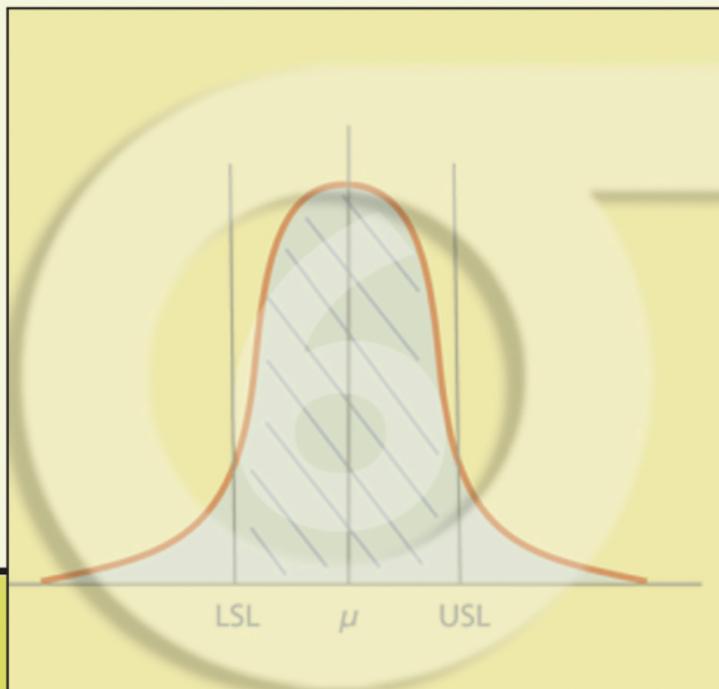


Six Sigma for IT Management

A Pocket Guide



SIX SIGMA FOR IT MANAGEMENT –
A POCKET GUIDE

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Six Sigma for IT Management

A P O C K E T G U I D E



Colophon

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This Pocket Guide is based on *Six Sigma for IT Management* (Van Haren Publishing 2006), which was written by:

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From another side of the world came Rajeev Andharia, a Project Management Professional (PMP), Certified Information Systems Auditor (CISA), Certified Manager in IT Service Management (ITIL), and a Certified Information System Security Professional (CISSP), who had more than eleven years of experience in IT consulting, project management and execution. Rajeev is familiar with many frameworks, among them ITIL and Six Sigma. The force behind Rajeev's contribution was the unwavering support of his friend and wife Shital. An MBA herself, Shital is an IT professional specializing in training and consulting. In addition to providing valuable inputs and quality reviews, Shital supported the project by spending weekends with Rajeev to create the chapter on IT process improvement.

Tieneke Verheijen, the expert editor co-ordinating the work on the original title on behalf of itSMF-NL, created this pocket guide with the core knowledge of the original publication, and co-ordinated the subsequent review. Jan van Bon, as itSMF-NL's chief editor, supervised this process and made sure that the resulting summary meets itSMF's requirements.

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We would like to thank them for all their efforts once again.

Given the desire for a broad consensus in the IT Service Management field, new developments, additional material and other contributions from IT Service Management professionals are welcome, to extend and further improve this publication. Any forwarded material will be discussed by the editorial team and, where appropriate, incorporated into new editions. Any comments can be sent to info@vanharen.net.

Jan van Bon, Chief Editor

Tieneke Verheijen, Editor

Foreword

There is overwhelming evidence that quality improvement processes really do increase customer satisfaction and operational efficiency (which results in measurable value to the business bottom line). Because of this, IT organizations have now added Six Sigma to ITIL processes. Since IT undoubtedly enables the business, improvement to IT services results in a direct and quantifiable improvement to the business processes they support.

Given that IT processes largely exist in an electronic universe where data capture and manipulation can be applied transparently with little or no human intervention, Six Sigma's statistical techniques and the plethora of IT data go hand in hand to help IT make more informed business decisions. It is often said that there's too much data and not enough information; Six Sigma helps transforming this data into business critical information - For example, cost of poor quality, risk and other business driven metrics.

Today, applications are more sophisticated and a wealth of tools exist to capture, consolidate and manipulate this data; it is a straightforward task to introduce a quality management layer to any IT service. Moreover, IT service management applications now contain Six Sigma techniques inherent in their solutions - making it even easier and more cost effective to benefit from Six Sigma techniques.

Six Sigma is gaining popularity in nearly every industry today, and has clear measurable successes widely recognized beyond the manufacturing organizations where it has its roots. Organizations such as Bank of America, American Express, Sun Microsystems and Getronics among others have realized tangible value from Six Sigma in IT.

This pocket guide is based on the '*Six Sigma for IT Management*' book; it is intended to help IT professionals understand the basics of Six Sigma

for IT Service Management. Six Sigma techniques and concepts key to IT Management are covered in the following chapters. It is a great pleasure to have taken part of the co-authoring team for the original Six Sigma for IT Management book, and to work with a team of Six Sigma and ITIL experts from around the world.

A handwritten signature in black ink, appearing to read 'Linh', with a stylized, cursive script.

Linh C. Ho
Co-Author
Six Sigma for IT Management

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Introduction

Delivering high quality IT services at minimum cost to the business continues to be a priority for IT executives. Because IT has become such an integral part of the business and its critical business processes, the need to align the business objectives with IT is crucial. The question is: how? How can IT be the enabler to improve the business and its processes? How can IT prove its added value to the business?

This is where quality improvement methodologies such as Six Sigma and best practices like ITIL can further help to bridge the gap between IT and the business. Moreover, combining these approaches helps IT to focus on strategic activities supporting business goals instead of dealing with day-to-day operations reactively.

This pocket guide gives an appreciation and insight into:

- what Six Sigma is
- how it can be used together with ITIL (V2)¹ best practices, Total Quality Management and the IT process improvement approach
- when to utilize and combine these methods
- why IT managers should consider these approaches
- who should use Six Sigma
- practical techniques enabling IT professionals to immediately apply them in their IT organization
- common challenges to be aware of, and mistakes to avoid when implementing Six Sigma

Though Six Sigma is not IT focused, it does provide a consistent framework for measuring process outcomes for products and services. It is particularly useful in complementing the IT Infrastructure Library (ITIL)

¹ When ITIL is mentioned, ITIL V2 is referred to.

process approach, the de facto standard for managing IT organizations today. Though ITIL provides a set of best practices to deliver and support IT services, it does not quantify the quality of service performance or how to improve it. It does urge IT Service Organizations to have a Service Improvement Program (SIP), but it does not explain how they should operate such a program in practice. Questions such as ‘How do I collect data?’, ‘What data should I collect?’ and ‘How can I draw any conclusions from them?’ are not answered. The *Planning to Implement Service Management* book and other published ITSM books and reports name Six Sigma as a complementary quality improvement approach to ITIL processes.¹

ITIL defines the ‘what’ of Service Management and Six Sigma defines the ‘how’ of process improvement.

Together ITIL and Six Sigma are a perfect fit for improving the quality of IT service delivery and support. The Six Sigma approach is well positioned to provide quantifiable measures of process performance outcomes and a consistent approach through the DMAIC (Define, Measure, Analyze, Improve and Control) quality improvement cycle, in how and when to use the metrics.

This pocket guide summarizes the ‘Six Sigma for IT Management’ book, which was the first book to provide a coherent view and guidance for using Six Sigma in IT service organizations. The book content has been adjusted to fit the pocket guide format, chapters of the book have been summarized and merged, while the case studies have been left out. Valuable techniques from the case studies are summarized in the Appendix C.

Chapter 1 highlights the natural use of Six Sigma in IT Service Management organizations, and is followed by Chapter 2 explaining Six

2 *Planning to Implement Service Management* by Office of Government Commerce (OGC) (London 2002).

Sigma in detail. Chapter 3 summarizes ITIL and how it can be aligned with Six Sigma. Chapter 4 merges the Six Sigma approach with the IT process improvement view. Appendix A provides a glossary containing terminologies that are used in this book, while Appendix B contains an overview of the DMAIC phases including respective tasks. Appendix C suggests project techniques, with Appendix D completing the book with suggested further reading.

What is Six Sigma?

The method owes its name to the Greek character sigma, 'σ'. In statistics, this letter represents the standard deviation, which indicates the amount of variation or inconsistency in a process. In the mid-eighties, Motorola introduced the statistical measurement of its process outcome, the measure of six times sigma, which means that in every million opportunities there are 3.4 defects.

The sigma measure, σ, represents the standard deviation. Six Sigma means six times sigma, indicating 3.4 defects per million opportunities (DPMO).

The Six Sigma method does not insist that every organization should strive for six sigma or 3.4 DPMO. It does provide a quantitative methodology of continual (process) improvement and reducing costs, by reducing the amount of variation in process outcomes to a level suitable for the given organization. It also pursues data-driven, fact-based decision-making in which decisions are tied to corporate objectives. And finally, it uses an implementation of measurement-based strategy that focuses on process improvement and variation reduction.

While using a statistical approach, Six Sigma accounts for the quality assurance part of quality management. The continual improvement part of quality management is covered by the **DMAIC** quality improvement cycle:

- Define
- Measure

- Analyze
- Improve
- Control

Each of the DMAIC phases has clear objectives, tasks and techniques, that are explained in Chapter 2. At some companies an additional *Reporting* step is added to the model; though this is not a formal part of the Six Sigma DMAIC model, it is clear that reporting should take place in a structured way. This will also create exposure and enable you to share your success.

With the quality assurance covered by the statistical measurement approach and the continual improvement covered by the DMAIC cycle, you might conclude that Six Sigma is a Total Quality Management approach. This is explained further in Chapter 1: Why Six Sigma for IT Service Management?

Why Six Sigma?

Six Sigma enables organizations to streamline their processes by reducing the number of defects or the amount of waste, and to raise their customer satisfaction. Figure 0.1 shows a process outline and the waste in a process: jobs that are not done right the first time take extra time to put right. The rework can be seen as waste and is also called 'the hidden organization'. By making this visible, Six Sigma helps management to make decisions: what parts of a process should be improved and how?

By first detecting, tackling and solving the issues that affect the business most, the value of an organization is increased exactly where it can be increased the most. On average, companies spend 20% of their revenue on the hidden organization, but a company at Six Sigma level in its processes spends significantly less.

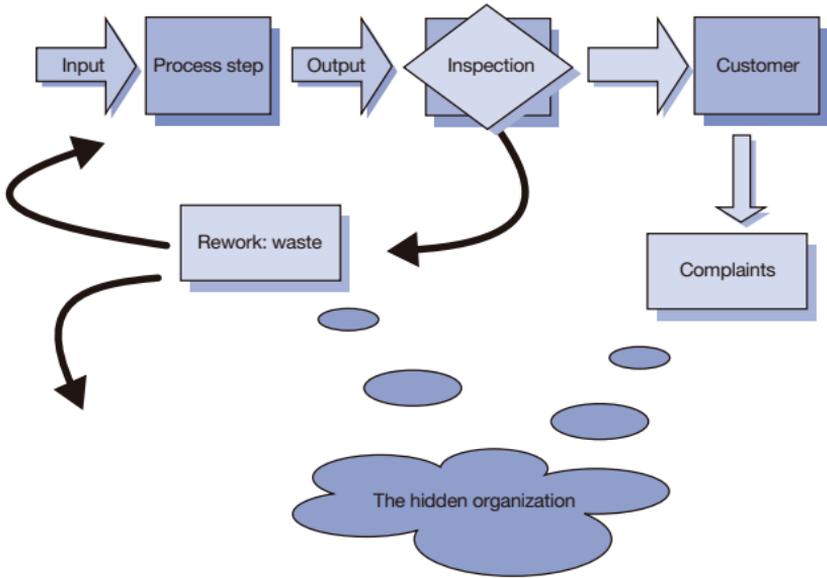


Figure 0.1 Waste in an organizational process

Thus, Six Sigma will allow you to prove success in a project from its start, through the use of consequent measurement. This represents a huge potential shown by virtually no other technology, providing a very good starting point for your projects.

Finally, Six Sigma will also help you to grow your organization's skill-set as it will reveal weaknesses and provide tools to close the gaps.

Who should use Six Sigma?

Each organization wishing to optimize its IT-dependant business processes can and should use Six Sigma. Various types of organizations have already proven its benefits and possibilities of adaptation. The financial industry, for example, focused on the core business processes, as these are nearly the same for all market players of this segment. Pharmaceutical companies, driven by the regulations of the US Food and Drug Administration (FDA), implemented Six Sigma to control their activities in this area. The government sector started Six Sigma activities a little later, but these go throughout their whole organization.

The techniques of Six Sigma can also be applied to identify and improve critical (IT) process areas in your IT organization. Six Sigma forces you to turn a process or organizational problem into a statistical problem that can be measured (Figure 0.2). These measurements give management information to base their decision on an operational solution for the problem. Using this approach organizations are spending less than 5% of revenue on what we call the hidden organization, when they have reached Six Sigma level (Figure 0.1).

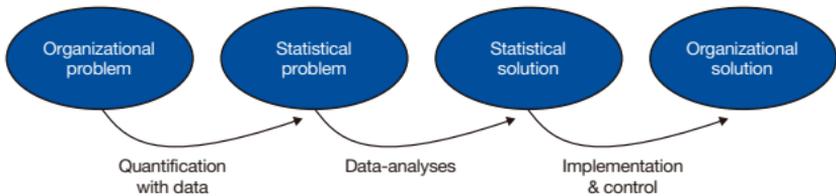


Figure 0.2 Fact-based decision-making

How to use Six Sigma

Deployed correctly, Six Sigma does not end; it becomes a way of life, thus ensuring the best results for any organization. The continual improvement ideas of Juran and Deming reflecting this idea will be introduced in Chapter 1.

In a number of cases, Six Sigma has become a tactical project focus on improvements using DMAIC methodology. In this situation, Six Sigma is viewed as a short-term ‘quick win’ and acceptance of the philosophy is never realized. As a result, the true value of Six Sigma as a holistic improvement effort fails to be realized.

Aligning Six Sigma with ITIL

ITIL was developed in the 1980s, by the British Government’s Central Computer and Telecommunications Agency (CCTA).³ It was based on the

³ Now known as the Office of Government Commerce (OGC).

premise that spending on IT in government was becoming too high, and a method to establish best practice processes for IT Service Management would be of benefit. ITIL became the de facto standard for IT Service Management. The book and this pocket guide are based on ITILv2. The framework can be used to assist organizations in developing their IT Service Management (ITSM) process-driven approaches. ITIL recognizes five principal elements in providing IT services, of which Service Delivery and Service Support are the most widely adopted elements. They are explained further in Chapter 3.

Though Six Sigma and ITIL are often used independently, this pocket guide suggests a way to gain the best of both worlds, using the process approach from ITIL and the improvement model from Six Sigma. In order to combine ITIL and Six Sigma, the two need to be aligned. This should be approached as a project, in the same way as you align IT with business objectives. Chapter 3 and 4 explain how this can be done. Of course you should always take your organization's culture into account, together with the process and investment aspects.

In this respect we distinguish four types of organizations:

- organizations using both ITIL and Six Sigma
- organizations using ITIL without using Six Sigma techniques
- organizations using Six Sigma but not using ITIL
- organizations using neither approach

This book is particularly aimed at companies in the last three scenarios; therefore we elaborate on these in Chapter 3. In this chapter, we also expand on how ITIL best practices can be placed within the DMAIC model.

Common Six Sigma techniques used in ITIL environments are Service Improvement Program (SIP), Voice of the Customer (VOC), Pareto charts, Failure Mode and Effects Analysis, control charts and process sigma value.

SIP is already embedded in both Six Sigma and ITIL. Appendix C contains a list recommending more valuable techniques.

Summary

While Six Sigma is not an IT focused framework, it does provide a consistent framework for measuring and improving the quality of services and products. Six Sigma is complementary to the IT Infrastructure Library (ITIL) best practices by quantifying and continually improving the quality of IT services delivered to the business.

ITIL defines the 'what' of Service Management and Six Sigma defines the 'how' of process improvement.

The sigma measure, σ , represents the standard deviation. Six Sigma means six times sigma, indicating 3.4 defects per million opportunities (DPMO).

This is not an arbitrary measure for which every organization should strive. The most important aspect of the methodology is the quantitative and **DMAIC** structured approach for continual (process) improvement and reducing costs, thereby enabling data-driven, fact-based decision-making tied to corporate objectives.

Each organization wishing to optimize its IT-dependant business processes should adopt Six Sigma as part of the company culture. Combining ITIL and Six Sigma helps IT further align itself to the business and exceed its performance requirements.

1 Why Six Sigma for IT Service Management?

1.1 The importance of quality management

Business, as well as IT success, depends on how well they can deliver against mounting expectations of an increasingly demanding client base. It entails understanding their perspective on quality and value, and ensuring that the service is designed and managed to meet that perspective. This is what *quality management* is about.

Total Quality Management (TQM) aims at realizing quality. It is a generic term used to describe a vast collection of philosophies, concepts, methods, and tools - among them, Six Sigma. We will first explain TQM in general and the Six Sigma methodology in particular, and then see how Six Sigma, coupled with IT Service Management, is a powerful breakthrough for business and IT process management.

1.1.1 Total Quality Management (TQM)

“Quality is the totality of characteristics of a product or service that bear on its ability to satisfy stated and implied needs.” (ISO-8402)

From the beginning of the twentieth century, with the industrial revolution as its main driver, companies have been trying to control the quality of the products they were producing. After World War II, W. Edwards Deming and Joseph Juran both contributed tremendously to the development of TQM techniques.

Juran established three fundamental concepts of Total Quality Management:

- **Customer focus** - Customer satisfaction surveys of 4.3 out of 5 mean nothing. What truly matters is whether satisfaction rating is creating

business or losing business. A continuous dialogue with the customer is essential to refine the services and to ensure that both the customer and the supplier know what is expected of the service. Section 1.2 discusses Six Sigma's Critical to Quality (CTQ) factors that can help establish this dialogue.

- **Continual improvement** - 'Continual improvement' is an important part of TQM. Deming's Quality Circle proved to be a simple and effective model to control and improve quality. It revolves around four principles of: *Plan, Do, Check, Act* (PDCA), see Figure 1.1. Using PDCA in a continuous cycle of improvements over time allows an organization to continuously mature its ability to drive quality in the services delivered:
 - *Plan* – what should be done, when should it be done, who should be doing it, how should it be done, and by using what
 - *Do* – the planned activities are implemented
 - *Check* – determine if the activities provided the expected result
 - *Act* – adjust the plans based on information gathered while checking
- **Value of every associate** - Employees influence change. When empowered, they become the greatest asset for improving quality. Empowering people improves employee satisfaction. Employee satisfaction improves productivity. A productive workplace stimulates innovation. Innovation fosters success! Total Quality Management must consider the 'people' aspect of the equation and often this emanates within the culture (the values and beliefs) of the organization. Influencing this requires a clear and consistent policy communicating to each employee how and to what extent their tasks contribute to realizing the organization's objectives. Then they can be empowered and accountable for carrying out those responsibilities.

1.2 Six Sigma for TQM

In order to get to the bottom line of every organizational problem, organizations need to measure value, as measurements carry relevance to every customer, every activity and every employee of an organization.

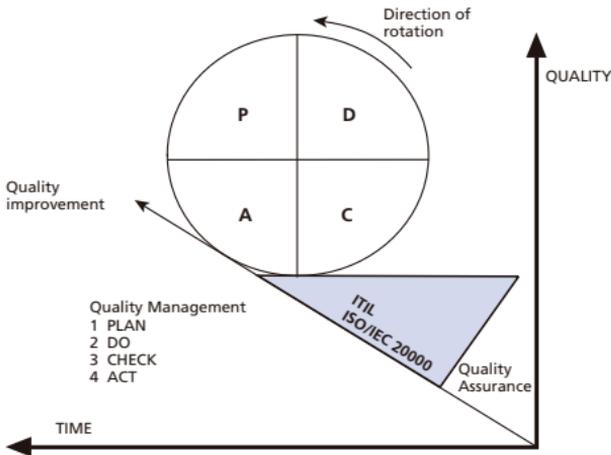


Figure 1.1 Deming's Quality Circle

But how do you measure quality and value? TQM measures quality as discrete functions. Six Sigma uses metrics to calculate the success of everything that an organization does.

Six Sigma focuses on Critical to Quality (CTQ) metrics following from customer requirements. Its end-to-end perspective allows for a total quality picture focused on the product, as well as the processes within the operation that produces the product.

As a result, Six Sigma produces quality with far more tangible and financial results than the TQM approaches:

- up to 20 percent margin improvement
- a 12-18 percent increase in capacity
- a 12 percent reduction in the number of employees
- a 10-30 percent capital reduction

Six Sigma splits the production of a product or a service into a series of processes. All processes consist of a series of steps, events, or activities that achieve an objective or goal. Six Sigma measures every step of the process by breaking apart the elements within each process, identifying the critical

characteristics, defining and mapping the related processes, understanding the capability of each process, discovering the weak links, and then upgrading the capability of the process. Only by taking these steps can a business raise the 'high-water mark' of its performance.

After this, the *Critical to Quality characteristics* (CTQs) become apparent. They define the output of the individual processes. Once defined and quantified, the variables (inputs) that affect the CTQs can be adjusted accordingly.

The key at this point is in determining which variables have the greatest impact on the outcome. This is statistically accomplished through 'Design of Experiments' and 'Probability'. Once the key variables (X) are identified and defined, measures can be taken to optimize and control. Thus, quality is improved *where it matters most and not for quality's sake*.

Six Sigma furthermore unveils variations within the process. Once identified, these variables can then be controlled so that they are predictable, repeatable and consistent. This ensures continuous customer satisfaction and significantly reduces operating costs.

The methodology for managing this is through Six Sigma's DMAIC cycle (Define, Measure, Analyze, Improve, Control).

It is important to note that Critical to Quality (CTQ) translates to 'Critical to Satisfaction' from the customer's perspective. Improving CTQs therefore requires linking to customer needs (Figure 1.2).

In summary, Six Sigma is the measurement of processes used to deliver a service or a product where critical-to-quality factors are optimized and brought under control in order to meet or exceed customer satisfaction.

Linking customer needs to supplier capabilities

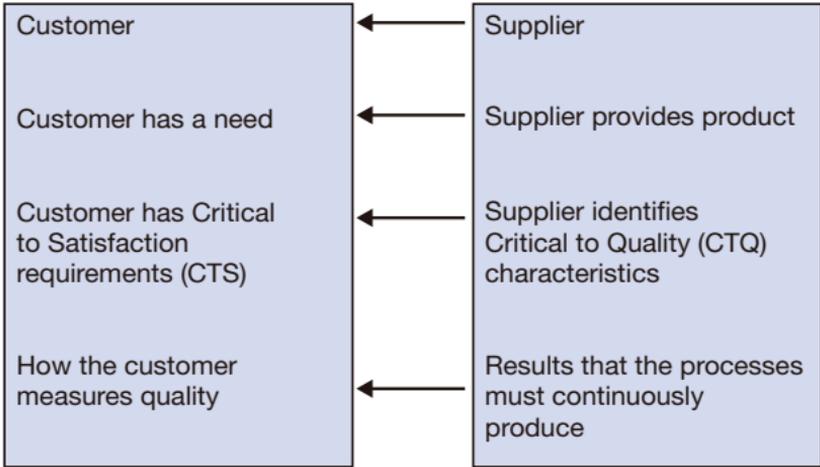


Figure 1.2 Linking customer needs to supplier capabilities

1.3 What is Service Management?

While Six Sigma is used to measure 'how' the inputs and outputs of a process can be optimized, we must also consider 'what' processes are necessary to deliver the service.

Service Management is an alignment of strategy with objectives, processes, and procedures that drives delivery of services to the customer.

This alignment of strategy is critical in understanding 'what' processes are required for the delivery of a service.

The key components in Service Management are:

- **Alignment** - The business and IT should agree upon what business and strategy indicators there are for IT to align with (for example, if the business wants to outsource parts of the production, then this is an indication for IT to prepare for integrating suppliers in business processes and systems). In Six Sigma terms, this is referenced from the customer's perspective as 'Critical to Satisfaction'.

- **Replication** - The most powerful way to accelerate dramatically the results of quality and productivity improvement efforts is the ability to replicate quickly across the organization. Resistance to change, the 'not invented here' syndrome, or the 'every location is different' excuse are three of the main challenges to be overcome here. Successful companies make replication an obligation, not an option. Creating an environment that is scalable and agile, where processes and procedures can be quickly and easily replicated, will foster success in the business.
- **Linkage (process management)** - A common theme carried throughout this chapter is to link processes from an 'end-to-end' perspective, and to measure performance in terms of inputs and outputs. Service Management also focuses on linking processes. The single most important factor that must be considered in every process is the customer. A company may be a collection of processes, but the customer only sees it in terms of the output of those processes. All he wants is a product that meets his needs and requirements at the agreed time for the agreed price. In order to meet these requirements, the organization must link all activities transparently, in such a way that the output meets the expectations. Process mapping is a powerful tool used in Six Sigma to gain an understanding of the activities necessary to produce an outcome. The final outcome must always be from a customer's perspective. Process mapping can be used to identify key value-add activities from those activities that provide little to no value and can be eliminated to produce a more efficient process (see section 4.6).

When you combine strategy, replication and process management you have Service Management. When you combine Service Management with the power of Six Sigma, you have a well defined, controlled set of efficient processes to deliver a product or service that consistently meets and exceeds customer satisfaction.

1.4 IT Service Management and Six Sigma

IT Service Management is: the whole of principles and practices of designing, delivering and maintaining IT services to an agreed level of quality, in support of a Customer activity.

The *objectives* of IT Service Management are *alignment by customer focus and delivering quality*. Six Sigma focuses on *customer and quality* as well, *through the use of metrics*. It will provide value to IT Service Management in the following ways (see Figure 1.3):

- **Gauge process performance through measurements and applied statistics** - the process (for example, break-fix service under a Service Level Agreement) can be monitored in a very sophisticated way, namely by a control chart (see Appendix A and C).
- **Improve process efficiency in a concrete and effective way** - the Six Sigma method to improve your business processes is unique: it relies on solid data and measurement. There is room for intuition at the start of an improvement project, and although Six Sigma involves some mathematical calculations, the vast amount of tools available in the market to automate these calculations helps Six Sigma beginners to learn it. The broad spectrum of analytical tools and techniques allows for problem-solving capabilities that are simply unsurpassed. They leave no room for confusion or ambiguity and can be transformed into crystal-clear benefits in terms of financials and customer satisfaction.
- **Defining and quantifying customer needs** - CTQs provide us with an understanding of what the customer expects our process to deliver. By aligning our process objectives and the CTQs through customer needs mapping, we not only understand what the customer considers important, but are positioned to measure how the process is performing relative to what the customer expects. By leveraging Process Capability Analysis (PCA) we can assess the capability of our process. Process capability, as measured by a PCA, provides a means to understand how a

process normally behaves considering the variables that normally impact the process. By analyzing the process capability, we can determine if the process will deliver to the CTQs or if an improvement of the process will be necessary.

- Predict process behavior instead of reacting to it** - Six Sigma identifies the root causes for process behavior and thus allows for proactive controlling of these factors, enabling a much better control over the process. A mathematical equation can be issued which will predict *at least 80%* of process behavior. This allows the process to be steered upfront, instead of correcting any mistakes later, and avoids mistakes and dissatisfied customers, saving time, money and reputations.
- Helps to distinguish between every day fluctuations and signals that need your attention** - Six Sigma gives us the root causes for process behavior in a mathematical equation and it allows us to calculate the lower and upper limits that these root causes may take when affecting the process in order to stay within customer or company specifications on process output. Controlling these inputs on a control chart allows for very rapid signalling when action is required.

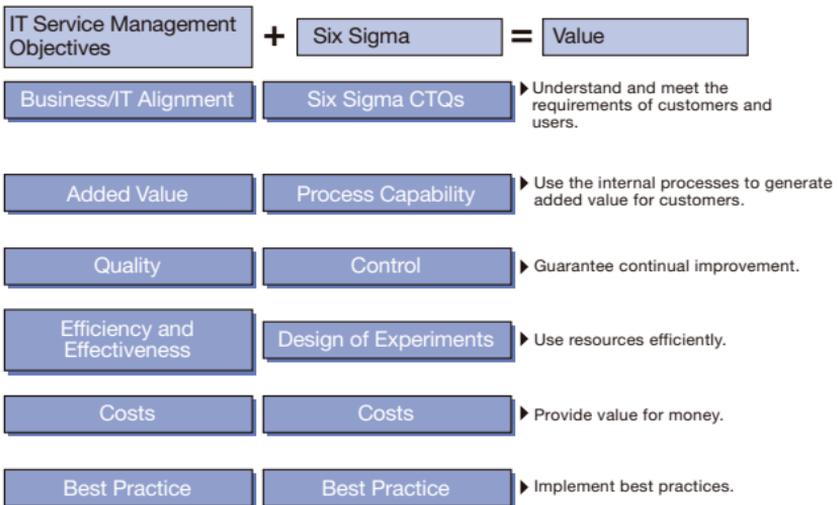


Figure 1.3 The sum of IT Service Management and Six Sigma

1.5 Summary

If you don't measure it, you can't control it.

If you don't control it, you can't improve it.

If you don't improve it, your company will not survive.

TQM is not simply a means of conforming to specifications and requirements, it is a means of meeting and even exceeding needs and expectations of customers through customer focus, continual improvement and employee empowerment. Management of processes through organizational alignment and replication evolves TQM into Service Management.

Six Sigma is a very specific form of Total Quality Management, getting to the bottom line of organizational problems by metrical fact-finding and improving quality where it matters most. Its integrated, holistic and coherent approach provides the means to measure 'how' IT Service Management processes deliver against the customer expectations of their services. Six Sigma does not merely measure the outcome, but also measures the factors that go into Service Management performance: the drivers of performance. This approach empowers the process owner to control and continually improve the process. Combining Service Management and Six Sigma provides a powerful breakthrough for business and IT process management!

