Life of a Mine Manager Using data

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The goal of this short paper is to tell the story of how a partnership with MISOM helped the Coal Mine I was managing, in Northern Canada, have a complete cultural transformation. This transformation resulted in a 31% reduction in safety incidents, 42% reduction in cost/tonne, and a 17% increase in productivity.

About Shane:
Shane Gant was the director of Continuous Improvement for Walter Energy Canada, then mine manager of the Wolverine mine. He has been a satisfied MISOM client for years. He is currently President and General Manager at Dakota Westmoreland Corporation.

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A key issue for all mining operations is a need for reliable, accurate, and up to date information that allows management the ability to make data driven decisions. Access to this type information can be used to positively influence performance in the areas of cost, safety, and productivity.

In operations where there is inconsistent or poor performance, it is sometimes very difficult to grasp the causes and many variables needed to be analyzed to fully understand these universal short comings. However, in most cases, it comes down to lack of actionable data, a poor workflow process, and most importantly, lack of site wide engagement from both hourly and salaried employees. In essence, to improve overall mine performance, a complete cultural change was required.

The goal of this short paper is to describe the total cultural transformation that can occur when a three prong process is used to drive performance. It can be referred to as the three P's of the cultural transformation. The three P's stand for people, process, and platform.

The "platform" in the three P's is referring to the technology platform that exists within a company. Examples of this in include fleet management systems, mobile apps and data warehouses. The "process" is referring to the company's operations work flow process. Finally the last P is for "people". This P is the most important and most difficult to change.

In order to invoke positive change in these respective areas, a data driven solution must be developed, with a deliberate meeting to review must be instituted. One of the most effective tools to achieve this is the balanced scorecard concept

The balanced scorecard system is a 24 hour look back at the overall mine performance. It is based on a set of KPI's that are driven by leading indicators.
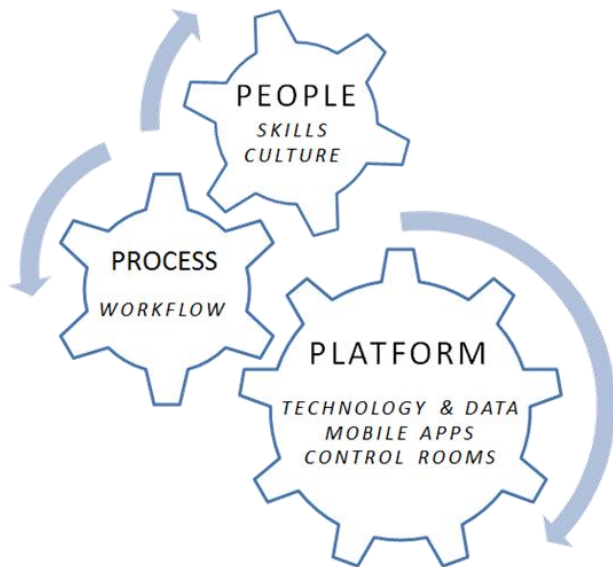
KPIs are what most mines use to measure performance and are things such as tons or accident count. However, this is like driving the business through the rear-view mirror. These are things that have already happened. It does not give managers a direction on how to improve. The review of the leading indicators is how to truly drive performance. The leading indicators are the thing you must do right on a daily basis to achieve your overall objectives (KPI's). This approach to the overall management of the mine changes the culture in positive ways.

A meeting is held every morning at 7:00 AM that allows each department head to review their specific (operations, maintenance, plant, and engineering) areas performance with the mine manager. The figure below is an example scorecard. There are a few core elements to a proper scorecard:

KPIs: as mentioned, these are measures that we traditionally use in mining. Every manager has their own set of measures. Only the areas for which the manager has control, should be used.

Leading Indicators: these are measures that help lead the manager toward asking the right questions. Leading indicators drive the manager to focus on what needs to be done to improve.

Goals: are a cultural enabler. They drive a conversation and competition between managers. Since each manager has different KPIs and Leading indicators, the only means of friendly competition are points (a score). This social aspect of the scorecard process is critical. Goals can be weighted according to their perceived importance.

Last 30 Day %: this measure helps to hyper-focus the scorecard meetings. Managers do not have the time to review each measure. However, with the % achieved metric, managers can immediately see which areas are in need of more attention (safety interactions, Ready hours, production, etc…), and which are opportunities for congratulations.

Date	Monday, April 07 2014
Shift	All

HOME

Key Performance Indicator	Actuals	Goals	Points Possible	Points Achieved	Last 30 Days %
Incidents (first aid or any incident)	0.0	0.0	20	20	64.5%
Coal Mined (Tonnes)	6,107.0	5,890.0	10	10	71.0%
Total Production - Shovel/Excavator (BCM)	75,469.4	85,566.0	20	0	0.0%
Production Meters Drilled	1,640.2	2,370.0	20	0	6.5%
		Total	**70**	**30**	

Leading Indicators	Actuals	Goals	Points Possible	Points Achieved	Last 30 Days %
Safety Interactions	23.0	36.0	20	0	3.2%
Equipment Health Alarm	2.0	0.0	20	0	3.2%
BCM/Shovel Ready Hour	1,164.5	1,355.0	10	0	3.2%
Meters/Drill Ready Hour	30.6	30.0	10	10	64.5%
BCM/Truck Ready Hour	274.0	241.0	10	10	71.0%
AM Production BCM's (6am to 8am)	4,327.0	5,350.0	10	0	3.2%
PM Production BCM's (6pm to 8pm)	4,856.6	5,350.0	10	0	3.2%
Available hrs (Shovel)	94.6	86.4	10	10	41.9%
Available hrs (Truck)	359.2	394.4	10	0	54.8%
Available hrs (Drill)	108.9	118.1	10	0	12.9%
Operational Delays (Primary Shovels)	14.2	9.5	10	0	32.3%
		Total	**130**	**30**	

Wrapping all these elements together, consider this example: note that the KPI goal for total production (Bank Cubic Meters (BCM)) for this mine manager has not been met once in the last 30 days. The leading indicators for this measure are the BCMs during the start-up hours 'AM Production BCM's (6am to 8 am)' and its afternoon counterpart. It had only been achieved once in the past 30 days. Having a good shift start is critical to achieving production goals. The manager can now focus on getting his shifts started-up and productive.

Since the MISOM data warehouse is easily viewed through OLAP-linked pivot tables in excel, the data can be quickly mined for reasons for under-performance if necessary. This high-visibility allowed for greater scrutiny on costs during a period of low-prices, enabling a reduction of 10% in costs. This

Total Cost: $x10^6$
$18.5 → $16.75
-10%
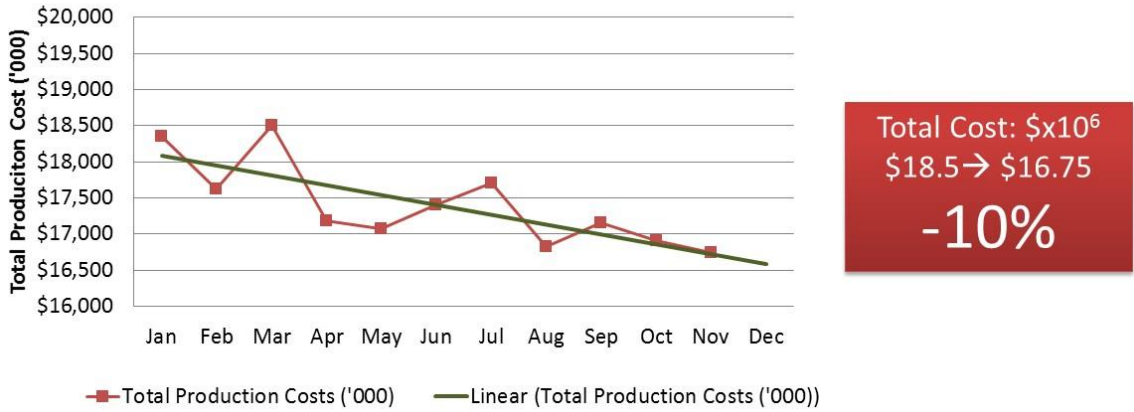
continuous focus through the scorecard, along with MISOM's mobile app, boosted productivity by 17%.
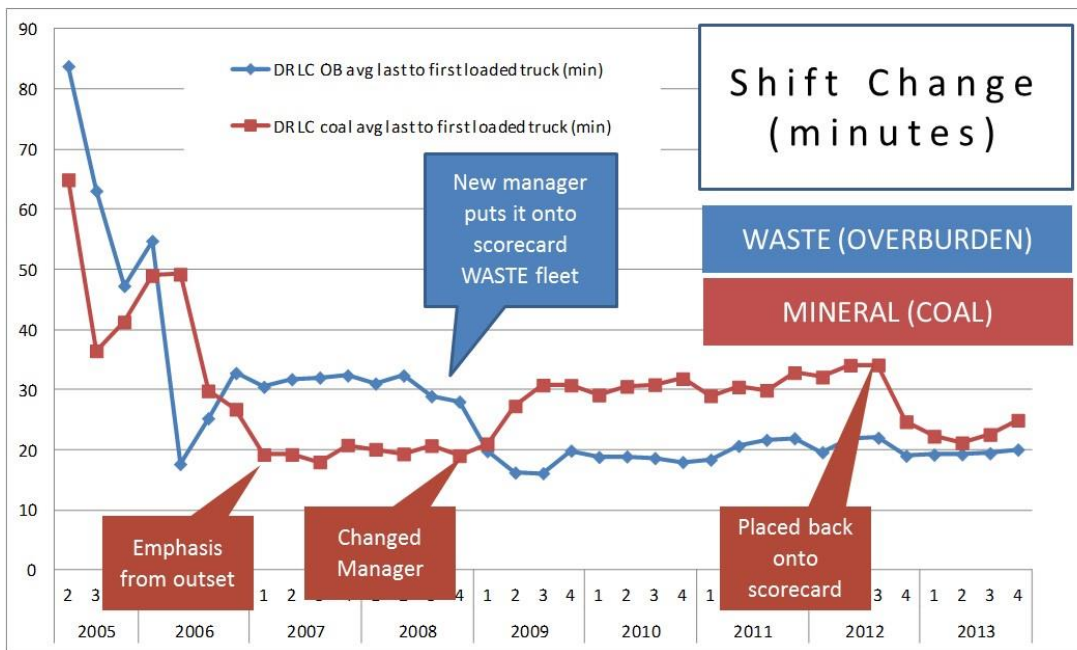
The final phase of the scorecard process is a 30 day review, which is a meeting held by the GM with individual department managers to review the previous month's performance. This serves as a platform to identify the validity of leading indicators (remove or add measures). The meeting should be formal and supported by ad hoc analysis from the DW supporting the manager's performance. The simple question that needs to be answered is "what is the data telling you" and "what are you doing about it.
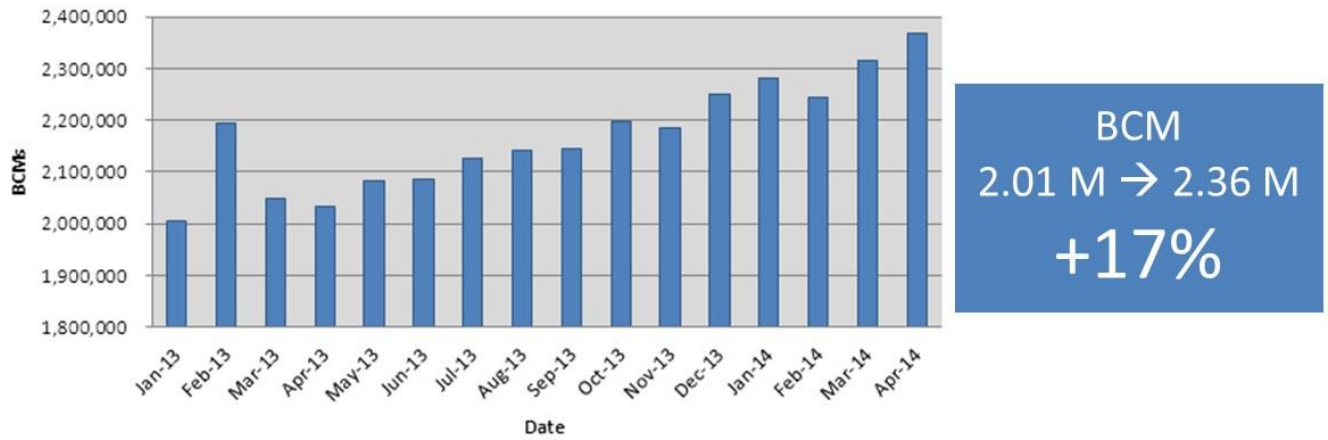
Following the scorecard process yields long-term results. At a large coal mine where MISOM has worked for the past decade, the improvements persisted. It also shows the impact of measures on a manager's card. The graph below shows shift change time (in minutes) for two managers, the coal manager (in red) and overburden (waste) manager (in blue). The scorecard process was initially implemented in 2006. It was placed on the coal manager's scorecard but not the overburden manager's, where a clear 15 minute difference can be seen. In the last quarter of 2008, managers changed, along with their scorecards. Now the coal manager did not include shift change whereas the new overburden manager did. Within two quarters, a clear improvement in the OB manager's crews occurred and devolution in the new coal manager's crew's performance. Finally, in the last quarter of 2012, increased scrutiny identified that shift change was a key leading indicator, and it was placed back onto the coal manager's scorecard and within single a quarter, performance was restored.