

Six Sigma Process Improvement Project

Project Name:

Process :

Black Belt :

DMAIC Steps

Deliverables	
Phase	
Define	<ul style="list-style-type: none"> SIPOC Customers and CTQs established Problem Statement, Business Case, Goals & Scope Team
Measure	<ul style="list-style-type: none"> Key output measures Y identified Data Collection Plan Do MSA (Gage R&R – Only for Black Belt) Process Variation displayed (Span) Baseline sigma performance calculated
Analyze	<ul style="list-style-type: none"> Possible causes identified by Segmentation/Stratification Detailed Process mapped in area of problem Process Map Analyzed Data Analysis – Root Cause validated Vital Few identified Opportunity is Quantified
Improve	<ul style="list-style-type: none"> Solutions identified/mapped Design Solutions Implementation Plan – (Consider Pilot) FMEA executed Cost Benefit Proposal Created
Control	<ul style="list-style-type: none"> Standardized process On-going Monitoring Plan established Procedures/documentation realised Response Plan developed and deployed Systems and structures modified (staffing, training, reward and recognition, systems) Ownership of on-going process management transferred to process owner

A Review of the Deliverables:

These are the guideline deliverables. You may want to refine for your project. Also, remember to refine your Charter as you progress through your project.

Define

SIPOC

Region :
Product :
Number of processes :
Process :
FTE :

Critical to Client Metric

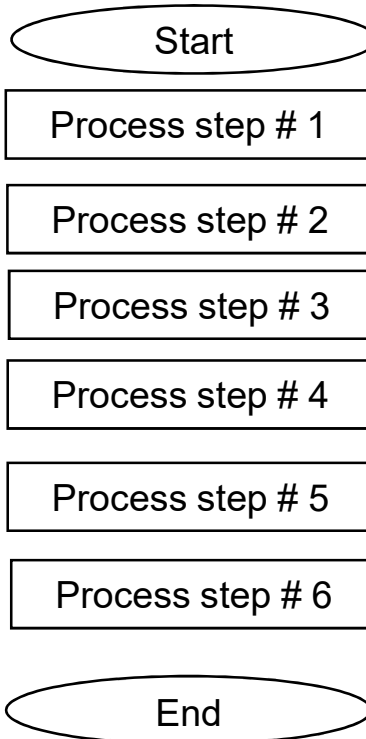
SUPPLIERS

- Supplier K
- Supplier L
- Supplier M

INPUTS

- Input G
- Input H
- Input I
- Input J

PROCESS



OUTPUTS

- Output A
- Output B

CUSTOMERS

- Customer C
- Customer D
- Customer E
- Customer F

Notes

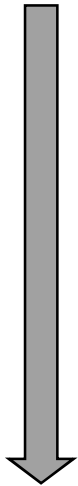
Make any notes here:

Tip: First start with Outputs and Customers. Next set process boundaries and do the process map steps and then list inputs and suppliers

Identify & Prioritise Customer Segments

For your process list the customers of your process and rank them according to your Business Strategy

Highest priority



Lower priority

Internal	External

You may choose to segment them based on criteria: similar expected CTQ's, geography, small, large etc

VOC Collection Strategy for Selected Segments

Customer Segment	Tool used	How Many	Who By	By When

DMAIC Project Charter

DMAIC Project Charter

		Project No.: _____	
Project Name:		Core Process:	
Resource Plan:		Team Members/Support Resources:	
Green Belt : Sponsor: Process Owner: Six Sigma Leader: Black Belt:		<i>Text</i>	
Problem Statement		Scope	
<i>Text</i>		<i>Text</i>	
Goal Statement		Customer CTQ's	
<i>Text</i>		<i>Text</i>	
Estimate Financial Opportunities		High Level Project Milestone	
<i>Text</i>		<i>Text</i>	
Functional Manager/Process Owner _____ Date: _____		Validation	
Sponsor: _____ Date: _____		Financial Analyst: _____ Date: _____	
Black/Green Belt: _____ Date: _____		Six Sigma Leader _____ Date: _____	
_____		Other: _____ Date: _____	
_____		_____	

High Level Improvement Timeline

Process Step	Aug				Sept				Oct				Nov				Dec				Jan				Feb				Deliverables
	2	3	4		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Define									■	■	■	■																	Charter Customer Focus SIPOC
Measure											■	■	■	■	■	■													Measures Collection Plan Baseline Sigma
Analyse															■	■	■	■	■	■									Mapping/Analysis Vital Few Opportunity quan.
Improve																			■	■	■	■	■	■					Solutions Evaluate Implementation Plan
Control/Verify																							■	■	■	■	■	■	Procedures Monitoring Communication

Original Plan
 Actual progress
 Update your plan as your project progresses
 Modify the deliverables for your project

Define Tollgate Review

Define Tollgate Review

TEAM

- Team is sponsored by a sponsor
- Team formed and team leaders (Six Sigma Black/Green Belt & Six Sigma Coach) assigned
- Improvement team members fully trained on Six Sigma and DMAIC
- Full participation by members in regularly held team meetings
- Team members perform project work when assigned and in a timely fashion
- Team members regularly document their project work
- Team is equipped with available and reliable resources

HIGH LEVEL BUSINESS PROCESS MAP

- Business Process Mapping Completed (SIPOC), verified, and validated high-level 'as is' (not 'should be' or 'could be') business process map
- Completed SIPOC representation, describing the Suppliers, Inputs, Process, Outputs, and Customers

CUSTOMERS & CTQs

- Data collected and displayed to better understand customer(s) critical needs and requirements
- Customer(s) identified and segmented according to their different needs and requirements

TEAM CHARTER

- Project management charter, including financial opportunities, problem and goal statements, project scope, milestones, roles and responsibilities, communication plan

Signatures	Six Sigma Leader:	Sponsor:	Process Owner:
	_____ date	_____ date	_____ date
	Black/Green Belt:	Six Sigma Financial Analyst:	Other:
	_____ date	_____ date	_____ date

Measure

Data Collection Plan Worksheet Key Output Measure Y

CTQ	Measure Description (op definition)	Data Type (Cont//Disc)	How many ? (sampling)	How Collected (use additional sheets if needed)	By Whom	Segmentation criteria (as appropriate)

Be sure to focus on Operational definitions, so that 2 people using the definition will give the same measure (reproducibility) AND if 1 person measures twice, they will give the same measure twice (repeatability).

Measure

Output Sigma

Understanding the Capability of the process



Double click on the spreadsheet and enter data in the the shaded cells.

Define the following

- CTQ:** your customer CTQ
Target: your customer required target
Defect: Describe here how you would identify a defect
Unit: How do you define a unit
Opportunity: What is the rationale behind the # of opportunities

DPMO

1 Number Of Units Processed

2 Total Number Of Defects Made (Include Defects Made And Later Fixed)

3 Number Of Defect Opportunities Per Unit

4 Solve For Defects Per Million Opportunities

5 Sigma will calculate

	enter
N=	0
D=	0
O=	0

#DIV/0!

Sigma= #DIV/0!

You may need to do more than one sheet (or consolidate in a table) to show other Baseline calc's or summary sigma.
Explain any sampling as appropriate. Hint: Update your problem and goal statements. Did they change based on your findings?

Measurement Data Display

Understanding process variation . . .

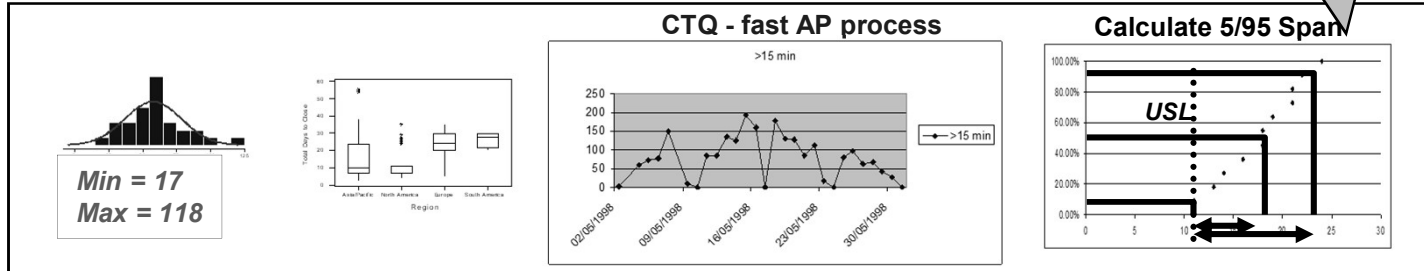
Display output data here using histogram and run charts.

From the histogram, look at the **shape of the curve** and select the appropriate metric that will lead your analysis.

Do you have:

- a Normal Distribution, metrics are mean and standard deviation
- a Stable Operation Distribution, metrics are either Q1 or Q3, and Stability Factor
- a non-normal distribution, metrics are median and span

Span is computed in all cases, on top of the Variation metrics



Metrics selected and corresponding values. Key learning :

Measure Tollgate Review

Measure Tollgate Review

KEY MEASURES Y IDENTIFIED

- ⦿ Key output measures Y identified and agreed upon
- ⦿ High impact defects defined and identified in the business process

DATA COLLECTION PLANNED AND EXECUTED

- ⦿ Solid data collection plan established that includes measurement systems analysis
- ⦿ Data collected on key measures that were identified

PROCESS VARIATION DISPLAYED/COMMUNICATED

- ⦿ Process variation components displayed/communicated using suitable charts, graphs, plots
- ⦿ Long term and short term variability accounted for

PERFORMANCE BASELINE/SIGMA CALCULATION

- ⦿ Measure baseline process performance (capability, yield, sigma level).
- ⦿ Update project goal

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	_____ date	_____ date	_____ date
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	_____ date	_____ date	_____ date

Analyse

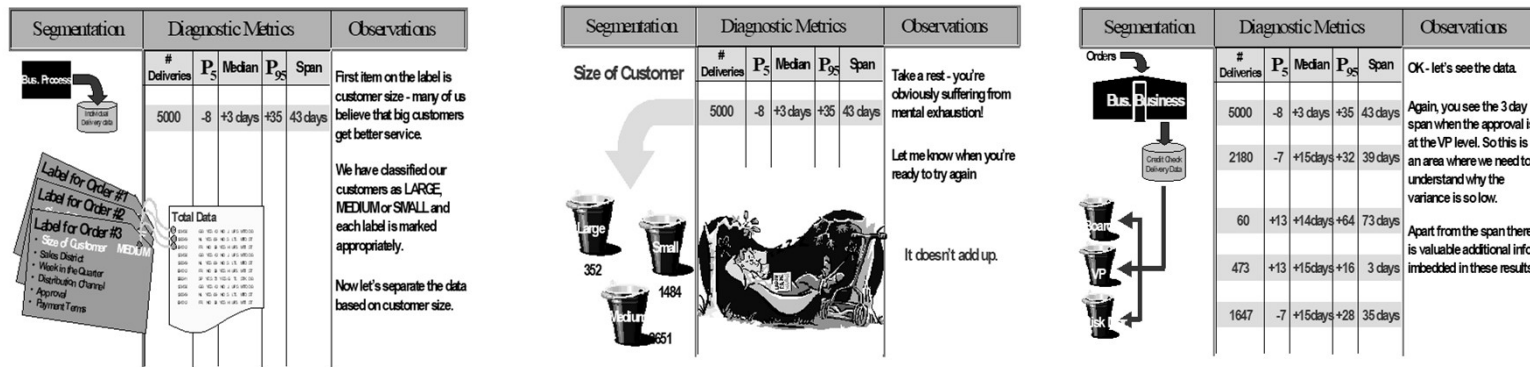
Segmentation and Stratification

Using your output data and the segmentation criteria collected, display segmented data and compute selected metrics to understand where the worst part of the variation comes from.

You may discover that instead of 1 process you have 2 processes and then you will have to **stratify**, divide your process into 2.

All this approach will lead you to possible causes identification.

Tools : histogram and curve, Normal probability plot, Box Plot, run chart, etc.....



Key learning :

As-Is Process Map

Process Name:

Step Who	Elapsed Time					

Tips: Attach extra pages do not squeeze/wrap around, as the visual will be misleading.
Keep the flow and level of detail (what vs. how) consistent. When you are finished, place a number (1-10...) next to each box to use in the value analysis.

“As-Is” Process Map Analysis

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	% Total	% Steps
Process Step																							
Avg. Time (Mins)																							
Value-Added																							
Nonvalue-Added																							
– Failure Int. / Ext.																							
– Control/Inspection																							
– Delay																							
– Prep/Set-Up																							
– Move																							

Total

Moments of Truth (MOT):

Any time a customer draws a critical judgement, positive or negative, about the service, based upon a service experience (or lack of it).

Value-Added (VA):

- Is the customer willing to pay for it?
- Is it done right the first time?
- Essential work that moves one step closer to the final product.

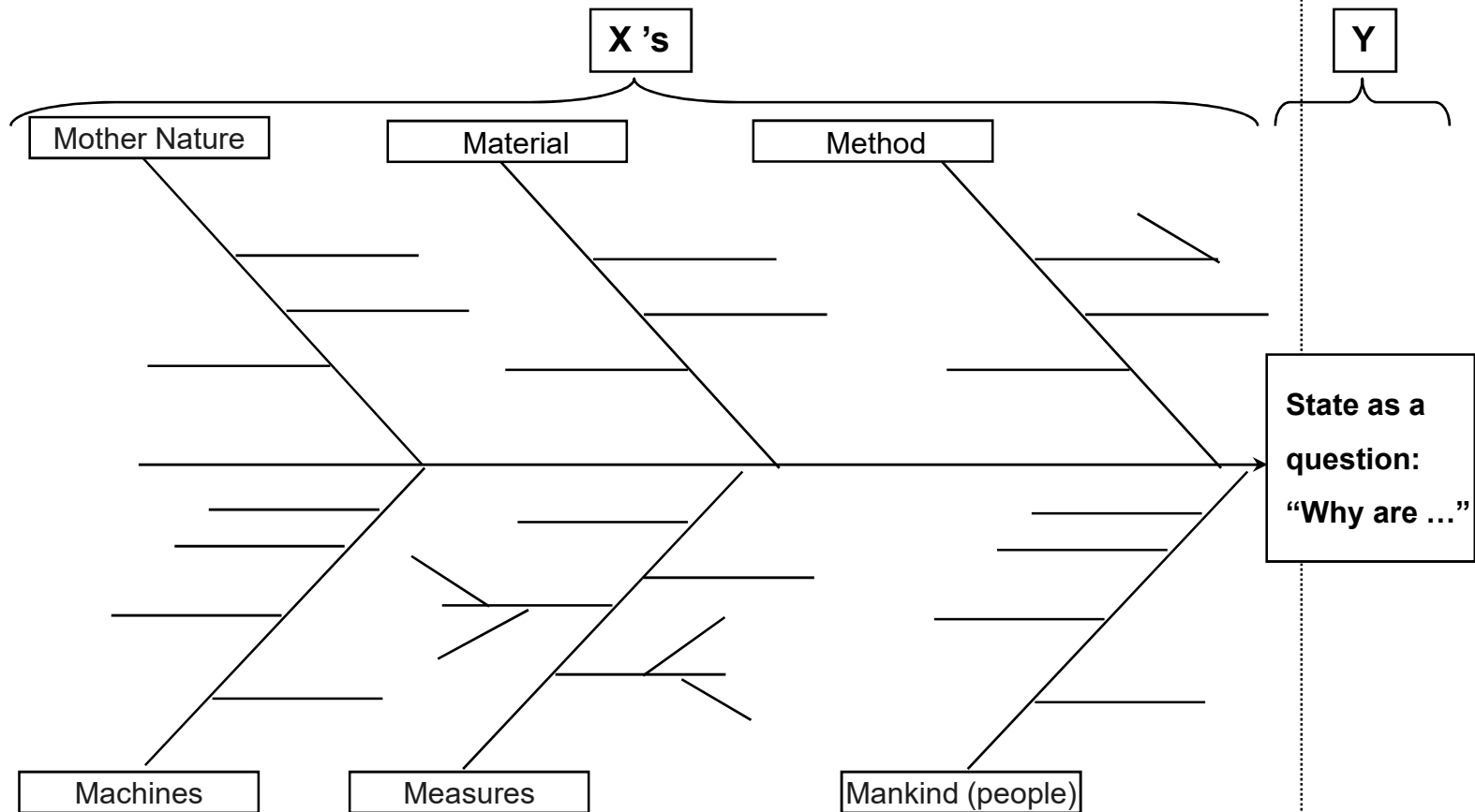
Value-Add Enabler: step that is required to do VA

Non-Value Add (NVA):

Steps considered non-essential to produce and deliver the product or service to meet the customer’s requirements. The customer is NOT willing to pay for the step.

Fish Bone Diagram/Cause & Effect/Ishikawa Diagram

$$Y=f(X_1, X_2, \dots, X_n)$$



Use the traditional categories: Machines, Methods, Mature Nature
 Measurement, Materials, People
 - OR, make up your own, based on your process problems

Notes:

- What are the causes of defects, variation, customer dissatisfaction, inefficiencies- Prioritise /
- Vote on the few main causes. Next, you will collect data to validate relationship /causal relationship.
- Remember, Y is the key output measure and X's are process or input variables

Prioritisation of Xs: Control / Impact Matrix

$$Y=f(X_1, X_2, \dots, X_n)$$

		IMPACT		
		High	Medium	Low
C O N T R O L	In Our Control			
	Out Of Our Control			

Classify your Xs coming from your C/E Diagram (Fishbone Diagram).

Narrow to Root Causes Display Your Data, Use Segmentation and Test Your Hypothesis

Add Root Cause Pareto OR
pertinent data analysis
here

you may look at scatter plot, histogram
and other analysis to show causal relationship, like you can give
scatter plots showing Correlation Coefficient(R)

Conclusions:

Vital Few Causes

Note: Update your charter as appropriate. Have your improvement opportunities changed? Savings or Revenue impact changed?

Analyze Tollgate Review

Analyze Tollgate Review

DATA AND PROCESS ANALYSIS

- ① Identify gaps between current performance and the goal performance
- ① Value added tasks / non value added tasks
- ① Moments Of Truth in process identified

ROOT CAUSE ANALYSIS

- ① Generate list of possible causes (sources of variation)
- ① Segment and stratify possible causes (sources of variation)
- ① Prioritize list of 'vital few' causes (key sources of variation)
- ① Verify and quantify the root causes of variation

QUANTIFYING THE GAP/OPPORTUNITY

- ① Determine the performance gap
- ① Display and communicate the gap/opportunity in financial terms

Signatures	<i>Six Sigma Leader:</i>	<i>Sponsor:</i>	<i>Process Owner:</i>
	_____ <i>date</i>	_____ <i>date</i>	_____ <i>date</i>
	<i>Black/Green Belt:</i>	<i>Six Sigma Financial Analyst:</i>	<i>Other:</i>
	_____ <i>date</i>	_____ <i>date</i>	_____ <i>date</i>

Improve

Improvement Context Analysis

Benchmarking:

Determine the competition performance (or other business) versus the process you are working on and also versus customer requirements.

Other Considerations:

Describe the potential impact of:

- New Technologies
- Regulation changes
- Politics / Economy

What improvement do you want for your process ?
Refine project goal according to possible multi generations - MGPP

Conclusions:

Solution Selection Matrix Select among Possible Using Objective Criteria

	Criteria	Weight	Solution A		Solution B		Solution C	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
1				0		0		0
2				0		0		0
3				0		0		0
4				0		0		0
5				0		0		0
6				0		0		0
TOTAL				0		0		0

Where **weight** and **scores** on following scale : High = 9, Medium = 3 and Low = 1.

Conclusions:

Criteria are the requirements that you want your solution to meet. Some criteria are “must” criteria. Any solution that does not meet even one of the “must” criteria must be eliminated

Solution Selection Matrix

	Criteria	Weight	Solution A		Solution B		Solution C	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
1	cheap solution	3	3	9	9	27	9	27
2	quick to implement	3	9	27	1	3	3	9
3	high impact on CTQs	9	9	81	9	81	9	81
4	compliant	9	1	9	9	81	9	81
5				0		0		0
6				0		0		0
TOTAL				126		192		198

Where **weight** and **scores** on following scale : High = 9, Medium = 3 and Low = 1.

Example(s):

Example :

Solution A = outsource all data processing

Solution B = development of our own software

Solution C = buy a software and adapt to our needs

It seems here that solution C is the most satisfying. B also can be considered as an option.

Criteria are the requirements that you want your solution to meet. Some criteria are “must” criteria. Any solution that does not meet even one of the “must” criteria must be eliminated

Describe Solution(s) Selected

Solution Description	Responsibility

New Process Map ("Should Be")

Owner:

	Step						
	Who						
							<p>You may think of piloting part or totality of your new process.</p>

Tips: Attach extra pages or do portrait...do not squeeze/wrap around, as the visual will be misleading.
 Keep the flow and level of detail (what vs. how) consistent. Number Process Steps to use in FMEA.

Attach any procedures Needed

Implementation Plan

Implementation Plan Example

Item	Responsibility	Projected Completion Date	Completion Date
Communication Plan			
Develop Communication Plan			
Identify Training Needs			
Communicate Policies			
Implement Communication Plan			
Resource Plan			
Determine Total # of People needed			
Determine Salaries			
Develop Job Description			
Post Job Listing			
Determine who (look at temps)			
Allocate Office Space			
Determine Equipment Needed			
Acquire/Install Equipment (Fax)			
Develop Telephone Menu			
Process Simulation			
Collect Data (PS, Volume)			
Develop Detailed Process Maps			
Input Process into "Model Process"			
Risk Management			
Identify Back-Up Plan			
Identify and Resolve "What Could Go Wrong"			
Control Plan			
Identify Measures			
Develop Plan			
Implement Plan			
Budget			
Develop Cost Benefit Analysis on Options			
Review and Decide on Option			
Determine Interim Fix (Develop & Implement Shell)			
Determine Billing Policies (No Billing Data No Class)			

A Gantt chart and Stakeholder Analysis may be useful to support successful implementation

Cost/Benefit Analysis

	Description	Assumptions used	Amt
Costs	Cost #1		
	Cost # 2		

Improvements:	Improvement #1		
	Improvement #2		

Net (Cost) Benefit	
---------------------------	--

Net (Cost) Benefit = Total Benefits less total costs

☉ Remember, decisions should not be made only on financials.

☉ There may be some very important “soft” benefits to consider.

☉ The cumulative cost benefit defines the time period for payback.

Improve Tollgate Review

GENERATING (AND TESTING) POSSIBLE SOLUTIONS

- ⦿ Possible solutions generated and tested

SELECTING THE BEST SOLUTION(S)

- ⦿ Optimal solution selected based on testing and analysis
- ⦿ New and improved process ('should be') maps developed. Cost/benefit analysis of optimal solution(s)
- ⦿ Small-scale pilot for proposed improvement(s)
- ⦿ Pilot data collected and analyzed
- ⦿ Improved process ('should be') maps modified based on pilot data and analysis
- ⦿ Project impact on utilizing the best solution(s)

DESIGNING IMPLEMENTATION PLAN

- ⦿ Solution implementation plan established, including schedule/work breakdown structure, resources, risk management plan, cost/budget, and control plan
- ⦿ Contingency plan established.

Signatures	Six Sigma Leader: _____	Sponsor: _____	Process Owner: _____
	Black/Green Belt: _____ <i>date</i>	Six Sigma Financial Analyst: _____ <i>date</i>	Other: _____ <i>date</i>
	_____ <i>date</i>	_____ <i>date</i>	_____ <i>date</i>

Control

Monitoring

For your Key Output Measure Y and all critical Xs, organise a monitoring plan :

- draw a **data collection plan**
- select **appropriate control chart** or graphical display according to data type and sample size
- follow up data collection and **chart interpretation with process owner** (coaching)

Process Management Chart

Process Name: _____

Process Owner: _____

Date: _____

Revised: _____

Process Map			Check The Process				Act/Fix Problem	
Area 1	Area 2	Area 3	Output Measure	Input/ Process Measure	Standard	Method for Sampling/ Recording Data	Immediate Control/Fix	Process/System Improvement
<p>This example combines a deployment flowchart with a response plan. It provides a concise way to monitor your project.</p>								<p>Work closely with your Sponsor to ensure a monitoring plan that identifies a process owner and ensures that the gains are held over the long term.</p>

Control Summary

**Sigma and DPMO
Before and After Measurements**

Six Sigma Net Income

**Translation opportunities
identified**

Lessons Learned

Control Tollgate Review

MONITORING PLAN

- ⦿ Control plan in place for sustaining improvements (short and long-term)

PROCESS STANDARDIZATION

- ⦿ New process steps, standards, and documentation are ingrained into normal operations

DOCUMENTED PROCEDURES

- ⦿ Operating procedures are consistent
- ⦿ Knowledge gained on process is shared and institutionalized

RESPONSE PLAN

- ⦿ Response plans established, understood, and deployed

TRANSFER OF OWNERSHIP (PROJECT CLOSURE)

- ⦿ Transfer ownership and Knowledge to process owner and process team.
- ⦿ Coaching for process reviews planned over XX months

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	_____	_____	_____
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