ASSIGNMENT 4

4

**DMAIC PLAN / STATUS**

CSE 6329 -- SOFTWARE MEASUREMENT AND QUALITY ENGINEERING

Professor Dennis J. Frailey

**Fall, 2019**

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| NAME(s) | ID Number(s) |
| **<your names go here>** | **<ID #s gohere>** |

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| **Grading Comments (student – do not write inside this box)** | | | |
| **<total goes here>** | 1. **Define -- CTQs (Critical to Quality) (10 points)** | | |
| **/ 5** |  | |
| **/ 5** |  | |
| **<total goes here>** | 1. **Measure – Organizations, Process Flow and Swim Lane Diagram (20 points)** | | |
| **/ 8** | **Table of People and Organizations** |  |
| **/ 12** | **Swim Lane Diagram** |
| **<total goes here>** | 1. **Analyze Response Problem-- Root Cause Analysis (30 points)** | | |
| **/ 10** | **RCA Method 1** |  |
| **/ 10** | **RCA Method 2** |
| **/ 5** | **Table of Causes (including Root Causes)** |
| **/ 5** | **Cause Map** |
| **<total goes here>** | 1. **Analyze Failure Rate Problem – Data Analysis (30 points)** | | |
| **/ 10** | **Analysis Phase 1 – manager, language, method** |  |
| **/ 10** | **Analysis Phase 2 – size, release date** |
| **/ 5** | **Root Cause(s)** |
| **/ 5** | **Analysis Phase 3 - Cause Map** |
| **<total goes here>** | 1. **Improve -- Recommendations (10 points)** | | |
| **/3** | **Most Important Root Causes** |  |
| **/ 3** | **Recommendations** |  |
| **/ 4** | **Legibility, Correct English, etc.** |
| **<total>** | **Grand Total** | | |

This is the template. **Delete this page and all red text** in this template.

Red text consists of instructions to you. Blue text indicates where you should provide information. To generate your DMAIC plan, **delete** all red text**. Replace** all blue text with suitable words, formulas, figures, etc. You may leave that new text in blue or change to black.

Note that the number of points assigned to each item can be found on the cover sheet (first page of this template).

**DMAIC Plan / Status**

This document consists of our DMAIC plan and the results obtained so far, so as to provide a status report on execution of that plan.

**DEFINE**

**Charter (from management):**

**Business Problem:** The customers are complaining that there are increasing numbers of failures in our newer products and that correction of software failures is too slow. Our most important customers are the ones complaining the most about this problem, although we are hearing from other customers as well. We must correct this in order to satisfy our customers.

**Goal:** Determine the causes of the slow response and higher failure rate and correct them. Reduce the response time by at least 50% and reduce failure rate to what it has traditionally been in the past (or better).

**Scope:** The entire business process of the company may be affected by this. No part of the company is off limits.

**Timeline:** We must have a complete plan and analysis by May 10.

**Resources:** We have obtained the assistance of several UTA students who have taken a course that covered the appropriate methods. We want them to develop a more complete DMAIC plan.

**Definition (from team assigned to solve the problem)**

**The problems:**

1) Slow response to software failures and

2) higher failure rates.

**The customers:** Several, notably Acme Corporation and Zephyr.

**Voice of the customer:** See memos from Acme and Zephyr. The customer quality requirement is software that runs properly, with minimal failures, and that there is rapid response to correcting the software when it does fail.

**CTQs:** Measurable attributes that are critical to quality for our customers.

| CTQ #1 (slow response) | How Measured | Why it is Critical |
| --- | --- | --- |
| <Replace TBDs with required information. This is task 1.a.  In this column explain what you are measuring and what information need you are satisfying. | <TBD>  Include specific base measures and compound measures to be used, including formulas for compound measures. | <TBD>  Here you should explain why this is so important for the customer. |

| CTQ # 2 (high failure rate) | How Measured | Why it is Critical |
| --- | --- | --- |
| Replace TBDs with required information. This is task 1.b. | <TBD> | <TBD> |

**Target process(es) to be improved:** All processes in the company. Note: we will begin by analyzing the customer support process but any part of our company’s process may be subject to improvement based on findings from our analysis. Specific improvements are defined as a result of the analysis.

**Project Targets:** Reduce response time by at least 50%; reduce failure rate to at least the historical average (preferably better).

**MEASURE processes and products.**

**2.1 Measure the customer support process (response time problem)**

**2.1.a Organizations/People (Roles) Interviewed:**

Fill in the table below, summarizing all the organizations interviewed (in document SH7).

<Task 2.1.a. List people interviewed, organizations (department that they work for), job titles or roles, and what they do in the table below. Add rows to the table and expand sizes of each space as necessary>

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 2.1.a – Table of People and Organizations** | | | |
| **Name** | **Organization** | **Job Title / Role** | **Summary of what they do** |
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**2.1.b Process Flow:**

Here you explain the process IPC follows to respond to a customer complaint, showing every step of the “response to customer complaints” process from complaint to final installation of the corrected software. You should show a swim lane diagram, illustrating the process. This diagram should show each department/person involved in responding to a customer problem and should show the approximate time required for each step. Briefly explain what happens at each of the steps shown. You should mention any steps of the process that you found to be a significant causal factor in the problem (for example, if there’s a part of the process you think is contributing to the problem and needs to be improved). You could also show such steps on the swim lane diagram by making them a different color or otherwise marking them. Feel free to show other diagrams as well if you think they will help explain things.

<Task 2.1.b – Explain the customer support process with a swim lane diagram. You may use multiple pages if convenient. Also, explain any abbreviations or other things on the diagram that might need further elaboration or clarification. The organizations shown should match the organizations listed in the table, above.>

**2.1.c: Data to Collect:**

* Interviews with key people involved in the process described above. Interviews are intended to extract their perspectives on the process as well as numeric data, where available.
* International Products Corporation Data relevant to this problem.

Interview results have been collected and are summarized in various supplementary files. Product data are found in the **IPC Data** and **IPC Defect Data** Reports.

**ANALYZE**

**3 Analyze Slow Response Problem:**

**3.1 Root Cause Analysis:** Here you discuss your root cause analysis. You should select at least two root cause analysis techniques, and **explain each of the techniques you used**, showing diagrams where appropriate, and identifying the root causes you found, as well as the intermediate and proximate causes.

<Task 3.1 First root cause analysis method is shown here. It may take several pages.>

<Task 3.2 Second root cause analysis method is shown here. It may take several pages.>

<Task 3.3 List the Causes in order of importance – add rows as needed>

| Table 3.3 – Summary of Causes (# = root cause) | | | |
| --- | --- | --- | --- |
| Cause  (# indicates a root cause) | Description | Importance (High, Medium, Low) | Reasons for indicated level of Importance |
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3.4 Cause Map: Here you should show a cause map that shows all root causes and the complete path from each root cause to the final problem.

<Task 3.4 cause map goes here. It should take approximately one or two pages.>

**3.5 Collect Data:** To be performed, if necessary, to identify most critical root causes. For purposes of this assignment, explain which of the data provided in the supplementary handouts and other assignment materials is relevant to this problem. If you believe something else should be collected, describe it here and explain why it should be collected.

**4 Analyze High Defect Level Problem:**

**4.1 Data Analysis Phase 1: Analyze Manager, Method and Language** to see if any of these relates to the defect level.Here you discuss the data on the manager, method and language found in the ***IPC Defect Data*** file and how you have analyzed that data. Discuss all analysis methods used, what conclusions you reached, and why. Include analyses that were inconclusive.

<Task 4.1.a Describe the data here as well as giving a high level description of the analysis you performed on that data (for example, “we used pareto analysis on the programming language data”. Note that details of your analysis are to be described after the summary tables, below.>

<Task 4.1.b In the table below, describe all data analysis that you performed as part of your initial (Phase 1) analysis – add rows as needed>. As described in the SOW, the analysis methods used here would be basic in nature such as sorting, central tendency measures, distributions, or robust statistics. See SOW for other suggestions. Your conclusion could be that the analysis method told you very little and was inconclusive, although at least some of the methods should enable you to identify causes or correlations that suggest potential causes.

| Table 4.1 – Summary of Phase 1 Data Analysis  Identifying Factors Related to High Defect Rate Problem | | |
| --- | --- | --- |
| Data Analysis Method | Description (what data were used for each analysis, what refinement, calculations, and analysis methods were used) | Conclusions reached from this analysis method (including methods that resulted in no conclusion) |
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Below the table, provide details of each analysis such as pictures of graphs or sorted data or formulas used and calculations performed.

Here you should show any diagrams or more detailed descriptions of the data analysis that you described in the above table.

**4.2 Data Analysis Phase 2: Analyze Release Date and Software Size** to see if either of these correlates to the defect level.Here you discuss the data on the size and release date found in the ***IPC Defect Data*** file and how you have analyzed that data using correlation analysis techniques. Discuss all analysis methods used, what conclusions you reached, and why. Include analyses that were inconclusive.

<Task 4.2.a Describe the data here as well as giving a high level description of the correlation analysis you performed on that data (for example, “we used spearman coefficient to analyze the release date data”. Note that details of your analysis are to be described after the summary tables, below. note also that you may need to correlate to both the normalized and unnormalized defect data or to look only at the high priority defect data in order to see where the strongest correlations are.>

<Task 4.2b In the table below, describe all data analysis that you performed as part of your Phase 2 analysis – add rows as needed>. As described in the SOW, the analysis methods used here would be statistical in nature such as correlation coefficients or ANOVA techniques.

| Table 4.2 – Summary of Phase 2 Data Analysis  Identifying Correlations Related to High Defect Rate Problem | | |
| --- | --- | --- |
| Data Analysis Method | Description (what data were used for each analysis, what refinement, calculations, and analysis methods were used) | Conclusions reached from this analysis method (including methods that resulted in no conclusion) |
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Below the table, provide details of each analysis such as pictures of graphs or sorted data or formulas used and calculations performed.

Here you should show any diagrams or more detailed descriptions of the data analysis that you described in the above table.

4.3.a Root Causes of High Defect Rate Problem Here you should list the root causes you have identified, in order of importance, based on your data analysis.

<Task 4.3.a List the Root Causes in order of importance – add rows as needed>

| Table 4.3.a – Root Causes of High Defect Rate Problem | | | |
| --- | --- | --- | --- |
| Root Cause | Description | Importance (High, Medium, Low) | Reasons for indicated level of Importance |
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4.3.b Causal Map: Here you should show a causal map that shows all root causes of the high defect rate problem and the complete path from each root cause to the final problem.

<Task 4.3.b causal map goes here. It should take approximately one or two pages.>

**4.4 Collect Data:** To be performed, if necessary, to identify most critical root causes. If you believe any additional data needs to be collected in order to further identify or rank the root causes, explain that here, indicating what data should be collected and why.

**IMPROVEMENTS and RECOMMENDATIONS**

**5.1 Most Important Root Causes:** Take the most important root causes for each problem and merge them so that the most important overall root cause is listed first. Describe each root cause and how it affects the customer’s problems.

| Table 5.1 - Most Important Root Causes |
| --- |
| <Task 5.1 describe each of the most important overall root causes (i.e., the causes for both problems), in order of importance, and explain why each of them is so important in terms of its effect on the customer problems.> |

**5.2 IMPROVE:**

**Recommended Solutions:**

Here you describe your recommended solutions for improving the problems. The solutions should address all of the most important root causes. For example, you should explain which root causes your recommended solution addresses. You should illustrate your proposed solution by explaining how you would change the processes currently used for software development and customer support.

<Task 5.2 discussion of solutions goes here. It should take several paragraphs and may also include figures, diagrams, tables, or whatever else you believe will help explain your recommended solutions.>

**Test the Solutions:** To be performed

**Assess Risks of Implementation:** To be performed

**Create full implementation plan:** To be performed

**Deploy the plan:** To be performed

**CONTROL:**

**Control Plan:** To be performed

**Monitor and Control:** To be performed

**Update training, process documents, procedures, etc.:** To be performed

**Develop Response Plan:** To be performed