1. **Introduction**
   1. **Purpose**

The main purpose of software quality assurance plan is to ensure that product meets the requirement specified by client. In a way, product should be as mention in software requirement specification.

SQA will include management of project, checking of software quality, and documentation after every phase. It will also include what standards and conventions are used for documentation and coding.

* 1. **Scope**

The scope of this document is to ensure quality of product.

This document will help in ensuring following things so that quality of product is ensured:

* To know responsibility of each member of project.
* To know what will be work product.
* Documentation after every phase are maintained.
* Project to be reviewed by reviewer team.
* Documentation are to be reviewed.
* Proper management approach throughout the project.

1. **Management:**
   1. **Organization:**

For Assurance of quality of our product:

* After every phase of our life cycle the product will be reviewed by review team.
* Documents generated at end of each phase are also reviewed.
* If any kind of changes are to be made in documents, the reviewer are responsible for making changes.
* If any changes are to be made in coding then reviewer ask the coder to make required changes.
  1. **Roles and Responsibility:**

Project manager:

The project manager is responsible for ensuring the quality of product. It is project manager’s responsibility to know whether product and documents are according to specified plan.

Project team:

Every team member are assign particular task for quality assurance. Project team is divided into following sub-groups:

* Designer.
* Developer.
* Module manager.
* Tester.

All the group members work for assurance of good quality product.

1. **Software Quality:**

**Structural Quality:**

Analysis of software’s inner structure and source code of inner structure is carried out. Structural quality is evaluated on basis of analysis carried out.

It will ensure how much structure of our product matches the designed structure at the time of design phase.

**Functional Quality:**

Testing of product is carried out for checking of functionality of product. It will ensure which functional requirements is not present in product that is mentioned in requirement specification. It will give the degree to which the product is produced correctly.

**Following activity must be performed for ensuring overall quality:**

* Convention for documentation and coding must be followed.
* All the documents must be properly formatted.
* Every documents should be completed within given deadline and every details must be mentioned in the documents.
* Coding convention must be followed so, the code is easy to understand and maintain.
* After completion of each document review should be carried out by other members. If there are any changes than reviewer are allowed to make changes in document. Changes are incorporated according to the configuration management plan.
* Verification and validation are done at end of each phase. It will ensure the quality of output artifact.
* If there are any further changes made in the requirements than according documents are updated.
* Configuration management plan is properly followed so that changes are properly known and changes are made.

1. **Documentation:**

It includes all the necessary documents that are needed for complete life cycle of our product. These documents are made and maintain throughout the project. Also necessary changes are also updated in the documents.

* 1. **Project plan:**

Following are some purposes that are satisfied by this document:

* It provides complete description, goal and different criteria of product.
* It also provide the deadline for each phase.
* It also gives how works are divided amongst group members.
* It also gives approximation of risk involved and cost of project.

Project plan is to be followed throughout the project and necessary changes are also updated in project plan.

* 1. **Software requirement specification:**

In general this document is of most importance. This document provides the all types of requirements that are needed by the client.

Following things must be mention in requirement specification document:

* All the functional requirement must be clearly mentioned.
* What input the system will take and what output it will produce should also be mentioned.
* Other non-functional requirements should also be mentioned clearly.
* Different types of assumptions made should also be mentioned.

This document is reflection of our final product so this document should be revised thoroughly and necessary changes should be made. All the functions mentioned in SRS should be meet at the end of project.

* 1. **Design – high level and low level document:**

After all the requirements are clearly specified now we move on to design phase.

There are two design documents: high level design and low level design. Both gives the design aspects of the product. It describes the architecture followed to develop the product.

High level design depicts modules and invocation of modules. While low level includes detailed of each modules.

Design aspects: user interface, database, implementation architecture, procedure design etc. are included in this documents. This document should be reviewed in such a way that it reflects the requirement specification document.

* 1. **Risk management and mitigation plan:**

This document will include all the types of risk faced during the course of our project. And it will also include strategies and actions that our team will take to mitigate these risks.

Risk management is done so that we do not have to face crises. It included all the types of risk by which project is surrounded. It includes past, present and future risks. It reduces the probability of failure of project.

* 1. **User manual:**

User manual is made for any user who wants to use this product. By user manual anyone can use product smoothly.

This document will specify user interface, input data, output data and different options of the product. All the corrective measures shall be described. It will also mention the limitation of the product. By using user manual anyone can know how to run the product.

* 1. **Software configuration management plan:**

It facilitates orderly management of system information and system changes for such beneficial purposes as to revise capability, improve performance, reliability, or maintainability, extend life, reduce cost, and reduce risk and liability.

It includes following methods:

* Identifying software items.
* Implementing changes.
* Recording and reporting change implementation status.

**5. Standards & Conventions**

**Documentation Conventions**

Document formats are referred to IEEE standards and previous year IT314 Software Engineering project documents. Documentation reviews are carried out by strictly following the standards which will ensure overall quality of document.

Following are the standard conventions that we followed while writing documents.

* Main Headings:

       Font - Times New Roman

Font Size - 16 pts

Bold

* Sub Headings:

Font - Times New Roman

Font Size - 14 pts

Bold, Underlined

* Content:

Font - Times New Roman

Font Size - 12 pts

**Coding Convention**

General WordPress coding convention for PHP is followed for writing code.

**6. Software Quality Assurance Activities**

* 1. **Quality Control**

Review team is assigned for the document/software that is to be reviewed. Review team performs a quality review of the document/software. Review team checks for correctness, completeness of document/software. They also ensure that document is easy to understand and there is no ambiguity and software is performing functionality which it supposed to do . Once the review is conducted, review team will check of if any problems still persist? If yes, then then it is again assigned a new review team which carries above mentioned process. And if there is no problem, then review team will select new document which is to be reviewed.

* 1. **Inspection & Review**

When document is to be drafted, drafting team will first discuss the template of the document with the project manager. Drafting team will make sure that document follow the template and clearly describe the content of the document. Then Document is handed to review team, which find flaws(Anomaly) in the documents. Review team make sure that each section of document contains relevant content.

IEEE gives standard definition of flaw (Anomaly) as, Any condition that deviates from expectations based on requirements specifications, design documents, user documents, standards, and so on or from someone’s perceptions or experiences. To maintain the quality of document/software we have to make sure that there are no flaws (Anomalies). Flaws may be mainly found in review, but may be also found in testing, compilation, analysis or at use of document or software product. Team sit together and discuss the flaws and make appropriate changes. Document is changed and changes are recorded in review document.

* 1. **Audits**

Regular audits of activities are held which ensure Software quality. This will help in many ways. It let the team members to know about the activities which help in determining the flaws and how well those activities are conducted. Every SQA activity is referred to know how well it is affecting the quality of the product. Goal of audit is to make sure that Software quality assurance activities are planned and when any changes are made Affected groups and individuals are informed of software quality assurance activities and results. Audit keeps the SQA team on right track. And help us charging up beneficial SQA activities and eliminating useless activities.

In every meeting work assigned to each member is audited. If the performance of individual is not good then problems and questions are asked to the team or individual. Weekly log is maintained to track the work of individual.

* 1. **Verification & Validation**

**Verification:** It is the process of determining whether or not the products of a given stage of the software development cycle fulfil the requirements established during the previous stage.

Different phases have different thing to be verified. As part of Design phase verification Correctness, completeness and accuracy of High level design is verified. HLD is the overall system design - covering the system architecture and database design. Low level design is also produced.

**Validation**: It is the process of evaluating software at the end of the software development process (acceptance testing activity in the Testing stage) to ensure compliance with software requirements.

There are some activities that are being carried out as part of validation:

* Plan acceptance testing.
* Plan documentation of test tasks and results.
* Execute Acceptance test plan.
* Document acceptance test results.
  1. **Testing**

Testing is activity carried out at end of project. Testing evaluates the capability of the project and it also ensures that it meets its required specification.

Following things are ensured by carrying out testing:

* It ensures that product meets all the functionality mentioned in required specification.
* It also verifies and validates the product. And also quality is assured.
* All the testing activities that are mention in test plan are made such that we can find maximum flaws in our product.
* The test plan includes features to be tested and types of testing.
* All these activities mentioned in test plan are assured in testing.
* Individual modules are tested and after that all the modules are tested together.

In general the quality of product is known at the end of testing phase. After testing phase we can know to what percentage our product meets the actual requirement.

If our product has more requirement satisfied which are not even mentioned in requirement specification than it is not a problem but it if our product meets less requirement than that are mention in requirement specification than there is problem.