Database Update Automation for a Service Company Applying DMAIC

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Abstract – *Working in a service oriented engineering organization, delivery, quality and cost reduction, are very important for a competitive and successful environment, managing data and present reports to their clients needs to be precise, accurate, and aware of the importance of the delivery date. Because of these reasons manual data management must be reduced using software programming to manage the data. The objective of this project was to reduce the manual data management from 100% to 75%. DMAIC methodology was used to identify possible causes and areas of improvement in the process. The major causes for complaints are the late delivery, missing information, and wrong data used. The standard works and workflow were updated during the Control phase of the DMAIC and a checklist was created to verify the data accuracy. The manual process was automated to a 95% and the lead time reduced in 80%.*

Key Terms – *Customer Satisfaction, Database Automation, DMAIC, Process Improvement.*

PROBLEM STATEMENT

Service companies are trying to manage their expenses and increase the profits and become more competitive in the market. It is important to implement effective cost reduction initiatives to cut expenses and succeed as a service company. Companies who manage data and present reports to their clients needs to be precise, accurate, and aware of the importance of the delivery date. Because of these reasons manual data management must be reduced using software programming to manage the data.

In service companies it is important to deliver a product with the quality expected by the clients and achieve every due date and requirement established.

It is important to show the clients the company care about the product by doing efforts to improve the cost, quality, reliability and delivery of the product.

RESEARCH DESCRIPTION

Service companies are contracted primarily to perform a job and open space in the contracting company to move their efforts focused on new and more important tasks. This design project is focused on cost reduction, productivity improvement, quality improvements and time management.

The reports creation consists on: extract the data reports from different customer databases, compilation of the different reports downloaded, data formatting, verify the data for compliance and upload the new data to the database. To create the final product uploaded to the database a lot of manual data management is performed giving opportunities for errors and waste time in rework or negative feedback from the clients.

RESEARCH OBJECTIVES

The main objective of this design project is the cost reduction of the time performing manual data management to update the database. Also the quality of the report will be improved for data accuracy eliminating complaints from the customer and rework. The following objectives are established:

- Completion time reduction of 75%
- Manual data management reduction of 100%
- No reworks
- No complaints from the clients

RESEARCH CONTRIBUTIONS

By completing this design project it will achieve a company initiative for cost reduction. The automation of this task will give a more reliable update procedure to the client database with reducing any complaint from accuracy. Because it is going to be more reliable the amount of rework will be reduced to zero. The time reduction will be reflected in money and the tool can be offered to other modules from the company that needs the same kind of database update. By reducing the human factor performing this task the quality, cost, reliability, and delivery will improve the productivity.

LITERATURE REVIEW

According to Alan Greenspan (1999) *"The new innovations have started to change the way we do business and give value to the work performed, sometime in an unpredictable way since five years ago"* when he was talking about the impact of the information technology revolution around the world. In 1995, Fortune Magazine published an article about how much money have been spend in technology by some business. It was established that in the past 30 year North American companies has spend around $1 trillion dollar in technology. Company spends include computers, computer software, communications, and consultants. It's also established that productivity improvement were slow during the first years but with an increase from 1% to 4% annually. The increase in productivity is not going to stop because companies are looking to reduce costs [1].

For service companies, one of the most important things is to have a satisfied client by delivering a competitive product. Since the product is a service, the human contact is much more important during the delivery of the same. The services have an immediate impact to the clients and a positive experience can maintain customers with the intentions of returning in search of that product [2]. Previous studies show that there is a strong relation between productivity and the quality of a product. These studies sustain the assertions made by quality experts, such as Deming, that an improvement in the quality of a product is an improvement on its production process [3].

A process improvement is initiated after and assessment is made, in this case after complaints received from the clients. It is important to select a correct method because it can have consequences for the success or failure of the process improvement efforts. Some improvement initiatives are based on a problem-solving approach that starts with an analysis of the current stat, continues with planning, the execution of a plan, and evaluation of the obtained results.

An organization always needs to improve and it's good to do it in a systematic way. A structured approach is necessary because they streamline efforts, enable effective planning, and logically order the steps to be performed, guide the organization from the initial state to completion, and measure actual performance improvements. There is more than one approach to process improvement. Some are generic and others are more specific but all are based on problem solving concepts [4]. All the problem-solving processes include the following:

- Identification of goals,
- Analysis of the present situation,
- Development of an approach,
- Construction of a plan,
- Execution of the plan,
- Measurement the results.

A DMAIC approach will be followed to complete the improvement. It was selected because conducted wisely it can go in the directions of what is needed. With the DMAIC we can directly attacks the cost of poor quality (COPQ). Within DMAIC, the interpretation for COPQ has a less rigid interpretation and perhaps a broader scope. Quality cost issues can dramatically affect a business, but very important issues are often hidden from view. Wisely applied Six Sigma and DMAIC techniques can help flatten many overall issues that affect cost [5].

METHODOLOGY

This methodology will follow the DMAIC tools for process improvement. A Kaizen will be implemented as part of the Six Sigma tools that will be used to follow a systematic approach to solve the problem and continuous improvement to the process. The Six Sigma tools to be used during the Kaizen are:

- **Define** - allows the team and its sponsor to reach an agreement of the scope, its goals, the financial and the performance targets of the projects. Tools to be used during this phase are:
  - o **SIPOC** – It is an acronym that stands for **S**uppliers, **I**nputs, **P**rocess, **O**utput and **C**ustomers. It is a diagram use by the team working to identify relevant elements of a process improvement project before the work begins. It will be used as part of the Measure phase of the DMAIC.
  - o **Project Charter -** This is a document that names de project, summarizes the project by explaining the business case in a brief statement, and also lists the project's scope and goals.
- **Measure** – The goal of this phase is to get as much information as possible on the current process so as to fully understand both how it works and how well it works.
  - o **Value Stream Map (VSM)** – is a technique used to analyze and design the flow of materials and information required to bring a product or service to a costumer.
  - o **Process Map** – It is a workflow diagram to understand the process or a series of parallel processes.
  - o **Pareto Chart** - It is a graphical technique used to quantify problems. The Pareto principle consist of eighty percent of the trouble comes from twenty percent of the problems.
- **Analyze** – during this phase the potential root causes for the problem are identified and then confirmed with data.

- o **Cause and effect diagram** – Known as fishbone diagram. It can be used to find the root cause of a problem by mentioning possible causes.
- **Improve -** the goal of the improve phase is to identify a solution to the problem that the project address.
  - o **Implementation Plan** - Solution implementation plan established, including schedule/work breakdown structure, resources, risk management plan, cost/budget, and control plan.
- **Control** - phase is to ensure that the gains obtained during Improve are maintained long after the project has ended.
  - o **Documents Standardization:** It is necessary to standardize and document procedures. Also make sure that all employees are trained and communicate the project's results.
  - o **Monitoring Plan:** It is to create a plan for ongoing monitoring the process and for reacting of any problem that arises.

Project Schedule

This is a suggested project plan with the milestones to complete each activity: (see Table 1)

Table 1
Project Plan

Task	Duration	Start	Finish
Define Phase	7 days	7/18/11	7/24/11
Measure Phase	7 days	7/25/11	7/31/11
Analyze Phase	10 days	8/1/11	8/10/11
Improve Phase	30 days	8/11/11	9/11/11
Control Phase	20 days	9/12/11	10/1/11
Final Project Presentation	7 days	10/2/11	10/8/11
Report Completion	7 days	10/9/11	10/15/11

RESULTS AND DISCUSSIONS

Using the DMAIC methodology we were able to define a problem by implementing solutions that were linked to specific causes and establishing the best solutions to ensure that the problems were corrected.

Define

During the Define phase different tools were used to understand the problem and causes to attack. A project charter was created to define the project statement, objective, impact in business, scope, and the schedule to complete the project. (Figure 1)

Project Charter - Quality Notifications Database Update	
Event Type:	DMAIC
Event Location:	PUERTO RICO
Event Start Date:	7/18/2011
Problem Statement	From April 2010 to June 2010 several complaints were received from the customer about the delivery 33% of the time and quality of the task delivered.
Objective Statement:	Reduce process time in a 75% and increase quality of the delivery
Business Impact:	Achieve 100% on time delivery and increase customer satisfaction.
Scope and Boundaries:	Manual database updates
Team Members:	F. Cortes, L. Fuentes, R. Reyes
Executive Sponsor(s):	Manufacturing Department
Pre-Work Plant / Activities	Define (1 week), Measure (1 week), Analize (1 week), Improve (1 month), Control (4 weeks)
Benefits / Measure of Success:	Customer Satisfaction, Excellent Feedback

Figure 1
Project Charter

A SIPOC was made to identify the different inputs ant outputs of the Database Update process. Understanding who are the suppliers for each data input needed, every output and who are the customer help us to identify and list critical information for the process. (Figure 2)

Suppliers	Inputs	Process	Outputs	Customer
Manufacturing Engineering Department	SAP / Manufacturing Engineering System		New & Closed Quality Notifications	Operations / Manufacturing Engineering / Quality Department
Manufacturing Engineering Department	SAP / Manufacturing Engineering System		Pending Tasks	Operations / Manufacturing Engineering / Quality Department
Manufacturing Engineering Department	SAP / Manufacturing Engineering System	Database Update	Scrap, Rework, and Repair Manufacturing Impact Report	Operations / Manufacturing Engineering / Quality Department
Manufacturing Engineering Department	SAP / Manufacturing Engineering System		Priority List	Operations / Manufacturing Engineering
Manufacturing Engineering Department	SAP / Manufacturing Engineering System		Database Backup	Operations / Manufacturing Engineering

Figure 2
Database Update Process SIPOC

Also a Value Stream Map was made during this define stage to map the process. Using the VSM the steps and their times were identified with the help of the persons who execute the process and are directly involved in the daily performance of the task. (Please see Figure 3)
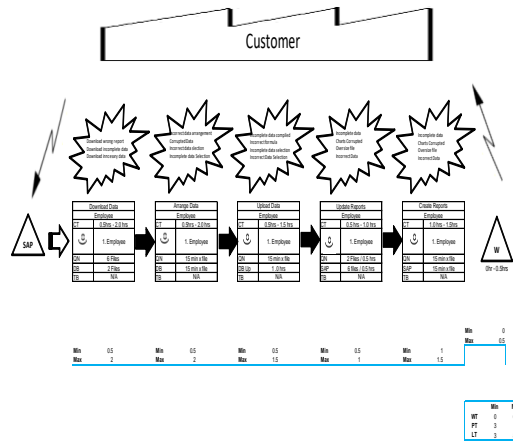

Figure 3
Database Update Process Actual VSM
Measure

During the measure phase a data collection plan was performed to collect feedback data from the customers who are using the output generated by the process.

Data was collected for 90 days and a Pareto chart including all the feedbacks from the customers was made in order to identify the most common complains. Looking into the Pareto Chart the three major offenders are Later Delivery, Missing Information, and Wrong Data Imported for the 80% of the problems. Also the data obtained from the VSM was used to identify the areas that are non-value added during the process but all the steps identified by the employees are required to complete the update and different reports delivered. (See Figure 4)

This phase help us to identify what we are going to specifically attack to resolve the majority of the complaints by the customers aiming to the major offenders.

Analyze

During this phase we are going to analyze the data collected during the measure phase in order to identify the possible root causes that affecting and impacting the database update process.
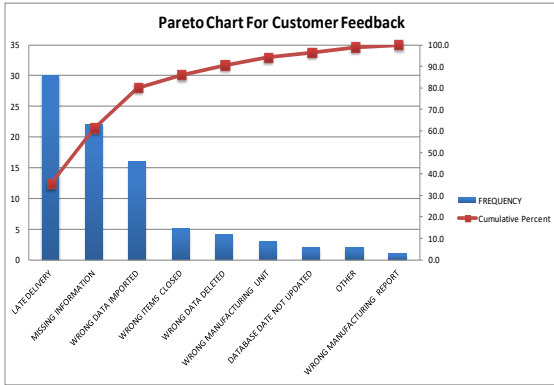
Figure 4
Customer Feedback Pareto Chart

Analyzing the data from the first two phases and the cause and effect diagram we can identify that download the data manually, arrange the data, and update the database is taking 5.5 hours without the creation of the reports. Also the amount of time used to update the database if the wrong data is imported or imported with incomplete information is causing the 80% of the feedbacks encountered by the customers. (See Figure 5)

The major offender for this process is the Late Delivery. This happens because of the big amount of time used to download the reports and manually arrange the data. Sometimes it is notice by the employee that the data is incomplete and the process must be repeated increasing the database update time. These steps to update the database are value added and for that reason the automation of these steps will have a big impact on the process.

This phase helps to identify the critical factors and the root causes of defects for the improvement.
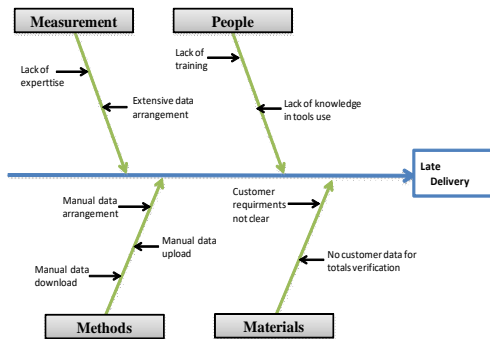

Figure 5
Database Update Process Cause and Effect Diagram

Improve

Identifying the major offenders in this phase we are going to develop, select, and implement the best solutions defining a problem through implementing solutions linked to causes and establishes the best practices to make sure the solutions stay in place.

The best way to eliminate the problems of import wrong data and have missing information is to automate the process. Automating the reports by using the less manual process possible the human errors will be eliminated and the process will have less impact. By creating a template in Microsoft Excel® and Microsoft Access® with the requirements from the customer to complete the update it can be connected to the supplier database to download the correct data needed. Obtaining the correct data it can be used in a Microsoft Excel® sheet programmed to use the downloaded data and arrange it to the format required to be inserted into the database. Also the database programmed in Microsoft Access® can have a feature to create the desired reports by each customer at every moment needed.

Control

With the implementation of a new and improved process a standard operating procedure was created to explain to the employees how to use the tools developed for the process. As part of the new process created a new value stream map was created to establish the process and the new times for it. Measuring the new process with the VSM we can see a reduction of time from 8 hours to 2.5 hour of the entire process. (See Figure 6)

Also a report with the expected results from the customer will be downloaded to compare it to the update data and ensure that data uploaded to the database is correct.

No feedbacks were received from the customers during the first 30 days of testing. The only feedback received was from the employees because of programming failures. The problems related to the programming were resolved in the moment that they appeared.
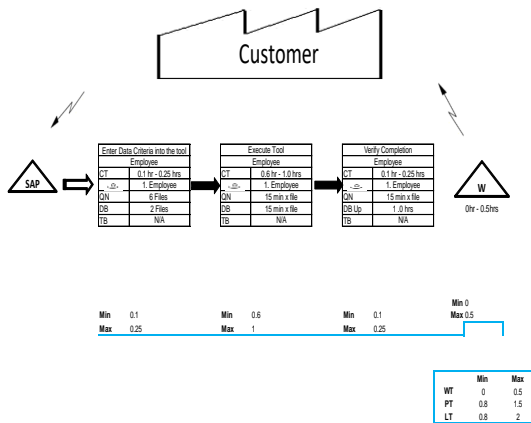
Figure 6
Database Update Future State VSM

CONCLUSION

Using the Six Sigma tools applying the DMAIC methodology we improved our process and achieved our objective of time reduction that will be reflected in money and improvement in the quality of the results from our process resulting in customer satisfaction. By automating our database update process from a 100% manual process to a 95% automated process the time was reduced from 8 hours 3 times a week to 2.5 hours. This reduction in time results in a saving of $72,600 per year to our customer. The quality was improved by reducing the variability in the reports resulting in basically no errors during the update or report creations.

The DMAIC methodology was helpful to guide us from defining a problem to through implementing the solutions determined linked to specific causes and establish the best solutions to improve the process. Tools like the Project Charter, SIPOC, Pareto Charts, Fish Bone, and Value Stream Map were used to identify the root cause and implement the corrective actions to robust the process. During the control phase some programming problems were found but corrected at the moment and also the reports are on a continuous improvement every time a requirement is change by the customer. As part of the control plan new standard work was created for the employees training in the use of the database update tool and report creation along with a new report, which verifies the Quality Notifications COPQ reports with the customer results to ensure that the database was updated correctly.

The automation of the database update resulted in the addition of new reports to the tool that can be created easily with the same data and with the time reduction there is time to create those report and focus on the analysis of them to the customer. This automation reduced the human errors to cero and basically eliminates the rework of the update and reports and reduces the COPQ of the process. As part of the results obtained and company initiative to reduce costs and increase quality the automation will be implemented in other company processes as well.

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