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Software Quality Assurance in Software Development

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ABSTRACT: The significance of quality assurance in the method of software development cannot be exaggerated as its adoption outcomes in high efficiency and easy setup of the software system as well as other software solutions. Quality assurance of software includes various practices like quality checks, quality control, requirements, quality preparing, optimization and enhancement of processes among many others. Software Quality Assurance helps to lower the number of missed targets as well as the time spent on prototypes and coding, as needed by clients. Quality is a major factor in the software industry. Performance of software depends on the satisfaction of clients which can be accomplished by implementing standards. Given the increasing consumer demands, achieving performance software is very critical in such an era. Quality controls how well the commodity is built and ensures that all user conditions are met. Evaluating quality can also assist in discovering user requirements objectives and make the regions that need to be more focused simpler for the developer as well as the overall project group.

KEYWORDS: Customer, Requirement, Software Quality Assurance (SQA), Quality, Project development.

I.INTRODUCTION

Quality plays a significant role in new product growth. Also, quality can be clarified as converting the customer's requirements to certain quantifiable properties. Software quality is divided into two types- structural and functional quality software's [1]. As the word refers to the functional quality of the software as a whole, it implies how well the commodity fulfills the functional specifications and how it fulfills the layout. Structural software quality relates to the accordance with the commodity with non-functional requirements like maintenance. After the product is shipped to the consumer, introducing software updates impacts the institution's credibility and this can result in the loss of important clients [2]. There can be many explanations for bad software quality and one of the major reasons is the incorrect description of the targets, incorrect interpretation of the responsibility of the Quality assurance team, misunderstanding of the duties of the Quality assurance teams, release of the Quality assurance unit needed for the task, evasion, misunderstanding and conflict risk, the Quality assurance department is identified as the organization, the other factors for the bad software quality are the lack of coverage by the Quality assurance team.

Quality assurance can thus prohibit flaws in the software that is being generated. Quality assurance relates to the collection of operations and procedures to verify that all of the objectives and criteria are met [3]. SQA enables to raise the quality of the software and verifies that all norms and processes are followed effectively. To accomplish the performance via SQA, it is very effective techniques to determine Quality assurance department and manage the performance. The quality assurance software as a whole includes different norms. The main objective of creating the department of Quality assurance is to find the defects. The examination is performed by the Quality assurance team. The regulators will not agree until the flaw is eliminated because of defects adverts from the existing business product. Over the time examination methods have developed and changed.

Software Quality Assurance

Quality assurance of software is a very well-defined, replicable method that is combined with software development to evaluate internal management processes to ensure compliance with software specifications and practices [4]. SQA is an



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organized and structured strategy to ensuring quality and compliance with software application specifications, systems, and processes. It involves the mechanism of ensuring that during the software development norms and processes are followed. SQA is a method itself that envelops the whole lifespan of the project and product development. It should not be limited to the final stage of application development, or as a way to measure the software created. It should start at the very beginning of the project, and extend the program itself through the completion or departure. This is because the performance could not be introduced to an end product, it can be fixed at this level; hence, SQA is a continual process and evaluation. SQA's primary function is to preserve software goods quality. To a certain end, it is to ensure that the guidelines and protocols are uniformly enforced [5]. SQA specifications are designed to help companies attain quality products. The quality of a software product is defined by the extent to which the product meets the standards of the client, the extent to which the product operates the parameters and the number of complications therein. The overview of Software Quality Assurance is shown below in Fig. 1 Software Quality Assurance

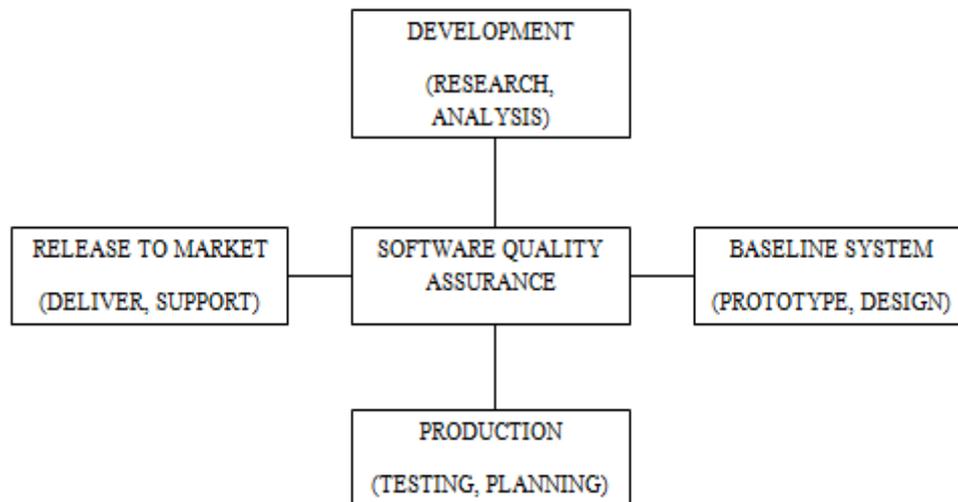


Fig. 1: Software Quality Assurance

II. STEPS OF SOFTWARE QUALITY ASSURANCE

Software Quality Assurance consists of stages and different activities that should be passed out independently of the software development team by an SQA team of qualified experts. The various steps of Software Quality Assurance is shown below in Fig. 2 Steps of Software Quality Assurance Process

Software Quality Initiation: The Software Quality Assurance team is informed of the implementation of Software Quality Assurance (SQA) before the start of a task, and appropriate quality assurance and inspection procedures are established.

Software Quality Assurance Planning: Software Quality Assurance, planning the quality software improvement plan's strategic goals are determined; quality measures or processes to be implemented, criteria and indicators to be used, reviews and inspections to be taken out are agreed upon.

Requirement Assurance: Verification of specifications to ensure testing, viability and comprehensiveness.

Design Assurance: Confirmation of design against specifications, and the use of intended techniques.

Development Assurance: Making sure the project team adheres to the specified development phase and programming norms.

Testing Assurance: Confirming that sufficient testing has been performed and tracking, recording, correcting of flaws takes place.

Implementation Assurance: Ensuring that the required execution steps have been finished before and after execution.



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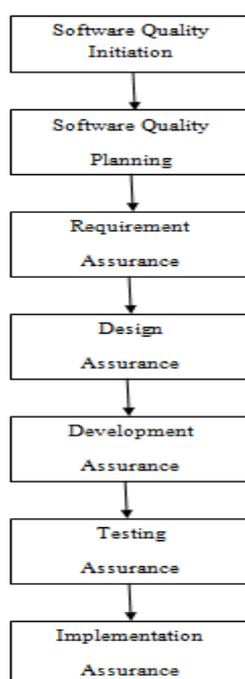


Fig. 2: Steps of Software Quality Assurance Process

III. TECHNIQUES FOR SOFTWARE QUALITY ASSURANCE

Quality Planning: This is the method where a particular project-specific quality plan is established. It includes a variety of administrative norms particular to the software project concerned and the mechanism of growth to be used. It also defines how to carry out the performance evaluation process. It enables to assess the task at its end by verifying if the plan is being accomplished and all the performance deliverables [6]. The quality plan describes the software's quality requirements and describes how to evaluate them. The quality strategy chooses certain administrative requirements that are suitable for a specific process of product design.

Quality Control: This is the method of tracking the mechanism of software development and verifying the commodity or deliverables (like the layout template or software) to ensure the design team follows the quality strategy and institutional standards and processes. Quality assurance involves a series of software engineering activities that help guarantee each work product fulfills its quality objectives [7]. This can be done either by automatic software evaluation or by a quality assurance team. This also requires calculations using metrics for the software. Any negotiation to identified quality standards shall be recorded and forwarded for clarification to the suitable staff.

Reliability: Reliability specifications fix service failure. These assess the software program's allowable failure rate and can apply to the whole system or to one or more of its subtasks.

Maintainability: Such a factor perceives the attempts that consumers and maintenance staff will have to define the explanations for software shortcomings, accurate the faults, and confirm the corrections' achievement.

Flexibility: Such a factor interacts with the abilities and an attempt needed to sustain the software's optimized maintenance activities. These include modifying the current software without adjusting the software to specific situations and customer expectations. The specifications of such a component also help ideal maintenance operations, such as adjustments and improvements to the software to enhance its operation and adjust it to improvements in the technological or corporate environment of the company.

Testability: Testability specifications describe the operating system validation as well as the process thereof. It involves user defined optimal outcomes, log documents, and also the instant diagnostic tools conducted by the software system



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before starting the model, to find out if all system elements are in working condition, and to receive a document on the identified flaws.

IV. BENEFITS OF SOFTWARE QUALITY ASSURANCE

The software quality control requirement cannot be overemphasised. One of the main causes of software project performance was shown to be a shortage of software quality. This plays a very critical role in the development phase of the software and can significantly increase the probability of achievement of a project. Independent of the development team's resources, strategies, and expertise, failure to pay attention to software quality can lead to excessive of the project's assigned budget and time, inability to meet task targets, poor employee experience, and unnecessary redesign[8]. Software quality is not accomplished by possibility; the software does not simply by pure luck meet the stated specifications. It is the consequence of intentional acts and measures that cost time, money and effort. Whilst quality assurance has a price, a lack of consistency also has a price. The quality costs can be classified into three: mitigation costs, evaluation costs, and failure costs. The quality costs can be classified into three: mitigation costs, evaluation costs, and failure costs. Preventative costs involve charges of preparing and managing operations in the SQA method; assessment expenses involve the expense of evaluating the commodity, like testing, updating, and indicators tests, whereas error expenses involve expenses of fixing a mistake, or tweaking a defect-related procedure[9]. In the longer term, quality management lowers the cost of manufacturing because the earlier a flaw is detected and fixed the less expensive it will be. Whereas the initial costs may be very significant, the negative effects of missing a client, a negative reputation, or going bankrupt cannot be measured. Preventative expenses are easier to tolerate than failure expenses. Quality assurance of software is important for the performance of a software organization. This guarantees the software's quality while making sure it's fully operational and well recorded for easy setup. SQA goes through evaluating the program but also involves tracking and control of the whole systems and goods for application development. It is well known that goods of high performance are often patronized to the disadvantage of those with the lowest standards. Quality is treated as a critical necessity for software products, an important business, a strategic necessity, and a software industry sustainability issue.

V. CHALLENGES OF SOFTWARE QUALITY ASSURANCE

Not Defining the Quality Assurance Department Accountability: Guaranteeing an ambitious project needs a Quality assurance team to collaborate alongside managers. The duties of the Quality assurance team go further than identifying the Quality assurance organization's roles to clearly identify procedures and perform evaluations. The Quality assurance unit has to be populated by individuals the project manager will uphold. There has to be an efficient interaction of continuing to work with each other. The team leader should be taking responsibility for the job [10].

Misconception about the responsibilities of Quality Assurance Team: If senior management fails to recognize their position in the Quality Assurance process, then QA will be ruined. As executive leadership determines whether to hire the QA team and defines where it will work within the organization, the deciding point comes in. The project manager and the Quality assurance unit may not cooperate properly. The team leader begins to complain about the Quality assurance employees so they don't comprehend our company or the employees don't practice what they preach about. If Quality assurance firms are not adequately populated and had no good understanding of its goals, this grievance may be legitimate.

Releasing the project-related Quality assurance Department: Transparency comes with responsibility and must be held responsible if the Quality assurance team is responsible for making sure performance. If the Quality assurance team is not held responsible by upper management for failed initiatives, it is a warning that management does not trust in the merit of a Quality assurance organization or the capacity of Quality assurance personnel. Both the Quality assurance personnel and the project leader are responsible for a project's achievement. If the project fails, the Quality assurance employees and software engineers will be called to a meeting with the president.

Preventing Dispute Risk: The threat is transmitted to the creation of software. The cost of halting a program and accommodating could potentially mean the advantages. The risk could not be removed but can be lowered; the aim is to understand the dangers. Quality assurance is truly a risk assessment method. The issue could be due to incorporation and incorrect calculations.



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Absence of Reporting: The Quality assurance team may not be safe although it does a great job guaranteeing important projects. It is possible to remove the Quality assurance unit if top management does not comprehend what Quality assurance is doing. The department of Quality assurance needs to create a deliverable that senior management requires, including a document that contains the following types of information: Information about the progress of the project that is quantitative and qualitative, data on important measures, Operations of the Quality assurance.

Unrealistic Targets: Time duration is also the main problem factor for software quality. The Quality assurance department has a very tight deadline for completing the product. Half of the amount of time spent mostly on comprehension of the realm and workable needs. The most important consideration for the Quality assurance group, as domain knowledge is. Unless they lack experience in the domain then the output will be very severely affected. If a technician is unable to actually understand the domain knowledge then they are unable to detect process failures or potentially find an incorrect system error.

Compromise on Quality: Team building is also very important to gather the criteria. There is sometimes no SQA representative in the Specifications team. This leads to a lack of understanding regarding the realm and practical specifications. Commitment to quality is yet another problematic area in developing nations because of the lack of software quality due to lower profitability.

SQA should not be regarded as the primary responsibility of the Software Quality Assurance team, but as the duty of everyone engaged in any operation in the entire lifespan of software development. Each employee should be fully aware of what is anticipated in whichever position they play in maintaining quality. In fact, Software Quality Assurance is far more than analysis, and should not be postponed until the project's respective end, but it should be implemented right from the start.

VI. CONCLUSION

Quality assurance plays an important role in the advancement of software. It is a way of establishing a method of quality for the production of a commodity of quality. In the earlier stages such as examination, correct application of software quality assurance practices, architecture decreases the work in the later stages. Software Quality Assurance plays a major role in Software Company's operations since customer loyalty is the only factor that occurs in having coherent programs from continuous customers. Large and reputable entities will irritate persistent vendors for their software/IT services when buying great and quality goods and producing them on time. Many professionals still do not recognize the standards of quality as main components of quality software, sometimes in the shortest scale. It means that the safety standards are not followed or regarded at all in their software development programs. The paper gives a comprehensive overview of software quality Assurance, the process of SQA, factors leading to SQA, its benefits followed by challenges.

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