

A Glance on SIX SIGMA and CMMI together

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1.0 What is CMMI and Six sigma?

CMMI or Capability Maturity Model Integration presents processes targeted to 4 disciplines: systems engineering, software engineering, integrated product and process development and supplier sourcing. The model presents both a staged and continuous approach to achieving maturity of processes in an organization. The most well known representation shows maturity extending from Level 0 to Level 5, where Level 0 Represents Incomplete (or ad hoc) and Level 5 represents optimizing (or continuous improvement).

Six Sigma is a statistical based approach to managing an organization through the creation of near perfect Processes, products and services aligned to delivering what the customer wants. The term Six Sigma Represents a goal of achieving a 0.003% defect failure rate in implemented products and services (in other Words a 99.97% success rate) through close understanding of customer needs, disciplined use of facts, data, And statistical analysis and diligent attention to managing, improving, and reinventing business processes.

1.1 Key Differentiators

Sr No	SIX SIGMA	CMMI
1.	Assumes Processes have been identified and defined	Focuses on defining management and technical processes early
2.	Does not distinguish Organizational standard and project processes	Organizational process definition used to capture best practices
3.	Emphasis on training to motivate and communicate skills	Emphasis on infrastructure to ensure key processes addressed
4.	Reliance on statistical methods to manage performance	Reliance on statistical methods to strengthen internal processes
5.	Focus on learning from internal experience and data	Additional mechanisms to leverage external technology
6.	Prioritization of efforts based on business payoff	Focus on process capability/ maturity
7.	Certification of Individual practitioners, not Organizations	Key Branding based on certification of assessors and organizations, not practitioners
8.	Six Sigma puts emphasis on understanding/ managing performance outcomes	CMMI puts emphasis on compliance activities

2.0 CMMI INSIGHT

2.1 CMMI Focus on Process Management Process Areas

- Contain the overarching practices related to implementing a successful and mature Process improvement program
- Provide capability to document and share best practices, process assets, and Learning
- Provide advanced capability to achieve quantitative objectives for quality and process

Performance

Sr No	CMMI Process Area	Descriptive Benefits
1	Organizational Process Focus (OPF)	Helps the organization to establish and maintain understanding of its processes and identify, plan, coordinate, and implement improvement
3	Organizational Process Definition (OPD)	Establishes and maintains organization's set of standard processes and supporting assets
5	Organizational Training (OT)	Identifies strategic training needs of organization, as well as tactical training needs common across projects and support groups
6	Organizational Process Performance (OPP)	Derives common, quantitative objectives for quality and process performance from organization's business objectives
7	Organizational Innovation and Deployment (OID)	Selects and deploys proposed incremental and innovative improvements to improve organization's ability to meet quality and process performance objectives

2.2 CMMI Focus on Project Management Process Areas

- Cover the project management activities related to planning, monitoring, and controlling a project
- Provide mechanisms to establish, maintain, and monitor commitments to customers and from suppliers
- Provide mechanisms to establish and maintain collaborative teaming environment
- Provide common method to proactively and quantitatively manage project

Sr No	CMMI Process Area	Descriptive Benefits
1.	Project Planning (PP)	Develops and maintains project plan, involves stakeholders appropriately, obtains commitment to the plan
2.	Project Monitoring and Control (PMC)	Monitors activities and takes corrective action, including re-planning
3.	Integrated Project Management (IPM)	Adapts organization's processes to project, and establishes project's shared
4.	Risk Management (RSKM)	Develops and implements proactive strategy to continuously identify, assess, prioritize, and handle program risks.
5.	Quantitative Project Management (QPM)	Collects project process and product metrics, and analyzes results to identify process improvement opportunities
6.	Supplier Agreement Management (SAM)	Manages the acquisition of products from suppliers for which there exists a formal agreement

2.3 CMMI Focus on engineering Process Areas

- Support product development life cycle activities, from initial requirements development to transition to operational use

Sr No	CMMI Process Area	Descriptive Benefits
1.	Requirements Development (RD)	Collects and harmonizes stakeholder needs to plan, develop, integrate, field, and sustain products, and translates needs into product requirements
2.	Requirements Management (RM)	Ensures that agreed-to requirements are understood and managed
3.	Technical Solution (TS)	Converts requirements into product architecture, design, and development
4.	Product Integration (PI)	Combines product components and ensures interfaces

5.	Verification (VER)	Ensures product meets specifications (“the thing is built right”), and that deficiencies are tracked, re-worked, and re-tested
6.	Validation (VAL)	Ensures product fills intended use when placed in intended environment (“we built the right thing”)

2.4 CMMI Focus on support Process Areas

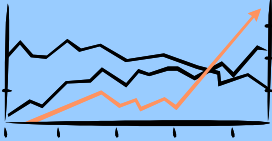
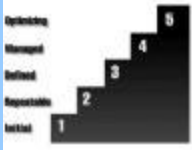
- Provide essential processes to support product development and maintenance
- Support establishment and maintenance of a work environment that facilitates and Stimulates integration and manages people to enable and reward integrative Behaviors
- Provide support functions used by all process areas during product development

Sr No	CMMI Process Area	Descriptive Benefits
1.	Measurement and Analysis (MA)	Establishes metrics program to provide objective results that can be used in making informed decisions, and in taking appropriate corrective actions
2.	Configuration Management (CM)	Establishes and maintains integrity of work products
3.	Process and Product Quality Assurance (PPQA)	Provides practices for objectively evaluating processes, products, and services
4.	Decision Analysis and Resolution (DAR)	Provides structured decision-making process that ensures alternatives are compared against established criteria, and best alternative is selected
5.	Causal Analysis and Resolution (CAR)	Identifies causes of defects and other problems, and takes action to prevent them from occurring in the future
6.	Organizational Environment for Integration (OEI)	Establishes approach and environment for the implementation of integrated teams

3.0 VALUE PROPOSITIONS OF SIX SIGMA AND CMMI

- Initially, the focus of Six Sigma was to improve production or manufacturing processes only. Over time, it has been more widely used by organizations to the rest of their business life cycles and supply chains. Data is used to understand variation and to drive decisions to improve the processes.
- CMMI provides an effective framework for project management and software engineering. The software engineering process definition is guided by a framework like CMMI. The efficiency of these processes is complemented by the usage of the Six Sigma methodologies. The process defines the data and that the data indicates the performance of the process.
- In totality, the CMMI and Six Sigma complement each other and in practice enhance the process efficiency and effectiveness in an organization.
- Define, Measure, Analyze, Improve, Control – these steps, more commonly called DMAIIC, the Six Sigma methodology, statistically measure and reduce variation, and thus decrease defects and improve quality. Over a period of time, IT organizations have been adopting Six Sigma methodology, or some variation of the methodology thereof, to improve software quality and efficiency and better meet customer requirements.

3.1 Value Enablers

Six Sigma	CMMI
	
<ul style="list-style-type: none"> ✓ Clarify what your customer wants (Voice of Customer) <ul style="list-style-type: none"> ○ Critical to Quality (CTQs) ✓ Determine what your processes can do (Voice of Process) <ul style="list-style-type: none"> ○ Statistical Process Control ✓ Identify and prioritize improvement opportunities <ul style="list-style-type: none"> ○ Causal analysis of data ✓ Determine where your customers/competitors are going (Voice of Business) <ul style="list-style-type: none"> ○ Design for Six Sigma 	<ul style="list-style-type: none"> ✓ Determine the industry best practice <ul style="list-style-type: none"> ○ Benchmarking, models ✓ Compare your current practices to the model <ul style="list-style-type: none"> ○ Appraisal, education ✓ Identify and prioritize improvement opportunities <ul style="list-style-type: none"> ○ Implementation ○ Institutionalization ✓ Look for ways to optimize the processes

3.2 CMMI and SIX SIGMA – WHAT DO THEY TELL YOU

Sr No	WHAT DOES CMMI TELL YOU	WHAT DOES SIX SIGMA TELL YOU
1.	Causal Analysis and Resolution	Pareto Chart, Regression Analysis
2.	Quantitative Project Management	Control Charts, Control Plan, Failure Mode Effect Analysis
3.	Decision Analysis & Resolution	Cause and Effect Matrix
4.	Organizational Process Definition	Process Mapping, SIPOC
5.	Measurements and Analysis	Measurements Systems Evaluation
6.	Requirements Development	CFQ indicators (Critical For Quality), Stakeholder Analysis

3.3 The WHAT’s of CMMI and HOW TO’s of SIX SIGMA

Sr No	WHAT DOES CMMI TELL YOU	WHAT DOES SIX SIGMA TELL YOU
1.	Requirements Development	VOC, Affinity Diagram, QFD, FMEA
2.	Causal Analysis and Resolution	Ishikawa Pareto chart, Fish Bone diagram
3.	Quantitative Project Management	Control Charts, Trend Charts
4.	Organizational Process Definition	Process Mapping, SIPOC
5.	Organizational Process Definition	SIPOC, Project Charter
6.	Decision Analysis and Resolution	Criteria Based Matrix, Pugh Matrix, QFD

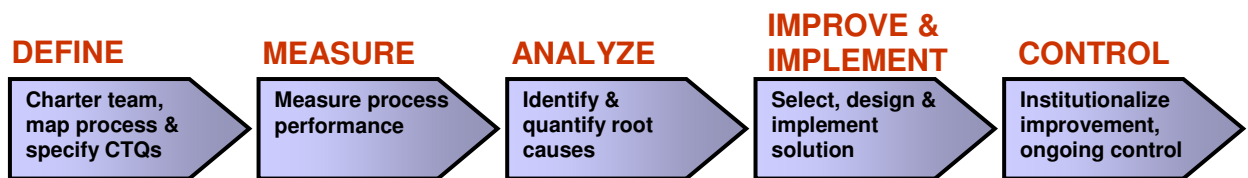
4.0 MODEL INTEGRATION - SIX SIGMA AND CMMI

- CMMI provides a list of best practices for systems and software engineering, acquisition, and integrated product and process development.

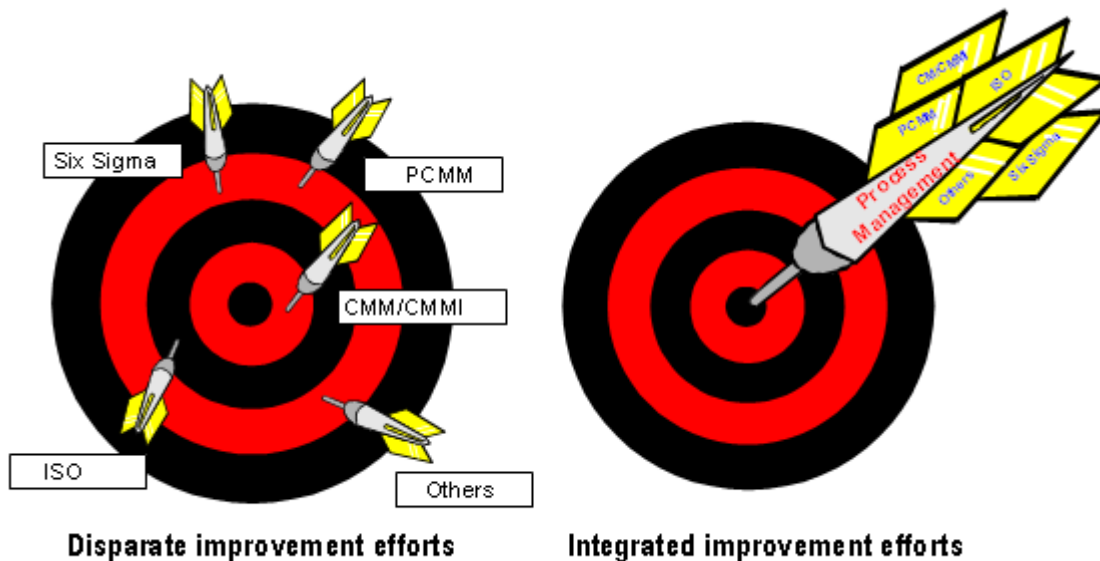
- CMMI provides a measurement scale to benchmark organizations against each other.
- CMMI defines the requirements of measurement and statistical process control; Lean Six Sigma provides the tools to implement them.
- Six Sigma provides a set of tools applicable to performing each process improvement activity.
- Six Sigma provides a strong mission/business orientation to process improvement.

4.1 Program integration - Six Sigma and CMMI

- Six Sigma connects process improvement and business value
- Six Sigma projects can help focus and measure CMMI-driven process improvements
- Identify the customer's needs, maximize the value/cost
- Tools for management by variation (CMMI Levels 4 and 5)
- Significant benefit to our customer – lower costs, better performance



4.2 Why integrate – SIX SIGMA and CMMI



5.0 SUMMARY

- We need Judicious and intelligent use of processes can help to achieve business goals
- If we are to survive in the future as leaders, we must integrate processes into our business practices.

¹ NOTE - Authors have not directly referred to any other existing papers / articles while writing this paper. If it matches with the views expressed in any existing articles, it is purely coincidental.