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This wiki project is bringing together experts to define Six Sigma and document best practices through community collaboration.

Failure Mode Effects Analysis (358 views)

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Major contributors: Dennis Stevenson, akshaya bhatia | All Contributors

Failure Mode Effects Analysis (FMEA)

A FMEA is an analytical tool used to evaluate the risk that a process will fail to execute properly, or will produce poor quality inputs. A FMEA is, primarily, risk mitigation, analytic and defect prevention tool in both product design and implementation processes. The FMEA was initially used in military for aerospace and rocket development and later gain popularity in automotive sector for improvement in manufacturing processes and other areas of production, management, R&D (Research and Development) etc.

The precursor to a FMEA is a Process Map which describes the steps of a process along with the inputs & outputs for each step. Most often FMEA are documented in a spreadsheet with a column for each piece of data, and preset calculations for the necessary math functions.

For each step in the process assess the following:

Step 1: Identify the different Failure Mode for each step within the process. For example in a time sensitive scenario: "This task completes late".

Step 2: Identify the effects of that Failure Mode being realized. Generally speaking the effects should be negative. In the example above, an effect might be "Subsequent tasks begin with incorrect inputs". If more than 1 effect could result, list each effect on a separate line duplicating all the data to the left.

Step 3: Using weighted rankings rate the overall **Severity** of the Failure Effects on the process. Use a scale from 0 (lowest) to 10 (highest).

Step 4: Identify potential causes for the Failure mode. If multiple causes exist for the Failure Mode, list each cause on a separate line duplicating all the data to the left.

Step 5: Using weighted rankings rate the **Likelihood** that the Cause will actually happen. Use a scale from 0 (most unlikely) to 10 (most likely).

Step 6: Identify any controls which are in place to detect or control the causes which drive the Failure Modes. A control is any function which would raise awareness of the presence or increased potential of the cause, or detect (after the fact) that the cause has already occurred.

Step 7. Using weighted rankings rate the **Detectability** of the cause happeingin before any negative effects occur. Use a scale from 0 (most likely to discover) to 10 (most unlikely to discover). If no detection methods are in place, the Detectability should be scored a 10.

Step 8: Calculate the Risk Priority Number (RPN) of the Failure Mode:Cause:Likelihood:Detectability combination by multiplying the 3 numeric scores together. The result will range from 0 to 1000. The larger the number, the higher the risk that particular combination poses to the overall process.

NOTE: As a rule of thumb, risks with an RPN greater than 400 are generally considered significant.

Following the identification of the RPN, specific actions can be assigned to address the impact, likelihood or detectability of the risk. Once these actions are assigned the impact on the risk can be determined by recalculating the Impact, Likelihood and Detectability scores after the actions are taken. This gives the Potential RPN. The impact of the actions is then the RPN minus the Potential RPN.

For a related tool see Failure Mode and Effects Criticality Analysis

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