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Synergy Management Consulting Group

Synergy Coal Mining Case-studies
Developing Lean Six Sigma Capability to
Maximize Profits from Existing Operations



realising business benefits

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1 Developing Lean Six Sigma Capability

Lean Six Sigma Capability should ideally span the interfaces of

- Mining Operations
- Coal Handling and Processing
- Transport Logistics from mine to port
- Maintenance Support Services
- Alliance and Contractual Arrangements

to provide an integrated approach to manage **cost reduction and productivity improvement** embedded throughout the mining enterprise **with benefits often 10 x cost of program**

Some of Synergy's Process Management and Lean Six Sigma coal and other industry clients in Australia & Indonesia

Anglo Coal

Xstrata Coal

Bengalla Coal

Drayton Coal

Boggabri Coal

Muswellbrook Coal

Port Waratah Coal Services

NSW RailCorp

Zurich Insurance

Commonwealth Bank

Westpac Bank

PT Sucofindo

PT General Motors Indonesia

PT Garuda Airlines

PT Bouraq Airlines

PT Pelni National Shipping Line

PT Tyco Electronics Indonesia

PT Bank National Indonesia



Application of Synergy Lean Six Sigma in Coal Mining to achieve cost reduction and performance improvement

- **Optimise Tyre Life**
- **Optimise Fuel Usage**
- **Optimise Drill & Blast**
- **Improve Mine, Haul & Dump Operations**
- **Reduce Maintenance Costs**
- **Improve Equipment Availability**
- **Improve In Pit Coal Recovery**
- **Improve Preparation Plant Coal Recovery**
- **Improve overland & river Logistics**
- **Streamline Administration Processes**



This is achieved through Sustainable Process Improvement

3 Achieving Sustainable Process Improvement

Process Management is the activity of mapping, improving and adhering to processes.

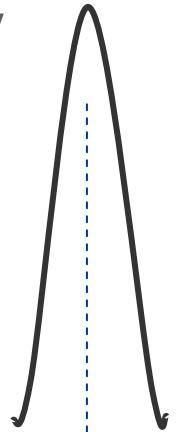
- **Delivers the best \$ value for investment (often >>10x)**

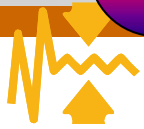
Lean and Six Sigma are proven process management and process improvement methodologies

- **Lean** to simplify processes and reduce cost by identification and eliminating Non-Value Added activities (and duplication) in Processes

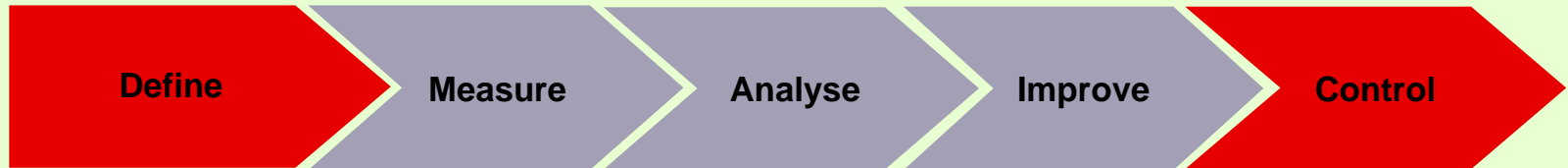
- **Six Sigma** to reduce variation and improve productivity and cost

- **Quality Management** to lock in gains by adhering to processes and follow up to ensure they are permanent gains





Six Sigma Method



- Define the problem & improvement opportunity
- Define customer requirements
- Define current process

- Identify what to measure
- Understand variation in processes (not average)
- Determine baseline

- Analyse data and process
- Develop hypothesis around root causes
- Validate root causes via data analysis

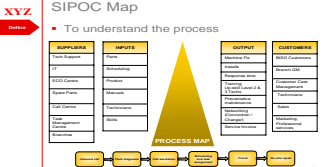
- Generate improvement ideas based on root causes
- Evaluate & select optimal solution
- Pilot changes

- Review pilot results
- Modify solution if required
- Roll out solution
- Closure

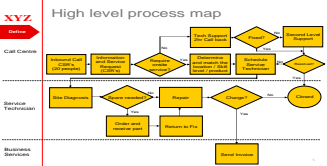
Field Workforce Productivity

- Productivity is low
- Objective to increase daily task rate by 0.5 tasks / day (= \$1.7m/day)

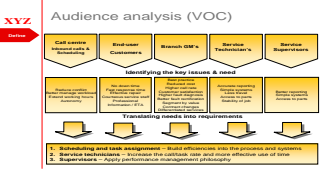
SIPOC map



Define current process

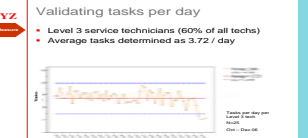


Voice of customer

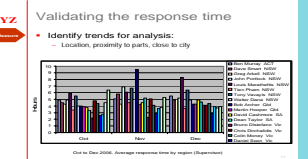


Identify what to measure

- Understand the variation in the processes (Not averages)
- Determine the baseline
- Validate task rate

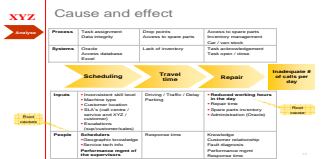


Validate response time



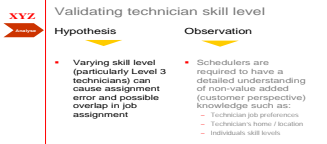
Analyse the data and the process

Cause & Effect



Validate root causes via data analysis

Validate skill level



Validate start times



Hypotheses

Generate improvement ideas for root causes

- Deploying Auto scheduler
- Implement one consistent SLA

Drive consistent level of skill (for Level 3 Techs, then across the board)

- Supervisors change from support to delivering perform. mgmt
- Evaluate optimal solution

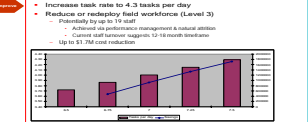
Increase task rate to 4.3 tasks per day

Reduce or redeploy field workforce (L3), by up to 19 staff

Current staff turnover suggests 12-18 month timeframe

\$1.7M cost savings

Cost benefit analysis



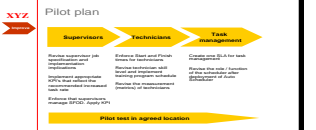
Pilot the changes

Review the pilot results

- Recommendations
- Increase technician productivity
 - A change communication plan required:
 - Does change in service call rate culture?
 - Service tasks to be automatically assigned
 - Minimal negotiation (Techs / Scheduler / Supervisors)
 - Outline increased call rate expectations
 - Set benchmarks (Team, State, Country)
 - Increase call rate KPI in the BSC
 - Enforce the earlier start program
 - Ensure compliance of process
 - Reward over achievement
 - Implement a reward program

Modify the solution if required

- Decide controls
- Revise SOPs
- Audit compliance
- Roll out the solution



Closure

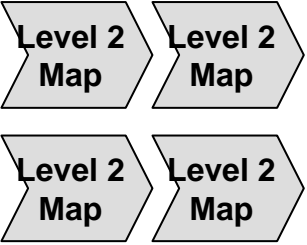
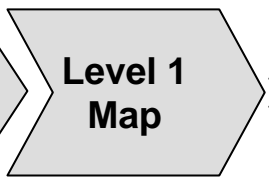
5 Examples of Synergy Lean Six Sigma Applications



Bank National Indonesia Six Sigma Overall Framework

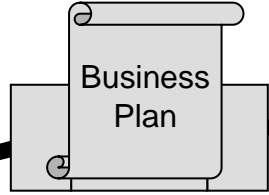


Define Customer Outcomes



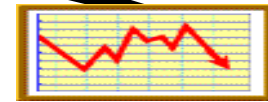
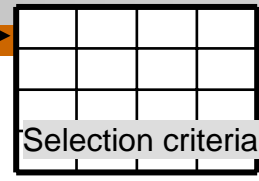
Update maps and SOP

Select processes that incorporate Operations tasks



Define process outcomes, outputs, inputs and steps.

Define



Define critical to customer KPI's. Measure process performance

Measure



Select projects



Scope, determine level & define project

Analyse



Measure problem and confirm scale of opportunity

Improve

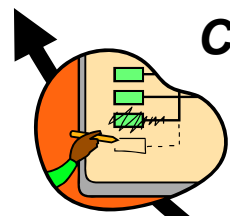


Develop and prove solution(s)



Assess and confirm causes of problem

Control

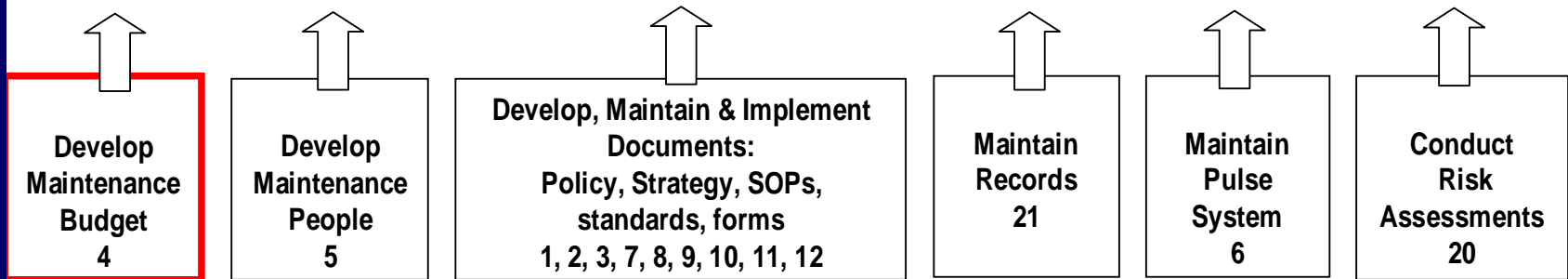
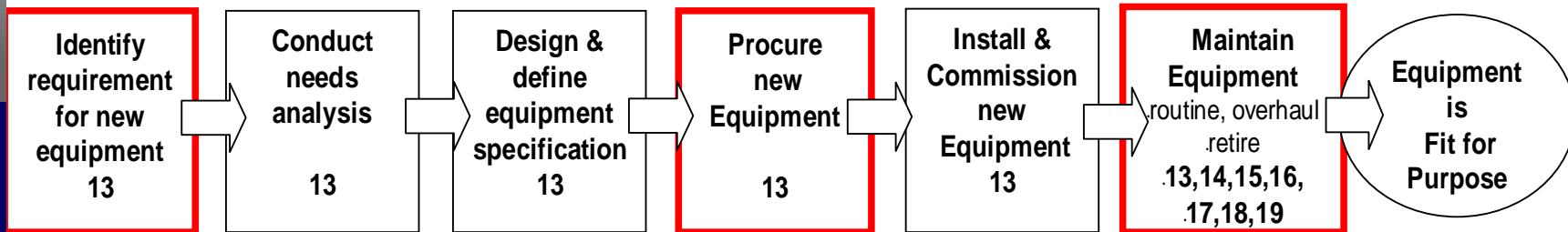


Implement and control changes to the process

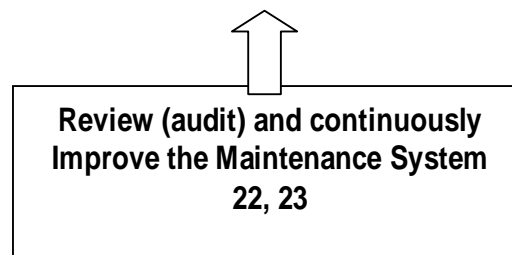


Which parts of maintenance process contribute risk to tyre process?

CORE PROCESS of EQUIPMENT LIFE CYCLE



SUPPORT PROCESSES



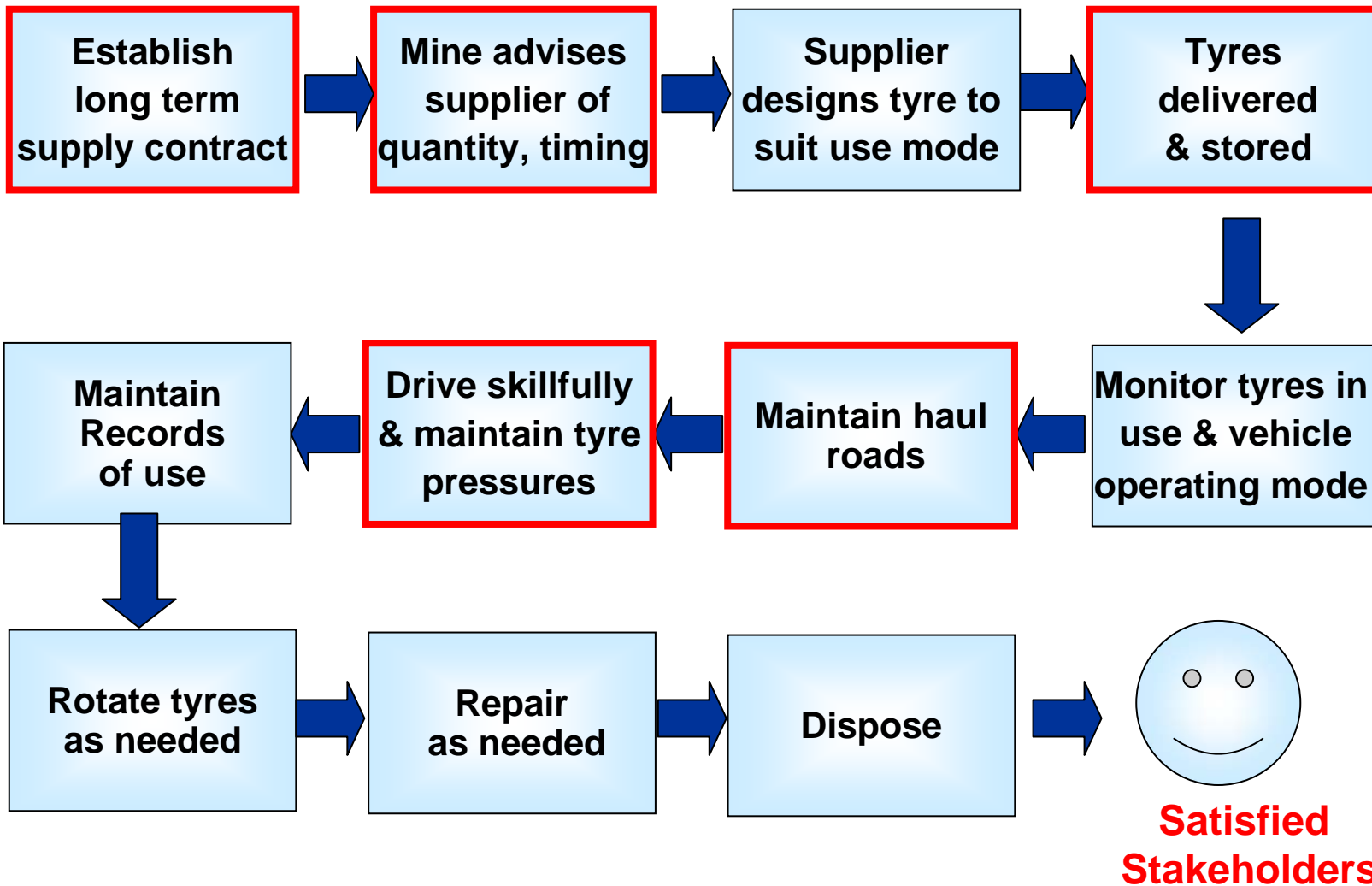
Numbers refer to tasks in the SOP

5 Examples of Six Sigma implementation OTR Tyres



Which Parts of the Tyre Process are at risk?

Tyres



5 Examples of Six Sigma implementation – Control by SOPs

SOP- 04- 42 Waste Dump Management

1. Objectives:

The safe dumping and positioning of material on Waste Dumps

2. Scope

To Identify, construct and manage waste dump in accordance with OHS standards

3. References:

Mine management Safety Plan

4. Definitions:

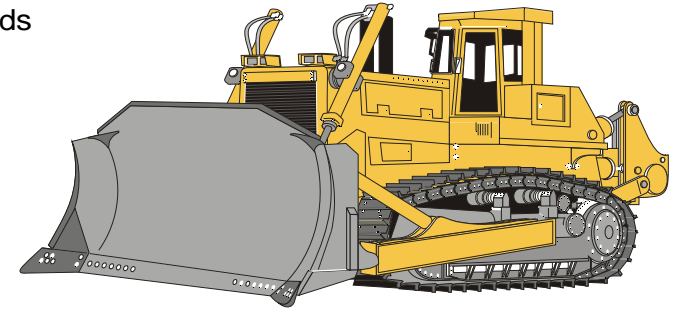
L/P = Lighting Plant

5. Performance Measures & Targets:

1. Dumps Constructed and Tipped to design
2. No lost time injuries

6. Procedure

Responsible	Task	Notes
Mining Engineer, Surveyor	1. Provide plan of dump design and location	<ol style="list-style-type: none"> 1. Identify area for dumps: <ul style="list-style-type: none"> ➤ Hot Dump ➤ Steel Dump ➤ Top soil and clay dumps ➤ Washery reject material 2. Determine drainage method and direction 3. Issue design and plans to show location of dump and levels 4. Design the dump taking into account the potential for spontaneous combustion by leaving a 10m wide access track around the toe of each 10m to 15m dump lift 5. Designate name/number for each dump based on RL & dump type
OCE/ Operator	2. Communicate Design	<ol style="list-style-type: none"> 1. Communicate dump design and location to operators working on or tipping on waste dumps



OCE/
Operator

1

Typical Tipping arrangement



OCE

2

Inspect Waste Dumps

End

1. OCE carries out regular inspections (operational, safety and environmental) inspections and takes corrective action:
 - dumps and tip heads
 - road conditions for accessing dump area
 - checks drainage profile to prevent ponding
 - uses on board GPS unit to check RLs
 - monitors temperature of hot ground
 - inspects for spon com
 - covers hot smouldering areas with inert material

6 Example of Communication and Control with Intranet

Microsoft Internet Explorer

Google

INTRANET HOME PAGE FOR INTEGRATED MANAGEMENT SYSTEM

ON THE JOB Think Safe Act Safe Work Safe GO HOME SAFE -

Core Processes

- Pre-mining & approvals P1
- Secure contracts P2
- Plan Mining P3
- Provide Pit Services P4
- Drill & Blast P5
- Mine, Haul & Dump P6
- Crush, Wash & Stockpile P7
- Deliver Coal P8
- Rehabilitate P9

Support Processes

- Manage Mining Operations P11
- Coordinate Technical Services P12
- Maintain Plant and Equipment P13
- Manage Risks (OH&S) P14a
- Manage Risks (Environmental) P14b
- Coordinate Training P15
- Coordinate Human Resources P16
- Manage Finance P17

System Support Process

- Measure, Review and Improve Performance P21
- Control Information – documents, records & IT P22

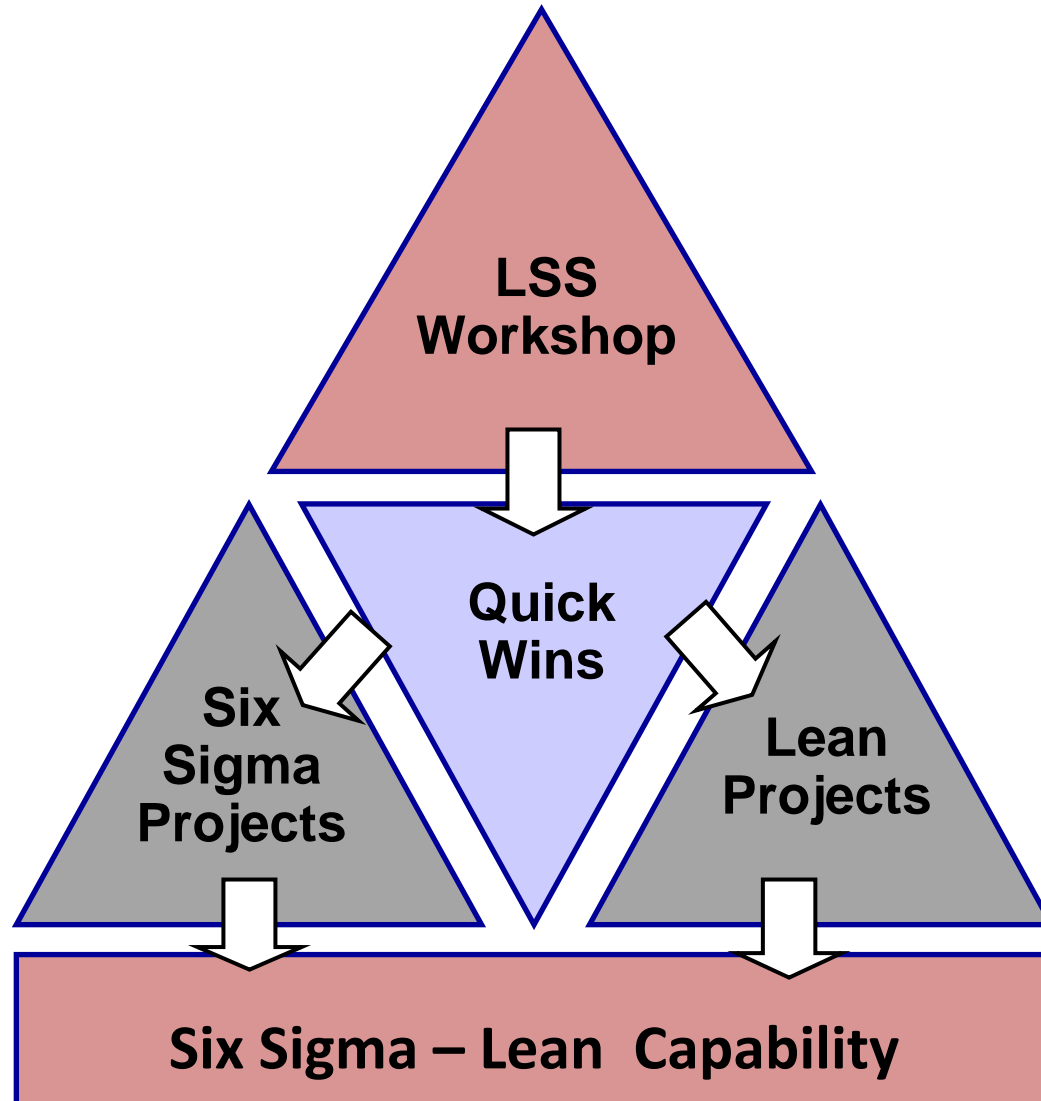
SGS

CHEM ALERT
Chemical Safety Management Services

Local intranet 100%

8:22 AM

7 Synergy Learn - by - Doing **Green Belt Process**



Developing Lean Six Sigma capability with Synergy Learn-by-Doing Green Belt Program

Improvement projects are identified and prioritised in an executive meeting facilitated by Synergy

- 1. A Lean Six Sigma Workshop** facilitated by Synergy is applied to each project
- 2. Identified quick wins** are implemented to deliver immediate benefits
- 3. Identified six sigma and lean projects** use Synergy's Learn-by-Doing Green Belt Program
 - full DMAIC & lean to deliver significant benefits
 - small learning groups of 8 - 12 learn key skills whilst applying skills to their projects over 12 weeks
 - **Award Synergy Green Belts to Participants**

Synergy was formed by Jim Laird and brought together principal consultants with a 20 year heritage in assisting executive clients realize business benefits through:

Change Management - to drive change by ensuring strategic decisions are put into action

Business Excellence – to drive business improvement with Lean Six Sigma and Quality Management

Business Risk and Opportunity Management – to control risks and convert into opportunities

Synergy is committed to assisting clients in Australia and Indonesia achieve their business objectives

For more information on how Synergy can assist you reduce costs and improve productivity contact:

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Or visit our website for free briefings on solutions to business critical issues

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