Process Improvement for Client Status Report

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Abstract – *During last year, customer service quality has been negatively affected, increasing document re-work and operational cost in the company. In order to improve the documentation development process the company plans to implement a measure that shows how much time they are saving their customers by delivering zero-defect status report to the approval process. To reach this goal, the DMAIC methodology was used to obtain a better understanding of the process and the areas that require an opportunity for improvement. Once the DMAIC structure was followed the total time to complete a status report process reduced from 86 minutes to an average of approximately 35 minutes. By reducing the amount of time in the status reports, employees could respond faster and obtain a much better quality and customer satisfaction.*

Key Terms — *Defects, DMAIC, Quality, Status Reports.*

PROJECT STATEMENT

An engineering services company wants to improve their clients' status report process. The status report is a briefing that the contractor has to present to the client each Monday with the actions performed last week with specific dates of when the action was completed, actions planned for the next week with specific due dates for each of the planned actions, and a table that compares the amount of hours consumed versus the amount of work left to complete. Currently this part of the process is taking an excessive amount of hours to complete and also high numbers of defects have been found in the reports which require rework to correct. Example of the most common defects are missing information, incomplete description of action completed, or the information is not clear enough to the project manager.

Research Description

This project is going to focus on the development of a new process for the creation of weekly status reports. This process shall be standardized to obtain better consistency on the final product from each employee and reduce defects. The new process shall also focus on reducing unnecessary steps and using new software that will help reduce waste of time in the process.

Research Objectives

The expected objectives of this research to be accomplished are:

- Reduce total time of status report process up to a 40%;
- Reduce defects found on the reports to zero.

Research Contributions

With the implementations on the status report will lead to better tracking of schedule and budget resulting in improved quality for the customer. Reducing the total time of the process will cause a reduction in labor charging and the total cost of the project. A 40% reduction of the time spent on status reports will represent an approximate cost reduction of $2,350 per task. These values will be revised upon completion of the project work. In addition standardizing the process will improve consistency of final results and provide mistake proofing.

LITERATURE REVIEW

To ensure the best possible customer satisfaction and quality of the product, companies constantly apply Lean principles to all the processes during the development of engineering or manufacturing projects. By applying Lean principles companies can reduce waste and defects to reduce the total time of a process and in result reduce cost, improve quality and customer
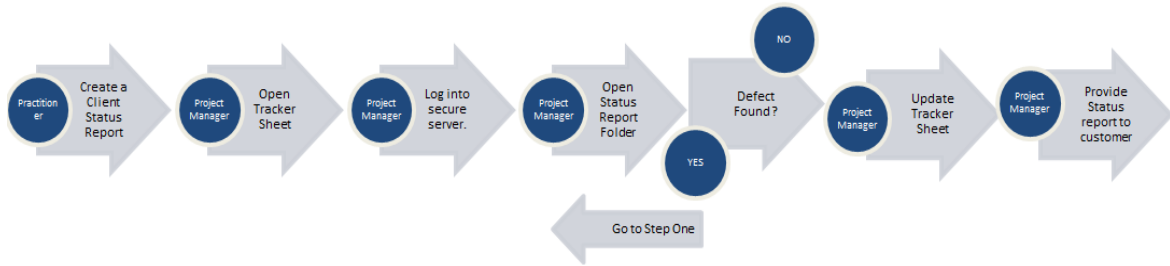
Figure 1
Client Status Report Current Process

satisfaction. Company MJS will perform a DMAIC in order to improve the weekly status report process which has been identify as a top offender process during many of the projects that have been delivered during the year 2015.

The current process is performed in collaboration between the practitioner and the project manager. The practitioner starts by creating a one slide presentation which has the actions performed during the week with completion date, the actions planned for next week with due dates, possible factors that might affect the schedule if applicable, expected date of final delivery, and a comparison between budget used and remaining budget versus the amount of workload still left to complete. These are the minimum requirements demanded by the client to be presented each Monday. The next step in the process requires the project manager to open the tracker sheet which is an excel spreadsheet with all running tasks used for own reference, then reviews the status presentation created by the practitioner and ensures all required information is accurate and complete. If a defect is found the project manager has to inform the practitioner and the process goes back to the first step. If no defect is found the project manager updates the tracker sheet and present the status to the client during the status meeting on Monday.

The methodology of Lean Six Sigma will be selected to comply with the proposed objectives. Lean Six Sigma is a tool used to improve processes by increasing in performance and decreasing its variation. [1] This increase in performance and decrease in process variation will lead to defect reduction and improvement in profits, quality of

product or service, as well as to business excellence. [1] Under the Lean Six Sigma tool exists a five stage process called DMAIC. These five stages are divided into the following: Define Measure, Analyze, Improve and Control. In the first step, the problem is defined along with the customer requirements. The second step, measures the defects and process operation. In the third step the whole data is analyzed to discover the causes for the problem. While in the fourth step, the process is improved to remove causes of mayor defects. As for the last step of DMAIC, it controls the process to make sure defects don't recur or be minimize significantly. Known the previous information, several approaches will be used for the process improvement of the weekly status reports looking for reduction in time management and customer satisfaction. For which the purpose of performing a DMAIC event is to promote continuous improvement for a process.

METHODOLOGY

This project will apply the DMAIC Six Sigma strategy in order to accomplish the defined objectives to improve the weekly status creation process. The DMAIC procedure consist in five key steps, each of these steps implement different strategies focused on reducing waste, increasing efficiency, and improving quality of the process. These five steps are:

- **Define Phase:** The first step consist in developing goals, plans, and milestones. These will be created based on lessons learned from previous projects which also help to determine

possible areas for improvement and those that will be benefited.

- **Measure Phase:** The goal of this step is to collect as much information as possible about the gap between the current performance and the required one. This data will be taken during multiple periods while practitioners and project managers are executing the current process. The data is then visually presented using graphs, charts, flowcharts, and SIPOC diagram.

- **Analyze Phase:** During this step, the data obtained from the previous step is evaluated in order to identify the root cause to be eliminated. The top offenders of the current process are identified using different strategies like value stream mapping or cause and effect diagram.

- **Improvement Phase:** This step consists in establishing possible solutions to the problem. These options are compared and the most suitable one is selected based on the analysis results, then tested, and finally implemented.

- **Control Phase:** The main purpose of this step is to sustain the improvements by monitoring the new process to ensure previous problems have been eliminated. A control plan such as periodic audits is also put in place to guarantee continuous improvement is maintained.

RESULTS AND DISCUSSION

This section presents the findings of this research work by using the DMAIC tool.

Define Phase

The status report process is a significant part of tasks progression and the customer has direct visibility of it since it is presented to them on a weekly basis. This process consistently causes delays and is also the step where most of the defects are found during the course of design projects. The results of this waste are an increased cost of the overall design process and customer satisfaction decreases. The current process consists

of multiple steps, it is not standardized, and it does not contain safeguards to avoid the most common defects. In some cases the practitioners fail to complete the weekly report on time or the report is complete but with missing or unclear information. If the defects are found by the project manager this means that re-work by the practitioner is required, if the defect is not identified the client receives an incomplete or inaccurate report.

The goal of this project is to investigate the possibility of reducing the time to complete the weekly status report process by 40% after project completion. The project scope includes the evaluation of the current steps in order to eliminate the unnecessary ones and combining the necessary ones to create a leaner and faster process. It will also focus on creating safeguards that will avoid the most common defects like missing information or preventing the practitioner from missing the due date of completion.

The team that will participate in the execution of this project consist of one supervisor, one project manager, four designers, and the assistance of a quality representative. The role of the team is to recollect data of the current process focusing on overall time of each step and held recurring meetings to analyze the data and brain storm possible solutions. These activities will be completed as part of a DMAIC measure phase.

Measure Phase

In order to understand the client's needs, a voice of customer (VOC) table was created. The VOC table is generally conducted at the start of any product, or process in order to have a better understanding of what the client's wants and needs to obtain a more detailed product and its specifications. [2] As defined in the VOC table, the customer needs a weekly status report for each project or task within a project. The most important drivers within the process of the status report are accuracy, timeliness, and clarity. In which a critical to quality (CTQ) was define for each. CTQs are the main key measurable characteristics of a product or process whose performance standards and

specifications limits must be met in order to satisfy the customer. [3]

If CTQs are not established, quality can be impacted very significantly. From an organizational perspective, it could mean extra costs; rework, low productivity and wrong decisions can be taken because of outdated data. Project managers need to assure that data associated with their designs is both accurate and complete. This will not eliminate the need to evaluate the metrics during the measure process, but it will help understand the overall project as an indicator of the customer needs.
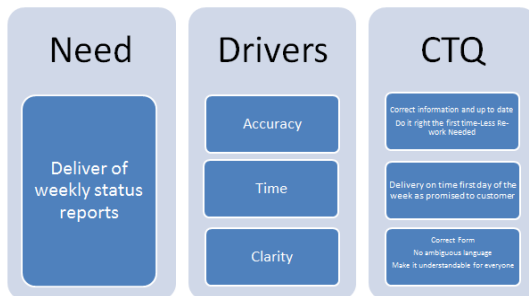
Voice of Customer
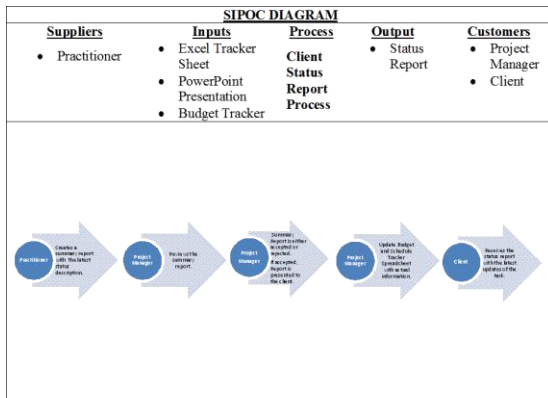

Figure 2
Voice of Customer Table

Figure 3
SIPOC Diagram

The SIPOC chart in Figure 3 provides an overview of the process. It helps identify all key elements such as relevant steps, inputs, outputs, and ultimately who will receive the final product. In addition to the SIPOC chart, data will be collected of the current process in order to identify which areas require more improvement. This data will also be used as a baseline and will later be

compared with performance of new process to determine if the improvement goal was reached.

The duration time of the different steps will be gathered by the member responsible of completing each step of the process. A group of four practitioners will be selected to measure the time of creation of the weekly progress status report. While the Project Manager will measure the time it takes to review the status report, update tracker sheet, and present the updated status to the client. If the status report is rejected due to incomplete or unclear information the Project Manager returns the report to the practitioner, this rework time will add time to the overall process and will also be measured. This information will show in which steps are the biggest opportunities for improvement. In addition of documenting the total time of the process, every time that rework is required due to incomplete or unclear information a defect will be documented by the Project Manager. This defect will include a detailed description and how many occurrences have been documented of that defect. This will be useful to analyze and create safeguards to make sure defects are not repeated.
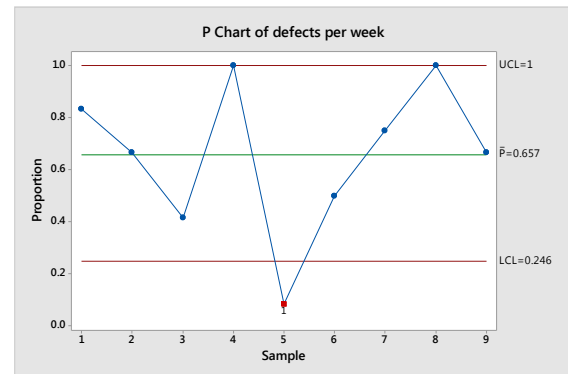

Figure 4
P-chart Diagram

The attribute p-chart above was plotted using the defects found per task data collected during a period of 9 weeks. A sample of 12 tasks was selected and monitored each week. This chart represents the percentage of tasks per week that failed the Project Manager inspection and therefore defects were documented. During weeks 4 and 8, defects were found for all 12 tasks being audited. On average 66% of the tasks had defects requiring

rework each week. This plot represents a process that is out of control and it is not consistent.

The data collected of total time of the process was plotted using an X-bar and Range chart. It was divided by weeks, each week a total of 12 tasks were audited. The X-bar chart plots the process time mean during each week and the mean for the total period of 9 weeks. Based on the X-bar plot, the status report process took on average 83 minutes during the whole 9 weeks period. During week 5 it took an average of 115 minutes to complete each status report, this was the highest time average during this period followed by week 8 when it took 96 minutes per task. In 3 occasions the average time plot was outside of the control limits calculated, this further proofs that this process is not in control. The R chart represents the time variance of the time data collected, specifically comparing the quickest delivery against the slowest for each week. The range helps to understand how far apart the best case and the worst case are. The highest time range was collected during week 2 with a value of 91 minutes while the lowest range measured was during week 7 with a value of 34 minutes. The average range of the entire 9 week period was 64 minutes. A difference of approximately one hour means that the current process is inconsistent.
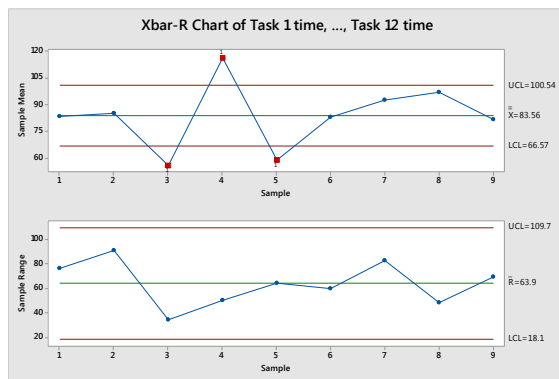

Figure 5
R-chart Diagram

During the measure phase the relevant data was collected and then analyzed using different resources that help visualize the data. The VOC helped to identify which aspects of the process are key to improve customer satisfaction, while the SIPOC diagram is used to visualize the whole process specifically relevant steps which can be useful to achieve a leaner process. Finally attributes charts such as the p-chart and control charts like the X-bar and R charts help to visualize the data and establish that the control is not in control. These plots can also be used as a baseline and compared with the outcome data after improvements have been implemented in order to measure achievements.

Analyze Phase

After measuring the baseline data for the status report creation process for a period of 9 weeks, the goal in the analyze phase is to identify the possible root causes of the defective status reports as well as excessive time waste and categorize the most critical errors found in the status report generation process. As presented on the measure phase, 66% of the status reports had at least 1 found defect during the 9 weeks period. Comparing the p-chart with the x-bar chart it can be observed how both plots behaved similarly. Looking at the p-chart during week 5 only one task had a defect found. After comparing that data with the x-bar chart, week 5 average time of completion was the second fastest. Same co-relation can be observed during weeks 4 and 8 when all of the tasks had at least one defect, looking at the x-bar chart, those two weeks had the highest times of completion. This is due to the fact that more defects found means that re-work is required and repeat steps result in more time waste.

In order to analyze the defect data, all identified defects were organized in sub-groups and then plotted using a Pareto chart. The Pareto chart can be used as a guide to identify major problems in the process. In the Pareto chart below it can be observed that the top offender was missing date with a frequency of 28 documented occurrences representing a 39% of all the total defects. Even though all defects lead to re-work which is the main cause of wasted time, this chart helps to identify in which areas to emphasize during the improvement

phase. By creating safeguards to avoid the top offenders the time waste should be reduced considerably, however eliminating all defects should still be a priority.

Before finding a suitable solution for these errors, a root cause analysis has to be performed in order to identify their origins. The current status report creation process was analyzed to find the potential root causes. To summarize those findings, a cause-and-effect or fishbone diagram was used.
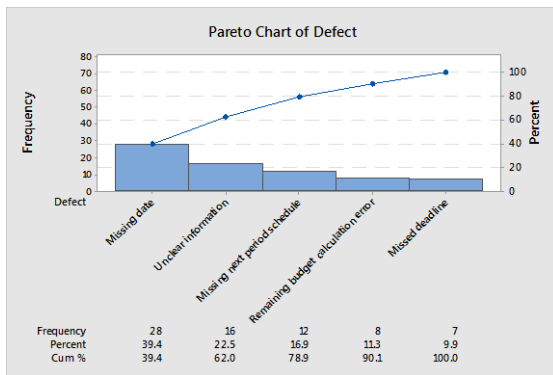
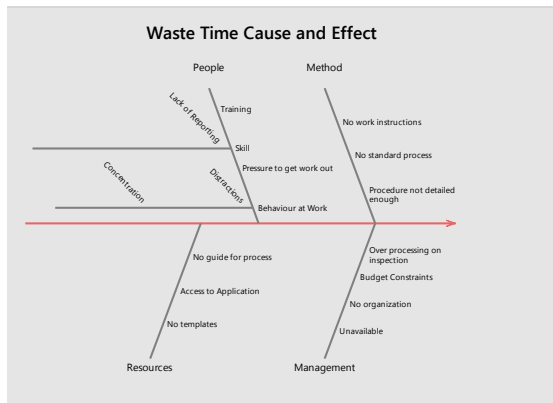

Figure 6
Pareto Chart of the Defects

Figure 7
Fishbone Diagram

The fishbone diagram detects many likely causes for an effect or problem. After some brainstorming the main categories for the waste time where Method, People, Management, and Resources. For each category mention, a why question should be answer. The causes can be written in several places if they relate to several categories. For example, the category of People has four causes; skills, behavior, training and

pressure. For which, the cause and effect diagram help to identify the major causes and point out to the potential remedial actions for further exploration and analysis.

Improve Phase

The objective in the improvement phase is to bring together proposed solutions and implement them to solve each problem. Priority will be given to the areas of opportunity with highest impact in the status report creation process. In order to identify all possible solutions a Kaizen event was held and the participation of all team members was required. During the brainstorming session a total of 8 possible solutions were identified. Every solution was then assigned a score based on how well it satisfies each category of the selected criteria. The criteria was made of 5 categories: resources required to implement, level of complexity, time it would take to implement, cost to implement, and whether or not is a mistake proof solution. The following are the solutions selected out of the Kaizen event to correct the issues found.

Incomplete Information

Missing or incomplete information was one of the top offenders during the original process. The main reason for this defect is due to the lack of standardized templates and trainings. In order to address this issue a template was created in which the practitioner has to fill a table, each row in the table asks for the specific information required by the client. The table includes a field for activities performed and next to each activity there is a space to input date of completion. The template also has a section to input planned activities for next reporting period and due dates for those planned activities. And finally a section for the practitioner to input possible actions that may be delaying the schedule and are not in control by the practitioner, this section is optional but it creates awareness to the client if something is holding up the task on their end.

Proposed State

Figure 8
Future Process Flow Map

Missed Deadline

Although this defect was not very frequent it was very critical since it directly affects the client's satisfaction. The improvement implemented to mitigate this issue was to add a recurring notice using the e-mail schedule application. An automatic reminder pops up each Friday at 11 a.m. and generates a "to-do" task in the e-mail inbox with a red flag, this reminder stays on the inbox until the practitioner clicks on a checkbox indicating that the status report has been completed and the red flag turns green.

Inconsistent Reports

Due to the lack of standardized methods each practitioner would complete the status report using their own style and strategies. Trainings were implemented to create awareness of best practices to complete the process, focusing on clients' requirements, and how to properly create the report. These trainings would serve as a refresher for already established members or as guide for new members.

Waste Reduction

This last improvement eliminates unnecessary steps while also helping to incorporate the others improvements more efficiently. It consists in the creation of a database software tool using Microsoft Access. This tool would include a simple GUI that allows the practitioner to add a task, this opens the template mentioned in the first improvement. The practitioner fills up the information required and the database would not save the report until all required fields are complete, this would save as a safeguard. The project manager would review and approve or reject the report within the database. After the report is approved the project manager can export the status report from the data base in an excel spreadsheet format. If the practitioner has not updated the status of an on-going task by Friday afternoon the database auto generates an email and sends it to the practitioner, project manager, and supervisor as a reminder. The above Figure 8 represents the flow chart of the new and leaner process after the database and all other improvements has been implemented.

Control Phase

Control phase is the last step of the DMAIC model, the purpose of this phase is to make sure that the enhancements implemented during the improvement phase are well documented and sustained. One key aspect to achieve continuous improvement is to standardize the process. In order to achieve this, work instructions tools were created. As mentioned in the improve phase, a database was implemented to assist the practitioners and project manager in the creation of status reports. In order to help the transition to this new and improved process, a digital training was created with the intent of teaching current and future employee on how to use the database. Another important aspect of the control phase is the documentation and monitoring of the new process. This is essential in order to identify opportunities

for constant improvement, to validate the new process, and measure success. In order to achieve this, a new category was added to the defect collection tool to report defects that occur under the new process. During the first 8 weeks of the new process implementation no defects were reported. The x-bar chart below shows the data for total time of completion during the first 8 weeks of implementation. The average total time of the new process is 36 minutes this represents a time reduction of 56% surpassing the initial goal of 40%.
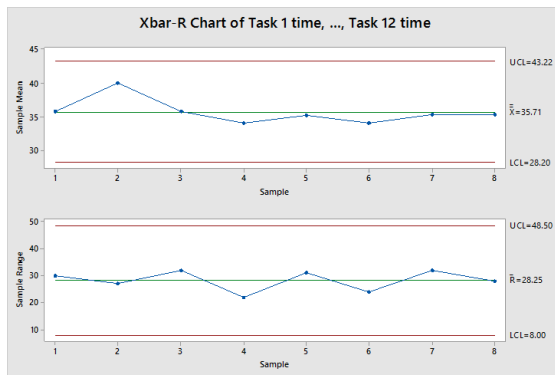

Figure 9
R-Chart Diagram with Proposed State

CONCLUSION

After applying DMAIC methodology, it was possible to create an improved process for the status report creation. The group of practitioners in combination with the project managers got involved from the beginning in order to establish realistic goals based on identified opportunities for improvement and customer needs. Based on gathered data the team was able to identify the areas that had the most impact in terms of time waste and defects. This helped to create possible solutions to each of the identified issues and the most effective ones were implemented. The creation of a database helped to implement all proposed improvements. By the end of the project both goals were met, the total defects were reduced to zero by implementing mistake proof improvements while the total time of the process was reduced by 56% exceeding the original goal by 16%. This was achieved by combining steps and

implementing improvements focused on eliminating waste. This reduction of defects and time waste represents an average saving of $3,270 per task.

Even though the improvements were successful, there are opportunities available for future improvements. By granting the customer access to the database they would be able to get the updated status as soon as is available and eliminating the need for a meeting. The meeting could be used to discuss critical or high priority tasks.

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