



DATA FOR BALANCED SCORECARD: Driving Profits in Mining, Metals, and Materials Industries

Balanced Scorecard is a model for managing a business; it was introduced by researchers Kaplan and Norton in the early 1990's to facilitate decision making and influence four areas:

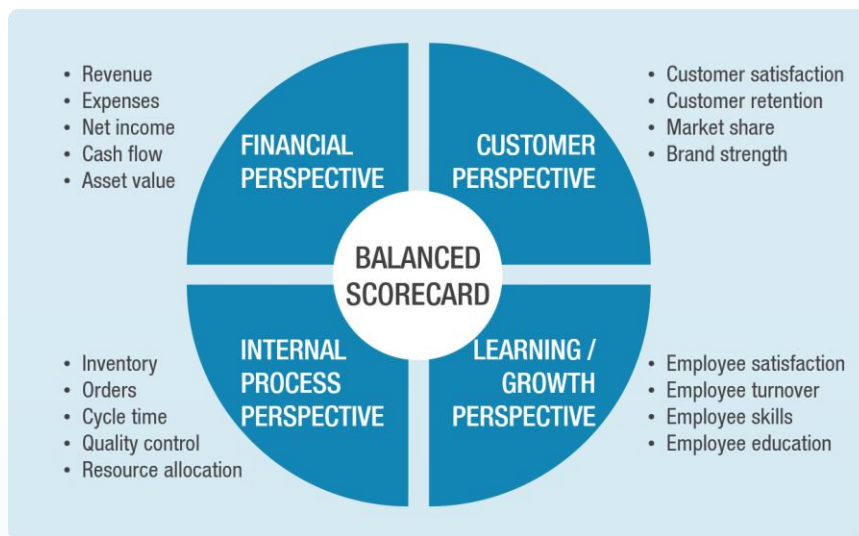
- Financial/stewardship (financial, resource use, sustainability, and corporate social responsibility, stakeholder engagement, etc.)
- Internal processes (health and safety, efficiency, quality, etc.)
- Customers (retention, perceived value, satisfaction, etc.)
- Innovation and learning (HR, technology, culture, etc.)

The goal with a balanced scorecard approach is to use business strategy to drive business actions. While many industries have applied it, mining has had only mixed results with it, and it is not as widely used in mining, metals, and materials as in other sectors. Given historical and recent challenges the mining, metals, and materials sector has faced, the next five to ten years could very well be the right time for the industry to get the most from the balanced scorecard approach.



A BALANCED SCORECARD helps businesses link performance to strategy. Design methods have evolved since the approach was first introduced in the early 1990's, and it has expanded to include issues related to sustainability, health and safety, and innovation.

—**DAN MIKLOVIC**
Research Fellow



The most problematic challenges are the dramatic swings in market pricing over the last two and a half decades, the commodity nature of much of the industry, and rapid changes in market dynamics, from demand to energy and transportation costs to geopolitical issues.

If the metals, mining, and materials industry is to adopt balanced scorecard, companies will have to invest in the necessary information to make

it effective. The path to information and insight is access to real-time and historical operational data and contextualize it so analytics can provide the insight to manage against **balanced scorecard objectives**.

Top Financial Objectives

	MINING	METALS	ALL INDUSTRIES
Grow revenue	41%	31%	51%
Grow operating margins	24%	36%	17%
Expand to global markets	0%	3%	8%
Cut costs	9%	11%	8%
Reduce risks	4%	3%	7%
Improve Return On Net Assets (RONA)	19%	17%	6%
Ensure compliance	4%	0%	4%

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Top Operational Objectives

	MINING	METALS	ALL INDUSTRIES
Improve manufacturing efficiency	42%	60%	31%
Improve customer services	9%	9%	18%
Ensure operations in compliance	23%	9%	17%
Improve ability to deliver new products	13%	9%	15%
Better manage operational risk	8%	9%	9%
Improve supply chain responsiveness	4%	6%	6%
Achieve corporate social responsibility goals	2%	0%	3%

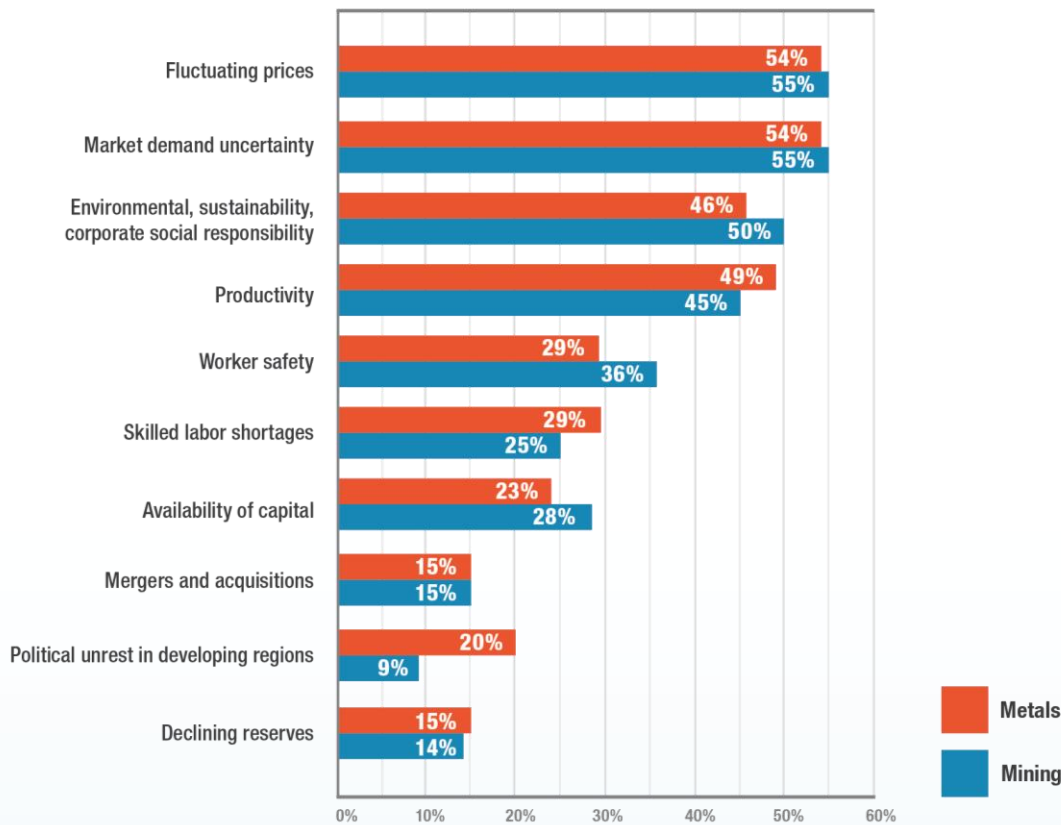
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The Case for Balanced Scorecard

It seems like the mining, metals, and materials industry has always had to rapidly adjust to wild market fluctuations, social pressures, labor shortages and other forces beyond its control. At the same time, it has had to provide the basic materials and much of the energy for the global manufacturing ecosystem. LNS Research survey data from respondents across the mining, metals, and materials sectors show that the top financial challenges are growing revenue and protecting margins, while the top operational challenges are manufacturing efficiency, and regulatory and industry compliance.

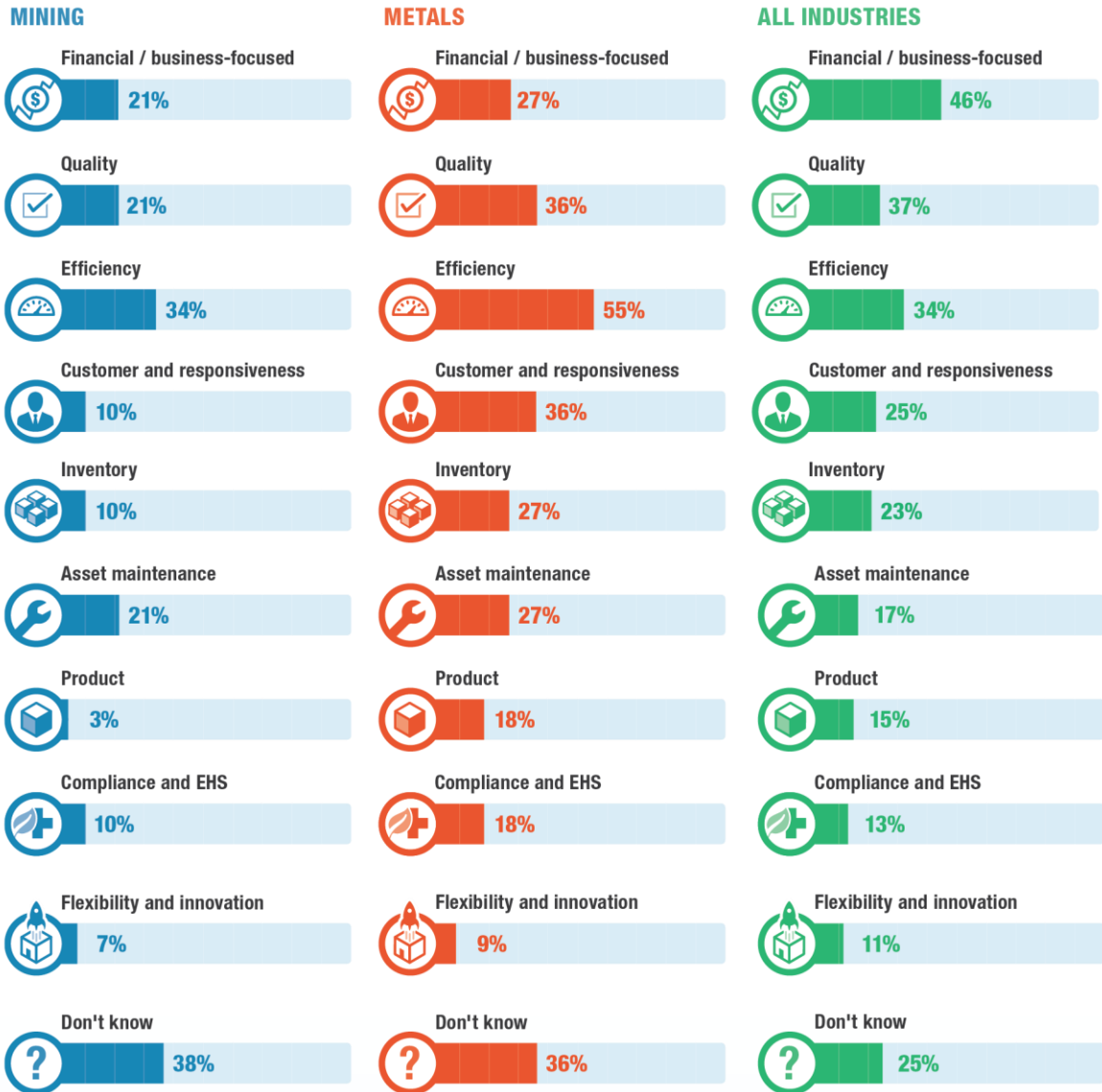
To help their business meet today’s challenges, manufacturing executives in each segment are **focusing on the metrics they feel will have the greatest impact** on their organization.

Industry Trends Impact Metals and Mining



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Key Manufacturing Metrics



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A balanced scorecard is an excellent tool for mining, metals, and materials companies to ensure that they are not focusing on one business area to the detriment of others. Often managers become so focused on one or several emergent problems that they lose sight of the overall performance of the business. Balanced scorecard provides a simultaneous view of performance in four key areas: financial, customer, internal processes, and learning / growth. The result: the ability to address immediate or emerging concerns without losing focus on overall business performance or allowing it to suffer.

The Data Connection

Balanced scorecard metrics obviously demand a combination of data from multiple sources. What companies often overlook is the need for historical data in addition to current performance data. The balanced scorecard is so much more than merely a real-time dashboard. Its true role and greatest value is link business strategy to execution; it allows executives to understand progress toward goals, which is more important than knowing if the company is “at goal” at any single point in time. In short, the balanced scorecard is both a map to get you to the goal and a measure of progress in reaching that goal, not just a GPS way-point showing where you are.

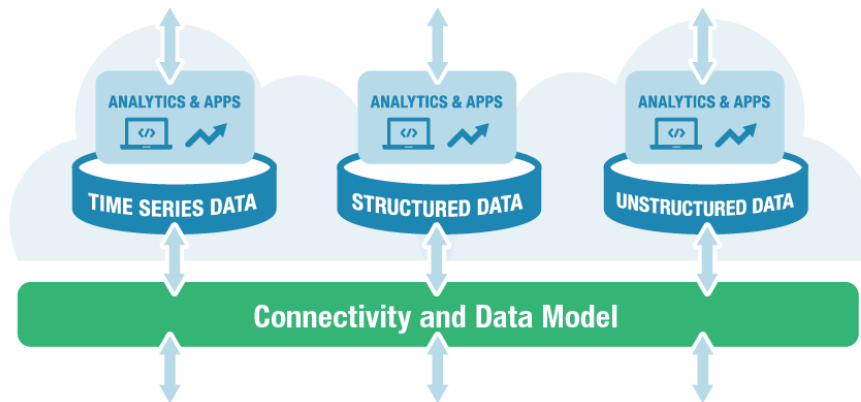
Structured Data Applications and Analytics

CORPORATE SYSTEMS - Defined by Sites and Organizational Structure										
ANALYTICS	HR, Procurement, Finance and Accounting, IT Management									
PLANNING	HR, Procurement, Finance and Accounting, IT Management									
EXECUTION	HR, Procurement, Finance and Accounting, IT Management									
MANAGEMENT SYSTEMS - Defined by Sites and Organizational Structure										
ANALYTICS	Quality, Environment, Health, Safety, Energy, Sustainability, Risk, Assets									
PLANNING	Quality, Environment, Health, Safety, Energy, Sustainability, Risk, Assets									
EXECUTION	Quality, Environment, Health, Safety, Energy, Sustainability, Risk, Assets									
VALUE CHAIN SYSTEMS - Defined by Sites and Organizational Structure										
ANALYTICS	Marketing	Sales	Engineering	Suppliers	Asset Management	Manufacturing	Warehousing	Distribution	Retail	Service
PLANNING	Marketing	Sales	Engineering	Suppliers	Asset Management	Manufacturing	Warehousing	Distribution	Retail	Service
EXECUTION	Marketing	Sales	Engineering	Suppliers	Asset Management	Manufacturing	Warehousing	Distribution	Retail	Service

Still, real-time information is just as important. The balanced scorecard can't be just a static map. Instead it should be —thanks to Big Data, the Industrial Internet of Things (IIoT), and analytics— a modern, sophisticated navigation system. It illustrates progress along the path towards the destination, shows optional paths in case of deviation, and provides insight about the impact of decisions you might make. A balanced scorecard [relies on a data lake of structured, unstructured and semi-structured information](#). In all cases, the organization must moderate the

data, so it has confidence in the information it receives. A historical reporting tool can only show what you did, and a real-time snapshot can only indicate where you are; ultimately it's the combination of information that helps a company get where it wants to be.

BIG DATA



Financial and Sustainability Opportunities

The primary financial management metrics that businesses have traditionally used to gauge performance gave rise to the balanced scorecard method. It adds another dimension to the financial quadrant, such as sustainability, but it always begins with economic improvements. Typical gains companies have achieved in the mining, metals, and materials industry are:

- **HIGHER OVERALL PROFITABILITY;** can be from a variety of use cases such as reduced downtime, increased yield or recovery, **decreased maintenance expenses**, better decisions to avoid overtime costs, and more.
- **SMALLER CARBON FOOTPRINT** through reduced fuel usage; companies save millions of dollars annually through route optimization, less idling time, and higher performance from an energy efficiency perspective.
- **LESS WATER USAGE;** results in direct dollar savings, lower processing and remediation costs, and a better reputation as a good corporate citizen in areas where water is a scarce resource.
- **HIGHER COMPLIANCE** (to compulsory or voluntary standards); up to **50% fewer environmental violations**, fewer or eliminating fines, and improved public reputation not uncommon.

Across the board, these improvements come from better visibility into and information about equipment performance, process efficiency, and operational cost reductions. As they accrue, they contribute to less spend on fuel, repair parts and labor, higher profits, and stock value increases.

Data Improves the Customer Axis

Mining, metals, and materials is a sector primarily driven by commodity prices, and the measure of customer satisfaction is relatively new. As information becomes an integral part of product delivery, it also becomes a point of differentiation. For mining, the ability to provide customers with detailed information about shipment status, assay details, or grade variation within a shipment are all opportunities to build customer loyalty and potentially demand a price premium, depending on the sector. In metals, the ability to provide electronic certificates of quality, assay, and shipment information has already proven the potential to drive customer loyalty and deliver value that justifies higher prices. [The extended mining value chain isn't left behind and has its own opportunities](#). Suppliers to mining, metals, and materials companies are already using data to serve the industry better. Mining and production equipment makers use machine data to provide maintenance, offer services instead of selling equipment, improve service response time, and driving optimal performance from their products.

Addressing Critical Labor Challenges

Mining, metals, and materials have some of the most significant challenges in all of industry when it comes to human resources, particularly the mining sector. Much of the work is often in remote areas, it's dirty, dangerous, and sometimes highly physical. These factors have made this industry one of the less desirable career choices for Gen Z and Millennial workers. Coupled with the aging workforce that serves the industry today, the current labor crisis is no surprise. As companies in mining, metals, and materials focus on the innovation, learning, and culture aspects of a balanced scorecard, they will address HR concerns and begin to stand out from the competition. Using data to improve safety, operator productivity, enable remote operations, and enhance the quality of work life are ways mining, metals, and materials companies can address the critical labor challenge. By reducing the amount of time needed to collect, report and analyze data, operators use the time they gain to perform more productive and meaningful tasks. Providing operators with immediate feedback on performance from a historical



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perspective and against best-in-class among colleagues creates an environment in which people can learn and grow.

When we consider the earlier topic of sustainability and eliminating out-of-compliance situations, a positive by-product of these efforts is a company builds its reputation as a socially responsible organization, which makes it even easier to attract socially conscious Gen Z and Millennial workers. Finally, automation makes remote worksites possible with the potential to remove people from the most hazardous work situations, which addresses a key labor issue. However, for automation to be effective and a viable option, it must include a supervisory monitoring element, to ensure work is completed to the same standard or better than a human. This is where having historical and real-time information readily accessible becomes critical.

Value of Process Quality and Other Internal Metrics

While virtually every internal process metric relates to overall financial performance, when using balanced scorecard, it becomes even more important to measure and manage to these internal metrics. A consistent view of internal metrics helps a company weather financial performance pressure caused by external factors such as price, MRO materials costs, or even currency fluctuations. These factors may inflate or depress financial performance and potentially obscure performance degradations or conceal improvements. Despite external obstacles, reliability, product quality, and process consistency are the most common ways balanced scorecard yields impressive results. Typical improvements span:

- **DOWNTIME;** typically 25-40% reduction
- **MRO MATERIALS;** 15%-25% reductions in ongoing MRO parts and material consumption, plus one-time inventory reduction from rebalancing stores by using data more effectively and applying optimization analytics to failure history
- **ENERGY USE;** 1-3% cost reduction by arming operators with energy consumption data, and through more reliable and better-maintained equipment which invariably uses less energy
- **RECOVERY AND PRODUCTIVITY;** 5-50% improvement with real-time dashboards for operators, depending on the process, activity, and environment
- **PRODUCT QUALITY AND CONSISTENCY;** more uniform blends, higher on-spec product with more detailed quality profile information



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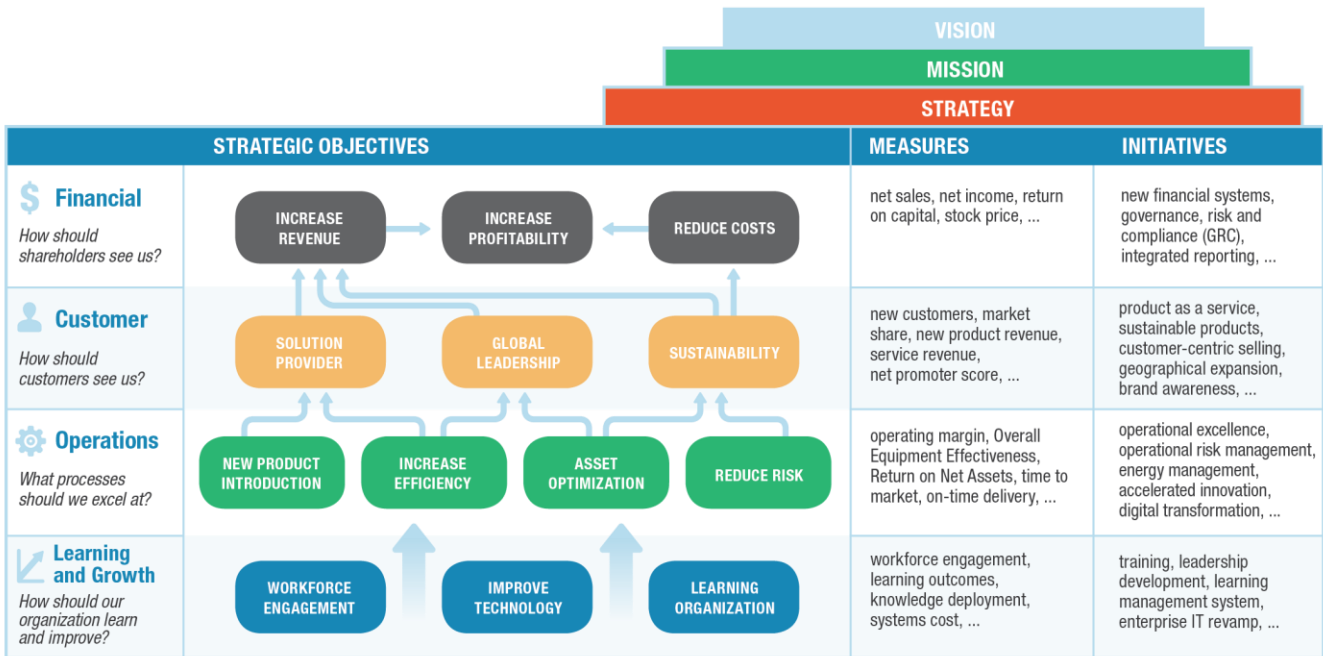


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Every one of these gains affects other balanced scorecard metrics such as the quality-customer relationship, the link between productivity / reliability and profitability, or the relationship between sustainability and job attractiveness. Ultimately, internal metrics drive balanced scorecard metrics, and companies should cultivate not abandon them.

Bottom Line for Balanced Scorecard Adoption



Let’s not confuse balanced scorecard with an automated version of a traditional management dashboard. Nor is it just a visual representation of the existing management reporting system. A true balanced scorecard approach must include:

1. Management restructuring;
2. Clarification of the roles, rights, and responsibilities of the organizational entities and individuals; and
3. Strong underpinning of planning, accounting, and reporting processes.

When done correctly, a balanced scorecard approach in the mining, metals, and materials industries often provides performance improvements that mean the difference between operating profitably or becoming unviable. Many of the leading companies in mining, metals, and materials have adopted a balanced scorecard approach and reported significant gains in all areas mentioned above.

Steps to Starting with Balanced Scorecard

Employing a balanced scorecard management approach, by its very name (scorecard), indicates that data and metrics are essential elements. In fact, a balanced scorecard approach is impossible without a reliable, accurate mechanism to collect and archive data. Mining, metals, and materials companies that want to adopt a balanced scorecard approach must focus on people, process and technology aspects simultaneously.

There is a well-established body of work on organizational structure and other people-related elements of balanced scorecard as well as the accounting and reporting processes to make a balanced scorecard work. The aspect that is not as adequately articulated is how to simplify data collection so that balanced scorecard doesn't become an organizational burden. The following actions will help a mining, metals, or materials company quickly implement and benefit from a balanced scorecard to drive business improvement:

1. Tackle the people aspects
2. Institute the accounting and planning processes
3. Define the key metrics for three to five critical activities in each of the balanced scorecard quadrants
4. Simultaneously prepare the data collection, storage, and analytics platform
 - Inventory all available data to support metrics calculations, historical and real-time
 - Instrument elements where necessary data is missing
 - Immediately start collecting history on all relevant data if not already available
 - Validate data integrity
5. Build role-specific dashboards and make them available to everyone, as appropriate
6. Meet regularly to review results, analyze deficiencies, institute corrections, refine training, and reward improvements

These straightforward steps, supported by reliable data collection, data historian, and an analysis platform, will arm any mining, metals, or materials company to achieve the benefits promised by the balanced scorecard methodology.

Presented by:



LNS Research provides advisory and benchmarking services to help Line-of-Business and IT executives make critical decisions. Our research focuses on the Industrial Internet of Things (IIoT), Digital Transformation; and providing insights into the metrics, leadership, business processes, and technology capabilities needed for achieving Operational Excellence. Learn more at www.lnsresearch.com.

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