

## **SIX SIGMA vs. PMBOK**

### **Complementary and Mutually Supporting Methodologies for Handling Projects**

By Dr. T D Jainendrakumar

#### **Six Sigma**

Sigma (the lower-case Greek letter  $\sigma$ ) is used to represent standard deviation (a measure of variation) of a population (lower-case 's', is an estimate, based on a sample). The term "six sigma process" comes from the notion that if one has six standard deviations between the mean of a process and the nearest specification limit, there will be practically no items that fail to meet the specifications. This is the basis of the Process Capability Study, often used by quality professionals.

Six  $\sigma$  is a set of practices originally developed by Motorola to systematically improve processes by eliminating defects. A defect is defined as nonconformity of a product or service to its specifications. While the particulars of the methodology were originally formulated by Bill Smith at Motorola in 1986, Six Sigma was heavily inspired by six preceding decades of quality improvement methodologies such as quality control, TQM, and Zero Defects. In addition to Motorola, many companies are adopting Six sigma approach. The term "Six Sigma" is following a set of processes using necessary tools, has its roots in this tool, rather than in simple process standard deviation, which is also measured in sigmas. Criticism of the tool itself, and the way that the term was derived from the tool, often sparks criticism of Six Sigma.

Then what is Six Sigma exactly?

Six Sigma is a methodology for improving products and processes; we can say it is a way of thinking! It Focus on the elimination of defects and it is data driven. It is not based on the emotions to jump into the solutions using commonsense, for this a process is to be followed by using the necessary tools such as Pareto Diagrams, Box Plots, Control Charts, QFD, FMEA, Minitab, Sky Mark's Path Maker. In terms of quality.

#### **Six Sigma Methodology**

The **DMAIC** methodology can be used when a product or process is in existence at any company but is not meeting customer specification or is not performing adequately.

**Define** - Set context and objective of the effort (Fully trained team is formed, supported, and committed to work on improvement project. Customers identified and high impact characteristics (CTQs) defined, team charter developed, business process mapped.)

**Measure** - Obtain baseline performance and capability of process (Key measures identified, data collection planned and executed, process variation displayed and communicated, performance base lined, sigma level calculated.)

**Analyze** - Use data and tools to understand cause-and effect relationships, using  $Y = f(x)$  and identification of causes (Data and process analysis, root cause analysis, quantifying the gap/opportunity)

**Improve** - Develop modifications for validated improvements to process (Generate (and test) possible solutions, select the best solutions, design implementation plan)

**Control** - Establish plans and procedures to ensure sustained improvements (Documented and implemented monitoring plan, standardized process, documented procedures, response plan established and deployed, transfer of ownership (project closure).

According to the Six Sigma Academy, Black Belts save companies approximately \$230,000 per project of \$1,000,000 and can complete four to 6 projects per year

## **PMBOK (PROJECT MANAGEMENT BODY OF KNOWLEDGE)**

Project Management Body of Knowledge (PMBOK® Guide) —Third Edition. They address and detail a project management process, set of processes, tool or technique that is generally recognized as good practice in the execution of projects.

Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring & controlling, and closing.

Initiating group for formal authorization of a project or a project phase. The basic scope, duration, deliverables and resources for the project are determined at this time. The relationship of the project to the organization's strategic initiatives is also identified. The project manager is also assigned during this phase. The project charter is written, and when the charter is approved, the project becomes officially authorized. It is critical to involve stakeholders during the initiation phase.

The planning process group is used to plan and manage the project. These processes identify, define and mature the project scope, cost and schedule. Significant changes during the life of the project will trigger the need to revisit planning process items. Key deliverables of the planning process include the project management plan, scope planning, the WBS, activities, sequencing and scheduling, cost estimating & budgeting, and planning for risk, Procurement, HR, communications and quality.

The executing process group contains the steps necessary to perform the work laid out in the project plan to meet the project's objectives. The vast majority of the project's budget will be spent in this phase.

The monitoring and controlling process group contains steps and processes needed to watch project execution to identify potential problems and corrective action can be taken to keep the project on track. This group also influences the factors that could thwart change control to ensure only approved changes get made (i.e. stop scope creep)

The closing process group includes the processes needed to formally conclude the project and hand off the completed product to the end customer.

Managing a project includes 1) identifying requirements 2) establishing objectives 3) balancing scope, timing and cost 4) adapting the plan to different concerns of stakeholders.

According to PMBOK, “the project management team is responsible for determining what is appropriate for any given project”.

### **PMBOK versus Six Sigma**

In brief we can say that the **PMBOK Methodology is a** compendium of best practices, drawn from multiple disciplines, for the successful management of projects. Designed to support single projects (vs. 44 processes included in 9 knowledge areas like Integration, Scope, Time, Cost, Quality, HR, Communication, Risk and Procurement management) using Tools, procedures, methodologies and have common lexicon but not all inclusive. Chapter Eight: Project Quality Management References to Six Sigma and supported by standard reference books (e.g., Kerzner). **PMBOK** – not only caring for the preventing the defects but also attempting to take corrective actions after the occurrence as for large projects, as there are chances of unanticipated Risk.

PMBOK applies Six Sigma data-Driven Techniques, Improved Scope Management, Improved Quality Planning and Control; Large Project Orientation Focused on Coordination and Management (in addition to Results), Management and Control Methods lays Foundation for Planning, Organizing, Managing, and Controlling Projects. Some of the Quality Control Tools and Techniques used in PMBOK are also used in Six Sigma.

**Six Sigma** focused on Small Project Orientation and also focused mainly on Results rather than efforts, Systematic Data-Driven Methods Incorporate PM Concepts. Six Sigma uses PMBOK Planning, Organizing, Managing, and Controlling Methodologies. Many of the methodologies advocated by PMBoK and Six Sigma have a great deal in common. Both seek to establish a sound plan; identify and communicate with stakeholders; conduct regular reviews; and manage schedule, cost, and resources. Six Sigma also has a well-defined project charter that outlines the scope of a project, financial targets, anticipated benefits, milestones, etc. It's based on hard financial data and savings. In typical project management, organizations go into a project without fully knowing what the financial gains might be. Six Sigma has a solid control phase (DMAIC: Define-Measure-Analyze-Improve-Control) that makes specific measurements, identifies specific problems, and provides specific solutions that can be measured.

Six Sigma is a robust continuous improvement strategy and process that includes cultural methodologies such as Total Quality Management (TQM), process control strategies such as Statistical Process Control (SPC), and other important statistical tools. When done correctly, Six Sigma becomes a way toward organization and cultural development, but it is more than a set of tools. **Six Sigma** is the strategic and systematic application of the tools on targeted important projects at the appropriate time to bring about significant and lasting change in an organization as a whole like **PMI**. **Six Sigma** – strongly concentrated on preventing defects instead of attempting to detect them after they occur. **PMBOK** also suggests prevention is better than repair.

PMBOK (Road Map)	SIX SIGMA (Road Map)
Feasibility studies (Initiation) (Some times performing as a separate projects )	Business Process Mapping (Completed, verified, and validated high-level 'as is' (not 'should be' or 'could be') business process). Completed SIPOC representation, describing the Suppliers, Inputs, Process, Outputs, and Customers. (Define)
Document Project Charter (Initiation)	Project management charter, including business case, problem and goal statements, project scope, milestones, roles and responsibilities, communication plan.(Define)
Recruit suitably skilled and qualified teams (Execution)	Team charter developed, business process mapped. Fully trained team is formed, supported, and committed to work on improvement project. (Define)
Establish a physical project office to serve as the project's central coordination point for the smooth project management activities(Execution)	Customer(s) identified and segmented according to their different needs and requirements and high impact characteristics (CTQs) defined. Data collected and displayed to better understand customer(s) critical needs and requirements. (Define)
Schedule the phase's activities and tasks required to undertake the project (Planning)	Key measures identified: Key measures identified and agreed upon and High impact defects defined and identified in the business process. (Measure)
Schedule the required resources for the project including procurement. (Planning)	Data collection planned and executed: Solid data collection plan established that includes measurement systems analysis. Data collected on key measures that were identified (Measure)

Create budgets for the required financial expenditure for various projects (Planning)	Process variation displayed and communicated: Process variation components displayed/communicated using suitable charts, graphs, plots. Long term and short term variability accounted for (Measure)
Define quality targets and standards and procedures for quality assurance and quality control (Planning)	Performance base lined, sigma level calculated: Measure baseline process performance (capability, yield, sigma level). (Measure)
Produce a Risk Plan to ensure that all high priority risks are identified and mitigated early (Planning)	Data and process analysis: Identify gaps between current performance and the goal performance. (Analysis)
Document the customer acceptance criteria for the final sign off on each project deliverables (Planning)	Root cause analysis: Generate list of possible causes (sources of variation), Segment and stratify possible causes (sources of variation). Prioritize list of 'vital few' causes (key sources of variation). Verify and quantify the root causes of variation. (Analysis)
Establish a clear communication Plan for all the projects (Planning)	Quantifying the gap/opportunity: Determine the performance gap. Display and communicate the gap/opportunity in financial terms.(Analysis)
Migrate the staff, assets and procedures to the project (Execution)	Generating (and Testing) Possible Solutions: Possible solutions generated and tested. (Improve)
Regularly monitor project progress against schedule. Establish proper reporting system to control the expenditure to ensure project delivery within budget (Monitor and Control)	Selecting The Best Solution(s): Optimal solution selected based on testing and analysis. New and improved process ('should be') maps developed. Cost/benefit analysis of optimal solution(s). Small-scale pilot for proposed improvement(s). Pilot data collected and analyzed. Improved process ('should be') maps modified based on pilot data and analysis. Project impact on utilizing the best solution(s). (Improve)
Ensured that, defined quality targets are achieved by undertaking quality assurance and quality control (Execution, Monitor & Control)	Designing Implementation Plan: Solution implementation plan established, including schedule, work breakdown structure, resources, risk management plan, cost/budget, and control plan. (Improve)
Monitoring controlling and managing the implementation of project change request.	Monitoring Plan: Control plan in place for sustaining improvements (short and long-

Raise high priority project risk to the project board and implemented all risk actions. Raise high priority project risk to the project board and implemented all risk actions (Monitor & Control, Execution)	term). (Control)
Identify and resolve all issues as and when required. Gain customer acceptance of each deliverables for the project success (Monitor & Control, Execution)	Process Standardization: New process steps, standards, and documentation are ingrained into normal operations. (Control)
Keep project stakeholders regularly and suitably informed of project progress(Monitor & Control)	Documented Procedures: Operating procedures are consistent. Knowledge gained on process is shared and institutionalized. (Control)
Documented project closure report and gain its approval from the project sponsor. Undertaken all actions necessary to formally close the project (Closure)	Response Plan: Response plans established, understood, and deployed. (Control)
Communicated project closure to all stake holders (Closure)	Transfer of Ownership (Project Closure): Transfer ownership and knowledge to process owner and process team tasked with the responsibilities. (Control)

**Achievement of Common (PMBOK & SIX SIGMA) Goals**

- Reduce Failures
- Prevent Defects
- Manage Risk
- Control Schedule and Cost
- Meet Scope

**Hence the Conclusion is: Both are Complementary and Mutually Supporting Methodologies**

**References:**

- PMBOK Third edition
- Clash of the Titans??? PMBOK vs Six Sigma by Michael E. Thorn
- (<http://www.pmi-tampabay.org/upload/PMBOK%20vs%20Six%20Sigma%20PMITB.pdf>)
- Six Sigma DMAIC Quick Reference by Patrick Waddick
- ([http://www.isixsigma.com/library/content/six\\_sigma\\_dmaic\\_quickref\\_define.asp](http://www.isixsigma.com/library/content/six_sigma_dmaic_quickref_define.asp))
- **Other internet resources.**

**Glossary**

- TQM – Total Quality Management
- QFD- Quality Function Deployment
- FMEA- Failure Modes and Effects Analysis
- CTQ- Critical to Quality

## About the Author



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Dr. T D Jainendrakumar, PhD, MCA, PMP is an international PMP trainer, EX-Scientist/Principal Scientist/Joint Director, N.I.C, Ministry of Information and Communication Technology, Government of India, Madhyapradesh. He has over 25 years' of extensive experience in the areas of IT Project management in e-governance at Ernakulam District Collectorate, District Courts of Kerala, Central Administrative Tribunal Ernakulam, Rajeev Gandhi National Drinking Water Mission (400 crore project), New Delhi and Principal Systems Analyst in National Informatics Centre, Madhya Pradesh State Centre especially in the following areas of specialization: IT practice management (Project Management Methodologies, Tools and techniques, Standards & Knowledge); IT Infrastructure Management (Project Governance, Assessment, Organisational Instructions & Facilities and Equipments); IT-Resource Integration Management (Resource Management, Training & Education, Career Development & Team Development); IT-Technical Support (Project Mentoring, Project Planning, Project Auditing and Project Recovery); and Business Alignment Management (Project Portfolio management, Customer Relationship Management, Vendor Management & Business performance management).

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