Qualcon 2005

Improving the Quality of IT Service with Six Sigma

A Case Study: Major Financial Institution

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ABSTRACT

Improving the quality of IT services continues to be on the agenda for IT managers and practitioners. To help address this, organisations have turned to practices and quality methods that include IT Infrastructure Library (ITIL), and Six Sigma – combining them to measure the quality of service, and improve IT-dependant business processes by focusing on the customers. IT Infrastructure Library (ITIL) provides guidelines for IT Service Delivery and Support, but it does not tell the quality status of IT service performance or how to improve it. Six Sigma provides a quality improvement process known as DMAIC, and is often used in conjunction with ITIL to measure and improve the Quality of Service (QoS) and assure high IT service levels are delivered at low cost.

In this article, a simplified case study at a major financial institution is used to illustrate IT service performance improvement through Six Sigma. Moreover, the case study mentions a number of ITIL disciplines that the bank practices.

Internationally in the banking and finance sector organisations such as Lloyds TSB, Barclays Bank, Bank of America, American Express, Merrill Lynch, HSBC, and Capital One, among others, are reporting tangible results from their Six Sigma adoptions. Moreover, Six Sigma has gained momentum within IT departments over the last few years; articles in CIO magazines, industry analyst reports and conferences often cover IT-specific Six Sigma topics. Clearly, Six Sigma has moved far beyond the manufacturing floor where it has its roots.

1 INTRODUCTION

Six Sigma complements ITIL by providing a quality measurement system and a set of statistical techniques to measure and improve the quality of service.

Six Sigma's DMAIC model — Define, Measure, Analyse, Improve, and Control — is its quality improvement process, divided into phases for project management purposes. The DMAIC model helps improve a process by focusing on the customer's or end-user's experience, and each of the DMAIC phases has clear objectives, tasks, and proven techniques.

1.1 Six Sigma Concepts and Techniques for IT

The following concepts and techniques represent a distillation of specific Six Sigma items that are relevant to IT, along with a definition of each:

1.2 Critical to Quality (CTQ)

CTQs are measurable characteristics and requirements generally defined by the customers to ensure that improvements meet their needs, thereby ensuring client satisfaction.

1.3 Voice of the Customer (VOC)

VOC helps capture the Critical to Quality (CTQs) requirements of the clients or end-users in the form of surveys, interviews, complaint logs, focus groups etc. Perception versus actual quality of service delivered can be very different, and VOC ensures that IT service managers understand the perception of the

customers and end-users of the service delivered, enabling comparisons to the levels of service that are believed to have been actually delivered.

1.4 Pareto Charts

The Pareto chart prioritizes improvement initiatives where the return is the greatest to the business. This is based on the famous “80/20 rule” first coined by Pareto, the Italian economist: understanding that 20% of the causes create 80% of the problems. In IT terms, this helps identify key components of the IT infrastructure that are causing the majority of the problems (see figure 1.0).

1.5 Failure Modes and Effects Analysis (FMEA)

FMEA helps mitigate risks by identifying potential failures and effects of the failures on a process, and prioritizing the problems using a risk rating system. The rating system consists of three components, using a score of one to ten for severity, probability, and detectability of failure, to find the total Risk Priority Number (RPN) for the potential problem. The RPN is found by multiplying the three numbers together (see figure 1.1). This technique can easily be applied for risk management and compliance projects, to help identify and mitigate the risks of non-compliance. Specifically, the RPN helps understand the current IT operational risks and alleviate those that underpin critical ‘business’ services. As a result of applying the FMEA, this lowers the risk of exposure to failures and disastrous consequences.

1.6 Control charts

Control charts ensure that a process or service performance is within an acceptable range, bound by an upper and lower limit. Should performance criteria act abnormally (for example, if a trend-line deviates from the mean — known as centerline — or if it crosses over specified limits), the user can take immediate corrective action.

1.7 Process sigma value

The sigma value is a metric that corresponds to the process or service performance. The objective is to achieve six sigma, which corresponds to 3.4 defects per million successful outputs — known as defects per million opportunities (DPMO). This value represents a key measure of IT service availability and performance.

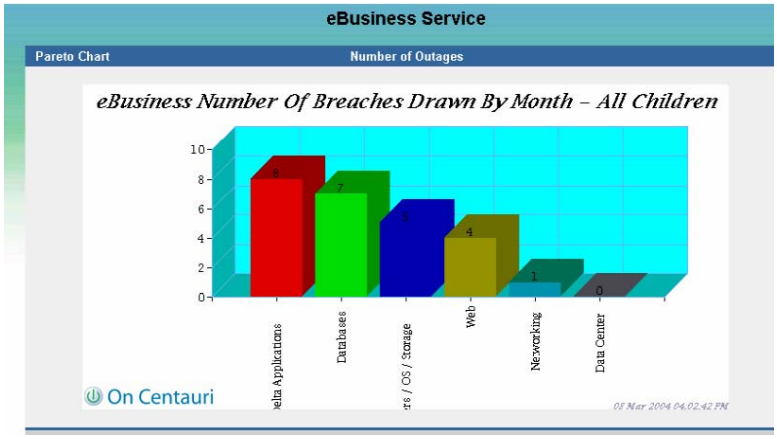

Figure 1 - A real-time Pareto chart showing the main components causing the majority of the problems in eBusiness Service.

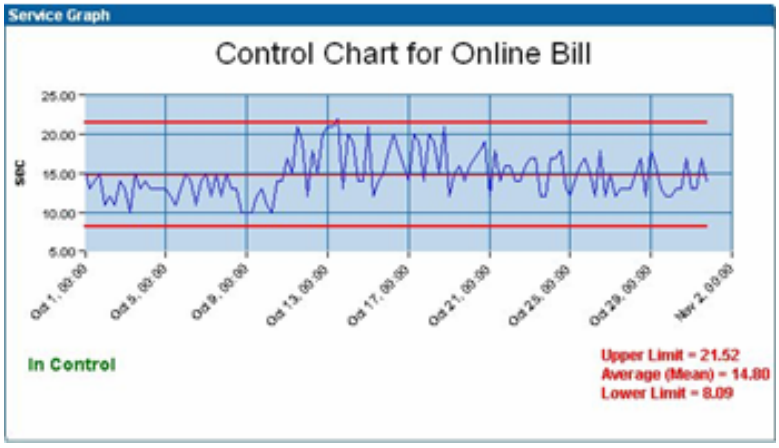

Figure 2 - Example of a Web-based Control chart for an online billing service performance.

Figure 3 - Example of a Web-based FMEA for an e-mail service.

2 CASE STUDY

This case study is based on a large financial institution, where the DMAIC model was used to improve service quality. To simplify, the study focuses on one business service — its online banking, and more specifically, the bank's e-credit card payment system. The case study also reflects the following ITIL disciplines: Availability, Capacity, Incident and Problem management.

2.1 Define

The key objectives in the Define phase are to identify the problem, client requirements, process, and measurable objectives (end results). The tasks include brainstorming to ensure that everyone involved understands the problem, impact, and end goal.

Problem: Availability of the bank's online credit-card system. The bank's customers were unable to make credit-card payments over the Internet.

In order to define the problem, there were a number of different analyses undertaken. Incident and problem records were examined to determine which problems were causing the highest business impact at the bank. The Service Level Manager was consulted and Service Level Reports inspected to verify this target and assess the impact on the customer.

Impact on the organisation:

- Customer dissatisfaction: complaints flooding the call center
- Cost of problem investigation: $170 per complaint
- Revenue lost and late payment interest fees waived

Process identified: e-credit card payment

Objective: Reduce complaints associated with e-credit card process by 40%.

2.2 Measure

The Measure phase is where information is collected on current process performance. Tasks include identifying and base-lining the CTQ measures.

Metrics collected:

- The e-credit card payment problems accounted for 13% of all customer complaints
- The number of incidents recorded against the eCredit card application in the period
- An average of 200 investigations per week

Cost of complaints (aka Cost of Poor Quality):

- Estimated at $34,000 per week

Techniques used:

- Pareto chart – identified that the areas needing investigation are the mainframe and the Internet banking application

2.3 Analyse

In the Analyse phase, the root cause of the problems is identified using the data collected in the previous phase. To analyse the problem, the error control process is undertaken to identify the error, assess the impact and cost of error, and provide the necessary information to design a solution. The overall goal is to identify the root cause of the errors and provide justification for fixing them. The intended outcome is to reduce incident volume as the most common problems are solved.

Techniques used:

- Failure Mode and Effects Analysis (FMEA): showed a high-risk priority number (RPN) in the e-credit card business process
- Control charts: application timed-out during peak hours
- Pareto chart: showed high volume, particularly on Friday
- Correlation diagram showed the higher the number of complaints (calls), the higher the cost (and the higher the impact on the business)

2.4 Improve

The Improve phase involves instigating a Service Improvement Programme (SIP) which involves determining the areas of improvement, tracking the improvement over time, and then performing a Post Audit to confirm the results. During this phase, action items are developed, solutions are assessed and the best solution(s) are recommended and implemented.

Recommended solutions:

- Increase CPU capacity in the mainframe CICS region
- Upgrade load balancing device
- Implement adequate monitoring and reporting tools

Results (measured over four weeks):

- Reduced complaints related to e-credit card process by 50%
- Cost-avoidance in investigation equates to $887,000 per year for e-credit card area only

2.5 Control

To control the improvement of the process, steps are taken to ensure the DMAIC cycle is a continuous closed-loop system. This ensures the stability and predictability of the newly improved process.

New control systems:

- Voice of the Customer (VOC): measure client and internal call centre staff for “real world” feedback every month
- Deploy a real-time business service dashboard for Web performance and related key performance metrics
- Implement a CICS capacity control chart with automated alert notification, also as part of capacity management

3 SUMMARY

The bank improved client satisfaction, as measured through positive feedback in the next VOC survey, and reduced client complaints from 13% to 6.5% (total 50%). Moreover, by decreasing the number of investigations related to e-credit card, the costs avoided was estimated at $887,000 per year. From an IT perspective, communication between IT and the client service call centre improved by sharing real-time business service dashboards.

Improving the quality of IT services will continue to be on the agenda for many IT managers and practitioners. Six Sigma is rapidly gaining momentum within the IT service community and many tools are available to automate Six Sigma techniques and ITIL disciplines. Furthermore, organisations looking into risk management and compliance could turn to Six Sigma’s FMEA to help identify and mitigate IT operational risks that impact the business.

Lastly, Six Sigma can be complementary or independent of ITIL— ITIL provides a set of guidelines to manage and improve every facet of the IT organisation, while Six Sigma provides the techniques to measure and improve IT service quality. Leveraging both in combination provides the most comprehensive quality and service management solution, but they clearly do not need to be implemented in tandem.