[cover sheet 1 of 2]

2

ASSIGNMENT 2

**DEFECT ANALYSIS REPORT**

CSE 6329 -- SOFTWARE MEASUREMENT AND QUALITY ENGINEERING

Professor Dennis J. Frailey

**Spring, 2017**

NAME \_\_\_**<put your name(s) here>**\_\_\_

ID Number\_\_\_**<put your ID number(s) here>**\_\_\_

This is the template. To generate your report, first make a copy of this template for use in developing your report. (Keep the original template for reference).

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Finally, as you develop your report, **delete all red text** and replace as appropriate with suitable words, formulas, figures, etc.

Also delete all notes in blue boxes (like this one), which are intended to suggest how you should do your report.

The Grading Template is on Next Page.

Leave this template in your report, for use by the instructor and TA in grading your report.

[cover sheet 2 of 2]

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| **Grading template Student do not write inside this box** | | | | | | | |
| \_\_\_\_\_ (/16) | 1.0 Description of Analysis Tool (spreadsheet)  1.1 \_\_\_\_ Purpose (1) 1.2 \_\_\_\_ Data Spreadsheet (3) 1.4 \_\_\_\_ Analysis Tool (12) | | | | | | (16 points) |
|  | 2.1 Details for each of the Post Release Quality graphs | | | | | | |
| \_\_\_\_\_\_\_ (/2) | 2.1.1 Overview of Post Release Quality (PRQ) graphs (2) | | | | | | |
|  | 2.1.2 … 2.1.7 Details of Individual Post Release Quality graphs (10 points each) | | | | | | |
| Introduction & Graph  (2.1.x), (2.1.x.1)  (2 points) | Analysis & Discussion  (2.1.x.2)  (2 points) | Procedure Used to Produce the Graph (2.1.x.3) | | | | |
| Base Metrics Collected  (2.1.x.3.1)  (1 point) | Compound Metrics  (2.1.x.3.2)  (1 point) | Data Refinement  (2.1.x.3.3)  (2 points) | How to Interpret  (2.1.x.3.4)  (2 points) | |
| Example  Product A  \_\_\_\_\_ (/10) | (2.1.2.1)  \_\_\_\_\_ | (2.1.2.2)  \_\_\_\_\_ | (2.1.2.3.1)  \_\_\_\_\_ | (2.1.2.3.2)  \_\_\_\_\_ | (2.1.2.3.3)  \_\_\_\_\_ | (2.1.2.3.4)  \_\_\_\_\_ | |
| Average  \_\_\_\_\_ (/10) | (2.1.3.1)  \_\_\_\_\_ | (2.1.3.2)  \_\_\_\_\_ | (2.1.3.3.1)  \_\_\_\_\_ | (2.1.3.3.2)  \_\_\_\_\_ | (2.1.3.3.3)  \_\_\_\_\_ | (2.1.3.3.4)  \_\_\_\_\_ | |
| Normalized by Size  \_\_\_\_\_ (/10) | (2.1.4.1)  \_\_\_\_\_ | (2.1.4.2)  \_\_\_\_\_ | (2.1.4.3.1)  \_\_\_\_\_ | (2.1.4.3.2)  \_\_\_\_\_ | (2.1.4.3.3)  \_\_\_\_\_ | (2.1.4.3.4)  \_\_\_\_\_ | |
| PRQ By  Process  \_\_\_\_\_ (/10) | (2.1.5.1)  \_\_\_\_\_ | (2.1.5.2)  \_\_\_\_\_ | (2.1.5.3.1)  \_\_\_\_\_ | (2.1.5.3.2)  \_\_\_\_\_ | (2.1.5.3.3)  \_\_\_\_\_ | (2.1.5.3.4)  \_\_\_\_\_ | |
| PRQ By Language  \_\_\_\_\_ (/10) | (2.1.6.1)  \_\_\_\_\_ | (2.1.6.2)  \_\_\_\_\_ | (2.1.6.3.1)  \_\_\_\_\_ | (2.1.6.3.2)  \_\_\_\_\_ | (2.1.6.3.3)  \_\_\_\_\_ | (2.1.6.3.4)  \_\_\_\_\_ | |
| Student’s Choice  \_\_\_\_\_ (/10) | (2.1.7.1)  \_\_\_\_\_ | (2.1.7.2)  \_\_\_\_\_ | (2.1.7.3.1)  \_\_\_\_\_ | (2.1.7.3.2)  \_\_\_\_\_ | (2.1.7.3.3)  \_\_\_\_\_ | (2.1.7.3.4)  \_\_\_\_\_ | |
|  | 2.2 Details for each of the Post Release Quality History graphs | | | | | | |
| \_\_\_\_\_\_\_ (/2) | 2.2.1 Overview of Post Release Quality History (PRQH) graphs (2) | | | | | | |
|  | 2.2.2, 2.2.3 Details of Individual Post Release Quality graphs (10 points each) | | | | | | |
| Graph  (2.2.x 1)  (2 points) | Analysis & Discussion  (2.2.x.2)  (2 points) | Procedure Used to Produce the Graph (2.2.x.3) | | | | |
| Base Metrics Collected  (2.2.x.3.1)  (1 point) | Compound Metrics  (2.2.x.3.2)  (1 point) | Data Refinement  (2.2.x.3.3)  (2 points) | How to Interpret  (2.2.x.3.4)  (2 points) | |
| PRQH by Quarter  (2.2.2)  \_\_\_\_\_ (/10) | (2.2.2.1)  \_\_\_\_\_ | (2.2.2.2)  \_\_\_\_\_ | (2.2.2.3.1)  \_\_\_\_\_ | (2.2.2.3.2)  \_\_\_\_\_ | (2.2.2.3.3)  \_\_\_\_\_ | (2.2.2.3.4)  \_\_\_\_\_ | |
| PRQH by Year  (2.2.3)  \_\_\_\_\_ (/10) | (2.2.3.1)  \_\_\_\_\_ | (2.2.3.2)  \_\_\_\_\_ | (2.2.3.3.1)  \_\_\_\_\_ | (2.2.3.3.2)  \_\_\_\_\_ | (2.2.3.3.3)  \_\_\_\_\_ | (2.2.3.3.4)  \_\_\_\_\_ | |
| \_\_\_\_\_\_\_  (/100) | Total Assignment Grade | | | | | | |

**Defect Analysis Report**

1. **Introduction**
   1. **Purpose of This Report**

This report shows the results of analyzing three years of defect data on our released products. The purpose is to gain a greater understanding of the quality levels of our released products and to determine whether there is any correlation between software quality and other factors such as the programming language used, the development process used, or the time when the product was developed. You may add information here if you wish.

* 1. **Data Used**

The data necessary to perform these measurements have been collected monthly for each active software product, over the past three years. The data are stored in the **data spreadsheet**, named A2data.xlsx. Continue, describing the data spreadsheet. A figure showing a picture of the spreadsheet would be helpful here. You could also show pictures of the individual worksheets for the various graphs/analyses, if you wish.

* 1. **Analyses and Graphs**

We have analyzed the data in several different ways, resulting in two different metrics and their corresponding graphs:

1. Post Release Quality (shown six ways),
2. Post Release Quality History (shown two ways).

These are described in further detail in section 2 of this report.

* 1. **Structure of Analysis Tool**

In order to analyze defect data, we have created a workbook … continue, with a description of your analysis tool. For example, explain that it is a workbook, how many worksheets, and what each worksheet is for. A picture or sample of each worksheet should be shown.

When you see red text in the 12 point font, like this, it means you are expected to replace the red text with something you have written.

1. **Measures, Graphs and Analysis**
   1. **Post Release Quality**
      1. **Overview**

Explain the purpose and format of this measure/graph. In other words, explain the **information need** and the **question(s)** being answered, as well as the **type of graph** (line chart, bar chart, etc.). Note that this section is an overview of all of the post release quality graphs, so it should describe characteristics common to all graphs in the collection or, if some graphs have a different format, should mention all of the different formats used.

* + 1. **Post Release Quality for Product A**

Provide a brief description of this measure. This is similar to the overview in 2.1.1, except that in this case it is specific to this graph rather than to the collection of post release quality graphs.

**2.1.2.1 Graph**

The graph below shows Post Release Quality for one year of Product A.

Insert your own figure depicting Product A here, along with additional descriptions if you wish.

**2.1.2.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. For example, you might observe that a particular line or bar means something significant. Note that the SOW and the data spreadsheet provide some background, which might help you explain some of the behaviors seen on the graphs. Look at the example in the SOW appendix.

**2.1.2.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.1.2.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) Here is an example:  Black text, like this, is an example that you may use for your report, where it is appropriate.  The data required for this measure are:   * **DPRE** – The number of known defects at the time of product release. Collected at time of product release. * **DRPT, i** – The number of defects reported in the ***ith*** customer failure report. Collected at the beginning of each month. * **N** – The total number of customer failure reports (total number of months). This is normally 12 for each product. * **DC,i** – The number of defects corrected in month ***i***, reported monthly by engineering staff.   The above data are collected separately for each software product. |

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| 2.1.2.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. Here is an example:   * **Total Defects** at month T (is defined as the cumulative sum of all defects known at month T. This measure is computed every month, for each product. This includes both defects reported by the customer (post-release defects) and defects known to be in the product at release time (pre-release defects):   Equation 1 - Total Defects   * **Uncorrected Defects** (at month T is defined as **Total Defects** minus the cumulative sum of all defects that have been corrected:   Equation 2 - Uncorrected Defects |

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| 2.1.2.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. Here is an example:   * For this graph, the total defects are computed each month by adding the latest month’s defects to the previous total. * The uncorrected defects are computed each month by subtracting the number of defects corrected in the latest month from the previous uncorrected defects total. |

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| 2.1.2.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. For example, explain what each axis, line or bar represents. You may include any other comments or observations you believe will be helpful for someone trying to understand how to interpret the graph, generate the graph or analyze the data. For example:   * Two lines are shown: both DT and DUNC,T are plotted monthly on a line chart for the first release of product A. The horizontal axis is number of months since product release and the vertical axis shows defect count. The chart shows one year of data. * The DT line is monotonic – it will tend to grow slowly, but to flatten out over time, as the product’s defects are found. When the line flattens, it is approximately equal to the total number of defects in the product. * The DUNC,T line should decrease over time, as defects are found and corrected. However it may increase in any particular month if a lot of new defects are found in that month. |

* + 1. **Post Release Quality Average**

Provide a brief description of this measure. This is similar to the overview in 2.1.1, except that in this case it is specific to this graph rather than to the collection of post release quality graphs.

**2.1.3.1 Graph**

The graph below shows Post Release Quality Average for all 30 products.

Insert your own figure here, along with additional descriptions if you wish.

**2.1.3.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. In this case, be sure to discuss how product A compares with the average.

**2.1.3.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.1.3.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.1.3.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.1.3.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.1.3.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. |

* + 1. **Post Release Quality Average Normalized by Size**

Provide a brief description of this measure. This is similar to the overview in 2.1.1, except that in this case it is specific to this graph rather than to the collection of post release quality graphs.

**2.1.4.1 Graph**

The graph below shows Post Release Quality Average Normalized by Size for all 30 products.

Insert your own figure here, along with additional descriptions if you wish.

**2.1.4.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. In this case, be sure to discuss the reason for normalization and what it tells you.

**2.1.4.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.1.4.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.1.4.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.1.4.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.1.4.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. |

* + 1. **Post Release Quality by Development Process**

Provide a brief description of this measure. This is similar to the overview in 2.1.1, except that in this case it is specific to this graph rather than to the collection of post release quality graphs.

**2.1.5.1 Graph**

The graph below shows Post Release Quality by Development Process for each of the two processes used: Extreme Programming and SCRUM.

Insert your own figure here, along with additional descriptions if you wish.

**2.1.5.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. In this case, be sure to discuss whether there are any significant differences between the two development processes.

**2.1.5.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.1.5.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.1.5.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.1.5.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.1.5.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. |

* + 1. **Post Release Quality by Programming Language**

Provide a brief description of this measure. This is similar to the overview in 2.1.1, except that in this case it is specific to this graph rather than to the collection of post release quality graphs.

**2.1.6.1 Graph**

The graph below shows Post Release Quality by programming language for each of the two languages used: Python and C.

Insert your own figure here, along with additional descriptions if you wish.

**2.1.6.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. In this case, be sure to discuss whether there are any significant differences between the two programming languages.

**2.1.6.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.1.6.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.1.6.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.1.6.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.1.6.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. |

* + 1. **????? (Your choice here)**

Provide a brief description of this measure. This is similar to the overview in 2.1.1, except that in this case it is specific to this graph rather than to the collection of post release quality graphs.

**2.1.7.1 Graph**

The graph below shows ?????

Insert your own figure here, along with additional descriptions if you wish.

**2.1.7.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. In this case, be sure to discuss what your graph shows.

**2.1.7.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.1.7.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.1.7.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.1.7.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.1.7.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. |

* 1. **Post Release Quality History**
     1. **Overview**

Explain the purpose and format of this measure/graph. In other words, explain the information need and the question(s) being answered, as well as the type of graph. Note that this section is an overview of both of the post release quality history graphs, so it should describe characteristics common to both graphs. You may also briefly explain the difference between the two graphs.

* + 1. **Post Release Quality History By Quarter**

Provide a brief description of this measure. This is similar to the overview in 2.2.1, except that in this case it is specific to this graph rather than to the collection of post release quality history graphs.

**2.2.2.1 Graph**

The graph below shows Post Release Quality History by Quarter

Insert your own figure depicting Post Release Quality History by Quarter, along with additional descriptions if you wish.

**2.2.2.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. For example, you might observe that a particular line or bar means something significant. Note that the SOW and the data spreadsheet provide some background, which might help you explain some of the behaviors seen on the graphs. Look at the example in the SOW appendix.

**2.2.2.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.2.2.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.2.2.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.2.2.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.2.2.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. For example, what does each axis, line or bar represent. You may place any other comments or observations you believe will be helpful for someone trying to understand how to generate the graph or analyze the data. |

* + 1. **Post Release Quality History by Year**

Provide a brief description of this measure. This is similar to the overview in 2.2.1, except that in this case it is specific to this graph rather than to the collection of post release quality history graphs.

**2.2.3.1 Graph**

The graph below shows Post Release Quality History by Year

Insert your own figure here, along with additional descriptions if you wish.

**2.2.3.2 Analysis and Discussion**

This section is for analysis, not just description. Here you analyze and describe the graph shown above and what conclusions or observations you make from looking at the graph. In this case, be sure to discuss how graphing by year differs from graphing by quarter and what the relative benefits are for each approach.

**2.2.3.3 Procedure Used to Collect and Refine Data and Produce Graph**

In the tables below, explain the details of your data refinement and how you produce the graph. The purpose of this section is to enable someone else to start with the same data and produce the same graphs. Describe each step of the measurement process: data collected, data refinement performed, compound measures calculated, and what data are shown on the graph. A sample of what is expected is shown below. You can use this for the first graph but need to provide the corresponding information for all other graphs.

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| 2.2.3.3.1 Data Collection: Base Metrics Collected |
| Here you list and describe the base metrics needed to compute this metric. Also describe when the data are collected (how often, etc.) |

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| 2.2.3.3.2 Compound Metrics (Metrics Computed) |
| Here you show all compound metrics used, including their formulas and any intermediate computations needed. |

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| 2.2.3.3.3 Data Refinement (manipulations, extractions, sorting, etc.) |
| Here you explain all data manipulations and refinements needed to compute this metric, such as computing totals, sorting, shifting data to new columns, and so forth. |

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| 2.2.3.3.4 How to Interpret the Graph |
| Here you explain how to interpret the lines, bars or other elements of the graph. |