



CASE STUDY | Sasol Mining

Making Operational Improvement Part of Daily Business DNA

Executive Summary

Following the implementation of Operational Excellence in a traditionally hierarchical business, maintaining of improvement initiatives and the understanding of using a structured, fact-based problem solving process is a challenge to sustain over the long-term.

To address that challenge, leaders at Sasol Mining decided to take the improvement process to business managers and operators in a practical and easy-to-understand way, firstly by helping the business identify opportunity areas in their work environment, and then by assisting them in finding effective solutions to these opportunities.

To make this approach a practical reality, an expert team engaged in the business, with managers and operators alike, in a program called Review and Enablement.

The elements of this approach include:

- Technical review of each operational area, comparing the operational effectiveness against defined standards and roles.
- Identify and agree on the opportunity gaps with the line functions—from line supervisors through to area managers—and agree on corrective action steps.
- Train the various line functions on structured and data-driven problem solving thinking and tools.
- Coach and mentor the responsible line supervisor/manager to correctly identify true root causes, and to develop the thinking to consider multiple solutions by engaging with experts and operators alike.
- Monitor, and ensure that action plans around these solutions are correctly implemented.
- Measure the impacts and improvements from these action steps, and continue to the process of continuous improvement.

In this manner, the business was able to realize significant double-digit improvement on various operational aspects like throughput increases, cost reductions and

safety improvements at each of the business units engaged in this manner.

Composed of technical industry experts and company best practice practitioners, and backed by Lean Methods Group's structured problem solving approach, the team was able to deliver a step-change performance improvement during their intervention, and more importantly to ensure that there was an effective transfer of skills needed to sustain the thinking necessary for performance improvement.

Background/History

When implementing Operational Excellence (OE), many businesses grapple with sustaining the process once the initial implementation team has done its work. For many people in the organization, this period is stressful, with managers, supervisors and operators frustratingly reverting to their original behaviors.

In order to address this risk to the sustainability of the overall improvement initiative, a team of experts (Review and Enablement team), comprised of technical industry experts, internal company improvement practitioners, and guided by Lean Methods Group's structured problem-solving experts, was established.

The Need

Historically, in this business, line managers, supervisors and operators have never been exposed to a systematic and structured basis of problem-solving, to address recurring problems or opportunities in their production processes.

The Operations Executive needed an effective and fact-driven process to enable the line managers to clearly understand the opportunities in their respective areas and to drive structured problem solving in an effective manner that achieves sustainable operational improvement.

What Was Lean Methods' Role?

Since Lean Methods has a clear understanding on the power of structured problem-solving, and has vast experience in the understanding of sustainable business improvement, we were an obvious choice for supporting this client in the Review and Enablement (R&E) role.

As highlighted earlier, our role was to support the client's internal OE function and form part of the R&E program. As part of the R&E team, Lean Methods Group provided the following skills and expertise:

Marshalling specialist support

Lean Methods Group assisted business units (BU) and their leadership to design and develop the appropriate intervention programs needed to entrench their BU improvement initiatives.

Prioritizing and classifying review recommendations

Following a detailed technical audit (Operational Core Process, Safety, OE Process, OE Practices), Lean Methods Group facilitated the development of agreed actions to correct deficiencies with the various BU leaders. The plans formed the basis for specialist intervention plans and were part of the review. Support was given to those teams or individuals who requested coaching or nontechnical advice related to the development of their plans, as well as with prioritization of these activities to ensure a sustainable and effective gap closure.

Coaching on system and tools

In parallel with the audits, coaching was delivered to the BU line managers and supervisors on the following key areas:

- Better understanding of the improvement process.
- Correct target setting and dashboarding.
- Application of root cause analysis tools.
- Improvement of the quality of action plans for effective gap closure.

Providing excellent change agents

Based on our in-depth expertise at change management and leadership development, Lean Methods Group also provided coaching, both on an individual and team basis. Basic change leadership principles were followed at both shop floor and executive levels.

Facilitating the knowledge transfer in mining, engineering and the OE process

Since each business unit had differing requirements, it was important to “tailor” specific approaches into the program for the duration of the R&E intervention at a specific site.

Coupled to implementation of this, Lean Methods developed a clear understanding of the relevant stakeholders, the appropriate communications approaches to be adopted during the program, and, with the agreement of the specific site BU leadership team, a clear scope and outcomes expectation for the duration of the intervention.

The Approach – Structured Problem Solving

The R&E team formulated a simple program, designed to engage multiple business levels simultaneously, to transfer the skills and knowledge needed to drive sustainable business improvement.

Understanding the Business Scale to Drive Behaviors

At Lean Methods Group, as implementation experts, in order to sustain any improvement initiative, it is important to be able to understand the culture and hierarchy (both formally and informally) that drive performance. This understanding will determine the format and approach needed to support large-scale programs.

In this case study, in order for the Operations Excellence implementation to be successful, it was recognized early on that a healthy improvement culture relies on the bottom-up involvement of line personnel and operators, with the guidance, support and leadership of executives and management.

In order to effectively sustain the implementation of the OE process and ensure a healthy “bottom-up” improvement approach, middle-level managers had to adopt a different management style. Instead of a command and control perspective, they had to “learn” to add a supporting, coaching and organizing skill to their style.

Recognizing this need, the R&E team adopted a facilitative and coaching approach, where supervisors and managers “discover” new working ways. This realization is fundamental when dealing with “old” hands in businesses that are traditionally resistant to sustainable change.

Internal Coaching

From the outset, it was recognized that the need to internalize key R&E activities and approaches, was essential in order for the program to be successful. To achieve this, the approach encompassed internal training,

coaching and development of team members who were assigned to the R&E team from line functions.

The R&E team members were deployed at different locations, so there was a mixture of new and seasoned team members from the business, each with different experience levels. The development of these individuals followed these themes:

- Production-area reviews and in-situ assessments.
- A clear understanding of the mechanics of the core production process.
- The role of the R&E tools to define quickhit actions as a part of everyday life.
- Target-setting objectives, roles, coaching and the use of any calculators.
- Crucial conversations – when to hold them, how to hold them and how to ensure successful outcomes.
- The business OE process and how it fits together – objectives, purpose and function.
- Improvement thinking – how to develop better action plans through fact-based information.
- Meetings and their objectives – how to ensure that the right conversations, questions and results are happening in meetings to make them more effective.
- Roles and responsibilities of line – reviewing the roles and accountabilities of line personnel from the first line up to the BU manager in order to understand the “Day-in-the-life-of”.
- The R&E puzzle – how to score, measure and ascertain whether the line function is using the OE process and tools effectively and using the puzzle as an opportunity to train, coach or mentor the line functions.

The Leadership Triangle for Structured Sustainability

One of the principles that Lean Methods Group believes in is the need to ensure sustainability. Change is hard enough but to sustain it requires sustained effort; all the elements in the Leadership Triangle (shown below) are key to ensuring changes stick.

Side One – Getting Alignment

Aligning an organization with its business objectives isn’t easy. Without clarity of this first side, effort becomes disjointed. Alignment is critical to engage all resources pulling in the same direction.

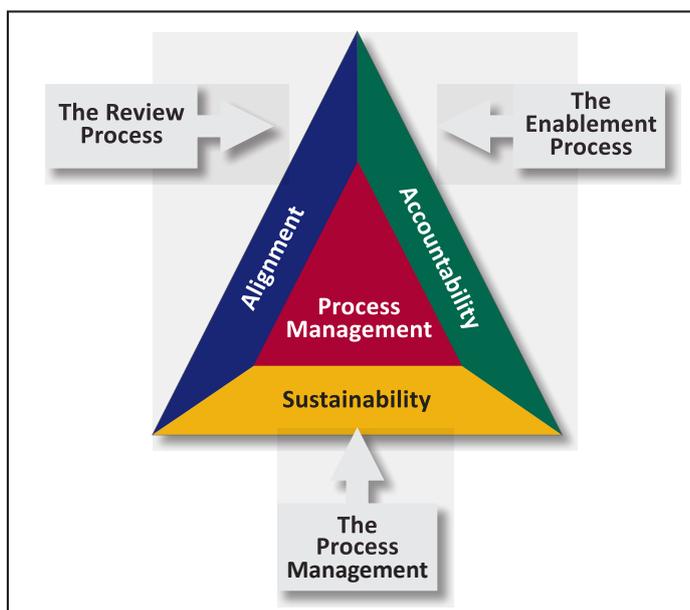
Side Two - Creating Accountability

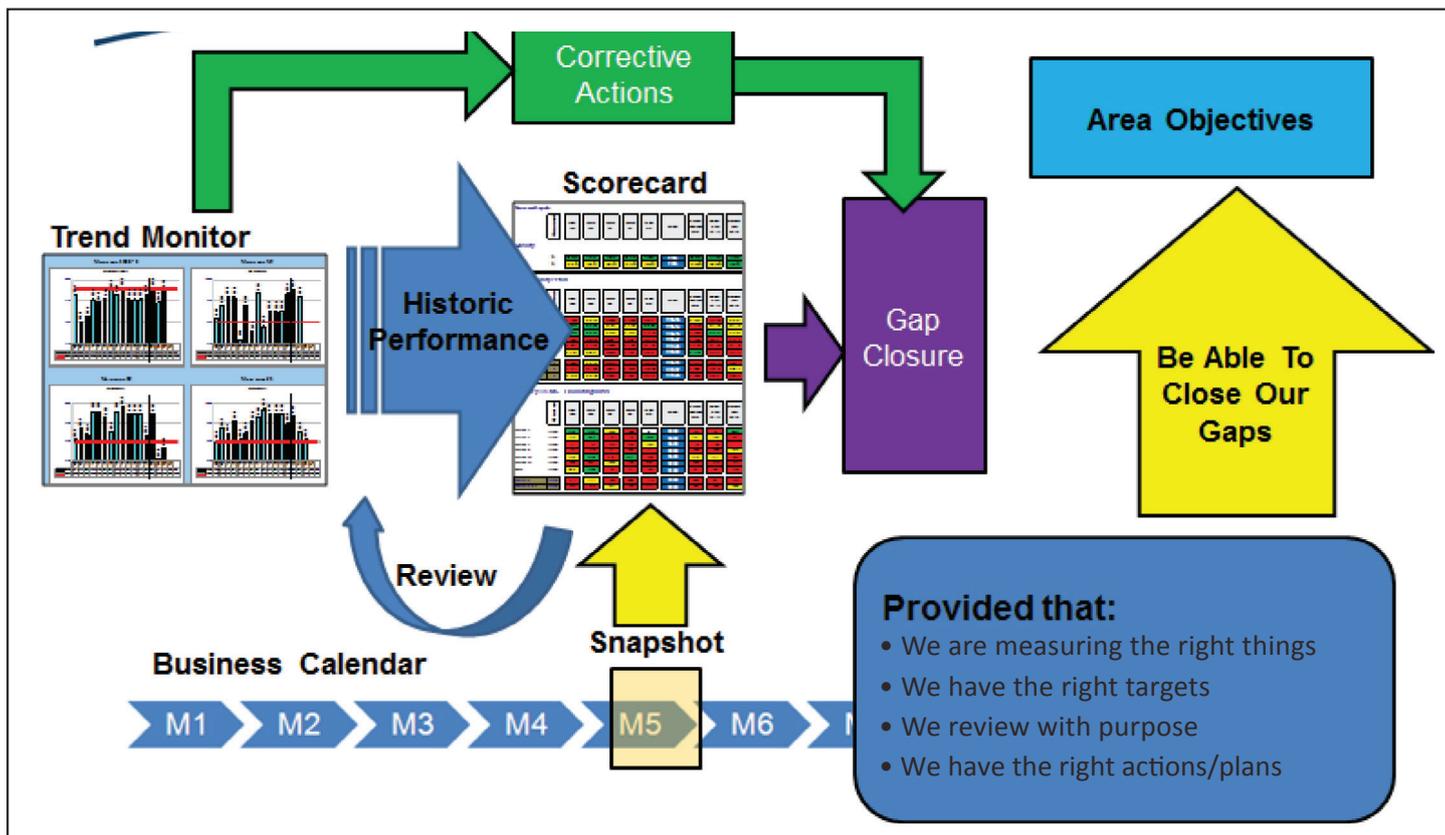
The second side of the Leadership Triangle deals with creating an environment of accountability. Employee empowerment sounds like a noble and good idea, but it also has contributed to people not being fully accountable in a way that we understand. Leaders have to learn how to trust their employees by creating environments and a style of management that enable the employees to function and to be held accountable. Lean Methods promotes this kind of behavior. Managing the team according to deadlines and holding them accountable through deadline management contributes to creating accountability.

Side Three - Demanding Sustainability

This acknowledges the fact that one of the most difficult tasks a leader performs is ensuring a culture of continuous improvement is sustained. The habit we often experience is an approach of firefighting on a burning platform with teams or leaders coming in “to save the day”. The problem is that the “hero culture” is hard to sustain. Additionally, we have to be careful of managers who “like the smell of smoke,”

meaning they don’t want to get others involved so they can be the one to put out the fire. Teaching others to solve problems is the quickest path to lasting improvement. Consequent management is a prerequisite for sustained performance.





Understanding Patterns and Trends

Fundamentally, teaching the line managers and supervisors how to use their data and develop the correct picture is critically important, and often overlooked by executives in any business.

Ensuring that the “picture” is being looked at correctly and interpreting the level of actions needed to address this picture is the starting point in effective problem solving. Some important concepts that the R&E team tried to instill in line managers and supervisors were the following:

Reviewing Performance

Scorecards and the theory behind “balanced Scorecards” tend to become fuzzy to lower-level employees trying to determine their performance gaps. What assists tremendously is ensuring that the current performance issues are prioritized in some form to allow the line managers to focus quickly and correctly on their performance areas. Generally, color-coded formats, relative to some performance target or budget, allows for this focus.

Unfortunately, scorecards on their own will NOT help modify, develop or implement solutions needed to correct their deficiencies since they are typically a snapshot and lack contextual trend information needed by line managers to understand the situation better.

Historic Trend Analysis

Trends monitoring is critical to problem-solving thinking and solution development. The reason for this is that the current “snapshots” that form the basis of most business reviews lack the historic context relating to process and area performance issues.

By developing a tracking system of information detailing past performance issues, one is better able to have an understanding of past events, learnings and actions and to overlay their impact on the performance these had on the area. This is fundamental if a business wishes their line function management to be able to develop a learning culture needed for sustainable performance improvement.

Some of the questions one would typically be asking with trend tracking tools are the following:

- Is the trend your friend? Is it going up, down or sideways?
- Are your targets correct?
- What is your hit rate – per week/per day/per shift?
- Are you measuring the right things? Inputs/outputs?
- Do you have a plan? Is it effective? Are you working it?

- How consistent is your performance? Pattern/trend?
- Are you reviewing historical events? What are your forward view/expectations?
- How effective were your past actions, and have they prevented a reoccurrence?

Developing Corrective Actions

Following the historic trend analysis, and identifying focus areas, line managers would embark on a process to develop corrective action plans.

At Lean Methods Group, we have seen many of our clients grapple with this area, principally due to the fact that addressing gaps is normally driven, correctly so, with urgency, but with little understanding of the issues that created the gaps in the first place.

In order to assist with this, we have developed a very clear framework for our clients, to remind the line managers of the path to follow.

The 5 DO Questions

1. Do you know your target?
2. Do you understand your gap?
3. Do you know what to do to close the gap?
4. Do you have a detailed action plan to close the gaps?
5. Do you complete your actions according to your plan and adjust your forecast?

The intention is that the Five D's should initiate questioning at all levels in the business. This drives a thought process to look at a problem and bring a level of self-questioning that creates some action to address the problem.

Below each of the questions is noted an explanation as to why, as well as the type of thoughts that it should trigger.

Question 1 - Do you know your targets?

It would be very difficult to know if something was not performing to the required levels if there was no effective measurement system in place. At operational levels, it is expected that they would know the in-process performance levels and know how to check on them through various reporting tools available to them.

Question 2 - Do you understand the gap?

Once a target level of performance is known, this is checked against the actual level of performance, and the gap can then be calculated. That is the easy part of question 2. The hard part is to understand the drivers that are causing the gap – and it is at this stage that investigation and observation skills become necessary.

Question 3 - Do you know what to do to close the gaps?

Once question 2 has been answered, the next thing is to understand what to do to close the gap. This might sound easy, but given the legislation within some industries, it will need to be backed up with consideration of roles, responsibilities and authority levels.

Question 4 - Do you have a detailed action plan to close the gaps?

Knowing what to do within the span of control of the section management team when the problem requires a plan as opposed to an action only is an indication that low level project management skills are required. It is not unreasonable for anyone who has identified a need to have an action plan to involve the on-site Operational Excellence team in supporting the owner of that plan.

Question 5 - Do you complete your actions according to the plan and adjust your forecast?

This is all about whether the completion of the actions as outlined in the action plan is on track. Without closing out the actions and doing what is in the plan, the original gap is not going to get closed through an effective sustainable solution.

In addition to these questions, line function needs to understand the types of information that exists in their area on a shift basis, as

well as daily, weekly and monthly. On many occasions, when constructing programs for our clients, we discover a whole plethora of relevant information that managers and supervisors fail to understand the relevance of when compiling effective gap-closure plans.

Structured Meetings

In parallel to the technical production-area review, the R&E team also reviews the above-ground management activities. The aim of this review is to assess, coach and mentor the line management on their day-to-day effectiveness in supporting the production activities, both short-term and long-term. The focus of this review is on the following day-to-day activities:

- Pre-shift meetings and their effectiveness in preparing the teams for the day.
- Daily business unit production meetings and their effectiveness in marshaling the required equipment and support needed for the production areas to reach their daily, weekly and monthly objectives.
- Weekly engineering planning meetings and the deployment of the planned maintenance functions to maximize equipment availability and effectiveness.
- Weekly business unit Operational Excellence steercoms to ensure that the focus of the management teams and their efforts is on gap closure.
- Weekly business unit head of department meetings where the month-to-date risks to the unit achieving its business goals are ascertained and action areas are discussed. Recurring risks are also identified and actioned appropriately.
- Monthly BU planning meetings where the operational objectives, the operational requirements and any risks are identified and discussed. A business plan for the coming months is agreed, with the required risk mitigation plans being put in place.

Not only did the R&E team succeed in assisting the operations team to have a clearer understanding of underlying habitual problems or opportunities in their operations and processes, but the team also succeeded in transferring the ability to develop a more structured approach to finding more effective solutions to these habitual root causes, leading to significant, and sustainable gap closure of operational KPIs.

Improvement Thinking

Adapted from Lean Methods Group's ABC Problem Solving curriculum, improvement thinking training was adapted and developed for this client. Improvement thinking training shows individuals and teams how to use basic

information and simple tools to help solve performance problems and sustainably improve business performance.

Use of Improvement Thinking

The entire improvement thinking process is driven by the need to develop that habit of looking at data. Looking at the trending KPIs that are central to the daily/weekly reports is the first behavioral habit that needs to be developed. This is the starting point from which this initial bucket of opportunities for improvement can further be explored.

It is through the monitoring of data that you will come to understand your performance, and it is important to ask questions which are central to the improvement thinking training and coaching.

It's imperative that throughout the entire improvement thinking training, the message is put across that this is not just for one individual grade or functional group within the mining structures, but that it is everyone's responsibility.

To illustrate this, the following shows how all levels in the business have a role to play in creating a culture of improvement that is developed through the improvement thinking training.

Levels of Problem Solving

As illustrated on the next page, Lean Methods teaches line managers and supervisors that around historic gaps and opportunities, there are different levels of thinking needed by different role-players in the organization.

For example, at shop-floor level, typical problem-solving activities center around fixing things (the Fix-its). Although "Fix-its" might appear to be at the bottom of this linked illustration, they are absolutely essential to the whole improvement thinking training and quite possibly the most important people in the whole loop. It is not only important to be able to see the opportunities, but also to table the data and information available to the "Fix-it" level.

Operating above this level is normally firstline supervisors (the Organize-its). Their problem solving focus is essentially to ensure that the Fix-its have the necessary resources and skills needed to be able to address problems in a time-effective safe manner. It is quite common in client businesses to "discover" that many managers/supervisors at this level were traditionally the best operators promoted to this tier, but have never had any formalized training either on their role/function or on the basics of effective problem solving. The R&E process coaches and mentors this level in being able to use the data at their disposal to ensure that they are focusing on the right issue.

5 Whys

Five Whys

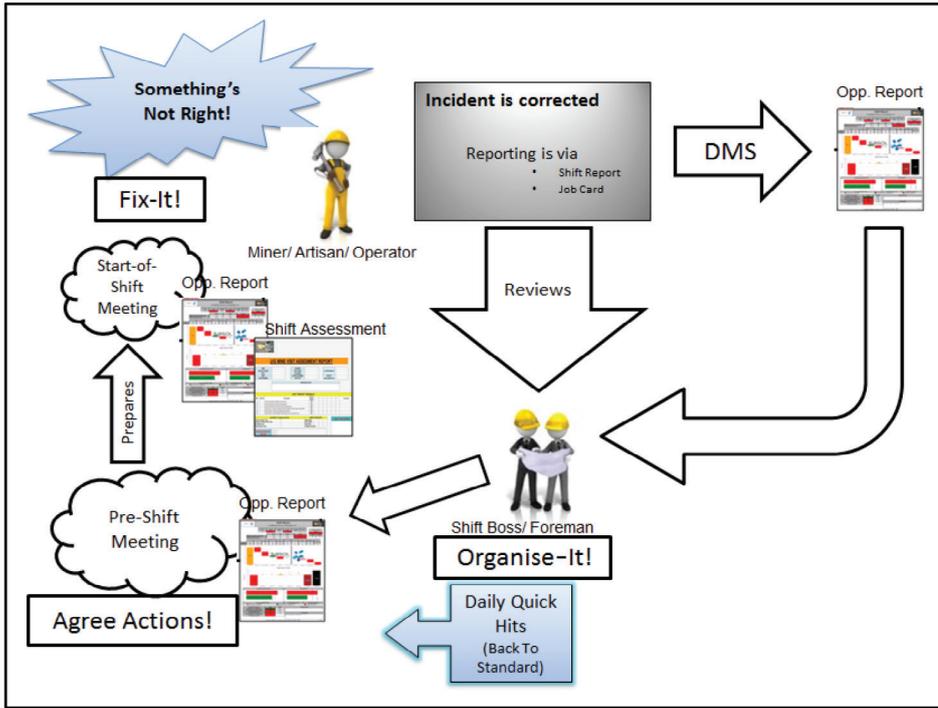
The Five Whys is an iterative question-asking approach used to explore the cause-and-effect relationships underlying a particular problem. Crucial to most root cause analysis techniques is being able to apply the problem solving methodology correctly.

The primary goal of the technique is to determine the root cause of a defect or problem. The Five in the name is derived from the number of observations on the number of iterations typically required to get to the root cause of the problem. It's an applied skill and applied mind-set that we encourage all our clients to build into their organization.

To illustrate this approach, the below graphic demonstrates a situation on the surface where the real cause is identified through asking the Five Why questions. As you can see, the root cause of the problem is some way from how the problem shows itself.

Critical to the success in applying the Five Whys is to actually detect the surface problem and then to ask the why question at the right point in the problem structure.

Understanding the response to the preceding question will enable you to ask the next why question in a way that does not come across in an aggressive interrogative manner, but in a way that will lead to a response of "Yes, I hear what you are saying, but let's just look at that possible cause".



In parallel to this, the line managers' role is primarily to monitor operations, functions and core processes for performance trends and recurring issues, and to ensure that the correct risk-mitigation strategy has been developed and implemented effectively (the Patterns). In many of our client organizations, many first- and second-tier managers have not been effectively equipped with the correct tools to be able to identify recurring patterns and trends and usually get caught up in the noise of current operations. One of the techniques that has proved effective in providing structure in identifying trends at these levels is structured root cause analysis.

level (primarily focused on process waste elimination). Both of these problem-solving methodologies, deployed in tandem, have proven to be a powerful and sustainable method for clients to achieve step-change improvements.

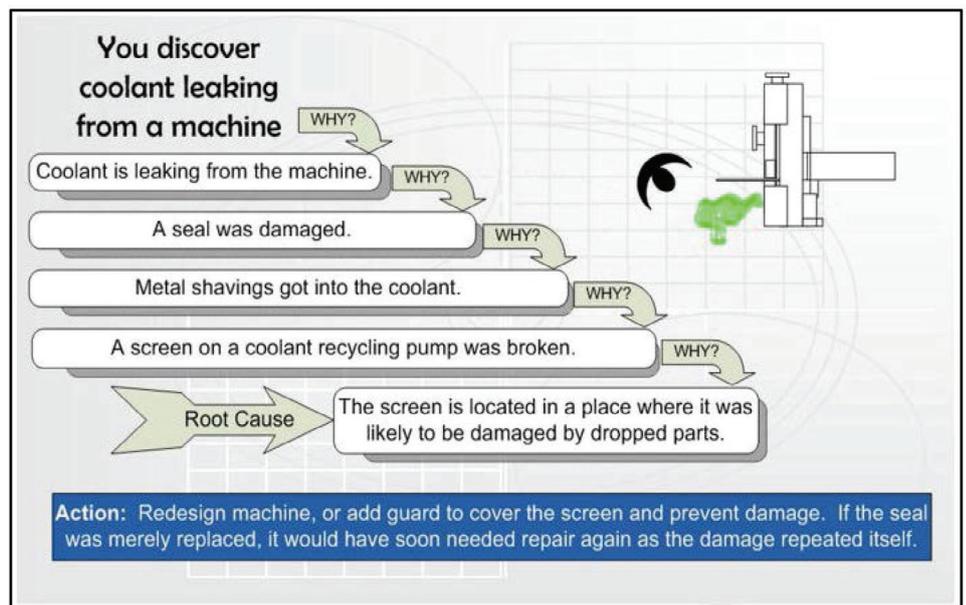
In the context of this case study, the R&E teams' focus was to educate the business units on the power of these approaches, although few of the line managers and supervisors are directly involved in running their own improvement projects utilizing DMAIC or SCORE.

Defined Improvement Methodology

The principle reason for a business to adopt the principles and tools of an operations excellence implementation is to give the business the ability to be more effective in improving its day-to-day performance. Having a defined improvement process and tools assists in ensuring that people, across the business, have a clear language and structure to be able to do this consistently.

At the core to this improvement process is having a robust, structured and effective improvement methodology, encompassing easy-to-use problem solving tools.

It is for this reason that this client chose to follow the Enterprise Lean Six Sigma approach as the core of its improvement thinking and approach. Executed at both the Black Belt DMAIC level (primarily focused on process variation removal), and at the SCORE



Formulation of Action Plans

Given that the development of effective action plans is a crucial component of problem solving, it is important to better understand how effective action plans are formulated, utilizing the age-old POLC principles (planning, organizing, leading, controlling).

It's easy to see that an action plan can work at any level as long as the appropriate level of questioning has been applied. All levels can determine the type and at what level an action plan can be formulated at.

For this particular client, and following on from the traditional project charter that one will see in DMAIC projects, the action plan follows a familiar one-page layout that allows for effective definition and tracking of the action steps and gap-closure benefits. By utilizing a standardized format, coaching and mentoring by senior managers of their juniors is encouraged.

LEVEL:	POSITION:	TOOLS:	ESCALATION PROCESS & PLAN TYPES:	REPORTS & SUPPORT DOCS:
Level 1	Miner, Artisan & Crew	Tools for Standard Tools for Improvement	Quick Hits Corrections Yes/No decision diamond	Opportunity Reports
Level 2	Shift Boss & Foreman	Tools for Standard Tools for Improvement	Quick Hits Corrections Yes/No decision diamond	Business Scorecard, Opportunity Reports & Quick Hit List
Level 3	Mine Overseer & Chief Foreman	Tools for Standard Tools for Improvement	Action Plan Yes/No decision diamond	Business Scorecard, 6-Week, Opportunity Reports, Quick Hit List & IIP
Level 4	Shaft Management	Tools for Standard Tools for Improvement	Action Plan Yes/No decision diamond	Business Scorecard & IIP
Level 5	Mine Manager	Tools for Standard Tools for Improvement	SCORE Yes/No decision diamond	Business Scorecard & IIP
Level 6	MD & GM's	Tools for Standard Tools for Improvement	DMAIC Yes/No decision diamond	Business Scorecard & IIP

Can the issue be resolved on this level? If not, ESCALATE

Integrated Improvement Plan (IIP)

The purpose of the IIP is to help the business unit track the focus and completion of action plans. This tracking is important if the BU is trying to achieve its performance targets.

Action plans (and their KPI benefit values) are captured and their progress is made visible, thereby, helping to bring the required level of attention to the actions needed to close any of the gaps against the performance matrix. The BU leader will use the IIP to ensure that there is the correct focus and balance in the actions plans, and that their completion is progressing against the agreed timelines.

In some client organizations, this activity would be limited to projects whose tracking would be via a PMO platform, however, in this instance, the IIP was the instrument designed to track ALL action plans in order to ensure accountability with gap closure progress.

IIP's are reviewed on a monthly basis as part of any BU steercom and as such are a key component in demonstrating that continuous improvement is central to the way in which business is done. It's an opportunity for the leaders within a operation to demonstrate to the entire BU teams that they follow through and act upon matters of improvement, showing that the voice of the business is being heard.

In Summary

Improvement thinking training is for improving operations as they are seen at the current time with current conditions. It is important that new and future strategies are seen as opportunities to table future problems that future solutions and improvement thinking need to address and solve.

Each level in an organization plays a role at supporting the function of core processes, but in many organizations, as you go up the management levels, how this support is supposed to manifest is often unclear and nebulous.

Outputs and Outcomes

A consulting company like Lean Methods Group has the capacity to provide a host of very specific and specialized abilities, which is precisely why client companies engage them. There are basically three reasons why a client would need to engage consultants rather than have the required capability internally:

- First, the specific skills required fall outside of the normal skills being procured or being developed within their own development approach.
- Second, it is not cost-effective for the organization to employ such skills.
- Third, the need is of a short-term nature and therefore employment is not practical.

The type of consulting service which Lean Methods provides to clients is of such a nature that there is often an expectation, whether it is specified or implied, that certain knowledge and skills be transferred to the client staff as

part of the engagement. These could typically include coaching, management, analysis, problem solving and reporting skills.

The result of an engagement covering a period of four odd years inevitably results in skills and knowledge transfer from consultant to client, whether intentional, i.e. part of the agreement, or purely as an automatic result of the client's exposure to the consultant over an extended period of time. If one adds to that the formal coaching being provided to the client, the resultant benefit to the client is significant growth in terms of their knowledge, skills and experience.

During engagements with our clients, the Lean Methods Group deployment methodology provides the opportunity for the client to gain the following benefits:

- The provision of data management through the continuous, consistent and accurate collection, analysis, processing and presentation of the client's performance and status.

- The application of structured problem-solving tools to analyze the client's business processes where applicable in order to assist in the establishment, maintenance and improvement.
- The transfer and development of knowledge and skills relating to improvement thinking through the introduction of a variety of tools and methods.
- The effective use of the 5 Whys and other tools to assist them in identifying factors and root causes relating to their problems and challenges on a daily basis.
- The provision of coaching to various levels of supervisors, managers and leaders to assist them in taking problems, issues and opportunities from the identification stage, through analysis and assessments, to the action planning phase.
- The provision of a wide spectrum of reporting at various levels within the client environment, which are backed up by accurate graphic displays.