CHAPTER 5

SOFTWARE ENGINEERING

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SOFTWARE MEASUREMENT

- Software Measurement: A measurement is an manifestation of the size, quantity, amount or dimension of a particular attributes of a product or process.
- Software measurement is a titrate impute of a characteristic of a software product or the software process.
- It is an authority within software engineering. Software measurement process is defined and governed by ISO Standard.
- Software Measurement is used as a parameter for the manifestation of software.

NEEDS OF SOFTWARE MEASUREMENT

- Create the quality of the current product or process.
- Anticipate future qualities of the product or process.
- Enhance the quality of a product or process.
- Regulate the state of the project in relation to budget and schedule.

These are the 4 basic needs of software measurement.

TYPES OF SOFTWARE MEASUREMENT

- There are 2 types of Software Measurement

→ Direct Measurement: In direct measurement the product, process or thing is measured directly using standard scale.

→Indirect measurement: In indirect measurement the quantity or quality to be measured is measured using related parameter i.e. by use of reference.

METRICS

A metrics is a measurement of the level that any impute belongs to a system product or process

The 4 Metrics are

→Planning
→Organizing
→Controlling
→Improving

CHARACTERISTICS OF METRICS

Quantitative

Understandable

Applicability

Repeatable

Economical

Language Independent

CLASSIFICATION OF SOFTWARE METRIC

There are 2 types of Software Metrics

Product Metric : Product metrics are used to evaluate the state of the product, tracing risks and under covering prospective problem areas. The ability of team to control quality is evaluated.

Process Metric: Process metrics pay particular attention on enhancing the long term process of the team or organization.

Project Metrics: Project matrix is describes the project characteristic and execution process.
Number of Developers, Staffing Pattern, Cost and Schedule and Productivity.

SOFTWARE RISK

- Software risk encompasses the probability of occurrence for uncertain events and their potential for loss within an organization
- Risk management has become an important component of software development as organizations continue to implement more applications across a multiple technology, multi-tiered environment.
- Typically, software risk is viewed as a combination of robustness, performance efficiency, security and transactional risk propagated throughout the system.

REACTIVE RISK MANAGEMENT

- Reactive risk management tries to reduce the damage of potential threats and speed an organization's recovery from them, but assumes that those threats will happen eventually.

PROACTIVE RISK MANAGEMENT

- As the name suggests, proactive risk management means that you identify risks before they happen and figure out ways to avoid or alleviate the risk. It seeks to reduce the hazard's risk potential or, even better, prevent the threat altogether. A good example here is vulnerability testing and remediation

REACTIVE VS PROACTIVE

RISK IDENTIFICATION

- Risk identification is the process of determining risks that could potentially prevent the program, enterprise, or investment from achieving its objectives. It includes documenting and communicating the concern.
- Risk identification is the critical first step of the risk management process

RISK PROJECTION

- Risk projection, also called risk estimation, attempts to rate each risk in two ways—the likelihood or probability that the risk is real and the consequences of the problems associated with the risk, should it occur.
- The project planner, along with other managers and technical staff, performs four risk projection activities:
  - (1) establish a scale that reflects the perceived likelihood of a risk
  - (2) delineate the consequences of the risk,
  - (3) estimate the impact of the risk on the project and the product,
  - (4)note the overall accuracy of the risk projection so that there will be no misunderstandings.

RISK REFINEMENT

- Process of restating the risks as a set of more detailed risks that will be easier to mitigate, monitor, and manage.
- In this step we actually understand the risk on a much more deeper detail and try to look at a broader perspective on how to handle the risk.
- These Steps are actually the basis for the RMMM Model
- It stands for Risk Mitigation, Monitoring and Management Plan.

RMMM

- RMMM Stands for Risk Mitigation, Monitoring and Management Plan.
- A risk management technique is usually seen in the software project plan.
- In this plan all works are done as a part of risk analysis
- Risk is documented with the help of a Risk Information Sheet (RIS).
- This RIS is controlled by using a database system for easier management of information i.e creation, priority ordering, searching, and other analysis.
- After documentation of RMMM and start of a project, risk mitigation and monitoring steps will start.

RISK MITIGATION

- It is an activity used to avoid problems (Risk Avoidance). Steps for mitigating the risks as follows.

1. Finding out the risk.
2. Removing causes that are the reason for risk creation.
3. Controlling the corresponding documents from time to time.
4. Conducting timely reviews to speed up the work.

RISK MONITORING

- It is an activity used for project tracking.
  It has the following primary objectives as follows.

1) To Check if Predicted risks occur or not.
2) To Ensure proper application of risk aversion steps defined for risk
3) To Collect data for future risk analysis
4) To allocate what problems are caused by which risks throughout the project.

RISK MANAGEMENT AND PLANNING

It assumes that the mitigation activity failed and the risk is a reality.

This task is done by Project manager when risk becomes reality and causes severe problems.

If the project manager effectively uses project mitigation to remove risks successfully then it is easier to manage the risks.

This shows that the response that will be taken for each risk by a manager.

RISK MANAGEMENT LIFECYCLE

SOFTWARE QUALITY

- Software Quality is defined as a field of study and practice that describes the desirable attributes of software products.
- Software Quality Product is defined in terms of it's fitness of purpose.
- Quality Product does Precisely what users want it to do.
- For software products the fitness of use is generally explained in terms of satisfaction of requirements.

SOFTWARE QUALITY ASSURANCE

- Software quality assurance (SQA) is a means and practice of monitoring the software engineering processes and methods used in a project to ensure proper quality of the software. It may include ensuring conformance to standards or models, such as ISO/IEC 9126 (now superseded by ISO 25010), SPICE or CMMI.
- It is simply a way to assure quality in the software.
- Set of Activities which ensure processes, procedures as well as Standards

SOFTWARE REVIEWS

- Software Review is systematic inspection of a software by one or more individuals who work together to find and resolve errors and defects in the software during the early stages of Software Development Life Cycle (SDLC).
- Software review is an essential part of Software Development Life Cycle (SDLC) that helps software engineers in validating the quality, functionality and other vital features and components of the software.
- It is a whole process that includes testing the software product and it makes sure that it meets the requirements stated by the client.

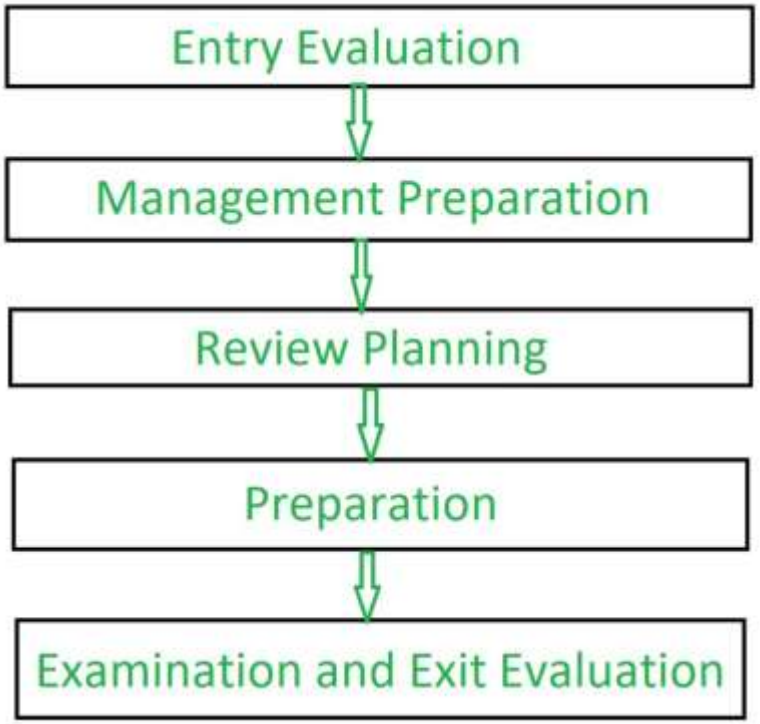
OBJECTIVE OF SOFTWARE REVIEWS

- To Improve the productivity of the development team
- To make the testing process time and cost effective.
- To make the final software and fewer defects
- To Eliminate the inadequacies

To understand the software reviews we need to understand the Process of Software Review.

The Process contains 5 steps that helps us understands the Software review Process during Software Engineering.

SOFTWARE REVIEW PROCESS



FORMAL TECHNICAL REVIEW

- Formal Technical Review (FTR) is a software quality control activity performed by software engineers.
- Useful to uncover error in logic, function and implementation for any representation of the software.
- The purpose of FTR is to verify that the software meets specified requirements.
- To ensure that software is represented according to predefined standards.
- To makes the project more manageable.
- It helps to review the uniformity in software that is development in a uniform manner.

STATISTICAL SOFTWARE QUALITY ASSURANCE

- SQA is used to reduce cost and improve the product time to the market. In this chapter we will discuss about various aspects of SQA.
- Software Quality Assurance is the set of activities which ensure that the standards, processes and procedures are suitable for the project and implemented correctly.
- Quality : Quality of Software is checked to see if it meets the requirements.
- Assurance: It means ensuring the correctness of the results and security of the product, as it works without any bug and according to the expectations.

SOFTWARE RELIABILITY

- Software Reliability means Operational reliability. It is described as the ability of a system or component to perform its required functions under static conditions for a specific period.
- Software reliability is also defined as the probability that a software system fulfills its assigned task in a given environment for a predefined number of input cases, assuming that the hardware and the input are free of error.
- Software Reliability is an essential connect of software quality, composed with functionality, usability, performance, serviceability, capability, install ability, maintainability, and documentation

ISO 9000 QUALITY STANDARDS

- The ISO 9000 series was created by the International Organization for Standardization (ISO) as international requirements and guidelines for quality management systems.
- It was originally introduced in 1987 and over the years has established itself in the global economy having been adopted in over 178 countries with over one million registrations.
- The Current Version is ISO 9001: 2015 of the ISO 9001 Standard.

WHY ISO

- ISO Standards are essential part of an societal institution.
- They Ensure quality and safety of our products and services in International Trade.
- Business can be seen to benefit from ISO standards as they can help cut costs by improved systems and procedures put in place.
- ISO 9001 is among ISO's best-known standards, and it defines the criteria for meeting a number of quality management principles. It helps businesses and organizations be more efficient and improve customer satisfaction.