



Cummins, Inc.

Supplier Six Sigma Reference Guide

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Purpose of Reference Guide

- This booklet has been created to provide a reference for Cummins Employees and Cummins' Suppliers on Cummins' Supplier Six Sigma Program.





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Cummins' Six Sigma Overview

- What is Six Sigma at Cummins?
- How is Six Sigma Different?
- Why Six Sigma with Suppliers?





What is Six Sigma at Cummins?

- Broad based quality and improvement methodology that permeates every aspect of our business using a statistical and qualitative tool sets
- Over 1,200,000 hours of Six Sigma employee training and more than 16,000 projects closed in the first 10 years
- Over \$3B in savings in the first 10 years
- Reduces variation, eliminates waste and ensures highest levels of quality





What is Six Sigma at Cummins?

- Through aggressive application of this methodology, we have been able to solve business issues that have resisted solutions for years. Six Sigma is an exciting improvement to existing improvement processes, with the inclusion and emphasis on:
 - Project priorities and selection of projects.
 - Establishment of targeted savings for projects.
 - Business leader ownership for targeted results of projects.
 - Data collection and the use of statistical tools.
 - Sustaining the gains through functional ownership and audit of control plans.
 - Involvement of everyone in the organization





What is Six Sigma at Cummins?

- Six Sigma is vital part of the Cummins Operating System (COS) and exists in all aspects of our work
 - DMAIC (Process Improvement Methodology or Process Six Sigma)
 - DFSS (Design for Six Sigma)
 - TDFSS (Technology Development for Six Sigma)
 - CFSS (Customer Focused Six Sigma)
 - SFSS (Supplier Focused Six Sigma)
 - ERSS (Enterprise Risk Six Sigma)
 - Community SS (Community Focused Six Sigma)





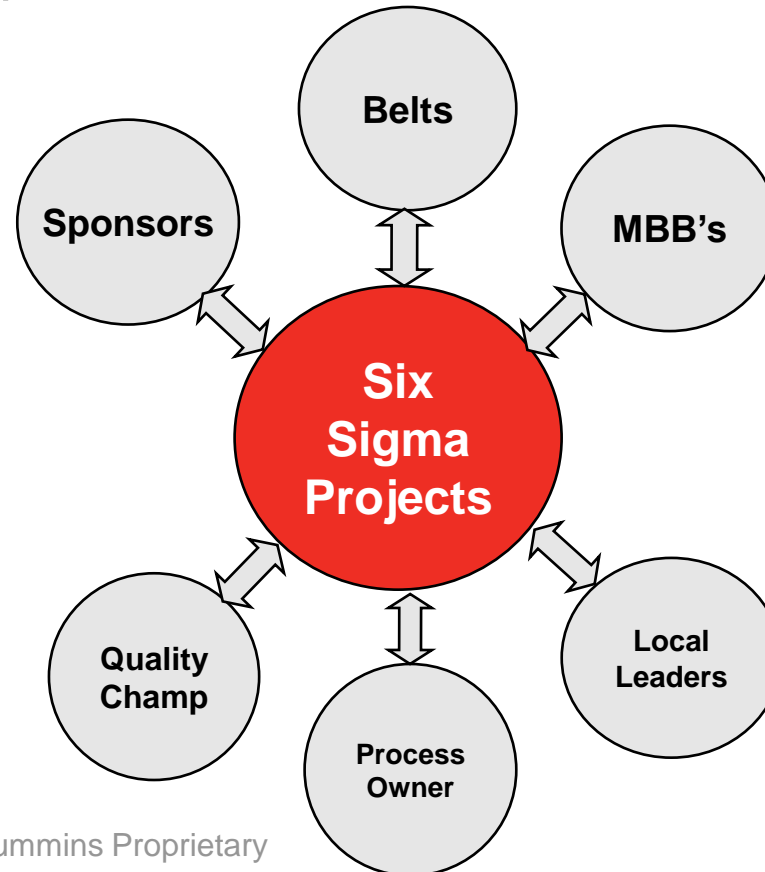
How is Six Sigma Different?

- Primary difference to other improvement methodologies
 - Structure
 - Discipline
 - Accountability for results
- Not a “Program of the Month”
- Yields significant dollar savings over a relatively short period of time
- Considers counterbalancing metrics
- Project sponsorship
- Control Plans and process owners



Six Sigma Structure

- Six Sigma is a team effort and the support structure is centered around the projects.
 - Roles and responsibilities are discussed later in this document





Why Six Sigma with Suppliers?

- A large percentage of Cummins' costs include services and material (direct and indirect) purchased from our supply base.
 - This presents significant opportunities for cost, quality and delivery improvements
- Cummins has proven that Six Sigma is an effective improvement methodology which delivers results
- Cummins expects our suppliers to continuously improve and highly recommends adopting Six Sigma as a primary methodology.
 - Helps maintain a healthy and sustainable supply base
 - Allows Cummins and our Suppliers to speak a common language with regard to improvement efforts.





Supplier Six Sigma Summary

- Eligibility for participation in Supplier Six Sigma
- Supplier Six Sigma Process Overview
- Supplier Six Sigma Roles and Responsibilities





Eligibility to Participate in Supplier 6-Sigma

- Cummins Supplier Six Sigma is offered to all Cummins' suppliers (Direct and Indirect).
- Given the magnitude of Cummins entire supply base, it is recognized that we cannot provide all elements of the program effectively to the total supply base.
- Cummins Business Units each have methods of identifying and prioritizing Supplier Six Sigma activity.
- Purchasing representatives and Quality Champions, using the methods identified by their business, will determine if a supplier is eligible to participate in the Cummins' Supplier Six Sigma Program.





Eligibility to Participate in Supplier 6-Sigma

- To participate in Cummins' Supplier Six Sigma program, the project must have direct benefit to Cummins
 - Some typical project examples (but not limited to)
 - Improved Quality
 - Quality as delivered to Cummins
 - Process Capability
 - Warranty with Cummins' Customers
 - Internal quality at the Supplier (Right First Time, etc)
 - Product design to meet technical requirements
 - Improved Delivery
 - Leadtimes
 - On-Time Delivery
 - Capacity
 - Reduced Cost
 - Internal scrap at the Supplier
 - Productivity
 - Resourcing of components
 - Implementation of a Cost Reduction Process





Supplier Six Sigma Process Overview

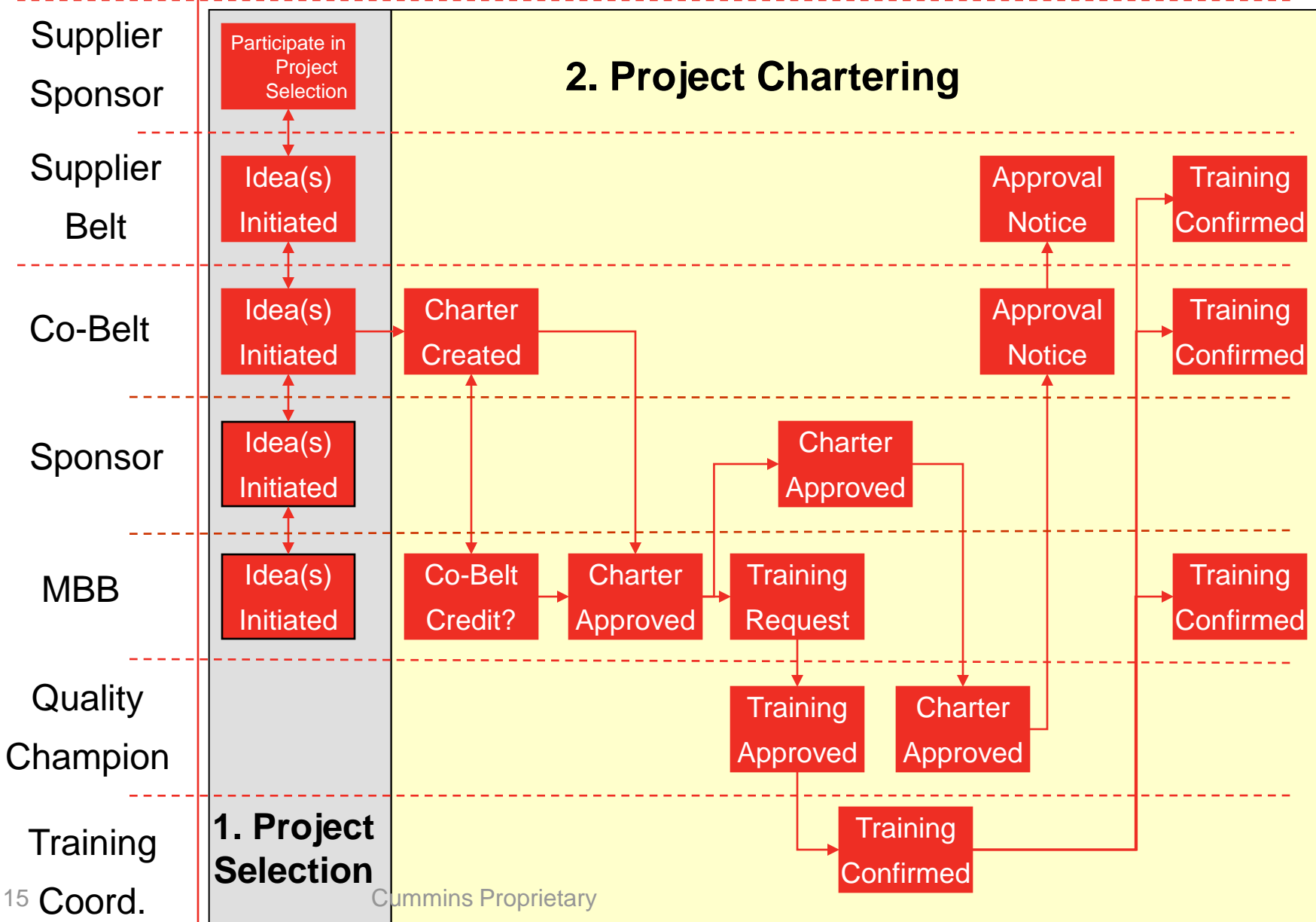
- The general process is defined in the next two slides and consists of four stages
 1. Project Selection
 2. Project Chartering
 3. Training
 4. Project Execution and Closure
- Each Stage will be explained further later in this document



Supplier Six Sigma: Cross-functional Process Map

Supplier

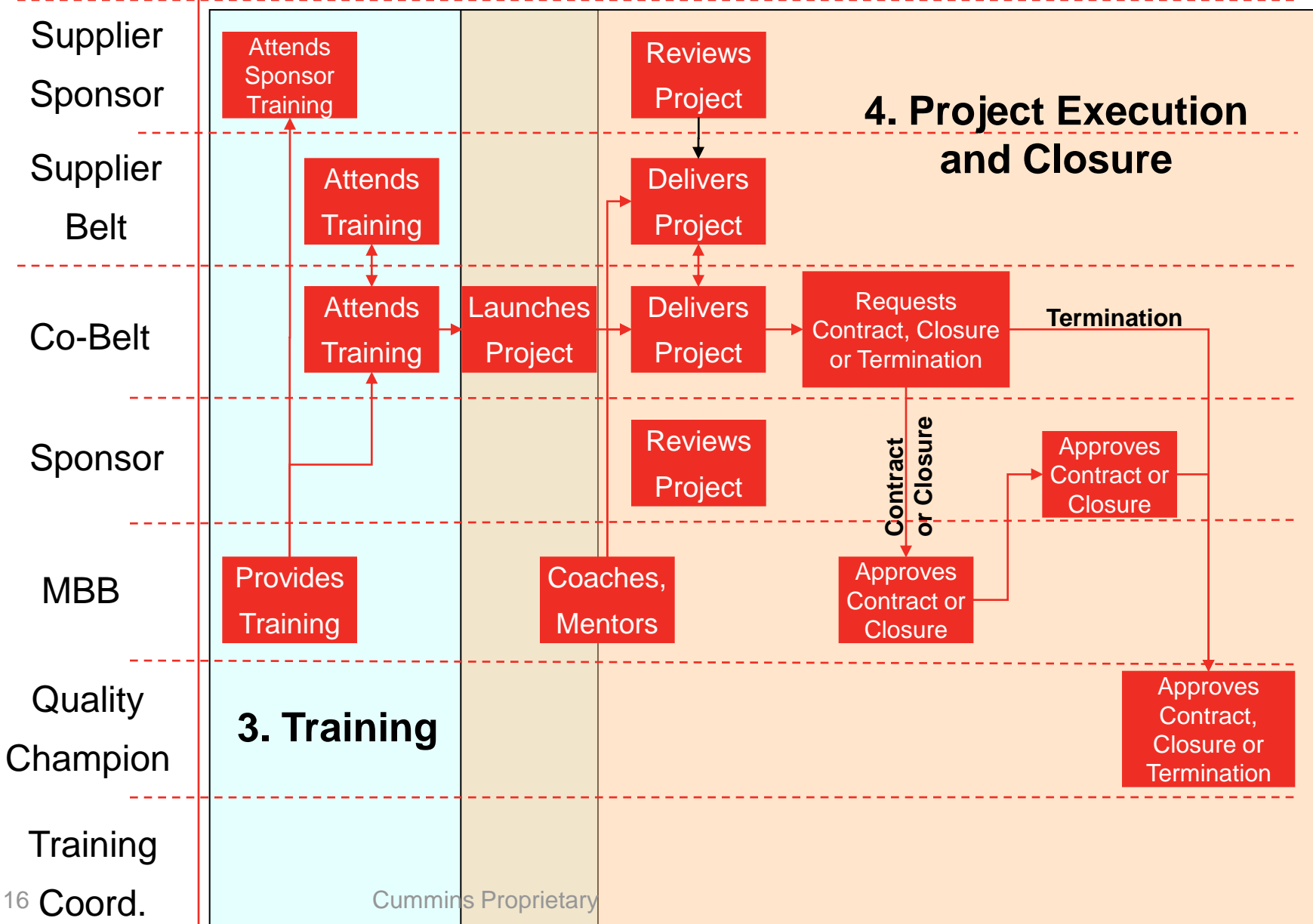
Cummins



Supplier Six Sigma: Cross-functional Process Map (cont'd)

Supplier

Cummins





Supplier Six Sigma Roles

- The following roles are key in the success of Supplier Six Sigma Projects
 - Supplier Belt
 - Supplier Sponsor
 - Cummins Co-Belt
 - Cummins Sponsor
 - Master Black Belt
 - Quality Champion
 - Process Owner
 - Local Leaders





Responsibilities of Supplier Belt

1. Lead and successfully close a Six Sigma project
2. Attend all of the required training sessions, if registered in a Cummins training launch
3. Lead/Participate in Master Black Belt Reviews
4. Utilize the 'Project Tracker' to communicate progress
5. Provide updates to the Cummins Sponsor/Co-Belt highlighting any issues or concerns
6. Provide data to Cummins' Co-Belt to load into the Cummins database
7. If requested, agree to present your project results to Cummins upon successful completion of the project





Responsibilities of Supplier Sponsor

1. Participate in project selection process and project charter development
2. Identify supplier team members
3. Remove roadblocks to help the belt and team stay on schedule and meet goals of the Six Sigma projects
4. Mentor and coach belt on areas where you have expertise related to the project
5. Understand the basic Six Sigma process by attending Sponsor training
6. Hold regular project reviews and monthly MBB reviews with belt
7. Accountable for project success or failure





Responsibilities of Cummins' Co-Belt

1. A Cummins Six Sigma Co-Belt will be assigned to work with the supplier belt
2. Attends training with Supplier Belt if not previously trained
3. Keeps the Cummins' Six Sigma database updated with all relevant files
4. Helps coordinate project reviews with the Master Black Belt
5. Receives certification credit, depending on the nature of the project and the level of participation required by the Co-Belt
6. Determine project savings in agreement with Supplier Belt/Sponsor and Cummins' Financial Controller





Responsibilities of Cummins' Sponsor

1. Participate in project selection process and project charter development
2. Identify Cummins' team members
3. Remove roadblocks to help the belt and team stay on schedule and meet goals of the Six Sigma project
4. Mentor and coach Co-Belt on areas where you have expertise related to the project
5. Understand the basic Six Sigma process by attending Supplier Six Sigma Sponsor training if necessary
6. Hold regular project reviews and monthly MBB reviews with Cummins' Co-Belt
7. Accountable for project success or failure
8. May be the same individual as the Cummins' Co-Belt





Responsibilities of Master Black Belt

1. Deliver Six Sigma training to Supplier Belt and Cummins' Co-Belt
2. Deliver Six Sigma Sponsor training to Supplier and Cummins' Sponsors
3. Provide Technical Conscience of Six Sigma to ensure consistency and proper use of the methodology and tools
4. Conduct Project Reviews with Supplier Belts and Cummins' Co-Belt
5. Mentor Belt, Co-Belt and Sponsor as necessary
6. Assist Local Leaders in developing project ideas and charters





Responsibilities of Quality Champion

1. Approve Six Sigma training requests
2. Approve Six Sigma charters, contracts, closures and terminations
3. Ensure Six Sigma Standards are followed
4. Monitor Six Sigma Measures and drive improvements
5. Assist BU leadership in project generation and prioritization





Responsibilities of Process Owner

1. Own project Control Plan and monitor performance of Six Sigma project outcome after closure.
2. Participate as team member and/or Sponsor of the Six Sigma project



Responsibilities of Local Leaders

1. Establish Business Goals and Objectives
2. Select Projects that align with Business Goals and Objectives
3. Establish Project Priorities to ensure success of the project
4. Select the Sponsor of the project and ensure commitment of the Sponsor for the duration of the project
5. Select the belt to lead the project and ensure commitment of the belt for the duration of the project
6. Assist in the savings estimates for the project charter and verify savings prior to project contract and closure.
7. Audit Control Plans to ensure on-going success of the closed project



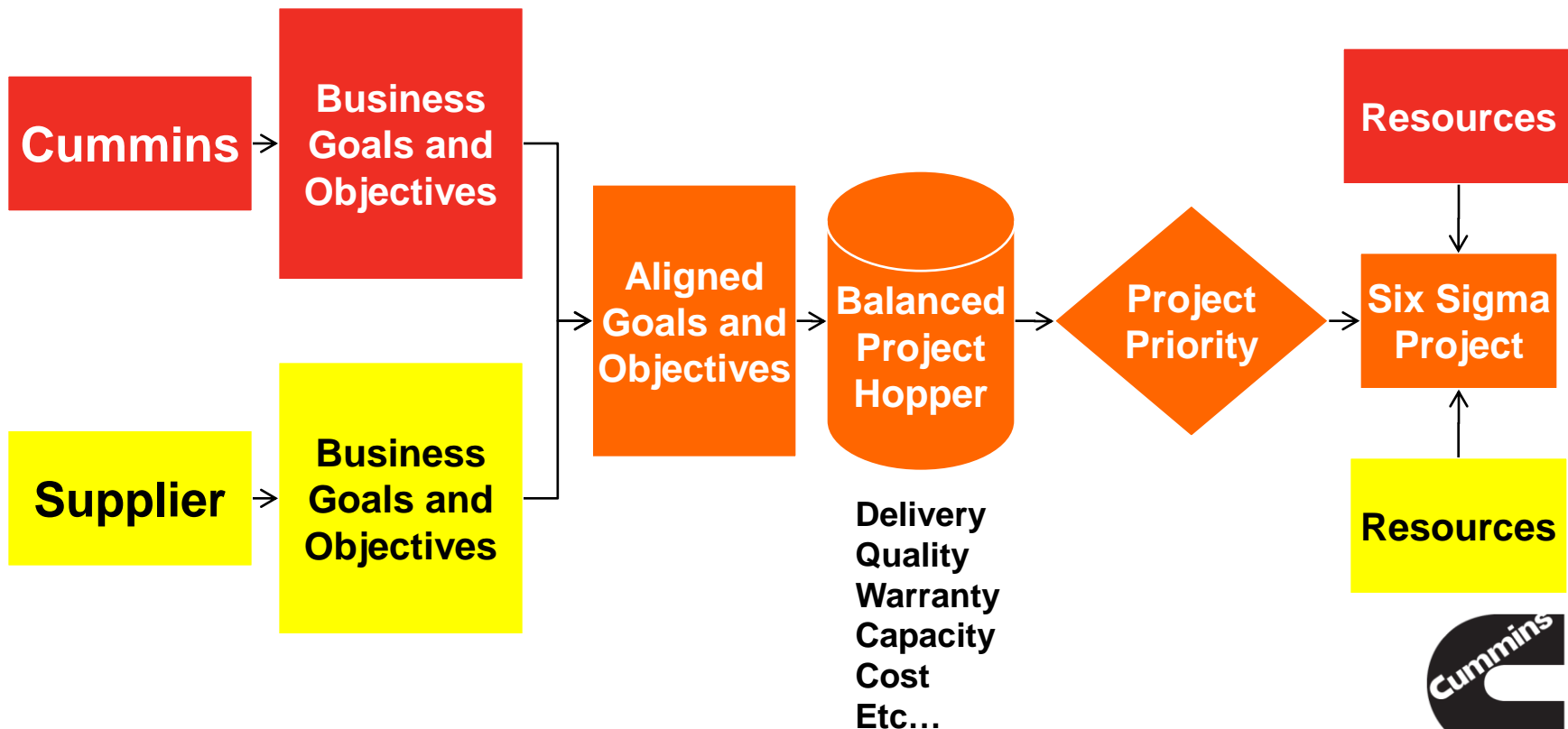
Project Selection

- Aligning Projects with Goals and Objectives
- Goal Tree Use and Creation of a Project Hopper

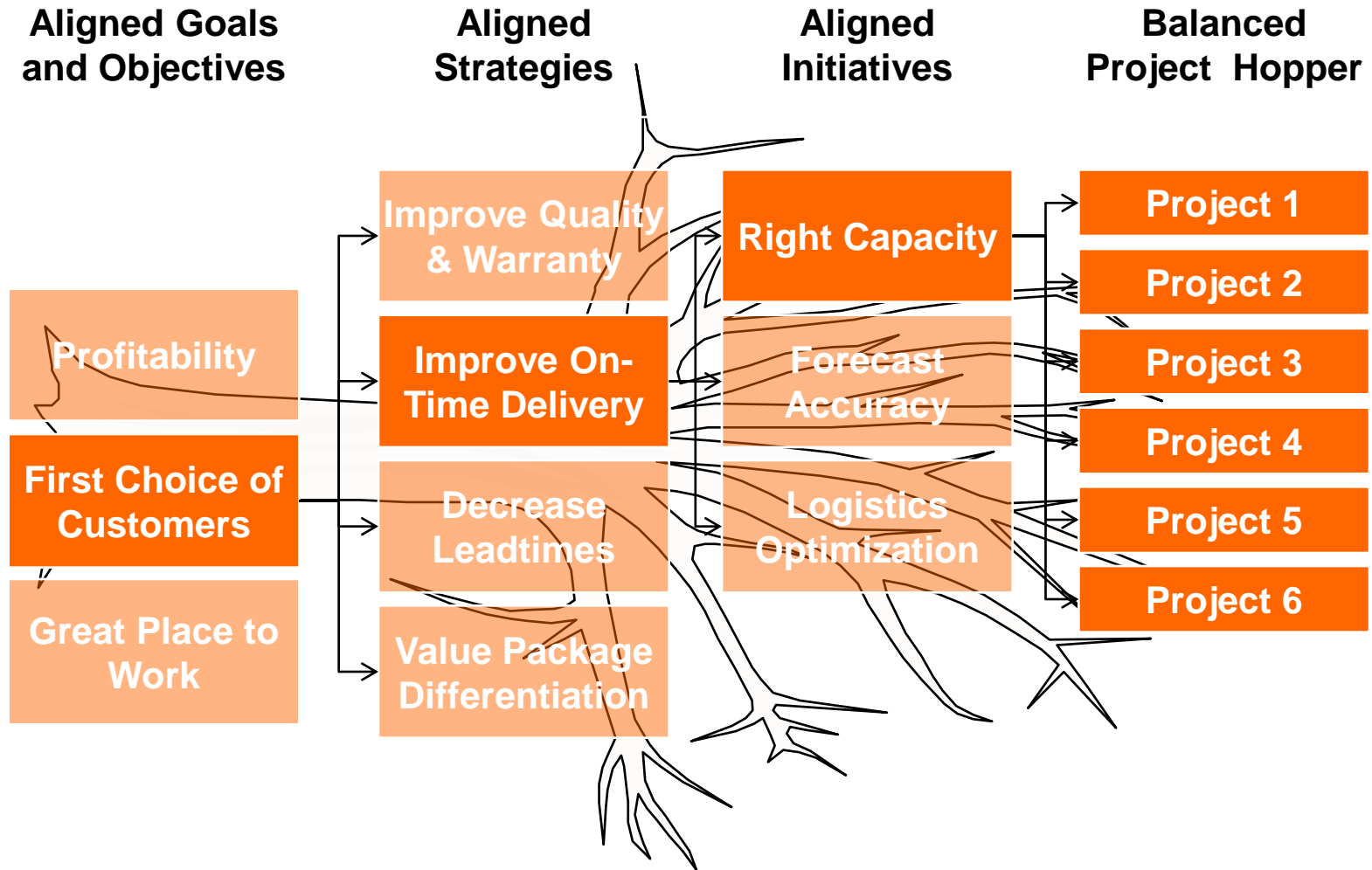


Aligning Projects with Goals and Objectives

- A successful Six Sigma project is one that aligns with both the Supplier's and Cummins' Business Goals and Objectives.



Goal Tree Use and Creation of a Project Hopper





Project Chartering

- Creating Project Charter
- Defining the Objective Statement
- Supply Six Sigma Savings Guidelines



Creating the Project Charter

- The Project Charter consists of the following elements
 - The Objective Statement
 - Benefits (financial and non-financial)
 - Resources
 - Schedule
- The Project Charter is used to communicate the project information between Cummins and the Supplier
 - This form (see following page) should be completed, reviewed and agreed to by the Supplier and Cummins
 - Upon agreement, the Cummins' Co-Belt will complete the project charter with the Cummins' Six Sigma Database and submit for approval

Project Description (Title here)

Objective Statement:

Reduce/optimize/increase _____ (project y)
from _____ (current level)
to _____ (good level)
for _____ (specific area) while
reducing/increasing/holding constant _____
_____ (constraining Y's)

Benefits:

Include \$ benefits

Project Team:

Supplier Belt:

Supplier Sponsor:

Cummins' Co-Belt::

Cummins' Sponsor:

Team members:

MBB:

Schedule:

Measure: _____ Improve: _____

Analyze: _____ Control: _____

Closeout: _____

Defining the Objective Statement

- The Objective Statement is a summary of the problem and objective of the project
 - The statement often contains constraining objectives to avoid unintended results
- The Objective Statement should be SMART
 - Specific
 - Measureable
 - Action oriented
 - Realistic
 - Time bound (default is < 180 days)
- Example:
 - Increase First Time Right on Gear Housing Machining Line from 87% to 95% while not impacting productivity, customer quality and delivery



Supplier Six Sigma Savings Guidelines

- The general guidelines for determining the savings benefit to Cummins are as follows:
 - PBIT (Profit Before Interest and Taxes)
 - For a project that contributes towards a contractual (or non-contractual if applicable) cost reduction, the contribution of the project savings should be determined and claimed as Six Sigma **PBIT** savings.
 - For a project that results in direct benefits at a Cummins facility (such as reduced downtime, inspection, etc), the project savings should be determined and claimed as Six Sigma **PBIT** savings. There may be additional savings that could be claimed as **Cost Avoidance**.
 - For a project that results in needed capacity increase, the savings could be claimed as 6-Sigma **PBIT** savings. The Cummins' Financial Controller should be consulted on these projects to determine the savings.
 - Avoidance
 - For a project that avoids a cost increase, the savings should be determined and claimed as 6-Sigma savings **Cost Avoidance** savings.
- In all cases, the savings calculations should be made clear in the project documentation and agreed to by the Cummins' Financial Controller.





Training

- Training Overview
- Training Schedule
- Training Content





Training Overview

- Once a project charter is generated and approved, training will be scheduled according to the local process.
- The training is provided free of charge. Laptop with Minitab software is required.
- Suppliers of both Indirect and Direct materials and services are eligible to attend to Six Sigma Training.
- Suppliers are encouraged to attend 'Supplier Designated' training launches if they are available for the business area. The Cummins' Purchasing Representative for each supplier shall be contacted for training availability.
- Six Sigma training is offered throughout the world within Cummins' facilities. If supplier designated training launches are not available, suppliers may be scheduled to attend any Cummins Six Sigma training launches with Cummins' participants.



Training Schedule

- Contact your Purchasing Representative regarding the Six Sigma training schedule
 - This schedule changes each year and there are frequent changes during the year based on demand
- The DMAIC training schedule consists of 3 weeks of training spread out over 3 months.
 - Example schedule DMAIC training is shown below

Launch / Event	Master Black Belt Launch Coordinators (A)	B Instructor	C Instructor (MBBITs only)	Training Launch	Dates
<i>COL 10 10</i>					
15 slots for suppliers	<i>Steve Reedy</i>	<i>Karen Cecil</i>	<i>Anne Trobaugh</i>	Week 1	August 30-September 3, 2010
	<i>Steve Reedy</i>	<i>Karen Cecil</i>	<i>Anne Trobaugh</i>	Week 2	October 4-8, 2010
	<i>Steve Reedy</i>	<i>Kaaren Cecil</i>	<i>Anne Trobaugh</i>	Week 3	November 8-12, 2010

Training Schedule

- The DMAIC training schedule consists of the 3 weeks of training.
- The DFSS training schedule consists of 4 weeks of training.
 - The project MBB will provide guidance on training needs
 - Example schedule for DMAIC is shown below

Launch / Event	Master Black Belt Launch Coordinators (A)	B Instructor	C Instructor (MBBITs only)	Start Date	End Date
COL 13 03					
Week 1	Patrick Gedeon	Waheed Mohammed/ Christopher J Walker		February 18 - 22, 2013	
Week 2	Patrick Gedeon	Waheed Mohammed/ Christopher J Walker		April 01 - 05, 2013	
Week 3	Patrick Gedeon	Waheed Mohammed/ Christopher J Walker		May 06 - 10, 2013	
COL 13 03S (Supplier Focused Launch)					
Week 1	Jay Grider	Carl Good/ Guadalupe Trujillo		March 04 - 08, 2013	
Week 2	Jay Grider	Carl Good/ Guadalupe Trujillo		April 15 - 19, 2013	
Week 3	Jay Grider	Carl Good/ Guadalupe Trujillo		May 20 - 24, 2013	

Training Content

■ DMAIC Training Content

■ Week 1 Content

- Minitab
- Basic Statistics and Graphs
- Intro to Statistical Process Control
- Process Mapping
- Cause and Effect Matrix
- Failure Mode and Effects Analysis
- Fault Tree Analysis
- Measurement System Analysis
- Process Redesign
- Voice of Customer/Voice of Business
- Cross Functional Process Mapping
- Planning for an Interview
- Interviewing Skills

■ Week 2 Content

- Hypothesis Testing
- Capability Analysis
- Multi-Vari 1 and 2
- Chi-Square
- Regression
- KJ
- Quality Function Deployment (QFD)
- Analysis of Variance (ANOVA)
- Sample Size
- Rifle Shot
- Championing Change

■ Week 3 Content

- Intro to Experimentation
- Full Factorial
- Fractional Factorial
- Planning Experiments
- Lean and Functional Analysis
- Creative Innovation
- Failsafing
- Procedures
- Control Plans
- Case Study

DFSS Training Content

Week 4	Week 3 Review	Empirical Tolerancing	Robust Design	Reliability	Regression with Life Data	ALT	ESW / Control Plan		
Week 3	Week 2 Review	Confidence Intervals, Hypothesis Testing t-Tests	ANOVA	Correlation / Regression	DOE: Full Factorial Fractional Factorials Multi-level DOEs	Response Surface & Multiple Response Optimization			
Week 2	iDesign FMEA (8 hr)	FTA	Week 1 Review (1 hr) MINITAB Intro Basic Stats Graphical Techniques	SPC	Capability	MSA	Statistical Tolerancing / Monte Carlo	CPM Week 2	DFMA
Week 1	DFSS/DMAIC Overview & Space Tower	Process Mapping With C&E	FMEA	VPI	CFSS	Concept Eng: VOC, KJ, QFD, Syst Level HOQ, Concept Gen., Pugh Process		Critical Parameter Mgmt	Product Portfolio



Common DFSS / DMAIC Training



Not in DMAIC



Project Execution and Closure

- Project Execution Expectations
- Project Contract/Closure
- Project Termination



Project Execution Expectations

- Once you have held your 1st team meeting and/or start your project, launch your project charter.
 - If you have just attended your 1st week of training, the project should be launched within 2 weeks following training.
 - Official Launching of the project must be done by the Cummins Co-Belt with the Cummins' Six Sigma Database
- It is important to Launch your charter when you start the project. This provides visibility to the Master Black Belt that the project has started and project reviews will be planned.
- NOTE: Any manufacturing process or product design change requires notification and approval by Cummins via the Supplier Change Request process

Project Execution Expectations

- Basic project management skills will be the key in the successful completion of your project in the least amount of time. The following recommendations may be useful:
 - Dedicate time to the project
 - Completing a 6-Sigma project requires effort. Belts should make sure to dedicate adequate time each week to keep the project on schedule. If this is an issue, proactively discuss it with the project Sponsor.
 - Have regular team meetings
 - Regular team meetings are important in keeping the team engaged and the project on schedule. Weekly meetings tend to work well until the project is through the Measure Phase. After the Measure phase, it may be appropriate to meet less frequently. This is a decision for belt and the team.

Project Execution Expectations

- Recommendations continued
 - Engage your Master Black Belt
 - The role of the MBB is to help the belt navigate through the Six Sigma Roadmap/Tracker. This includes providing guidance on which tools can offer the most value for the project and ensuring that the tools are used correctly. MBBs often can provide insight on projects beyond just the tools. Please note the early and frequent MBB engagement will increase your likelihood of successfully closing your project. Engage the MBB via regularly scheduled project reviews.
 - Additionally, the MBB can provide guidance regarding project termination if the belt has run into issues that cannot be resolved.
 - Engage your Sponsor
 - The role of the Sponsor is to help remove barriers that prevent the Belt from successfully delivering the project. Meet regularly with the project Sponsor to provide and update and ask for help when needed. It is always a good idea to invite the Sponsor to all the team meetings and reviews with the MBB.

Project Contract/Closure

■ Project Contract

- The contract has a similar structure to the charter. The difference between contract and charter is that the “charter” is a challenge given to a belt and the team. The “contract” is the belt’s response in terms of what they can/will deliver (supported by the team).
- A guideline to remain on schedule is to be at the contract stage at approximately 120 days. The key deliverable in order to Contract your project is that the key improvements need to be defined.
- The Master Black Belt will give individual guidance on when the project is ready to move to contract.
- Contract Approval process must be initiated by the Cummins’ Co-Belt within the Cummins’ Six Sigma database.



Project Contract/Closure

■ Project Closure

- The Project Closure process documents what the project has actually delivered.
- The Master Black Belt will give individual guidance on when the project is ready to close.
- Closure Approval process must be initiated by the Cummins' Co-Belt within the Cummins' Six Sigma database.





Project Termination

- There are many reasons for a Supplier Six Sigma project being terminated
 - Changes in priorities
 - Changes in personnel
 - Changes in business conditions
 - Etc.
- Due to the investment that Cummins has made in providing Six Sigma training and support, reimbursement of these costs will be requested if the project is terminated.





Miscellaneous

- Project Confidentiality
- Training/Materials Copyright Information
- Installing a Six Sigma Program at the Supplier





Project Confidentiality

- Project confidentiality is a vital part of the Supplier Six Sigma Program
- Cummins and each supplier involved will typically have confidentiality agreements in place. Confirmation of this agreement should be completed when the project is chartered.
- During training the supplier belt will interact with Cummins' belts and other supplier belts
 - It is unlikely that suppliers involved in training will have confidentiality agreements between themselves
 - Project confidentiality during training is accommodated via private reviews if requested by the belt. This request can be made for both Supplier projects and internal Cummins' projects
 - The training contents and exercises performed during training do not compromise confidentiality.
 - Suppliers with concerns regarding confidentiality are instructed to see their purchasing representative or training instructor/Master Black Belt
- All supplier six projects will be tracked in the Cummins' internal database. Confidentiality of material will be addressed during the project execution and closure.





Training/Materials Copyright Information

- The training material presented during the training is copyrighted to Sigma Breakthrough Technologies Inc. (SBTI) and other outside consulting firms to Cummins.
- Please adhere to United States copyright laws regarding the training material. Do not copy or distribute the training materials.
- If you are interested in using the training materials at your company, please contact Sigma Breakthrough Technologies Inc. (SBTI).





Installing a Six Sigma Program at the Supplier

- Cummins will not 'install' a Six Sigma program at your company.
- Cummins will provide initial training for suppliers to work improvement projects with Cummins.
- Cummins may be able to provide guidance on an approach to implement a Six Sigma program at the Supplier's company. However, Cummins will not provide resources to implement a Six Sigma program at the supplier.

