Engine Instrumentation Database Optimization

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Abstract

This project examines the turnaround time of a database task in a company at Puerto Rico. The main purpose of the paper is identifying the main problems in order to reduce turnaround time on the delivery of a specific task. After conducting a series of analysis to the data provided by the incorporation of Value Stream Mapping, Process Flow Maps and SIPOC diagrams, two main problems were identified. The internal process fault was related to the assignation of workload to employees while the external process fault was the time spent re-doing processes due to incorrect inputs from the clients. Using the Lean Six Sigma principles and tools, two solutions were identified and implemented in order to reduce turnaround time in the Company. For the internal process fault, an employee was assigned as a focal to assign the workload appropriately within the team. For the external process fault, a spreadsheet was created which reduced the number of incorrect data inputs being added to the company's database. To verify if the solutions worked, another set of analyses was done which demonstrated that the new procedures were effective and reduced the turnaround time.

Introduction

Pratt and Whitney Puerto Rico, located in Isabela, Puerto Rico is an Aerospace Engineering company that provides technical engineering services for the aerospace industry. After analyzing technical data and receiving input from clients, the employees noticed that the company is exceeding the amount of time expected to complete a delivery for the Engine Instrumentation Database tasks.

Objective

The main focus of this project was reducing the turn-around time within a specific task with the potential to become a productivity improvement project. The process of the studied task involves the management of a database system. Reducing the turn-around time is expected to increase productivity and customer satisfaction. The main objective of this project was to identify the problems that were causing the increase in turnaround time in order to optimize the process and thus reducing delay and wait time. This change was expected to improve customer satisfaction by reducing turnaround time on the delivery of a specific task.

Methodology

The purpose of this study was to analyze the process of entering information to a database in order to find a possible solution to the problem and prevent the company from exceeding the amount of time expected to complete a delivery. In order to find the source of the problem in the process, which was exceeding the amount of time expected to complete a delivery, the development of a methodology included the creation of a Process Flow Map (PFM) (Figure 1). After the PFM is completed, the instrumentation database service SIPOC diagram (Figure 2) will be created as well. In this case, a SIPOC analysis is to be completed for both the requester and the employees, for the same process.

The third step in this first analysis process will be creating a current Value Stream Mapping (VSM) shown in Figure 3, which allows the researcher to observe where and when the faults in a process occur. Once this process was completed, the data obtained will be analyzed, possible solutions will be determined and implemented. This will lead to the creation of a Value Stream Mapping (VSM) which will allow the further study of the problem in order to observe whether the proposed solutions were effective or not.

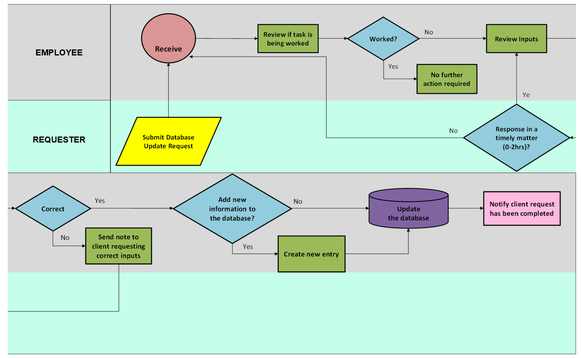

Figure 1
Process Flow Map

Suppliers	Inputs		Process
	Description	*Quantified measure*	
Requestor	Request sent via email	Instrumentation type, units, component, position, among others.	**Upload request into the Database**
Employee	Completed entries in the database admin tool.	All required fields of the database admin tool.	**Notify client that the request has been completed**
Outputs			**Customers**
Description	*Quantified measure Delivery*	*Quantified measure Quality*	
Complete entries in the Database system	All required fields of the database admin tool filled.	No typos/errors in the database admin tool.	**Employee**
Email notification	Information of where to find the requested entries in the database.	No typos/errors in email communication.	**Requestor**

Figure 2
Instrumentation Database Service SIPOC

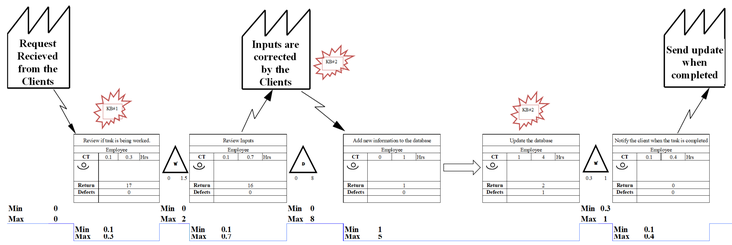

Figure 3
Current Value Stream Mapping

Results and Discussion

The results of the Value Stream Mapping (VSM), presented on Figure 3, outlined the wait times for the process. The wait time for the tasks to be completed, as presented on Table 1, included a time frame going from 0.3 hours to 10.5 hours while the process hours ranged between 1.3 hours and 6.4 hours. These values give a range from 1.6 hours to 16.9 hours per task. Based on this information, the maximum wait time is exceeding the actual process time. The VSM suggested two main faults in the process, one internal and one external fault. The internal process fault is the fact that the workload is not being assigned properly to the employees. This accounts to many tasks being stuck on queue for a substantial amount of time. The external process fault is the time wasted when the process needs to be redone due to incorrect inputs from the client. Both of these issues result in the increase of turnaround time and pinpoint the specific areas that need to be worked on in order to achieve the proposed goal of this project.

Implementation of the Solutions

The solution to the internal process fault, included the assignation of a focal employee who should control the process of assigning tasks to all the employees in the team. Two spreadsheets were created for this process, one with the necessary information for the focal employee to keep track of his tasks and duties and another spreadsheet that included the tasks that was being worked on and by who, which was shared with all team members. For the external process fault a spreadsheet was created as well. This document included a pre-filled form for the clients to fill out before sending a request to the company.

Both solutions had a two week trial period which included follow up meetings and calls to clients in order to make sure that the changes in the new format were understood and implemented appropriately. After the two-week trial period was completed, the Process Flow Map (PFM) shown on Figure 1 was re-examined to identify is any changes had to be made. The same procedure was done with the instrumentation database service SIPOC diagram shown on Figure 2. A future state Value Stream Mapping, shown on Figure 4, was developed. The wait time as, shown on Table 2, presents a reduction from 0.20 to 0.71 hours; the process time had a new time value ranging from 1.20 to 4.40 hours that states the lead-time indicated a new time frame from 1.14 to 5.11 hours per task.

Table 1
Current State Value Stream Mapping Times

Current State VSM			
VSM Times	Min	Max	Units
Waiting Time (WT)	0.3	**10.5**	hrs
Process Time (PT)	1.3	6.4	hrs
Lead Time (LT)	1.6	16.9	hrs

Table 2
Future State Value Stream Mapping Times

Future State VSM			
VSM Times	Min	Max	Units
Waiting Time (WT)	0.20	0.71	hrs
Process Time (PT)	1.20	4.40	hrs
Lead Time (LT)	1.40	5.11	hrs

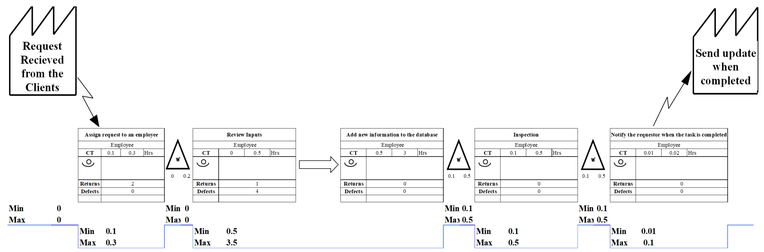

Figure 4
Future State Value Stream Mapping

Conclusion

The main objective of this project was to reduce the turnaround time of a task related to a database process. After analyzing the current state Lean Six Sigma tools incorporated in the project compared to the initial stage processes, there was a substantial decrease in the lead-time per task, specifically. This demonstrates that the implemented changes did in fact increase the level of efficiency by reducing wait time. Also, these changes did not represent an extra cost to the company, and with decreased amount of hours there is an improvement in the productivity of the employees. Therefore, it is implied that both the main objective of the project and the optimization goal were met