Quality Concepts

Quality Certification Program

Section 1.1: General Awareness Session

- **Objectives**

- **What is Quality?, Definitions of Software Quality**

- **Quality Principles and Concepts**

- **Quality Leadership**

- **Quality Planning, Control, Baselines**

- **Define, Build, Implement and Improve Work Processes**

- **Metrics and Measurement**

- **Internal Control and Security**

- **Key Concepts: CM, Traceability, DP**

- **Models & Standards**

- **Further Information**

An ISO 9001 & SEI CMM Level 5 Company

- **The objective of this Awareness session is to understand key concepts around definitions of Quality, Dimensions of Quality, Quality planning, control, baselines, quality principles, definitions of key terms, some of the important models and standards etc.**

- **Quality is everyone's responsibility and is expected in everything we do. Most of the concepts are generic in nature and applies to non software scenario as well.**

- **Ultimate goal of quality is to ensure customer satisfaction and improve on it to be ahead of the competition in the business**
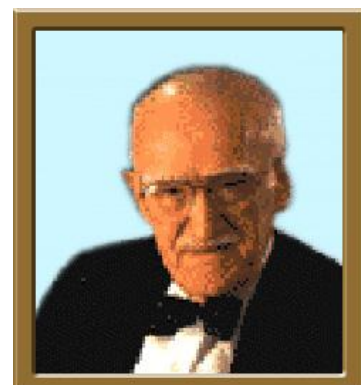
"Conformance to requirements
of the Customer"

- Philip Crosby

"Predictable uniformity &
dependability at low cost and suited to
the market"

- W. Edwards Deming

"Fitness for use"
- Joseph Juran

"The totality of features and characteristics of the entity that bear on its ability to meet stated
and implied needs"

- ISO 8402

- **Definitions of quality**
    - Quality is customer satisfaction
    - Quality is delivery within budgeted cost, schedule and with minimal defects
    - Consistent performance of a uniform product meeting the customer's needs for economy and function;
    - To be at a high degree of excellence; something that is good or well done;
    - The totality of an entity's properties which make it capable of satisfying an expressed or hypothetic need, that is, acceptability or suitability for a given purpose

An ISO 9001 & SEI CMM Level 5 Company

Different views on Quality

- **Quality from the producer's point of view:**
  - A product is a quality product if it conforms to the specified requirements of the product

- **Quality from the customer's point of view:**
  - A product is a quality product if it is fit for use

- **Finally the different views are bridged when the common goal is that :**
  - "A product is a quality product if it is defect free"

An ISO 9001 & SEI CMM Level 5 Company

Dimensions of Quality

- **Functionality**

- **Integrity**

- **Reliability**

- **Maintainability**

- **Portability**

- **Interoperability**

- **Consistency**

- **Testability**

- **Usability**

- **Reusability**

- **Efficiency**

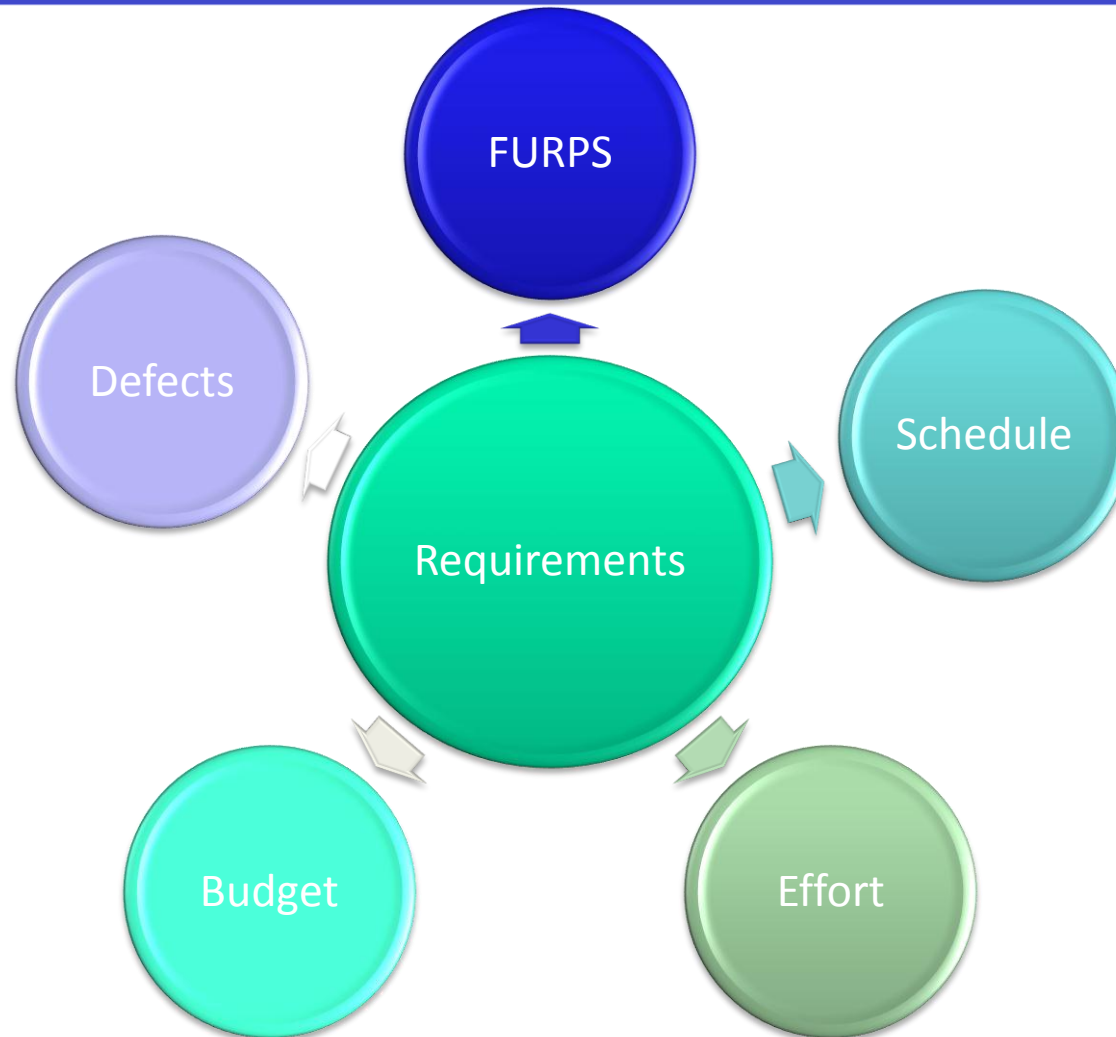**F** — FUNCTIONALITY → *Functionality stated in requirements*

U — USABILITY → *Ease of Use, Aesthetics, Consistency and Online Help*

R — RELIABILITY → *Integrity, Structure and Stress*

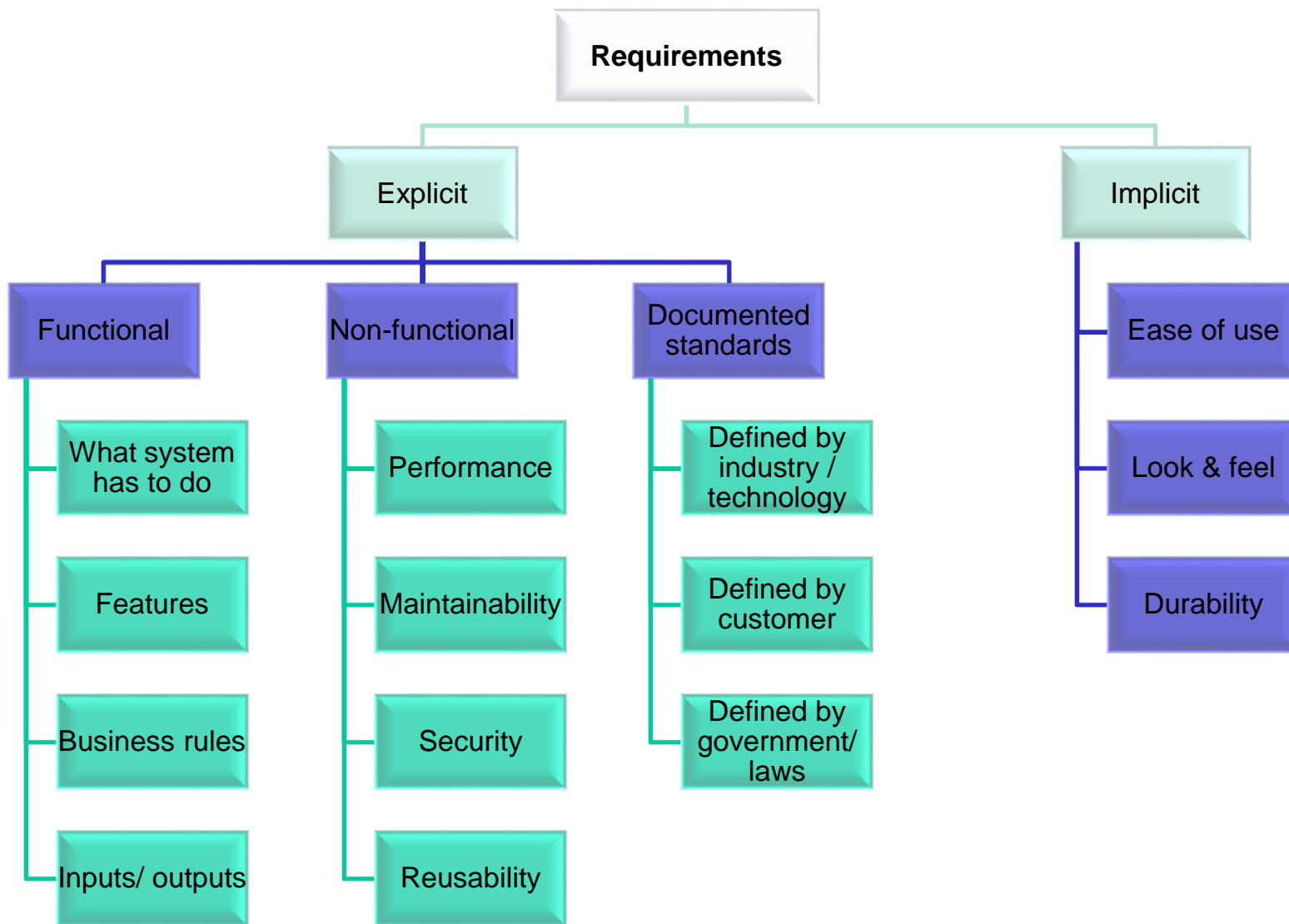**P** — PERFORMANCE → *Processing Speed, Response Time, and Throughput*

S — SUPPORTABILITY → *Multiple Browser, Installation on Different HW/SW Configurations*

P.S: Can refer to Speaker Notes for details

Quality is an optimal balance in attributes

An ISO 9001 & SEI CMM Level 5 Company

ITC INFOTECH
Business-friendly Solutions

- **Vocabulary of quality : Understanding the vocabulary used to explain and implement quality in an IT organization, includes terms such as quality, processes, defects and products.**

- **Processes:**

  - A process is a set of interrelated activities performed to achieve a given purpose. The Tools, methods, materials, people, guidelines, checklists, templates form a part and parcel of a process

  - Process quality is focuses on building the PRODUCT RIGHT. Whereas, Product quality concentrates on building the RIGHT PRODUCT.

- **Products:**

  - Product is a result of processes. If there is no quality process, the resulting product is a non-confirming product. Hence, we need to ensure product quality and process quality

- **Defects**

  - Defect is deviation from the requirements observed in a product or associated work products, which is called as bug/fault/error or anything that **causes customer dissatisfaction,** whether stated in requirements or not

An ISO 9001 & SEI CMM Level 5 Company

- **What is a System?**

  - A bigger group of entities involved to accomplish a set of specific functions.

- **What is Software?**

  - The programs, procedures, rules and associated documentation pertaining to the operation of a system.

  - A system can have several software working together to accomplish a set of objectives or functions

- **What is Software Engineering?**

  - The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software;   i.e., the application of engineering to software.

  - Software engineering is a discipline whose aim is the production of defect-free software, delivered on time and within budget, that satisfies the user's needs.

- **Quality Management**
    - It is a planned and systematic set of activities to ensure quality is built into the product/ service. It consists of Quality assurance, Quality control, and Quality engineering.

```
                    ┌─────────────────────────┐
                    │   Quality Management    │
                    └─────────────────────────┘
        ┌────────────────────┼────────────────────┐
┌───────────────┐    ┌───────────────┐    ┌───────────────────┐
│ Quality       │    │ Quality       │    │ Quality           │
│ Assurance     │    │ Control       │    │ Engineering       │
└───────────────┘    └───────────────┘    └───────────────────┘
```

An ISO 9001 & SEI CMM Level 5 Company

Quality Management

- **Quality Assurance (QA):**
  - The function of quality that assures that the standards, processes and procedures are appropriate for the project and are correctly implemented

- **Quality Control (QC):**
  - The function of quality that checks that the project follows its standards processes, and procedures, and that the project produces the required internal and external (deliverable) products.

- **Quality Engineering (QE):**
  - The function of quality that assures that quality is built into the delivery by performing analyses, trade studies, and investigations on the requirements, design, code and verification processes and results to assure that reliability, maintainability, and other quality factors are met.

Difference between QA & QC

Quality Assurance	Quality Control
Activity, which establishes and evaluates the processes, which produce the products.	Product quality is compared with applicable standards and action taken when non conformance is detected
Is oriented towards preventing defects from occurring	Is designed primarily to detect and correct defects
Identifies weakness in the process and improves them	Focuses on inspections, testing, removal of defects before shipment of products
Responsibility of Management	Responsibility of worker
Is performed by specialists with the knowledge and understanding Standards/Models/Processes	Is performed by the group responsible for the development of the product as well as specialists
Proactive and preventive	Reactive and corrective
Sometimes called as quality control over quality control	Concerned with specific products

Quality Principles & objectives

- **Quality concepts and practices - an overview of the more prevalent concepts, approaches and practices used by quality professionals to implement and improve quality. These include:**
  - the PDCA Cycle (Plan-Do-Check-Act)
  - the Cost of Quality
  - Baseline and Benchmarking

- **Quality control and quality assurance - understanding the difference between quality control and quality assurance, definitions, activities, and processes.**

- **Quality pioneers approach to quality - includes quality pioneers such as Dr. W. Edwards Deming, Philip Crosby, and Dr. Joseph Juran.**

- **The most important prerequisites for successful implementation of any major quality initiative are leadership and commitment from executive management.**
  - Management to create a work environment supportive of quality initiatives.
  - Management's responsibility to establish strategic objectives and build an infrastructure that is strategically aligned to those objectives.
  - Requires management processes to establish the foundation of a quality-managed environment, as well as commitment, new behaviors, building the infrastructure, techniques, approaches and communications.

An ISO 9001 & SEI CMM Level 5 Company

- **Executive and Middle Management Commitment :**
  - Commitment begins by putting quality at the top of every agenda. Understand concept of Quality Management, show commitment, provide infrastructure support, training, awarding results etc.

- **Quality Champion :**
  - This is the person who accepts personal responsibility for the success of quality management without being assigned the responsibility. The champion should be respected in the organization, have high quality standards and believe that the organization needs to improve

- **New Behaviors for Management**
  - Traditional Management versus Quality Management (differences in philosophy)
  - Leadership (modeling, coaching, reinforcing)
  - The importance of establishing mentoring relationships
  - Establishing Trust

- **Empowerment of employees**

An ISO 9001 & SEI CMM Level 5 Company

QM Infrastructure & Environment

- **Quality Management Infrastructure**
  - Quality Council
  - Management Committees
  - Teams and Work Groups
  - Process Improvement review teams
- **Quality Environment**
  - Setting the proper "tone" at the top
  - Code of Ethics
  - Open communication
  - Implementing a mission, a vision, goals, values and a quality policy
  - Monitoring compliance to organizational policy and procedures
  - Enforcement of organizational policies and procedures

Quality Management System

- **Quality Management System is a collection of business processes focused on achieving organization's quality policy and quality objectives**

  - It is expressed as the organizational structure, policies, procedures, processes and resources needed to implement quality management.

  - It contains well defined processes that are documented, used and living;

  - It contains Quality Control that checks the Quality of the products- reviews, testing;

  - It contains Quality Assurance that checks that the processes and Quality Control are working , efficient and effective.

- **Thus : "Quality is Everyone's Responsibility"**

Define, Build, Implement & Improve

- **Process Management Concepts**
  - Definition of a Process: Set of interrelated activities that results in a desired output
  - Benefits of process: Consistent and predictable output
  - Process Components (standards, input, work and check procedures, output/deliverables)
  - Process Categories
    - Management Processes
    - Work & Check Processes
    - The Process Maturity Continuum (products and services, work and check processes, customer involvement)
    - How Processes are Managed?
    - Process Template

An ISO 9001 & SEI CMM Level 5 Company

Define, Build, Implement & Improve

- **Process Management Processes**
  - Planning Processes
  - Process Inventory
  - Process Mapping
  - Process Planning
- **Do Process**
  - Process Definition
- **Check Processes**
  - Process Measurement
  - Testing
- **Act Processes**
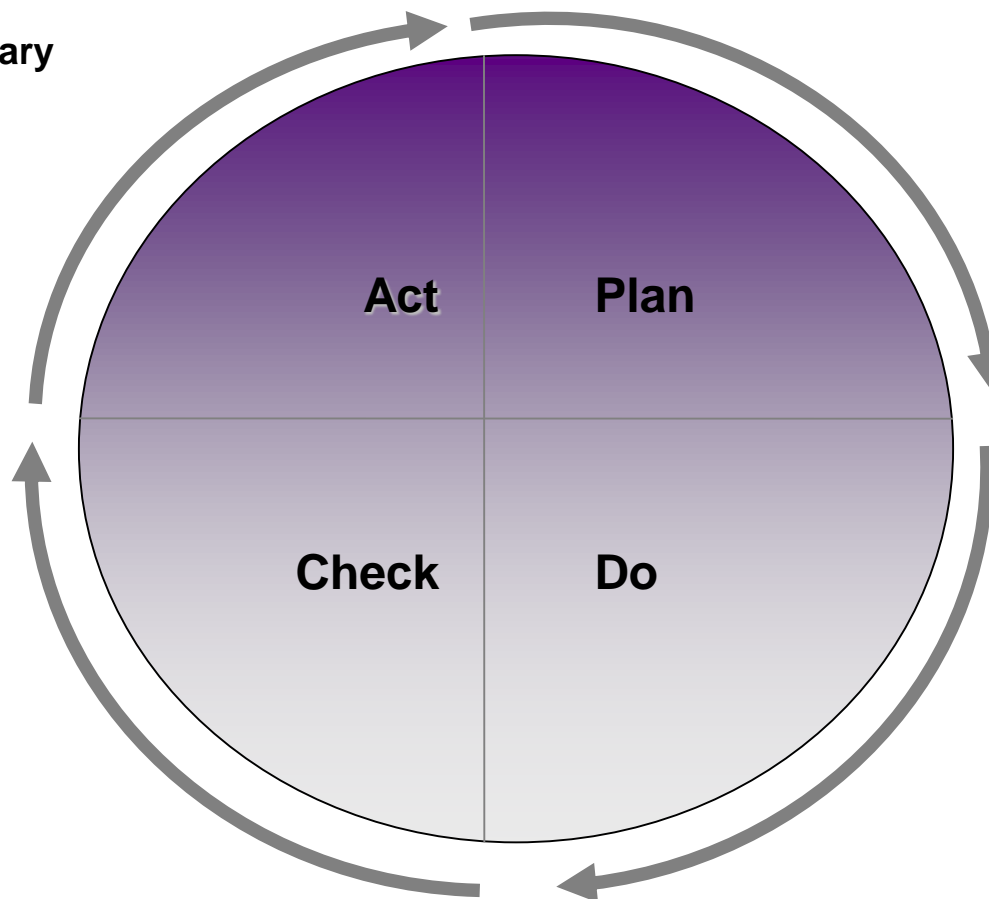 - Process Improvement Teams
  - Process Improvement Process

An ISO 9001 & SEI CMM Level 5 Company

4. Take the Necessary Action

Corrective & Preventive Action

1. Devise a Plan

Define Documented QMS

Act

Plan

Check

Do

3. Check the Results

Check Internal Audits
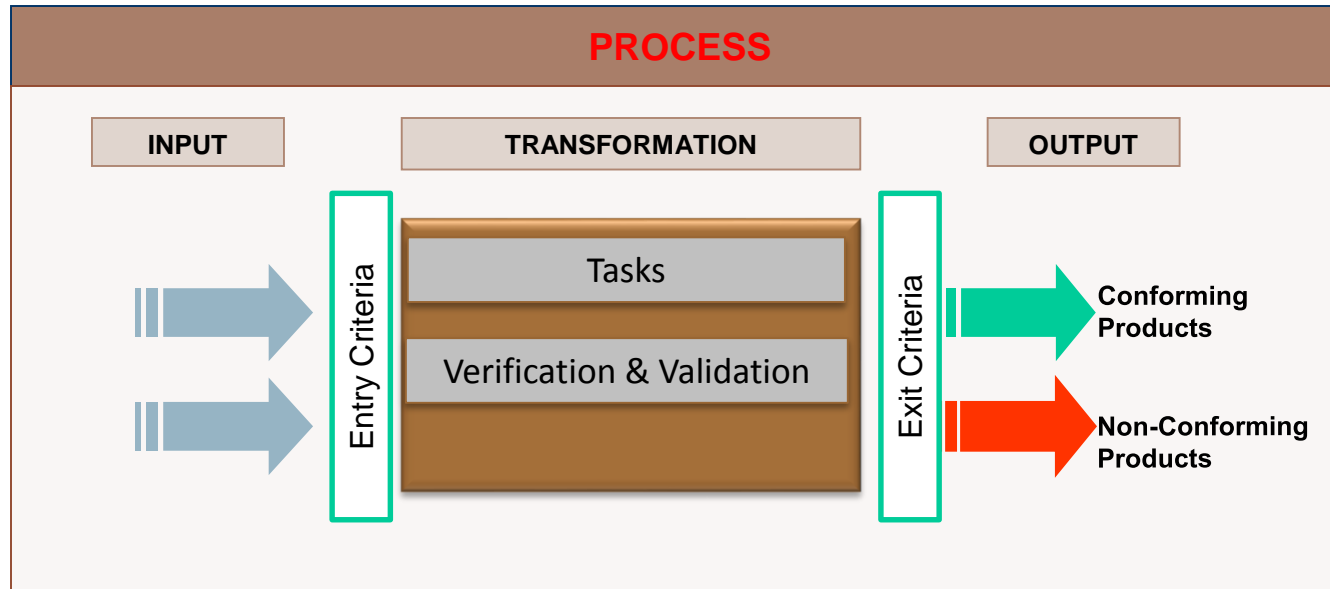
Dr. W. Edwards Deming, who is considered by many to be the father of modern quality control; however referred to it as "Shewhart cycle."

An ISO 9001 & SEI CMM Level 5 Company

Quality Management System

PROCESS

INPUT	TRANSFORMATION	OUTPUT

Entry Criteria

Tasks

Verification & Validation

Exit Criteria

Conforming Products

Non-Conforming Products

- A process is a value adding transformation.

- Business results are achieved through a network of processes.

People, drivers, methods, techniques, tools and environment get in to the process

"When you build a product or system, it is important to go through a series of predictable steps - a road map that helps you create a timely, high quality result. The road map that you follow is called a software process." - Roger Pressman

"A software process is a set of activities, methods, practices and transformations to develop and maintain software and the associated products." *- CMM for Software, Version 1.1*

Quality Management System

- **The process definition in QMS follows ETVX structure**

- **E - Entry criteria:**
  - That must be satisfied before a set of tasks can be performed in that process.

- **T - Tasks:**
  - The set of tasks to be performed.

- **V - Verification & Validation:**
  - Process to ensure that right tasks were performed. If an activity fails in the V&V check, either corrective action is taken or a rework is ordered.

- **X - Exit criteria:**
  - That must be satisfied before exiting from the process

- **Quality Planning: It is the systematic process of describing how an organization will achieve its quality policy / objectives, through quality assurance, control & improvement activities**

  - Executive management establishes the vision and strategic goals.

  - Planning is the process that describes how those strategic goals will be accomplished.

  - Quality planning should be integrated into the project plan so that it becomes a single plan. In simplistic terms, the software plan represents the producer and the quality plan represents the customer.

An ISO 9001 & SEI CMM Level 5 Company

- **Quality control practices occur during product development, product acquisition, product construction at the end of development/acquisition and throughout product change and operation.**

- **During development, the quality control process is frequently called verification and at the conclusion of development, it is called validation.**

  - Testing Concepts: Static, Dynamic, negative etc.

  - Verification: Are we building the right product.

  - Validation: Have we built the right product

  - Change Control: Managing changes

  - Defect Management: Managing and tracking the defects to closure

An ISO 9001 & SEI CMM Level 5 Company

- **Why?**

  - As total Quality Control is the most necessary inspection control

  - If the original specification does not reflect the correct quality requirements, quality cannot be inspected or developed into the product.

  - As all parameters of a product or service should include not only the material and dimensions but operating, environmental, safety, reliability and maintainability requirements.

  - As "Control" - under statistical control - is a three step process of specification, production, and inspection.

An ISO 9001 & SEI CMM Level 5 Company

- **Quality baselines are baselines of organization's performance for quality, productivity and customer satisfaction.**

- **Why Baselines are needed?**
  - To measure current level of performance
  - Basis for establishing improvement goals
  - Means to measure improvement

- **Methods Used for Establishing Baselines**
  - Customer Surveys
  - Benchmarking
  - Assessments against industry models
  - Assessments against management established criteria (e.g. requirements and user acceptance criteria)

An ISO 9001 & SEI CMM Level 5 Company

- **Cost of Quality (CoQ) is defined as the money spent beyond what it would cost to build a product right the first time. This has three components**

  - **Cost of Prevention:** Cost incurred while preventing defects and to do the job right the first time. This includes effort spent on establishing methods and procedures, training workers and planning for quality before the product is actually built (Simply: Cost of Training, Defect Prevention etc.)

  - **Cost of Appraisal**: Money spent to review completed products against requirements. Appraisal includes the cost of inspections, testing and reviews. This money is spent after the product or subcomponents are built but before it is shipped to the user (Simply: Cost of Reviews, Testing etc)

  - **Cost of Failure**: Failure costs are all costs associated with defective products. Some failure costs involve repairing products to make them meet requirements. Others are costs generated by failures, such as the cost of operating faulty products, damage incurred by using them and the costs incurred because the product is not available. The user or customer of the organization may also experience failure costs (Simply: Cost of rework)

Cost of Conformance (CoC)

- An organization's investment in the quality of its products
- It is the total cost expended to ensure that product conforms to the quality
- It includes costs associated with "Quality Assurance" (Training, Processes) and "Quality Control" (Reviews, Testing, Audits etc.)

Cost of Non-Conformance (CoNC)

- Cost expended in ensuring that non-conforming products is transformed into conforming product
- It includes of cost of rework to fix defects, customer complaints, wasted time, missed milestones, additional efforts to bring the project on track, address non-conformance with respect to product/ process quality issues

An ISO 9001 & SEI CMM Level 5 Company

- **Audit:**
  - An independent inspection or assessment activity that verifies compliance with plans, policies, and procedures; and ensures that resources are conserved. Audit is a staff function; it serves as the "eyes and ears" of management

- **Internal Audits**
  - Periodic internal audit by Quality group

- **Periodic external Audits by authorized ISO Auditors**
  - Compliance to policy, processes and standards
  - Continuing suitability of processes
  - Continuous improvement and their parameters

- **Re-certification Audit Once in 3 Years**

An ISO 9001 & SEI CMM Level 5 Company

- **Best Practice**
  - In addition to compliance best practices followed

- **Observations**
  - Potential non-compliance

- **NC**
  - Non-compliance

An ISO 9001 & SEI CMM Level 5 Company

- **Correction**
  - Steps taken to fix the non-conformities

- **Corrective actions**
  - Steps that are taken to remove the causes of existing nonconformities;
  - Address actual problems, ones that have already occurred;
  - A problem solving process.

- **Preventive actions**
  - Steps that are taken to remove the causes of potential nonconformities;
  - Address potential problems, ones that haven't yet occurred;
  - A risk analysis process.

An ISO 9001 & SEI CMM Level 5 Company

Metrics & Measurements

- **A properly established measurement system is used to help achieve missions, visions, goals, and objectives.**

  - Measurement data is most reliable when it is generated as a by-product of producing a product or services.

  - The QA analyst must ensure that quantitative data is valued and reliable, and presented to management in a timely and easy-to-use manner.

  - Measurement is used to know the status, effectiveness and efficiency of processes, customer satisfaction, product quality, and as a tool for management to use in their decision-making processes.

- **Measurements**

  - Product Measurement (size, complexity, quality and customer perception)

  - Process Measurement

- **Metrics – Derived from the term Metre**

- **Measurement – Single attribute of an entity**

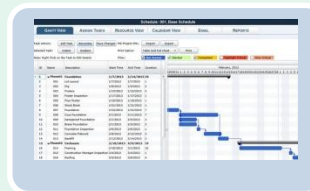- **Metrics – Resultant of two or more measurements**

Effort	Defect	Schedule	Size
• Hrs, Days, Month • **OnePoint**	• #, Injected / Detected Stage • Causes, Status • **BugZilla**	• Planned / Actual • Start / Finish • Days • Primavera	• FP, LOC • Use cases, Features etc

Metrics & Measurement

Business Goals → Management Information Needs → Measures / Metrics

Process Metrics
- Effort Variance
- Schedule Variance
- Productivity
- Review Effectiveness
- Cost of Quality

Product Metrics
- Defect Density
- Program Complexity
- Product Performance Metrics
- Software Reliability

Support Metrics
- Response time
- Resolution time
- Age of Open Requests/Tickets
- On-time Delivery
- Turn Around Time
- System Availability

An ISO 9001 & SEI CMM Level 5 Company

Metrics are used for

- Setting quantifiable goals
- Measure and track progress
- Taking decisions

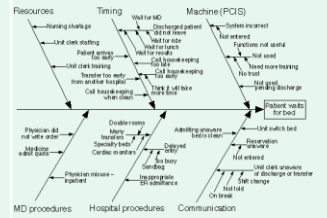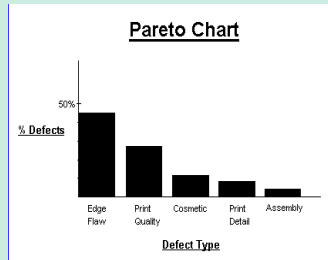| Project	Top management	Customer	QAG/SEPG
• Estimation • Tracking & control • Setting goals • Process improvements	• Benchmarking against industry standards • Performance across Units	• Monitor progress • Establish SLAs	• Establish Process capability • Introduce process improvements

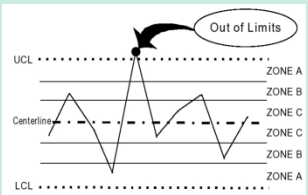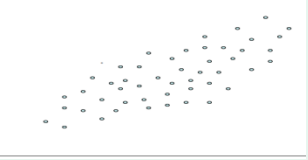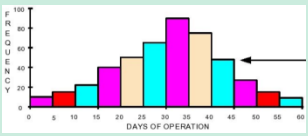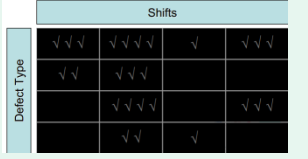An ISO 9001 & SEI CMM Level 5 Company

Statistical Quality Control

- **Statistics refers to a range of techniques and procedures for analyzing data, interpreting data, displaying data, and making decisions based on data."**

- **Types of Data**
  - Subjective: These are basically observation or perception
  - Objective: These are quantitative information obtained through measurements
    - Attribute/ Discrete Data: These can take limited no. of values. E.g. Team size, No. of programs
    - Variable/ Continuous Data: These can take any values between two specified values. E.g. Effort, Productivity etc.

- **Measure of Central tendency**
  - Mean: Average of observed values
  - Median: Mid point of observed values arranged in a ascending order
  - Mode: Most frequently occurring value in a data set

- **Measure of variability**
  - Standard deviation: Amount of data dispersion around mean
  - Variance: The difference between planned and actual values
  - Range: Difference between highest and the lowest value in a data set

- **Statistical quality control:** Refers to the use of statistical methods in the monitoring and controlling of the quality in products and services

- **The 7 QC tools have made statistical analysis simple and good visual aids make statistical quality control more easier for process improvements**

7 QC Tool	Purpose	Diagram
Flow Chart	A symbolic representation of flow of steps in a process	
Cause & Effect Diagram	It is also known as Fishbone or Ishikawa diagram. It depicts various causes which results in a single effect. Helps in performing in root cause analysis	
Pareto Diagram	Bar chart arranged in a descending order of importance and separates vital few from trivial many. 80-20 rule: 80% of problems are due to 20% of caues	

An ISO 9001 & SEI CMM Level 5 Company

7 QC Tool	Purpose	Diagram
Control chart	A run chart with control limits. This helps in identifying random (common) causes of variations and special causes of variations. This helps in making the process stable and capable	
Scatter Diagram	Helps to study and identify the possible relationship between the changes observed in two different sets of variables.	
Histogram	A special form of Bar chart, showing distribution of data (it's a frequency distribution diagram)	
Checksheet	It is a data collection tool, to record data for further analysis	

- **Privacy laws and increased accessibility to information has necessitated increased security.**

- **Increased importance on building and maintaining adequate systems of internal control**
  - Principles and Concepts of Internal Control and Security
  - Risk, Internal Control and Security Models
  - Building Controls into Software Systems
  - Assuring Adequacy of Internal Control and Security

- **Information is classified based on Confidentiality, Integrity and Availability (CIA)**
  - **Confidentiality**: Refers to access/ disclosure of information to authorized personnel
  - **Integrity**: Refers to completeness and correctness of the Information
  - **Availability**: Refers to availability of information when needed

An ISO 9001 & SEI CMM Level 5 Company

Configuration Management

- **Configuration Management is management of configurations . "Configuration" means the functional and physical characteristics of hardware or software as set forth in technical documentation, or achieved in a product or product component.**

  - CM ensures that :
    - We have place for every item and every item is in place with a proper access control
    - Deliverables are consistent with each other
    - We are using the right version
    - Right versions are delivered to customers
  - CM Addresses
    - Version Control, Change Control, Access Control
    - Simultaneous Usage, Reconciliation, Release, Backup/ Archival

An ISO 9001 & SEI CMM Level 5 Company

- **Traceability is the ability to trace customer requirements / inputs to various work, work plans, work products throughout life cycle of the product/ service delivery**
  - This helps to perform impact analysis whenever there are changes to requirements/ expectations from customer
    - Impact can occur on Schedule, Cost, Effort, work products/ deliverables and finally end product

- **Maintain Bi-Directional Traceability**
  - Bi-directional traceability includes Vertical Traceability (Forward & Backward) & Horizontal traceability
  - Vertical Traceability means traceability of the requirements/inputs to plans, design, code, test artifacts
  - Horizontal traceability means traceability between similar artifacts e.g. between requirements, between test cases etc.

Defect Prevention (DP)

- **The most efficient way to produce quality product/ service is to prevent the injection of defects in the first place, i.e doing right the first time itself**
  - Learn from past experience
  - Do defect prevention regularly by analyzing the data resulting in defects or rework
  - Measure the improvement

Less Defects → Less Rework → Less Effort → Higher Q & P

An ISO 9001 & SEI CMM Level 5 Company

List of Standards & Models

- **ISO 9001:2008 :** ISO 9001 is the internationally recognized standard for the quality management of businesses. It applies to the processes that create and control the products and services of an organization, and prescribes systematic control of activities to ensure that the needs and expectations of customers are met. ISO 9001 is designed and intended to apply to virtually any product or service, made by any process anywhere in the world

- **SEI-CMMI :** The Capability Maturity Model Integration (CMMI), developed by the Software Engineering Institute (SEI). This provides a guidance for the organization in developing, improving and assessing maturity of the processes that meets the business goals of an organization.

- **ISO 20000** : It promotes the adoption of an integrated process approach to effectively deliver managed services to meet business and customer requirements.

- **Six Sigma** : Customer centric, data driven, improvement methodology. It is 3.4 Defects/ Million Opportunities (i.e. 99.99966% accuracy)

- **ISO 27001** : Information Security Management System based on British Standard BS 7799 (now known as ISO 27001).

An ISO 9001 & SEI CMM Level 5 Company

List of Standards & Models

- **ITIL** : Information Technology Infrastructure Library framework essentially defines how to organize the system and network management departments within individual organizations.

- **MBNQA:** Malcom Balridge National Quality Award is an award instituted by US government for stimulating and recognizing high performance across US industries. Awards may be given each year in the manufacturing, service, small business, education, health care, and nonprofit sectors

- **Lean**: lean is a systematic approach to identify and eliminate waste (non-value added activities) through continuous improvement by flowing the product only when the customer needs it in pursuit of perfection

An ISO 9001 & SEI CMM Level 5 Company

List of standards & models

- **SAS 70 - SSAE 16 :** Statement on Standards for Attestation Engagements (SSAE 16) is an attestation standard put forth by the Auditing Standards Board (ASB) of the American Institute of Certified Public Accountants (AICPA) that addresses engagements undertaken by a service auditor for reporting on controls at organizations (i.e., service organizations) that provide services to user entities, for which a service organization's controls are likely to be relevant to a user entities internal control over financial reporting (ICFR)

- **PCI DSS:** The Payment Card Industry (PCI) Data Security Standard (DSS) was developed to encourage and enhance cardholder data security and facilitate the broad adoption of consistent data security measures globally. PCI DSS applies to all entities involved in payment card processing – including merchants, processors, acquirers, issuers, and service providers, as well as all other entities that store, process or transmit cardholder data

- **PCMM:** People Capability Maturity Model describes an evolutionary improvement path from ad hoc, inconsistently performed practices, to a mature, disciplined, and continuously improving development of the knowledge, skills, and motivation of the workforce that enhances strategic business performance

List of standards & models

- **Dodd–Frank Act:** The stated aim of this act is To promote the financial stability of the United States by improving accountability and transparency in the financial system, to end "too big to fail", to protect the American taxpayer by ending bailouts, to protect consumers from abusive financial services practices, and for other purposes.

- **ISO 22000 HACCP:** ISO 22000 is an international standard designed to ensure worldwide safe food supply chains and provide a framework of internationally harmonized requirements for the global approach that is needed. HACCP is a widely recognised and used product safety management principle in food manufacturing, processing, treatment and service organisations

- **ISO 13485:** Represents the requirements for a comprehensive quality management system for the design and manufacture of medical devices. This standard supersedes earlier documents such as EN 46001 and EN 46002 (both 1997)

- **CE MARK Certification:** The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EC directives. CE Mark is a mandatory conformity marking for certain products sold within the European Economic Area (EEA)

List of standards & models

- **HIPAA :** The Health Insurance Portability and Accountability Act. The primary goal of the law is to make it easier for people to keep health insurance (change /lose jobs), protect the confidentiality and security of healthcare information and help the healthcare industry control administrative costs

- **AS 9100 (**BS EN 9100) : AS9100 is based on ISO 9001:2008 and a widely adopted and standardized quality management system for the aerospace industry. AS 9100 is published by the Society of Automotive Engineers, an international association of engineering professionals in industries such as aerospace, automobile and commercial vehicle manufacturing. AS 9100 has been endorsed by the Federal Aviation Administration as the recognized quality standard for the aerospace industry

- **ISO 14001:** It is a recognized Environmental Management System. It is designed to help communities and other types of organizations meet their environmental obligations and reduce the impact of their operations on the environment, it is relevant to all types of organizations. EMS can be used as a framework to help these operations improve their environmental performance and make greater use of pollution prevention approaches

ISO 9001:2008

- **ISO 9001:2008 is based on eight quality management principles (all fundamental to good business practice)**

  - **Customer focus:** Organizations depend on their customers (internal & external), they should understand current and future customer needs, should meet customer requirements and should try to exceed the expectations of customers

  - **Leadership**: is needed to provide unity of purpose and direction

  - **Involvement of people**: Organization to create an environment where people become fully involved in achieving the organization's objectives

  - **Process approach**: The desired result can be achieved when activities and related resources are managed in an organization as process

  - **System approach to management**: the effectiveness and efficiency of the organization depends on a systemized approach to work activities

  - **Continual improvement**: One of the permanent quality objectives of an organization should be the continual improvement of its overall performance

  - **Fact based decision-making**: effective decisions are based on the analysis of data and factual information

  - **Mutually beneficial supplier relationships**: Since an organization and its suppliers are interdependent, therefore a mutually beneficial relationship between them increases the ability of both to add value

As regards to Quality, every apparent finish line is actually a start line !

The achievement of quality or the "fitness-for-purpose" is "Quality Awareness" throughout the company.

An ISO 9001 & SEI CMM Level 5 Company

- **For further advanced reading the following sites can be checked:**
  - Internal Audit - http://www.in.kpmg.com/services/services_ias.asp
  - SQA - www.webopedia.com/TERM/S/Software_Quality_Assurance.html
  - Software Quality - http://en.wikipedia.org/wiki/Software_quality

- **For QCP Test**
  - It is an online exam with a duration of 30 mins. for the mandatory test of 50 Multiple Choice Questions and to qualify, one should accrue minimum 70 credit points from the overall test.

- **All the Best!**

An ISO 9001 & SEI CMM Level 5 Company

Thank you

An ISO 9000 & SEI CMM Level 5 Company