Software Quality Assurance (SQA)

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Quality?

- FIT for USE or PURPOSE
- Meeting Need and Expectation of Customer
- It’s NOT about Brand

Assurance?

- It’s a +ve DECLARATION or GUARANTEE on a Product or Service

Quality Assurance?

- It’s a +ve DECLARATION or GUARANTEE on QUALITY of a Product or Service

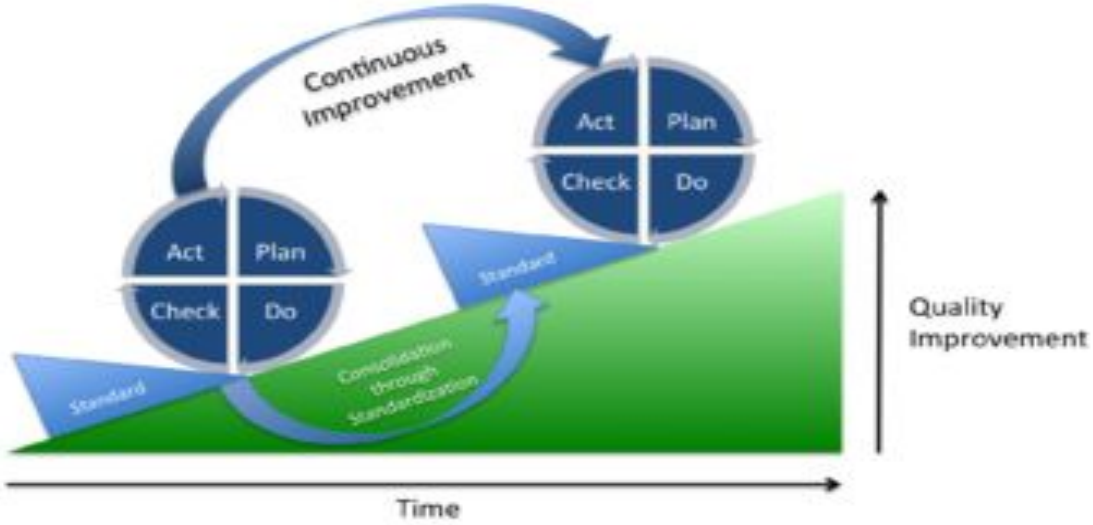
- It is defined as an activity/process to ensure that an organization is providing the best possible product or service to customers.

Software Quality Assurance?

- It’s a +ve DECLARATION or GUARANTEE on QUALITY of a SOFTWARE Product or Service.

- It is a process which assures that all software engineering processes, methods, activities and work items are monitored and comply against the defined standards.
  - These defined standards could be one or a combination of any like ISO 9000, CMMI model, ISO15504, etc.

QA Process

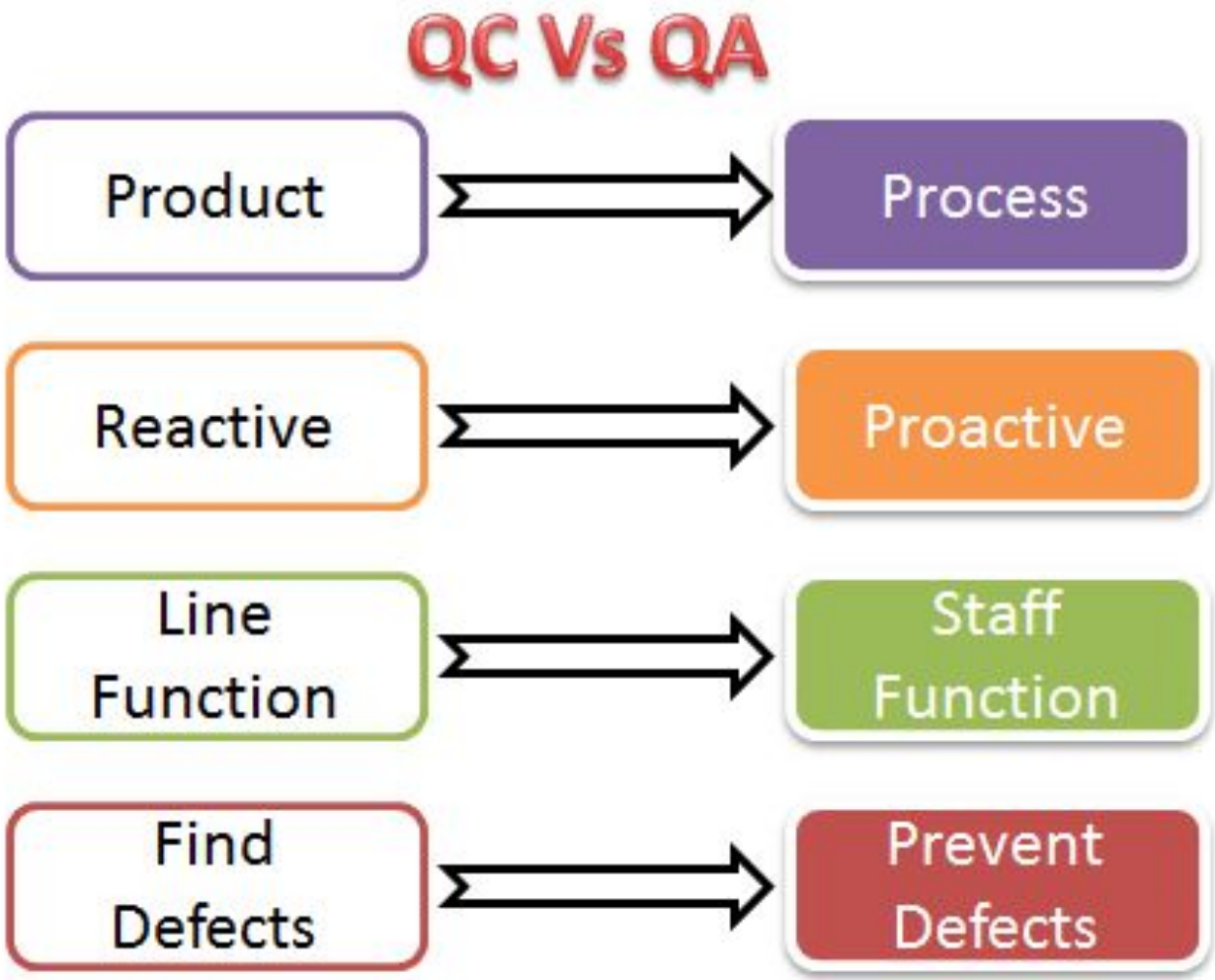


- PDCA Cycle or Deming Cycle
- PDCA are repeated to ensure that processes followed in the organization are evaluated and improved on a periodic basis.
- Plan - Organization should plan and establish the process related objectives and determine the processes that are required to deliver a high-Quality end product.
- Do - Development and testing of Processes and also "do" changes in the processes
- Check - Monitoring of processes, modify the processes, and check whether it meets the predetermined objectives
- Act - Implement actions that are necessary to achieve improvements in the processes

Quality Control (QC) [Software Testing]

- It’s a CHECK on the DECLARATION or GUARANTEE regarding Quality of a Product or Service.
- It does not deal with the processes used to create a product; rather it examines the quality of the "end products" and the final outcome.
- QC also evaluates people on their quality level skill sets and imparts training and certifications.

QA VS QC


QC Vs QA
Product
Process
Reactive
Proactive
Line Function
Staff Function
Find Defects
Prevent Defects

QA vs QC - Activities

Quality Control Activities	Quality Assurance Activities
Walkthrough	Quality Audit
Testing	Defining Process
Inspection	Tool Identification and selection
Checkpoint review	Training of Quality Standards and Processes

SQA vs SQC (Software Testing)

SQA	Software Testing
Software Quality Assurance is about engineering process that ensures quality	Software Testing is to test a product for problems before the product goes live
Involves activities related to the implementation of processes, procedures, and standards. Example - Audits Training	Involves actives concerning verification of product Example - Review Testing
Process focused	Product focused
Preventive technique	Corrective technique
Proactive measure	Reactive measure
The scope of SQA applied to all products that will be created by the organization	The scope of Software Testing applies to a particular product being tested.

Best SQA Practices

- Create a Robust Testing Environment
- Select release criteria carefully
- Apply automated testing to high-risk areas to save money. It helps to fasten the entire process.
- Allocate Time Appropriately for each process
- It is important to prioritize bugs fixes based on software usage
- Form dedicated security and performance testing team
- Simulate customer accounts similar to a production environment

SQA Functions

- **Technology transfer:** This function involves getting a product design document as well as trial and error data and its evaluation. The documents are distributed, checked and approved
- **Validation:** Here validation master plan for the entire system is prepared. Approval of test criteria for validating product and process is set. Resource planning for execution of a validation plan is done.
- **Documentation:** This function controls the distribution and archiving of documents. Any change in a document is made by adopting the proper change control procedure. Approval of all types of documents.
- **Assuring Quality of products**
- **Quality improvement plans**

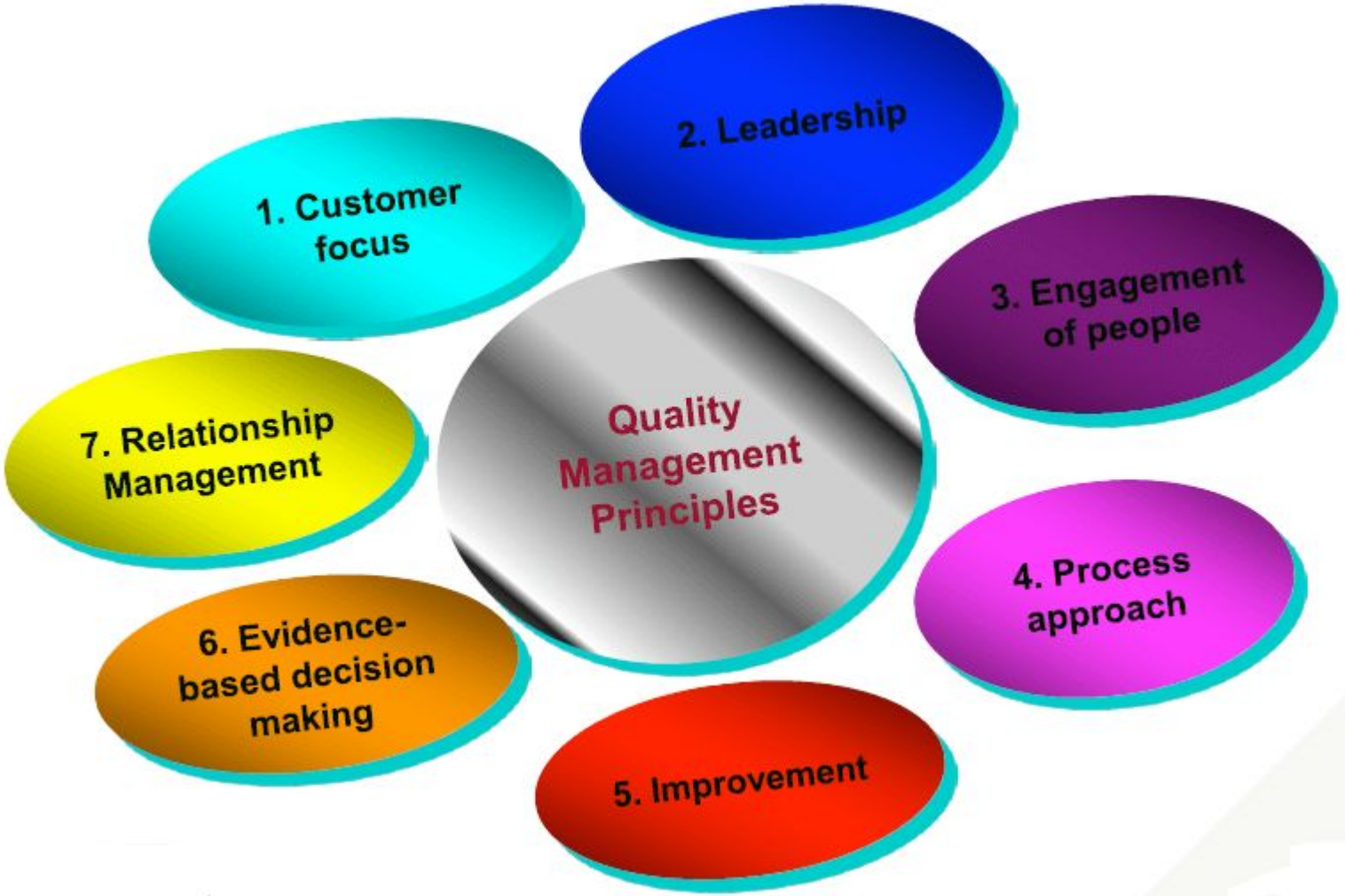
SQA Techniques

- Auditing
- Reviewing
- Code Inspection
- Design Inspection
- Simulation
- Functional Testing
- Standardization
- Static Analysis
- Walkthroughs
- Path Testing
- Stress Testing
- Six Sigma

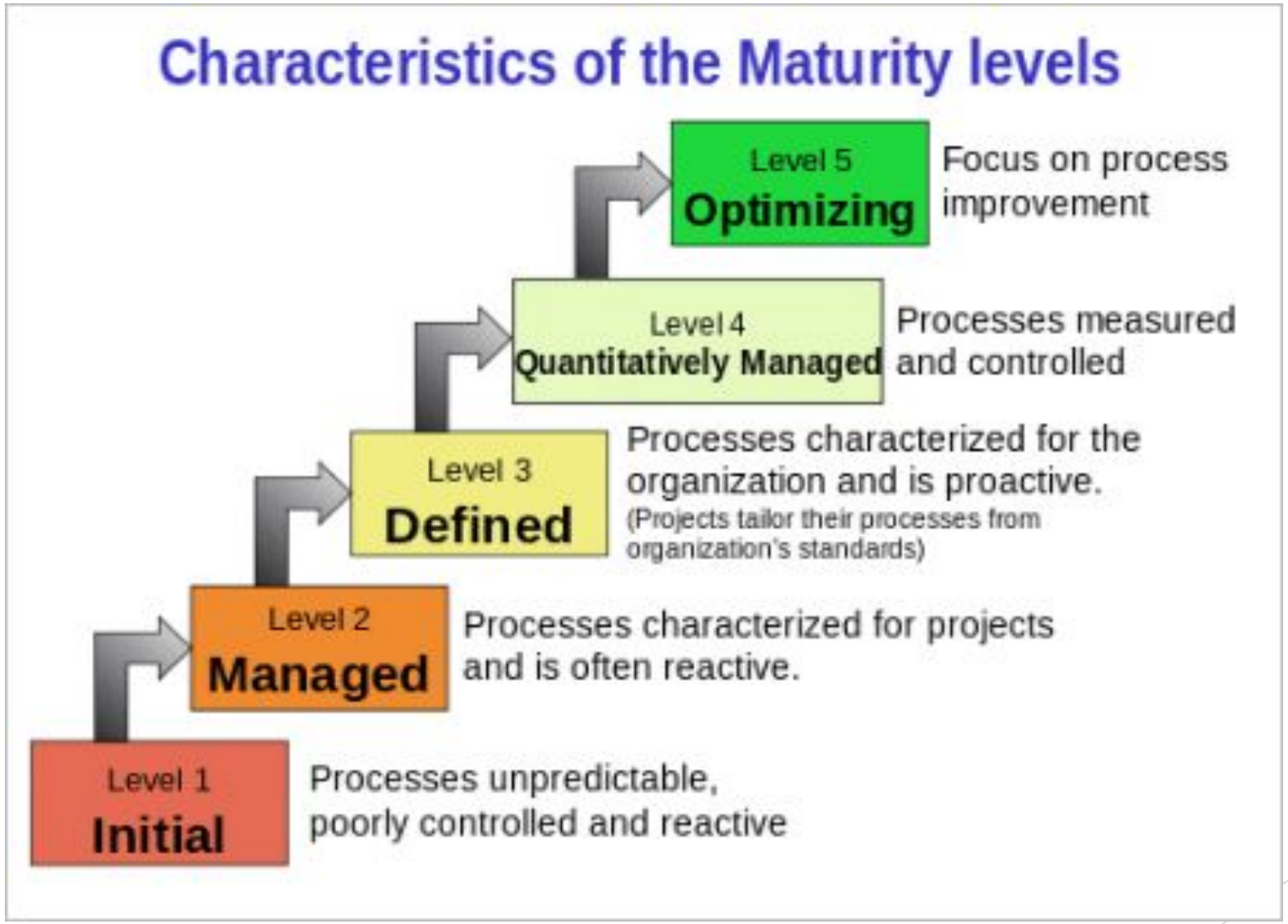
SQA Standards

- ISO 9000
- Capability Maturity Model Integrated (CMMI)
- Test Maturity Model (TMM)

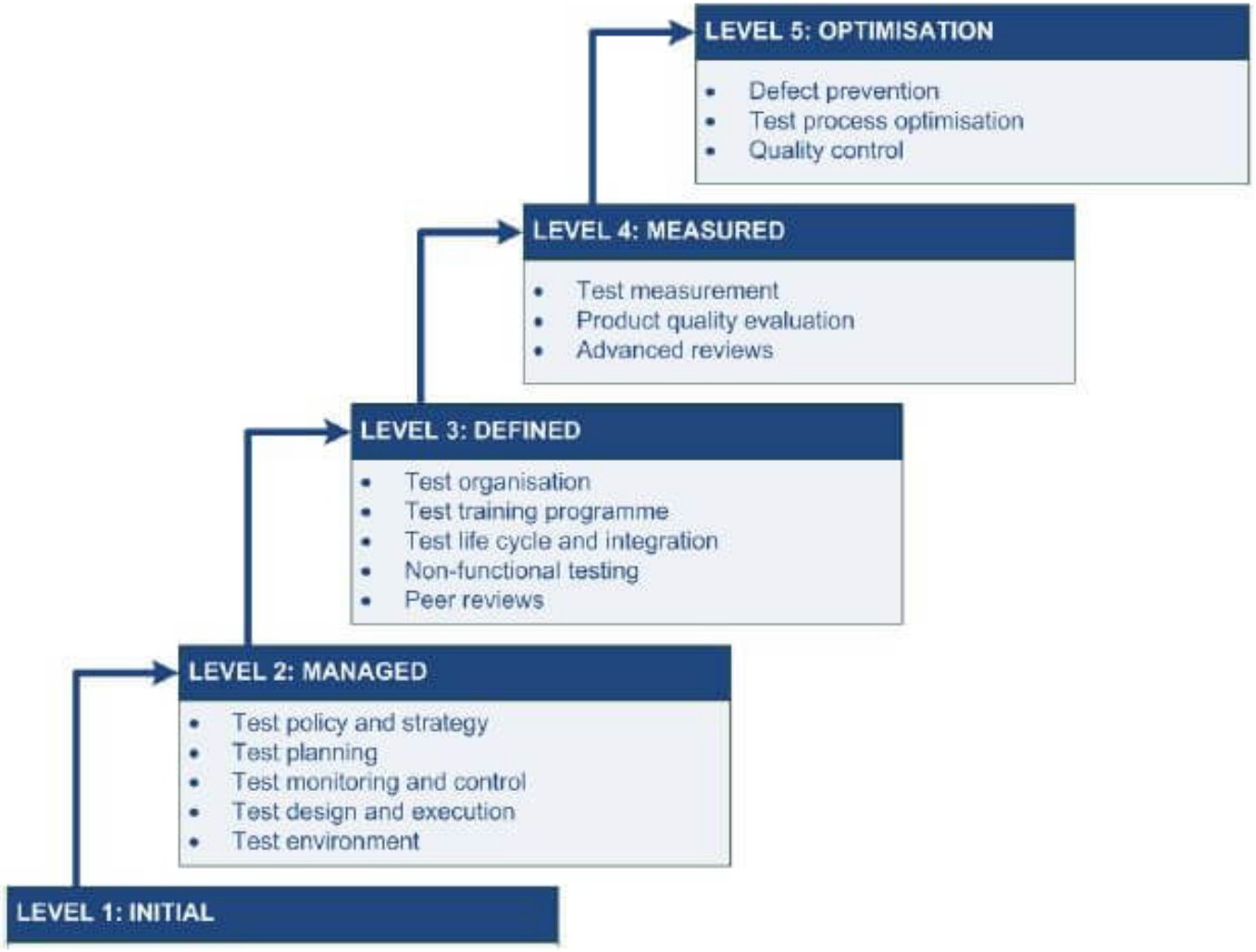
ISO 9000


Quality Management Principles
1. Customer focus
2. Leadership
3. Engagement of people
4. Process approach
5. Improvement
6. Evidence-based decision making
7. Relationship Management

CMMI [See this ITS -> Case Study]



TMM


LEVEL 5: OPTIMISATION
Defect prevention
Test process optimisation
Quality control
LEVEL 4: MEASURED
Test measurement
Product quality evaluation
Advanced reviews
LEVEL 3: DEFINED
Test organisation
Test training programme
Test life cycle and integration
Non-functional testing
Peer reviews
LEVEL 2: MANAGED
Test policy and strategy
Test planning
Test monitoring and control
Test design and execution
Test environment
LEVEL 1: INITIAL

Software Testing

Software Testing

- According to **ANSI/IEEE 1059** standard – A process of analyzing a software item to detect the differences between existing and required conditions (i.e., defects) and to evaluate the features of the software item.

Testing Approaches

- White Box [https://youtu.be/3bJcvBLJViQ]
  - Also called as Glass Box, Clear Box, Structural Testing
  - Based on applications internal code structure
  - Usually done at the unit level
- Black Box [https://youtu.be/Wi75S5TTfQ0]
  - Also called as Behavioral/Specification-Based/Input-Output Testing
  - Testers evaluate the functionality of the software under test without looking at the internal code structure.
- Grey Box
  - Combination of both White Box and Black Box Testing

Testing Levels

- Unit Testing
  - Done to check whether the individual modules of the source code are working properly
  - AKA Modules Testing or Component Testing
- Integration Testing
  - The process of testing the connectivity or data transfer between a couple of unit tested modules
  - AKA I&T Testing or String Testing
  - Subdivided into Top-Down Approach, Bottom-Up Approach and Sandwich Approach

Testing Levels

- **System Testing (end to end testing):**
  - A black box testing
  - Testing the fully integrated application
  - AKA end to end scenario testing
  - Testing of the users experiences with the application

- **Acceptance Testing**
  - To obtain customer sign-off so that software can be delivered and payments received.
  - Types of Acceptance Testing are Alpha, Beta & Gamma Testing.

Supporting Materail

- https://www.guru99.com/all-about-quality-assurance.html#4
- https://www.softwaretestinghelp.com/software-quality-assurance/#Software_Quality_Assurance_Plan
- https://www.softwaretestingmaterial.com/software-testing/
- https://youtu.be/3bJcvBLJViQ
- https://www.guru99.com/white-box-testing.html
- https://youtu.be/Wi75S5TTfQ0
- https://www.guru99.com/black-box-testing.html