

## EXPLAIN CMM MODEL IN DETAIL

**ANS:** The Capability Maturity Model (CMM) is a methodology used to develop and refine an organization's software development process. The model describes a five-level evolutionary path of increasingly organized and systematically more mature processes. CMM was developed and is promoted by the Software Engineering Institute (SEI), a research and development center sponsored by the U.S. Department of Defense (DoD). SEI was founded in 1984 to address software engineering issues and, in a broad sense, to advance software engineering methodologies. More specifically, SEI was established to optimize the process of developing, acquiring, and maintaining heavily software-reliant systems for the DoD. Because the processes involved are equally applicable to the software industry as a whole, SEI advocates industry-wide adoption of the CMM.

### **Key Process Areas (KPA's):**

Each of these KPA's defines the basic requirements that should be met by a software process in order to satisfy the KPA and achieve that level of maturity.

The 5 levels of CMM are as follows:

#### **Level-1: Initial –**

- No KPA's defined.
- Processes followed are Adhoc and immature and are not well defined.
- Unstable environment for software development.
- No basis for predicting product quality, time for completion, etc.

#### **Level-2: Repeatable –**

- Focuses on establishing basic project management policies.
- Experience with earlier projects is used for managing new similar natured projects.
- **Project Planning-** It includes defining resources required, goals, constraints, etc. for the project. It presents a detailed plan to be

followed systematically for the successful completion of good quality software.

- **Configuration Management-** The focus is on maintaining the performance of the software product, including all its components, for the entire lifecycle.
- **Requirements Management-** It includes the management of customer reviews and feedback which result in some changes in the requirement set. It also consists of accommodation of those modified requirements.
- **Subcontract Management-** It focuses on the effective management of qualified software contractors i.e. it manages the parts of the software which are developed by third parties.
- **Software Quality Assurance-** It guarantees a good quality software product by following certain rules and quality standard guidelines while developing.

### **Level-3: Defined –**

- At this level, documentation of the standard guidelines and procedures takes place.
- It is a well-defined integrated set of project-specific software engineering and management processes.
- **Peer Reviews-** In this method, defects are removed by using a number of review methods like walkthroughs, inspections, buddy checks, etc.
- **Intergroup Coordination-** It consists of planned interactions between different development teams to ensure efficient and proper fulfillment of customer needs.
- **Organization Process Definition-** Its key focus is on the development and maintenance of the standard development processes.
- **Organization Process Focus-** It includes activities and practices that should be followed to improve the process capabilities of an organization.
- **Training Programs-** It focuses on the enhancement of knowledge and skills of the team members including the developers and ensuring an increase in work efficiency.

### **Level-4: Managed –**

- At this stage, quantitative quality goals are set for the organization for software products as well as software processes.

- The measurements made help the organization to predict the product and process quality within some limits defined quantitatively.
- **Software Quality Management-** It includes the establishment of plans and strategies to develop quantitative analysis and understanding of the product's quality.
- **Quantitative Management-** It focuses on controlling the project performance in a quantitative manner.

#### **Level-5: Optimizing –**

- This is the highest level of process maturity in CMM and focuses on continuous process improvement in the organization using quantitative feedback.
- Use of new tools, techniques, and evaluation of software processes is done to prevent recurrence of known defects.
- **Process Change Management-** Its focus is on the continuous improvement of the organization's software processes to improve productivity, quality, and cycle time for the software product.
- **Technology Change Management-** It consists of the identification and use of new technologies to improve product quality and decrease product development time.
- **Defect Prevention-** It focuses on the identification of causes of defects and prevents them from recurring in future projects by improving project-defined processes.