ± Sigmas)	Percent of Population within Range	Defective Units per Billion
1	68.27	317,300,000
2	95.45	45,400,000
3	99.73	2,700,000
4	99.9937	63,000
5	99.999943	57
6	99.9999998	2

Testing

- Many IT professionals think of testing as a stage that comes near the end of IT product development – **Wrong!!**
- Testing should be done during almost every phase of the IT product development life cycle



- Shows 17 main tasks and their relationship to each other
- Every project should start by initiating the project, conducting a feasibility study, and then performing project planning
- The work involved in preparing detailed requirements and the detailed architecture for the system can be performed simultaneously
- The oval-shaped phases represent actual tests or tasks, which will include test plans to help ensure quality on software development projects.

Types of Tests

- **Unit testing** tests each individual component (often a program) to ensure it is as defect-free as possible
- **Integration testing** occurs between unit and system testing to test functionally grouped components
- **System testing** tests the entire system as one entity. Ensures 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 fit of the system to the organization, rather than technical issues
- Other types of testing include alpha and beta testing, performance testing, and scalability testing
- To help improve the quality of software development projects, it is important for organizations to follow a thorough and disciplined testing methodology.
- System developers and testers must also establish a partnership with all project stakeholders to make sure the system meets their needs and expectations and the tests are done properly

ISO Standards

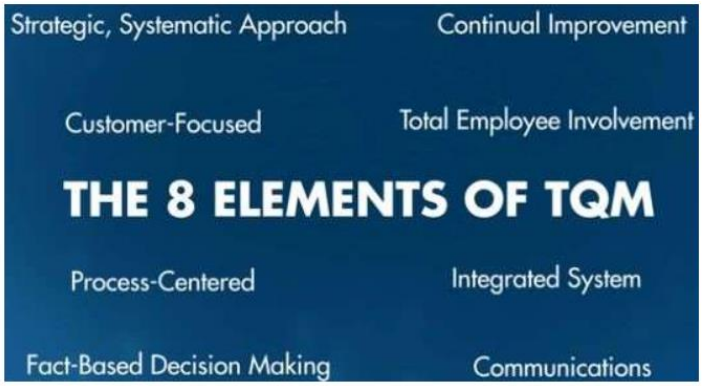
The International Organization for Standardization (ISO) is a network of national standards institutes that work in partnership with international organizations, governments, industries, businesses, and consumer representatives. ISO 9000, a quality system standard developed by the ISO, is a three-part, continuous cycle of planning, controlling, and documenting quality in an organization. It consists of standards and guidelines relating to quality management systems and related supporting standards. ISO 9001:2008 is the standard that provides a set of standardized requirements for a quality management system, regardless of what the user organization does, its size, or whether it is in the private or public sector. ISO continues to offer standards to provide a framework for the assessment of software processes. The overall goals of a standard are to encourage organizations that are interested in improving quality of software products to employ proven, consistent, and reliable methods for assessing the state of their software development processes. One of the outcomes of assessment and consequent improvement programs is reliable, predictable, and continuously improving software processes.

Improving IT Project Quality

- Several suggestions for improving quality for IT projects include:
  - Establish leadership that promotes quality
  - Understand the cost of quality
  - Focus on organizational influences and workplace factors that affect quality
  - Follow maturity models

Total Quality Management (TQM)

Total quality management (TQM) is the continual process of detecting and reducing or eliminating errors in manufacturing, streamlining supply chain management, improving the customer experience, and ensuring that employees are up to speed with training. Total quality management aims to hold all parties involved in the production process accountable for the overall quality of the final product or service.



Primary Elements of Total Quality Management (TQM)