## Lean Six Sigma DMAIC Roadmap

### Define

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Key Tools</th>
<th>Key Outputs</th>
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| To establish a quantified problem statement, objective and business case that will become the foundation to your Six Sigma project. Conduct stakeholder analysis, select team members and kick-off your project. | **Primary Metric** | • Process Map  
• Gather VOC  
• Translate VOC to CTQ's  
• QFD/HOQ  
• COPQ  
• Primary & Secondary Metrics  
• Establish Project Charter  
• Stakeholder Analysis  
• Team Selection  
• Project Plan |
| **Project Charter** | **Project Plan** |

### Measure

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| Refine your understanding of the process. Assess process capability relative to customer specifications. Validate measurement systems. Brainstorm potential x's. | **C&E** | • Early Y=f(x) Hypothesis  
• Detailed Process Map  
• SIPOC  
• Cause & Effect Diagram  
• Cause & Effect Matrix  
• FMEA  
• Basic Statistics  
• Normality Test  
• Capability Analysis  
• Gage R&R |
| **SIPOC** | **FMEA** |

### Analyze

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| Conduct data collection and planned studies in order to eliminate non-critical x's and validate critical x's. Establish a stronger and quantified Y=f(x) equation. | **Normality Test** | • Narrowed Y=f(x)  
• 1 & 2 Sample t-tests  
• 1 & 2 Proportions tests  
• Equal variance tests  
• Normality tests  
• ANOVA  
• Mood's Median  
• Mann Whitney  
• Paired t-test  
• Chi-Squared test |
| **ANOVA** | **2 Sample t-test** |

### Improve

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| Design, test and implement your new process or product under live operating conditions. Pilot solutions if feasible before broadly deploying expensive improvements or products. | **Pugh Matrix** | • Refined Y=f(x)  
• Pugh Matrix  
• Correlation  
• Simple Linear Regression  
• Multiple Linear Regression  
• Binary Logistic Regression  
• Full Factorial DOE  
• Fractional Factorial DOE |
| **Linear Regression** | **Binary Logistic Regression** |

### Control

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| Plan, communicate, train and implement your product or process solutions. Ensure control mechanisms are established. Use Poke Yoke, visual controls, SOP's and SPC wherever possible. | **Control Plan** | • Control Plan  
• Training Plan  
• Refined FMEA  
• Communication Plan  
• Standard Operating Procedures  
• Five-S Audit  
• Poke Yoke  
• Visual Controls  
• Statistical Process Control |
| **SOP’s** | **Communication Plan** |

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