Software quality control

Software Quality Control is the set of procedures used by organizations[1] to ensure that a software product will meet its quality goals at the best value to the customer,[2] and to continually improve the organization's ability to produce software products in the future.[1]

Software quality control refers to specified functional requirements as well as non-functional requirements such as supportability, performance and usability.[2] It also refers to the ability for software to perform well in unforeseeable scenarios and to keep a relatively low defect rate.

These specified procedures and outlined requirements leads to the idea of Verification and Validation and software testing.

It is distinct from software quality assurance which includes audits of the quality management system against a standard. Whereas software quality control is a control of products, software quality assurance is a control of processes.

Definition

Software Quality Control is the function that checks whether the software project follows its standards processes, and procedures, and that the project produces the desired internal and external (deliverable) products i.e. output.

Quality Control Plan (Project Quality Control Plan)

1. INTRODUCTION

1.1 Definition

''A Quality Control Plan sets out to analyze the actions required to fulfill the project requirements such that the end product meets its specifications and product quality is maintained'' .

1.2 The characteristics of a Quality Plan

- Consistent : The plan should follow the standard and guidelines set by LADOTD design manuals and AASHTO standard.

- Complete:The plan should include the overall representation of the project requirements, features, documentation of the project plan .such plan should be developed through all the stages of the project development activity.

- Clear:The plan, thus developed should be very clear to the developer and also to the stakeholders regarding project requirements and other project details .

- Correct:The project details will be very clear to stakeholders regarding product delivery date of its postponement or cancellation of the product.

- Constructible:The project development plan should be such that if by chance some design errors occurs in product development then it should be constructible within small time span .

To achieve 5 C's it is recognized that communication between stakeholders and developer is very necessary .

1.3   Purpose

The purpose of Quality Control Plan is to assure that the quality of the product being developed is maintained throughout the development process.The Plan also includes the procedures which assist in controlling the quality of the product.

1.4   Objective

The main objective of Quality Control Plan is to provide mechanism by which all the plans are executed consistently without any design errors. It ensures that the procedures are continuously reviewed by the stakeholders and the designers. To achieve quality control, a project file document is created where feedback is given at regular intervals. Periodic review of the feedback results in appropriate changes in the development process.

1.5   Requirements of Quality Control

The basic requirements of Quality Control is to fulfill all the valid requirements of the project . It also requires planning, documentation of the project development activities, constant supervision of designer throughout the development process . It also require the developer to ensure that all the project activities are co-ordinated and completed as per schedule and reviews are made periodically.

2.   PROJECT QUALITY CONTROL REQUIREMENTS

A Project Quality Control Plan is necessary for each project before starting the project work.

Project Quality Control Plan: This plan gives the detailed information of methods & process that provides the good quality control for all work products.This plan is kept updated with the requirements of project. The plan includes the following parts:

2.1   Quality Control Staff

Mainly the QC team contains following members:

- Engineer of Record (EOR)
- Designer
- Technical Advisors
- Checkers/Testers
- Quality Assurance Manager

Engineer of Record is a professional engineer who controls and supervises all the engineering work performed during project development. The Engineer of Record (EOR)is responsible for developing the Project Quality Control Plan & maintaining the Quality of Project. When the project work starts, EOR has to make a team for Review & Quality control with the help

of Design Engineer. Then the team completes the process to satisfy all the requirements of project & reports it to the designer.

2.2 Quality Control Reviews

Every Project will undergo this review step. The reviewer is an experienced person who is not an active member of project development team. The different reviews are given below.

2.2.1. Bidability, Constructibility and Right of Way Reviews

- Bidability Reviews:

These reviews are initialized by Project Management Team . These reviews can take place as part of the Final Plans Processing.

- Constructibility and Right of Way Reviews:

These reviews allow input from these departments, for constructibility reviews and assist in the Right of Way Office in reducing right of way costs.

2.2.2. Checking Procedures

- Checking Reports
  - o Avoid Redundant data
  - o Support for focusing on Major issues
  - o Makes data & structures consistent
- Checking Drawings
  - o Provides the design according to the requirement of project
  - o Provides Complete & clear idea of project
  - o Provides Coordination with other aspects of the project, i.e., structural, civil, traffic, right-of-way, etc.
  - o Gives Compatible standards and good plans preparation practice
- Checking Calculations
- Checking Correspondence

2.2.3. Resolution of Disputes

In review and checking process, if results are not up to mark, then the checker discuss the issue with design Engineer & tries to solve the issue, If even though the issue is not resolved between the checker and the Designer,then he goes to a senior technical advisor in order to assist in the resolution of the dispute.

2.3 Proposed method of documentation of comments, coordination responses and quality assurance records.

- Documentation of Comments, Coordination and Responses
- Quality Assurance Records
- Coordination with Operations (Construction and Maintenance)

2.3.1. QA of Consultant Projects

The consultants projects should undergo the same Quality Control Plan.

3. Quality Control Activities

- Check that assumptions and criteria for the selection of data and the different factors related to data are documented.
- Check for transcription errors in data input and reference.
- Check the integrity of database files.
- Check for consistency in data.
- Check that the movement of inventory data among processing steps is correct.
- Check for uncertainties in data, database files etc.
- Undertake review of internal documentation.
- Check methodological and data changes resulting in recalculations.
- Undertake completeness checks.
- Compare Results to previous Results.

3.1   Software Control Methods

- Rome laboratory Software framework
- Goal Question Metric Paradigm
- Risk Management Model
- The Plan-Do-Check-Action Model of Quality Control
- Total Software Quality Control
- Spiral Model Of Software Developments

3.2   Verification & Validation

Verification and **Validation** assures that a software system meets a user's needs.

Verification: "Are we building the product right". The software should conform to its specification.

Validation: "Are we building the right product". The software should do what the user really requires.

Two principal objectives are

- Discovery of defects in a system.
- Assessment of whether the system is usable in an operational situation.

3.3   Verification and Validation of Methods

This list is incomplete; you can help by expanding it.

- Independent Verification and Validation (IV&V)
- Requirements Traceability Matrix (RTM)
- Requirements Verification Matrix
- Software Quality Assurance[1]

3.4 Testing

- [Unit testing](#)
- [Functional testing](#)
- [Integration testing](#)
- [System testing](#)
- [Usability testing](#)
- [Software performance testing](#)
- [Load testing](#)
- [Installation testing](#)
- [Regression testing](#)

References

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