Comparison between a few Quality initiatives

By Vivek Dixit (based on personal knowledge and experience)

Maturity models –
Denotes maturity in a company. Denotes that the processes and practices in a company are standardized and are usually used across the company. In a few cases there may be deviations which are tailored as per the company processes. In my view the focus of Capability Maturity Models particularly SEI-CMM and SEI-CMMI was applying the principles of TQM (Total Quality Management) to Software engineering. As regards the OPM3 i.e. the Organization Project Program Portfolio Maturity Model developed by PMI the focus was on individual projects, followed by Programs, and then the entire portfolio. This was the projects across the company will be structured and will have a common maturity. The focus on Customer Satisfaction is obvious in any Maturity Model.

Framework –
A guideline, where the processes and practices are defined within the company within this framework. A framework may be defined as the area of operation which has boundary walls and the processes and practices need to be defined within this area of operation and within these boundary walls.

ISO –
Define processes and follow the processes. Walk the talk, talk the walk. Quality of deliverables depends on the defined processes, hence Quality may not be assured.

CMM –
Capability Maturity Model – used to determine the Capability at a stage of Maturity in a company. The various Capability Maturity Models are – CMM (for Software Development), CMMI (for Software Development, an upgrade over CMM), and P-CMMI i.e. People CMM for demonstrating the Maturity of an organization for People Management.

CMM (SEI-CMM, and SEI-CMMI) –
Maturity Model developed by SEI specifically for Software, to have a more structured approach to software development, and to progressively enhance software quality with the help of measurements, and ultimately move on the Continuous Improvements. This is a framework within which the company develops it's processes, standardizes it across the company, starts measuring it's product and processes, and moves on to Continuous Improvement.

P-CMM (People CMM) –
Developed by SEI to have a Maturity Model for People Management in all companies. This can be used by any company. This shows how the company recruits, trains, manages it's employees. A way to show that the Company looks after it's employees. This too is a framework, the processes and practices are developed by the company… and like other SEI-CMM models the last stage is Continuous Improvement.

The above Capability Maturity Model's (CMM, CMMI and P-CMM) have a 5 level maturity model as follows:-

Level 1 – initial, generally ad hoc approach, unstructured approach
Level 2 – Repeatable, focus on projects in CMM and CMMI, Reactive approach
Level 3 – Defined, proactive approach, focus on organization wide database, organization wide initiatives
Level 4 – Managed (Quantitatively managed) by measurements
Level 5 – Optimizing, i.e. Continuous improvements by reviewing current status, identifying areas of improvements, and continuously improving

Six Sigma –
A statistical approach to have continuous improvement. This used statistical measurements with a structured approach. A great tool for Continuous Improvement. This works well with CMM, CMMI for Continuous Improvement. This can be used in any area, viz. software development, manufacturing, services, administration, HR, etc…… In my view the Best tool for Continuous Improvement.

Project Management (PMI Project Management Institute) –
PMI has PMBOK Project Managers Book of Knowledge with a PMP exam. This is structured approach to Project Management. This by itself is not a Maturity model. This in it's entirety or in parts may be used to mange a project in conjunction with CMM.

OPM3 –
Organization Project Program Portfolio Management is the maturity model for managing projects. This has been developed by PMI. This has a structured way of managing projects, then programs (multiple projects within a segment), and then portfolio. They follow the SMCI approach i.e. Standardize, Measure, Control and Improve. The approach can be SMCI for projects, then move on the Programs and then onto Portfolio;

or Standardize Projects, programs and Portfolio, and then Measure Projects, Programs and portfolio, and then Control Projects, Programs and portfolio followed by Improve Projects, programs and portfolio. The company is considered mature for PROJECT MANAGEMENT only after all of SMCI is completed for Projects, programs and portfolio.
This has a structured approach and can be approached with usage of appropriate tools like MS-Project.

PSP –
Personal Software Process used exclusively for improving personal effectiveness at work primarily for Software Development. In my view to some extent can be used in other areas of work by an individual to ensure personal effectiveness.

TSP –
Team software Process – All PSP trained personnel can work in a Team to improve the Team's effectiveness.

The results are PSP/TSP are seen only after a few months after the training of individuals and if the individuals have put it in practice.

How similar or different are these models –

P-CMM – Very useful for any HR team to demonstrate that the HR has a significant maturity and can attract outside talent and retain current talent in the company. 5 levels of Maturity.

P-CMM levels of maturity with Key Process Areas

Level 1 – Initial – Ad hoc and unstructured approach

Level 2 – Repeatable – Focus on compensation, Training, Performance Management, Staffing, Communication, Work Environment
Level 3 – Defined – Participatory culture, competency based practices, Career Development, Competency Development, Workplace planning, Knowledge and Skills analysis
Level 4 – Managed – Organizational Performance Alignment, Organization competency Management, Team based practices, Team building, Mentoring
Level 5 – Optimizing – Continuous Workforce innovation, Coaching, Personal Competency Development

CMM/CMMI – Useful to find out the Software Development company's maturity level. Signifies how the company functions. Project Management forms a basic part of this framework.

PSP/TSP – Useful for any company and particularly for those companies going towards CMMI. Also useful for any company which wants it's personnel to improve and be more effective. Since the results are visible only after a few months, it is essential that the teams which are going to be on the project for a 12 months or more are selected for this training.

OPM3 – A Maturity model for Project Management. This is a new model and in my view useful for any company which believes in structured and systematic project management. This in conjunction with our MS-Project as an enabler would be a great combination.

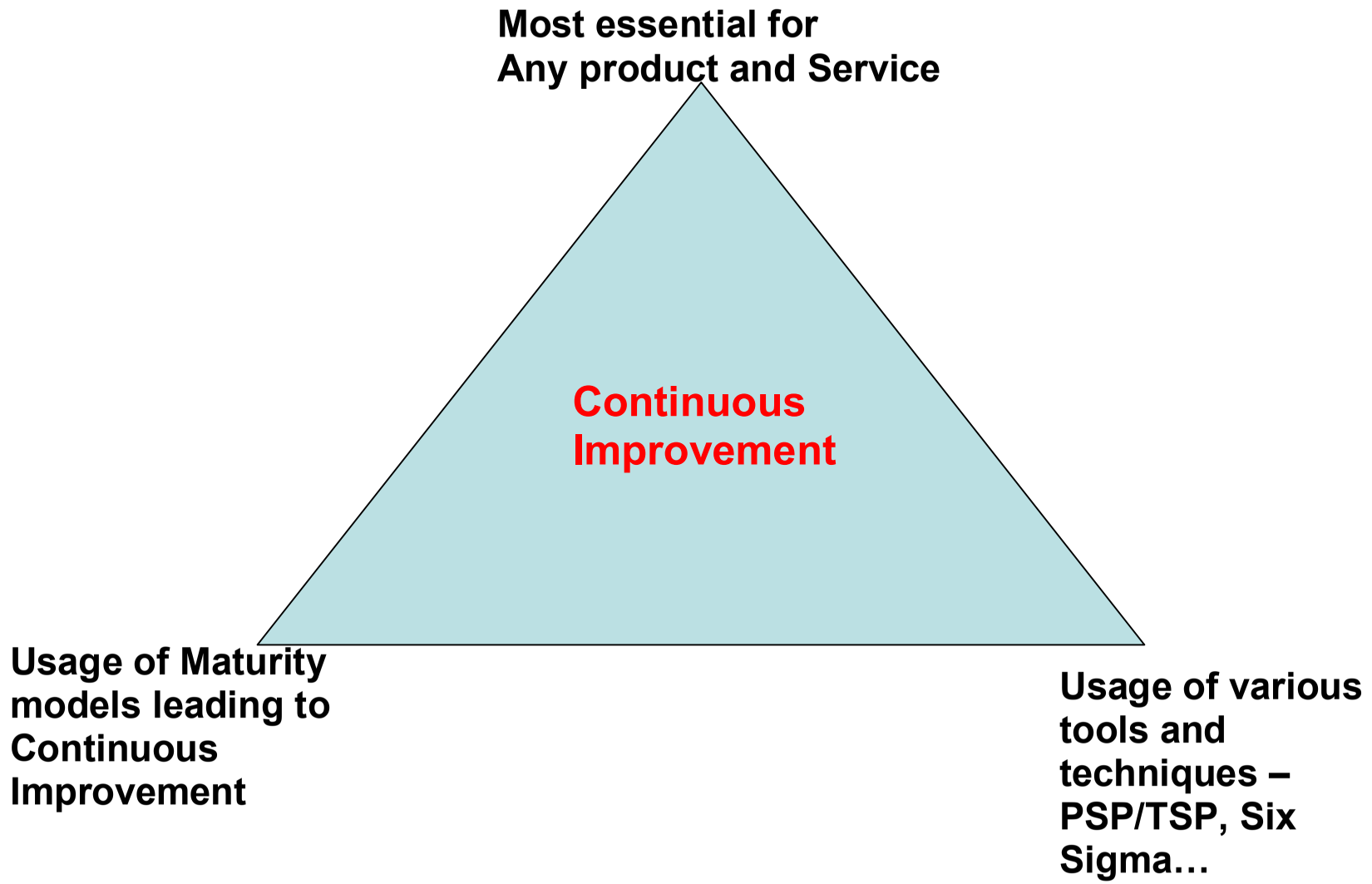
Most essential for
Any product and Service
Continuous
Improvement
Usage of Maturity models leading to Continuous Improvement
Usage of various tools and techniques – PSP/TSP, Six Sigma…

Table detailing and comparing the methodologies.

Description of Activity	ISO	SEI-CMM	CMM-I	PSP	TSP	Six Sigma	OPM3
What is it?	Framework. Helps a company become a process oriented company.	Framework. Helps develop better software. Maturity model	Framework. Helps develop better software. Maturity model	Framework. Plan for personal development	Framework. Plan for Team development	Framework. Continuous improvement, elimination of defects	Organization Project Management Maturity Model. It is a maturity model for Project management.
Focus area?	Suitable for any type of company	Software. Develop better software with assured quality at respective levels.	Develop better software with assured quality at respective levels. Integrates Software engineering and Systems engineering	Personal software development. Scaled down version of Industrial software process to make it suitable for individual use	Team software development	Customer Delight. Suitable for any company in manufacturing, service, process etc..	Organization Project Management, Portfolio management, Program Management, Project management
Approach	Develop Processes and follow processes. Management must have an effective quality policy	Framework. Develop your processes which satisfy the goals for the respective areas.	Framework. Develop your processes which satisfy the goals for the respective process areas.	Framework. Even CMM expects that engineers use effective personal practices. A set of steps	Framework. Team must define and use effective team practices A set of steps for doing the job.	Quantitative approach to Quality. -- Eliminate defects -- continuous improvement. To identify	Process based. Standardize Processes, Measure Processes, Control, Continuous Improvement.

				for doing the job.		defects use statistical tools like Pareto charts, Ishikawa (Fishbone) charts. Identify root causes of defects and eliminate them.	Focus on Initiation, Planning, Controlling, Execution, and Closing processes. Start with Projects, move to Programs, move to Portfolio. Feedback from Programs and Portfolio Processes to Planning processes in Project Management. Enhance Capabilities, Identify and Measure Deliverables, Measure KPI's or results, keep repeating until you achieve Best Practice.

Stages or levels	None.	5 levels Level 1 – Unstructured approach, ad hoc way of working Level 2 – Project driven approach Level 3 – Organization wide database and structured approach, tailored processes, Level 4 – Product and Process Measurements Level 5 – Optimizing .. in other words Continuous Improvements	5 levels Level 1 – Unstructured approach, ad hoc way of working Level 2 – Project driven approach Level 3 – Organization wide database and structured approach, tailored processes, Level 4 – Product and Process Measurements Level 5 – Optimizing .. in other words Continuous Improvements	None	None	None. Some approaches denote this as a move from 0 Sigma to 6 sigma. Considering a million opportunities ---- - number of possible errors at 0 sigma – 933192 1 sigma – 691462 2 sigma - 308537 3 sigma – 66807 4 sigma – 6210 5 sigma – 233 6 sigma – 3.4 -- ability to meet customer expectations at 0 sigma –6.68% 1 sigma – 30.85% 2 sigma -69.15% 3 sigma -93.32% 4 sigma- 99.38% 5 sigma – 99.98%	4 levels - Standardize - Measure - Control - Continuous Improvement Matrix can be 12 levels – - Projects - Programs - Portfolio And within these – - Standardize - Measure - Control - Continuous Improvement

						6 sigma - 99.999%	
Deliverables	Process	Process which meets the goals. Better output.	Process which meets the goals. Better output.	Better individual output	Better team output	Better output. Improved product or service	Better organization project management
Is Quality assured by using this?	No, quality is totally dependent on the process established	Yes, because the goals for each process area have to be met	Yes, because the goals for each process area have to be met	Depends, it helps improve the person plan and organize better	Depends, it helps to improve the team plan and organize better	Yes, it shows improved results. Also shows how the process is performing.	Yes, it shows improved results. Demonstrates how the portfolio, program and project is performing and is at what stage of maturity viz. Standardize, Measure, Control, Continuous Improvement.
Applicability	All industries viz. Manufacturing, Service, Product companies etc…	Specifically for Software	Specifically for Software	Individuals -helps develop personal skills and methods -estimating and planning methods -Shows how to track performance against plans -Provides a defined process	Team -helps develop team in estimation and coordination with one another -shows how team performance can be tracked -provides a defined	Any type of company -- manufacturing, product development, service……	Projects, Programs, Portfolios in an Organization. Organizational Project Management. Use of Projects Server as an Enabler will help.

				which can be fine tuned by individuals -Recognizes that a process for individual use can be different from a team process or project	process		
Audits and Assessments	Yes, at certification time, certification valid for 3 years, Surveillance audit every year. Audits conducted by Certification body. Internal audits expected to be conducted to ensure process compliant.	Assessment when asked for by the company. No subsequent assessments. Normally internal assessments carried out by the company. Formal assessment done by external Certification body. No subsequent assessments done by external agency unless requested.	Assessment when asked for by the company. No subsequent assessments. Normally internal assessments carried out by the company. Formal assessment done by external Certification body. No subsequent assessments done by external agency unless requested.	None. Internal assessments possible by individuals.	None. Internal assessments possible within teams.	Continuous measurements and comparisons of these measurements to check current status. The goal is to improve the process such that it comes to a possibility of having 3.4 errors in a million opportunities.	Continuous improvement is the goal, so feedback is provided and efforts made to ensure this Continuous Improvement.
Why Certification	-- Confidence of customers	-- For internal use	-- For internal use	For betterment of individuals	For betterment of teams	Competition is challenging them	To be prepared for competition,

or Why use this	increases -- Points out weakness of an organization -- Sets the basic framework -- Can be quoted in official documents	-- goes beyond quality assurance aims for TQM, ISO 9001 can compare with SEI-CMM level 3 -- provides gradual improvements over several stages --	-- goes beyond quality assurance aims for TQM, ISO 9001 can compare with SEI-CMM level 3 -- provides gradual improvements over several stages			to Reduce time for delivery and adopt six sigma technology	be prepared to realize and accept Changes in environment, way of working, business models etc..
Shortcomings	-possible variations in awarding certificates as certification bodies may be different -- Addresses mostly the management aspects Techniques to software development ignored e.g. configuration management, reviews, builds etc… Your internal process if	After the assessment is completed and the company achieves the desired levels, then the company may not follow all the processes as defined. Result – quality can slip to lower levels.	After the assessment is completed and the company achieves the desired levels, then the company may not follow all the processes as defined. Result – quality can slip to lower levels.	This helps the person develop. The results may be visible after a few months.	This helps the team develop. The results will be visible after a year.	The efforts to improve continuously must be maintained.	The efforts to improve continuously must be maintained.

	defined properly can cover these aspects.						
Steps	Define process. Follow process.	Processes which can fulfill goals needed. This will also ensure Quality at that point is assured. Conduct trainings on processes to educate personnel. Collect metrics and measurements as defined. Conduct audits for process compliance and assessments at organization level.	Recommended for consideration -- ----- Processes which can fulfill goals needed. This will also ensure Quality at that point is assured. Conduct trainings on processes to educate personnel. Collect metrics and measurements as defined. Conduct audits for process compliance and assessments at	Conduct trainings for personnel. Ask them to track their own records and measure their own improvements. Results are normally visible after 6 months. In a model where one works with vendors we have to ensure continuity of vendor personnel.	Conduct workshops at team level. Ask teams to maintain their own records at team levels and measure their improvements. Results are normally visible after 6 months In our model of working with vendors we have to ensure continuity of vendor teams.	Conduct trainings for Support personnel. Define the areas or problems or specific area of improvement. Measure the current status. Use it as a baseline. Analyze the process. Define new process if required. Validate the importance of inputs. Device metrics and measurements. Track baseline. Track measurements. Track progress	Training Define processes Conduct Self Assessment Measure Improvise Control Measure Continuous Improvement (Control, Measure, Refine, Control, Measure…)

			organization level.			and improvement. Implement controls to ensure continued improvements.	
Recommended Approach any company	**Useful if all processes are complete and focus on Quality. Else, Not useful.**	**Will be useful**	**Will be useful**	**Very useful for personal development of Developers**	**Very useful for team development**	**Very useful to ensure continuous improvement.** **A MUST for Support projects.** **Can be useful for Development projects as well.**	**Very useful for Portfolio, Program and Project Management.** **Projects Server can be a great tool as an Enabler for this.**