

Six Sigma DMAIC Model and its Synergy with ITIL and CMMI

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Abstract: *Considering the rapid growth of the emerging trends and technologies as well as the consumers concern regarding the quality of the product or services, it has become an essential necessity for the organizations to get familiarized and adapt various mechanism that could enable them to achieve their desired goals both with respect to the quality of the product or service and the return on the investments. As some of the critical issues faced by many organizations these days are that some projects may not be closely aligned with the business goal and objectives or sometimes due to imprecise requirements, ambiguities develop among the team members that eventually results into drifting away from the client requirements. Process Improvement is a mechanism to improve the overall productivity and performance of the any organization. It enables management to enhance the speed of the processes, reduce defects by eliminating variations in the processes and helps to effectively align the customer requirements with the business objectives. Six Sigma is one of the leading ways of business process improvement.*

Whether it is a manufacturing industry or some industry related to IT, Six Sigma provides a comprehensive model specifying how the business functions should be performed at each level. The implementation of the Six Sigma is accomplished through the DMAIC methodology which stands for Define, Measure, Analyze, Improve and Control. For any company targeting for Six Sigma certification, the steps of DMAIC methodology are continuously repeated for each individual process within an organization until the Six Sigma status is not accomplished.

KEYWORDS:

DMAIC process, Yellow Belt, Green Belt, Black Belt, Six Sigma Champion, ITIL, CMMI, Process Improvement, Return on Investment, etc.

1. INTRODUCTION

Six Sigma is a business management strategy. It is simply a measure of quality that attempts for proximate perfection. It is a disciplined, data-driven approach and methodology for eliminating defects in any process from manufacturing to transactional and from product to service. With the help of statistical representation, Six Sigma quantitatively demonstrates how the process is performing.

To understand the impact of the six sigma practices in the industries, consider the following scenarios; A lot of people will consider 90% quality of any of the product to

be acceptable. And if the quality is 90% then many more will find it to be excellent. But what if the quality measure comes up to be 99.73%?

Assuming if the public sanitation, healthcare and pharmaceutical industries met 99.73% quality standard then it would enable us to accurately illustrate that there would be more than 50,000 improperly filled drug prescriptions, annually. The healthcare industry will be held responsible for losing more than 40,000 newborn babies annually. And, there would two hours in each month when the public sanitation industries would allow the consumption of unsafe water. But, if Six Sigma would have been effectively implemented in these industries then as a result the quality would have improved drastically resulting in, only one drug prescription filled improperly in every twenty-five years in the pharmaceutical industry. In healthcare industry, for every one hundred years only three babies would be dropped. Finally, there would be only one second of unsafe consumption of water in every sixteen years.

To accomplish Six Sigma, a process, services or product must not produce more than 3.4 defects per million opportunities. The basic objective of the Six Sigma methodology is the implementation of measurement-based strategy which focuses on process improvement and prevents variation through the application of Six Sigma improvement plans. This is achieved by using DMAIC and DMADV, the two methodologies for Six Sigma. [2][3]

2. IMPORTANCE OF SIX SIGMA

Six Sigma has evolved as a natural advancement in business processes. Today, the business environment demands and rewards improvement more than ever before, particularly because of the following aspects,

- Customer Expectations
- Technological Change
- Global Competition
- Market Fragmentation

Six Sigma Initiatives are simply a formalized, organized, strategic approach for identifying and applying opportunities for innovation in products, services, and processes. Six Sigma attempts to remove inconsistency from all aspects of an organization and forces each member of the organization to become committed to this culture as the Six Sigma practices are intended towards much more

than only eliminating flaws in the manufacturing products and processes. Companies following Six Sigma focus on improving process involved in every business practice. [4]

When it comes to the software service industry, Six Sigma is applied in a different manner as compare to the manufacturing industry. For any organization planning to reorganize their processes, Six Sigma can help to improve the mechanism.

The combination of DMAIC methodology of Six Sigma works best with GQM technique, especially when Six Sigma is more focused on data- driven techniques. However, an essential aspect of applying Six Sigma in any organization is a suitable tool or technique is established before introducing the Six Sigma. [5]

3. IMPLEMENTATION OF SIX SIGMA:

The Six Sigma implementation begins with selecting the project that holds the top most priority for the organization. Conventionally the implementation of Six Sigma involved five-step process referred to as DMAIC. It is a system targeted for improving the existing business processes or designs in an incremental manner. The DMAIC process includes

- Defines,
- Measure,
- Analyze,
- Improve, and
- Control

However, the Six Sigma practice has evolved over period of years and the modern approach is based on eight-step Six Sigma Breakthrough Process that is being rapidly adopted by organizations to rework the quality issues. The eight steps process includes Standardize and Integrate in addition to the existing model. [2]

4. THE SIX SIGMA DMAIC METHODOLOGY

The DMAIC methodology provides organization with a consistent and standardized approach for solving problems organization wide. It enables organizations to identify and evaluate the processes or products that do not perform up to the (internal or external) customer's expectations and subject them to quantifiable and substantial improvements in order to achieve the organization's objective.

Given below are the details of the impact and significance of each phase of the DMAIC methodology and how it enables organization to overcome the performance hurdles and gain benefit through creative improvement process.

DMAIC strategy involves following five interrelate phases to attain the Six Sigma:

4.1. Phase One: Define

Formally identify the project deliverable for both internal and external customers and define the consistent process improvements that are aligned with customers' demands and business strategy.

4.2. Phase Two: Measure

Create a scale to effectively measure the processes in order to understand the current performance and limitations

4.3. Phase Three: Analyze

Once the inefficient or faulty processes identified, select the critical root causes that are of higher importance for the business

4.4. Phase Four: Improve

Tackle the targeted issues and implement the solutions by eliminating defects to evaluate the overall improvement in the process

4.5. Phase Five: Control

Control the improvement into procedures and sustain the gains.

5. SIX SIGMA MEMBERS

The Six Sigma follows a structured and organized training process that serves multiple purposes. It enables the corporate decision makers to evaluate the advancement of the organization throughout the implementation of Six Sigma at each level. Most significantly the process of training promotes the environment of employee contribution. [2]

5.1. Yellow Belt

It is for the starters and the employees going through this training learn the basic fundamentals of Six Sigma and get an understanding of how the process works. A Yellow Belt typically has the adequate information of Six Sigma and participates as an important team member called Subject Matter Expert (SME) on a single or multiple projects unlike the Green Belt or Black Belt who tend to lead projects. This training is intended to give employees a clear and stronger understanding of business processes so that the each member could play meaningful role in achieving the organization's goals and objectives. [7][8]

5.2. Green Belt

In this training program, employees are presented with multiple methods of quantifying data using various models that are used to highlight inadequacies in the organization. They are trained to effectively utilize several Six Sigma problem-solving techniques and statistical tools in order to add to the success of the organization. The primary task of Green Belt includes effectively deploying Six Sigma techniques and to lead different small or

medium size projects for the achieving improvements within their particular areas. [9]

5.3. Black Belt:

In addition to the skill set of Green belt employees, the Black belt employees have the information of leading different groups of Six Sigma projects, simultaneously. The qualified Black Belt is capable of explaining Six Sigma perspectives and ideologies, including systems and tools involved in supporting. The Six Sigma Black belts are required to have in depth knowledge of all aspects of the DMAIC (Design, Measure, Analyze, Improve and Control) model in accordance with Six Sigma philosophies. [10]

6. SIX SIGMA BENEFITS

There is a vast amount of literature available that describes the benefits of incorporating Six Sigma practices in an organization. These benefits primarily focus on how don't stick have to do with these companies not being fully committed to the process.

In addition, many organizations are faced with challenges regarding implementation of Six Sigma because they fail to assign metrics to all business functions. One of the necessities of Six Sigma is to quantify all business functions in order to improve on them. Even when it comes to support functions such as paperwork, quality of this function must be analyzed quantitatively. Stating that peripheral business functions are good or bad is not precise enough. It is essential to determine how many errors are made per million attempts.

7.1. Six Sigma Champions:

The Six Sigma Champion is the crowning level of Six Sigma training. This title is awarded to the employees who prove their worth as effective black belts. Being a Six Sigma Champion, the employee is also associated with the senior management of the organization to categorize and head projects of significant status. The Six Sigma Champions are responsible for providing mentorship to the Six Sigma project leaders (Green belt and Black belt). The Six Sigma Champions are the critical players in the accomplishment of any Six Sigma deployment. The Six Sigma Champions select projects with respect to the priorities of the top management and provide guidance to Green and Black Belts.

an organization must continuously work on bringing improvement in their everyday task. Following are the aspects of the organization that are benefited most by the implementation of Six Sigma,

- Team Effort
- Consistent Progress
- Required training
- Return on investment
- Organizational change

7. SIX SIGMA CHALLENGES

Certainly, the process of implementing Six Sigma is a challenge for any organization. Many of the Six Sigma organizational implementations that

8. ITIL WITH SIX SIGMA

ITIL provides a framework for managing IT Services Management capabilities and defines various essential IT Practices, highlight tasks, procedures and checklist for organizations based on the industry best practices.

The short comings of the ITIL model are that it does not properly explain actual implementation of the suggested tasks and procedures. Instead it relies on the organization, adapting to this model for highlighting and defining the process flows in detail, development of process models, creation of the instructions for the required work, etc. It does not indicate the quality of IT Services delivered neither it explain how they can be improved over period of time.

Both ITIL and Six Sigma, when combined together empower organization to define what IT service Management is required and analyze how these processes can be maintained and improved for enhanced quality over period of time. The combination helps the organization in improving the IT Services and focuses more on the customer by aligning their business objectives with the customer's requirements in an appropriate manner. The merger of the ITIL and Six Sigma practices have proven to be extremely beneficial in in enhancing the organization's overall productivity and quality of IT Services Management. With the help of this framework, organizations can now fully understand and evaluate the investment on best practices.

Table 1: DMAIC and Connection to ITIL for Service Outage improvement

Six Phase	Sigma Steps	Sigma Tools	ITIL Process interaction
Define	<ul style="list-style-type: none"> Identify problem to be analyzed Define scope Select team 	<ul style="list-style-type: none"> Brainstorming Interviews 	<ul style="list-style-type: none"> Inputs from incident management Analysis Problem identification and recording
Measure	<ul style="list-style-type: none"> Identify measurement system Measure current process performance 	<ul style="list-style-type: none"> Business Impact Cost of poor quality 	<ul style="list-style-type: none"> Problem classification, prioritization and allocation
Analyse	<ul style="list-style-type: none"> Identify root causes of problems 	<ul style="list-style-type: none"> Process analysis Fishbone diagram Pareto chart 	<ul style="list-style-type: none"> Problem investigation and diagnosis Raise Known Error
Improve	<ul style="list-style-type: none"> Recommend/implement solutions 	<ul style="list-style-type: none"> Benchmarking Piloting 	<ul style="list-style-type: none"> Request for change Build, Test and implement Release
Control	<ul style="list-style-type: none"> Implement process control Determine process capability Sustain improvement 	<ul style="list-style-type: none"> Control charts FMEA Cost of poor quality 	<ul style="list-style-type: none"> Post Implementation Review Problem evaluation review Closure

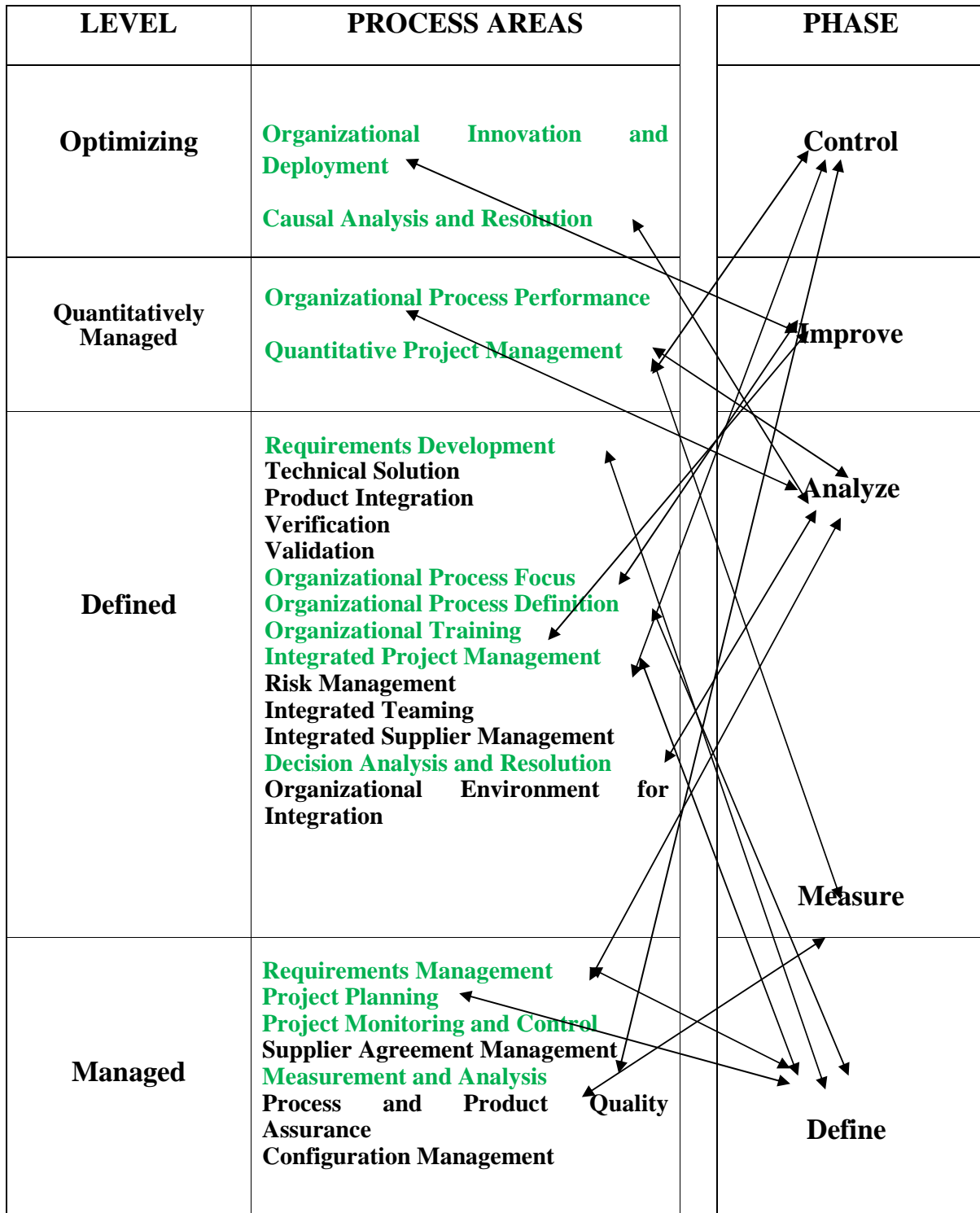
9.CMMI WITH SIX SIGMA:

Capability Maturity Model Integration and Six Sigma are two of the most acclaimed approaches in software industry for gaining Process improvement. Both the models help organization in enhancing the quality of their product or services and establish a balance between the customer requirements and the business objectives.

On the basis of the several studies conducted in many organizations across the globe, experts from the software industries have now discovered that the combination of Six Sigma and CMMI provides organization with best of both

the worlds. These approaches cannot only be integrated but can work effectively in parallel, helping organization to achieve its desired quality goals and measure the success through different quantifiable matrices. Six Sigma techniques enable organization to identify, select and prioritize critical processes for improvement within the CMMI model whether it is in the Continuous Model or the Staged Model. There are five maturity levels in a CMMI Model and as an organization traverse through these levels, from initial it becomes defined, quantitatively managed and optimized. As the CMMI model gets mature it automatically becomes a perfect fit with Six Sigma that primarily focuses on quantitative management. The power of the Six Sigma relies in its DMAIC model.

Table 2: CMMI Process Area/Six Sigma Relationships



10. CONCLUSION

Despite of the increasing popularity of the Six Sigma model and the significant amount of difference it is making in the organization globally; it is felt that there still is a lag in the proper understanding and the execution of this model. Some critical issues faced by many organizations these days are that projects are often not closely aligned with the business goal or due to imprecise requirements, various ambiguities are developed among the team members resulting into project ultimately drifting away from the client requirements.

This report mainly highlights the Six Sigma DMAIC methodology, the procedures and activities involved in each phase of this methodology as well as the roles and responsibilities of the individual involved in order to develop awareness among professionals regarding the different aspects of the Six Sigma model and facilitate organizations in gaining maximum benefit from the implementation of the Six Sigma Model. Also to enable organizations to take preemptive measure to handle all the challenges involved in the implementation of the Six Sigma model.

In addition to the comprehensive information about Six Sigma methodology, this report also focus on the benefits of synchronizing Six Sigma Model with other widely used process improvement models, such as ITIL and CMMI. This report mainly reveals the fact that Six Sigma is one of the leading ways of business process improvement and is a mechanism to improve the overall productivity and performance of the any organization.

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