

CAPABILITY MATURITY MODEL

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Abstract: The Capability Maturity Model (CMM) is a development model created after study of data collected from organizations that contracted with the U.S. department of defense , who founded the research. The term “Maturity” relates to the degree of formality and optimization of processes , from adhoc practices, to formally defined steps, to managed result metrics, to active optimization of the processes. In this paper we will define what is capability Maturity Model, it’s aim and application, levels of capability of maturity model, key process area of CMM. And its purposes.

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Introduction

The Capability Maturity Model (CMM) is a development model created after study of data collected from organizations that contracted with the U.S. department of defense , who founded the research. The term “Maturity” relates to the degree of formality and optimization of processes , from adhoc practices, to formally defined steps, to managed result metrics, to active optimization of the processes. The model’s aim is to improve existing software development process, but it can also be applied to other processes. The capability maturity model was originally developed as a tool for objectively assessing the ability of government contractor processes to implement a contracted software project.

Application: Though the model comes from the field of software development , it is also used as general model to aid in business processes generally, and has been used extensively worldwide in government offices, commerce , and industry and software development organizations. The Software engineering institute(SEI) Capability Maturity Model(CMM) specifies an increasing series of levels of software development organization the higher the level , the better the software development process hence reaching each level is an expensive and time consuming process.

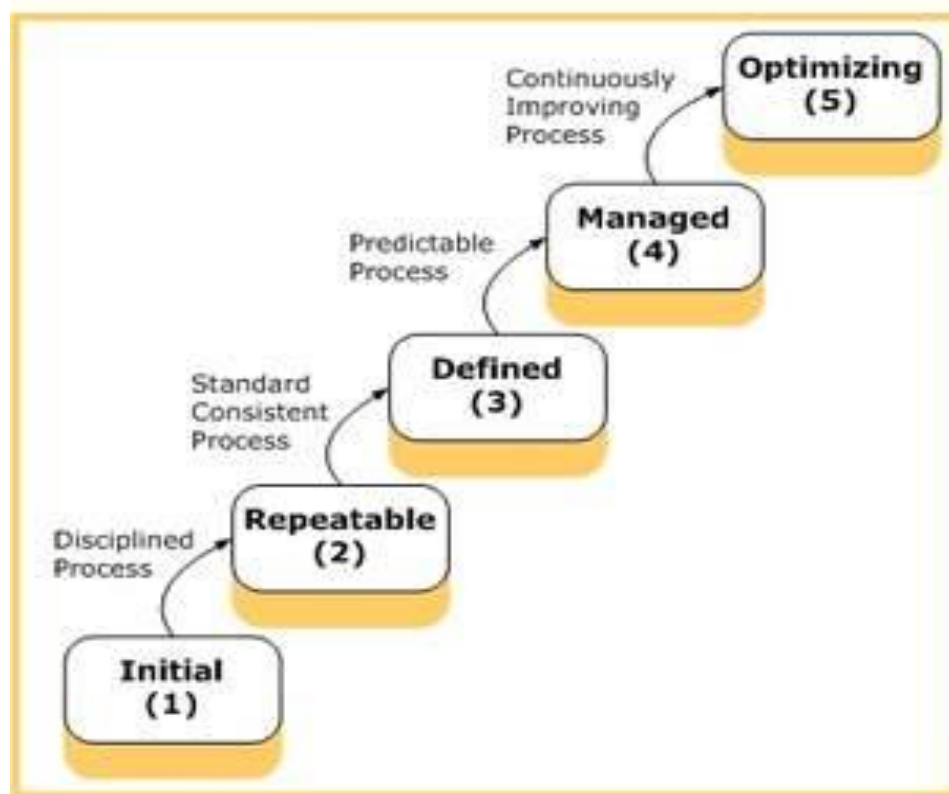
Levels of CMM:

- ❖ **Level One :Initial** –The software process is characterized as inconsistent , and occasionally even chaotic . defined processes and standard practices that exist are abandoned during a crisis. Success of organization majorly depends on an individual effort , talent, and heroics. The heroes eventually move to the other organization taking their wealth of knowledge or lessons learnt with .
- ❖ **Level Two: Repeatable-** This level of software development organization has a basic and consistent project management processes to track cost , schedule, and functionality.

Level Three : Defined- The software process for both management and engineering activities are documented , standardized , and integrated into a standard software process for the entire organization and all projects across the organization use an approved , tailored version of organization standard software process , for developing ,testing and maintaining the application.

Level Four: Managed- Management can effectively control the software development effort using precise measurements .At this level , organization set a quantitate quality goal for both software process and software Maintenance . At this maturity level , the performance of processes is controlled using statistical and other quantitate techniques and is quantitatively predictable.

Level Five:Optimizing- The key characteristic of this level is focusing on continually improving process performance through incremental and innovative technological improvements . At this level , changes to the process are to improve the process performance and the same time maintaining statistical portability to achieve the established quantitative improvement objectives.



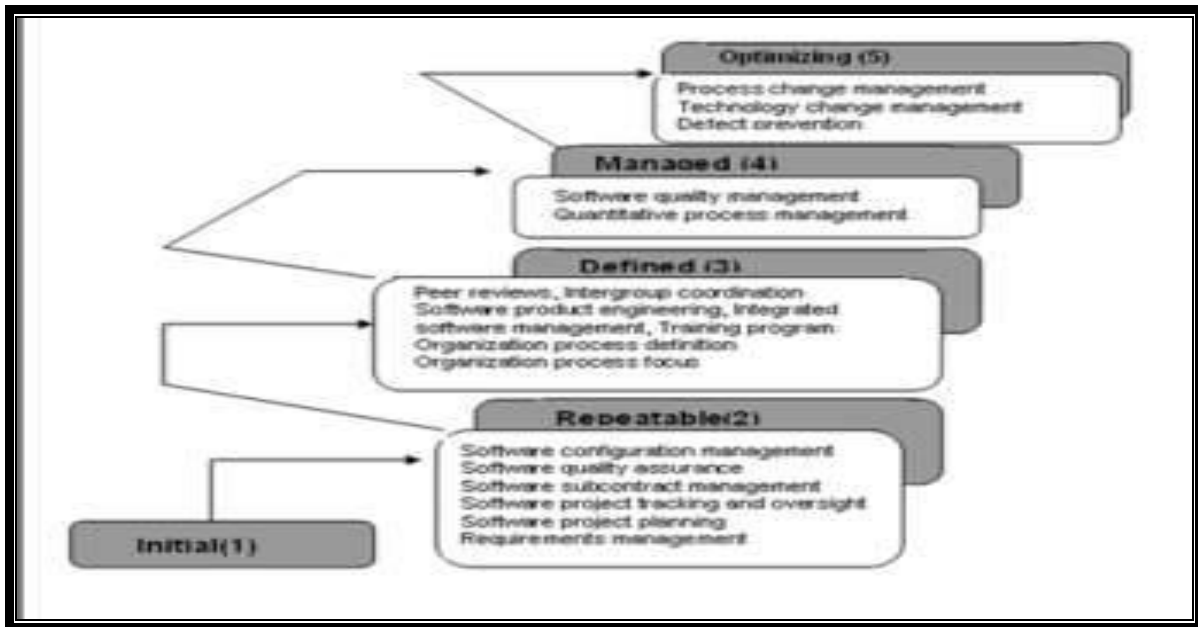
Key Process Areas(KPA) of CMM: Each key process area defines a cluster of related activities that when performed collectively , achieve a set of goals considered important for enhancing process capability. The key process areas have been defined to reside at a single maturity level . the key process areas are building blocks that indicate the areas an organization should focus on to improves its software process. Key process areas identify the issues that must be addressed to achieve a maturity level.

Key process areas at level 2: Focus on the software project concerns related to establishing basic project management controls. Descriptions of each of the key process areas for level 2 are given below:

- **The Purpose of Requirement Management** is to establish a common understanding between the customer and software project of the customer's requirements that will be addressed by Software project. This

agreement with the customer is the basis for planning and managing the software project. Control of the relationship with the customer depends on following an effective change control process.

- **The Purpose of Software Project Planning** is to establish reasonable plans for performing the software engineering and for managing the software project. These plans are the necessary foundation for managing the software project. Without realistic plans, effective project management cannot be implemented.
- **The purpose of software quality assurance** is to provide management with appropriate visibility into the process being used by the software project and of the products being built. Software quality assurance is an integral part of most software engineering and management processes.



Key process area at level 3: Address both project and organizational issues, as the organization establishes an infrastructure that institutionalizes effective software engineering and management processes across all projects. Description of each of the key process areas for level 3 are given below:

The Purpose Of Organization Process Definition is to develop and maintain a usable set of software process assets that improve process performance across the projects and provide a basis for cumulative, long term benefits to the organization.

The Purpose Of Training Program is to develop the skills and knowledge of individuals so they can perform their roles effectively and efficiently. Training is an organizational responsibility, but the software projects should identify their needed skills and provide the necessary training when the project needs are unique.

The Purpose Of Integrated Software Management is to integrate the software engineering and management activities into coherent, defined software processes that are tailored from the organization's standard software process and related process assets, which are described in organization process definition. This tailoring is based on the business environment and technical needs of the project, as described in the software project engineering. Integrated software management evolves from software project planning and software project tracking and oversight at level 2.

The Purpose Of Peer Review is to remove defects from the software products Early and efficiently . An important corollary effect is to develop a better understanding of the software work products and of the defects that can be prevented . the peer review is an important and effective engineering method that is called out in software project engineering.

Key process area at level 4: Focus on establishing a quantitative understanding of both the software process and software products being built. The two key process areas at this level, quantitative process management and software quality management , are highly interdependent as described below:

The Purpose Of Quantitative Process Management is to control the process performance of the software project quantitatively . software process performance represents the actual results achieved from following a software process . the focus is on identifying special causes of variation within a measurably stable process and correcting , as appropriate , that circumstances that drove the transient variation to occur. Quantitative process management adds a comprehensive management , intergroup coordination and peer reviews

The Purpose Of Software Quality Management is to develop a quantitative understanding of the quality of the software's products and achieve quality goals . software quality management applies a comprehensive measurement program to the software work products described in software product engineering.

Key process area at level 5: Cover the issues that both the organization and projects must address to implement continuous and measurable software process improvement. Description of each of the key process areas for level 5 are given below:

The Purpose Of Defect Prevention is to identify the causes of defects and prevent them from recurring . the software project analyses defects , identify their causes and change its defined software process as is described in software management. Process changes of general value are transitioned to other software projects, as is described in process change management.

The Purpose Of Technology Change Management is to identify beneficial new

Technologies and transfer them into the organization in an orderly manner. As is described in process change management . The focus Technology change management is an on performing innovation efficiently in an ever changing world .

The Purpose Of Process Change Management is to continually improve the software processes used in the organization with the intent of improving software quality. , increasing productivity. And decreasing the cycle time for product development . process change management takes the incremental improvements of defect prevention and the innovation improvements of technology change management and them available to the entire organization

Process level	category	Management	Organizational	Engineering
5) Optimizing			Technology Change Management	Defect Prevention

		Process Change Management	
4)Managed	Quantitative Process Management		Software Quality Management
3)Defined	Integrated Software Management Intergroup Coordination	Organization Process Focus Organization Process Definition Training Program	Software engineering Peer Review
2)Repeatable	Requirement Management Software Project Planning Software Configuration Management		
1)Initial	AdHoc Process		

The key Process areas are categorized into figure three board categories : Management , Organizational and Engineering Process. The management process category contains the project management activities as they evolve from planning and tracking at level 2, to managing according to a defined software process at level 3 , to quantitative management at level 4, to innovative management in a constantly changing environment at level 5. The organizational process category contains the cross project Responsibilities as the organization matures , beginning with a focus on culminating with management of change in an environment of continuous process improvement at level 5. The engineering process category contains the technical activity, such as requirements, analysis, design , code and test , which are performed at all levels , but that evolve toward an engineering discipline at level 3, statistical process at level 4,and continuous measured improvement at level5.

Difference between ISO & CMM

S.NO	ISO	CMM
1	ISO is an generic standard . it is applicable for all industries.	CMM is S/W specific.

2	ISO is standard . It tell what it needa to be done in an organization.	CMM is a model . It does not mandate Practices.
3	ISO focuses on the entire organization's processes.	CMM is specific to S/W Processes.
4	ISO is continuous	CMM is staged.

Conclusion: At the we came to the conclusion that The Capability Maturity Model (CMM) is a development model created after study of data collected from organizations that contracted with the U.S. department of defense , who founded the research. The term “Maturity” relates to the degree of formality and optimization of processes , from adhoc practices, to formally defined steps, to managed result metrics, to active optimization of the processes. The model's aim is to improve existing software development process, but it can also be applied to other processes.

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Bibliography:

I vanita. I have done my graduation (BCA) and post graduation(MSC(IT)) from “DEV SAMAJ COLLEGE “ for women . I also qualified UGC (NET) exam