10.1 Software quality attributes

Software Quality Attributes are features that facilitate the measurement of performance of a software product by Software Testing professionals, and include attributes such as availability, interoperability, correctness, reliability, robustness, maintainability, readability, extensibility, testability, efficiency, and portability.

High scores in Software Quality Attributes enable software architects to guarantee that a software application will perform as the specifications provided by the client.

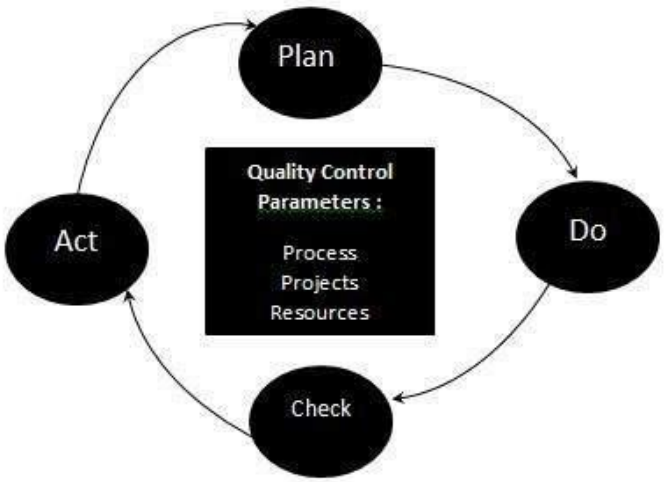
10.2 Quality factors

The various factors, which influence the software, are termed as software factors. They can be broadly divided into two categories. The first category of the factors is of those that can be measured directly such as the number of logical errors, and the second category clubs those factors which can be measured only indirectly. For example, maintainability but each of the factors is to be measured to check for the content and the quality control.

10.3 Quality Control

Quality control is a set of methods used by organizations to achieve quality parameters or quality goals and continually improve the organization's ability to ensure that a software product will meet quality goals.

Quality Control Process:



The total quality control process consists of:

- Plan - It is the stage where the Quality control processes are planned
- Do - Use a defined parameter to develop the quality
- Check - Stage to verify if the quality of the parameters are met
- Act - Take corrective action if needed and repeat the work

Quality Control characteristics:

- Process adopted to deliver a quality product to the clients at best cost.
- Goal is to learn from other organizations so that quality would be better each time.
- To avoid making errors by proper planning and execution with correct review process.

10.4 Quality assurance

Quality Assurance is defined as the auditing and reporting procedures used to provide the stakeholders with data needed to make well-informed decisions.

It is the Degree to which a system meets specified requirements and customer expectations. It is also monitoring the processes and products throughout the SDLC.

Quality Assurance Criteria:

Below are the Quality assurance criteria against which the software would be evaluated against:

- correctness
- efficiency
- flexibility
- integrity
- interoperability
- maintainability
- portability
- reliability
- reusability
- testability
- usability

10.5 Software quality assurance

Software Quality Assurance (SQA) is simply a way to assure quality in the software. It is the set of activities which ensure processes, procedures as well as standards are suitable for the project and implemented correctly.

Software Quality Assurance is a process which works parallel to development of software. It focuses on improving the process of development of software so that

problems can be prevented before they become a major issue. Software Quality Assurance is a kind of Umbrella activity that is applied throughout the software process.

Software Quality Assurance has:

- A quality management approach
- Formal technical reviews
- Multi testing strategy
- Measurement and reporting mechanism

Benefits of Software Quality Assurance (SQA):

- SQA produces high quality software.
- High quality application saves time and cost.
- SQA is beneficial for better reliability.
- SQA is beneficial in the condition of no maintenance for a long time.

10.6 Software safety

In software engineering, software system safety optimizes system safety in the design, development, use, and maintenance of software systems and their integration with safety-critical hardware systems in an operational environment.

10.7 The ISO 9000 model

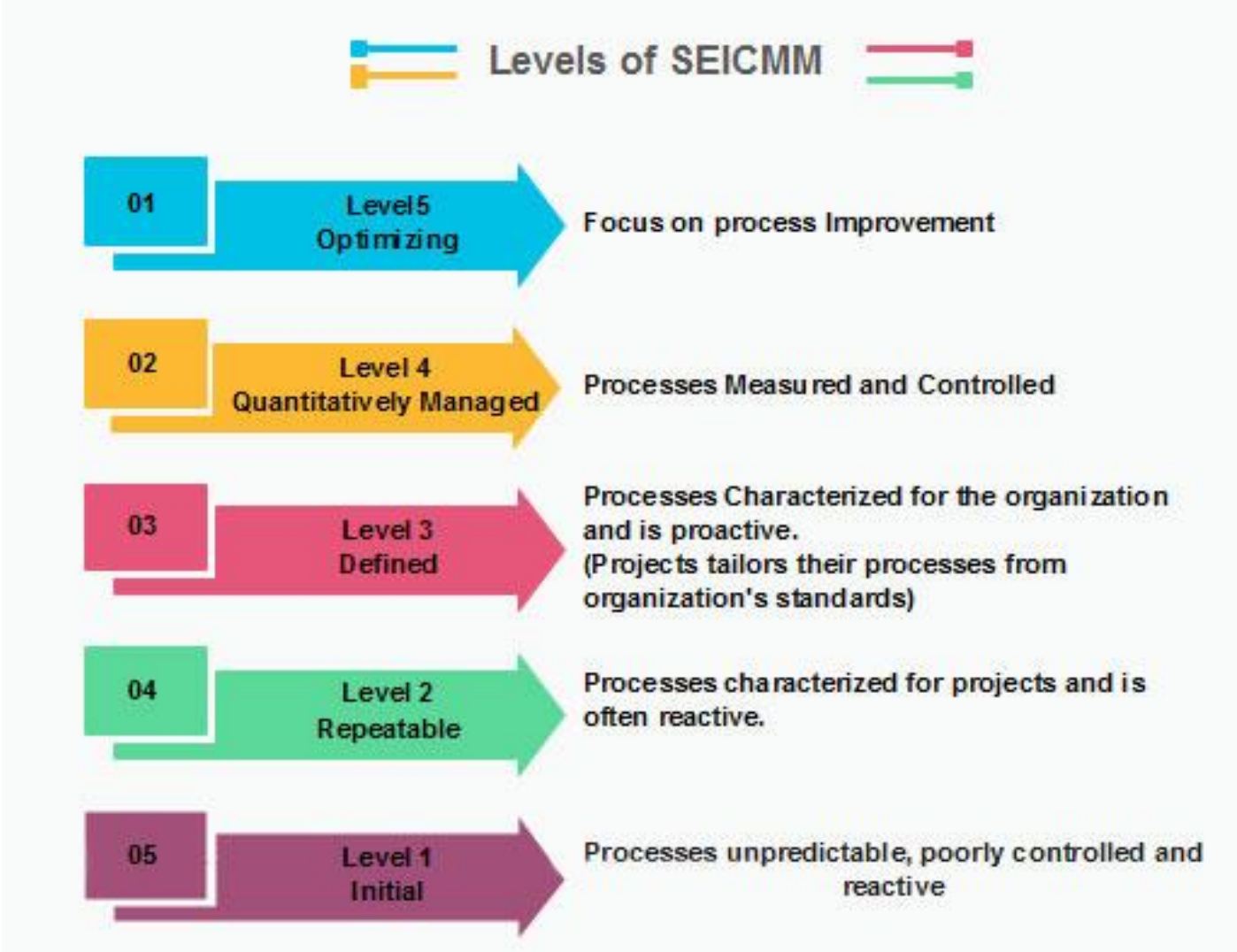
The International organization for Standardization is a world wide federation of national standard bodies. The International standards organization (ISO) is a standard which serves as a for contract between independent parties. It specifies guidelines for development of quality system.

Quality system of an organization means the various activities related to its products or services. Standard of ISO addresses to both aspects i.e. operational and organizational aspects which includes responsibilities, reporting etc. An ISO 9000 standard contains set of guidelines of production process without considering product itself. It ensures quality planning, quality control, quality assurance and quality improvement.

10.8 SEI capability maturity model

The Capability Maturity Model (CMM) is a procedure used to develop and refine an organization's software development process.

The model defines a five-level evolutionary stage of increasingly organized and consistently more mature processes.



Level 1: Initial

Ad hoc activities characterize a software development organization at this level. Very few or no processes are described and followed. Since software production processes are not limited, different engineers follow their process and as a result, development efforts become chaotic. Therefore, it is also called a chaotic level.

Level 2: Repeatable

At this level, the fundamental project management practices like tracking cost and schedule are established. Size and cost estimation methods, like function point analysis, COCOMO, etc. are used.

Level 3: Defined

At this level, the methods for both management and development activities are defined and documented. There is a common organization-wide understanding of operations, roles, and responsibilities. The ways through defined, the process and product qualities are not measured. ISO 9000 goals at achieving this level.

Level 4: Managed

At this level, the focus is on software metrics. Two kinds of metrics are composed.

Product metrics measure the features of the product being developed, such as its size, reliability, time complexity, understandability, etc.

Process metrics follow the effectiveness of the process being used, such as average defect correction time, productivity, the average number of defects found per hour inspection, the average number of failures detected during testing per LOC, etc. The software process and product quality are measured, and quantitative quality requirements for the product are met.

Level 5: Optimizing

At this phase, process and product metrics are collected. Process and product measurement data are evaluated for continuous process improvement.

10.9 Verification and validation

Validation refers to the set of authorities which ensure that software is correctly implemented for a specific function.

Verification refers to a different set of authorities which ensure that software which has been built is traceable to customer requirements.

Verification: - are we making the product?

Validation: - are we making the right product.

It is basically a part of the software quantity assurance (SQA): - tested approach in the S/E-

It includes the following objectivity-

1) To ensure that product is safe.

2) To ensure that product will function properly under both normal exceptional conditions.

3) To ensure that the product is what the user want.