GETTING TO MINING 2020 TODAY

Capturing the Industry 4.0 Payoff

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SECTION 1

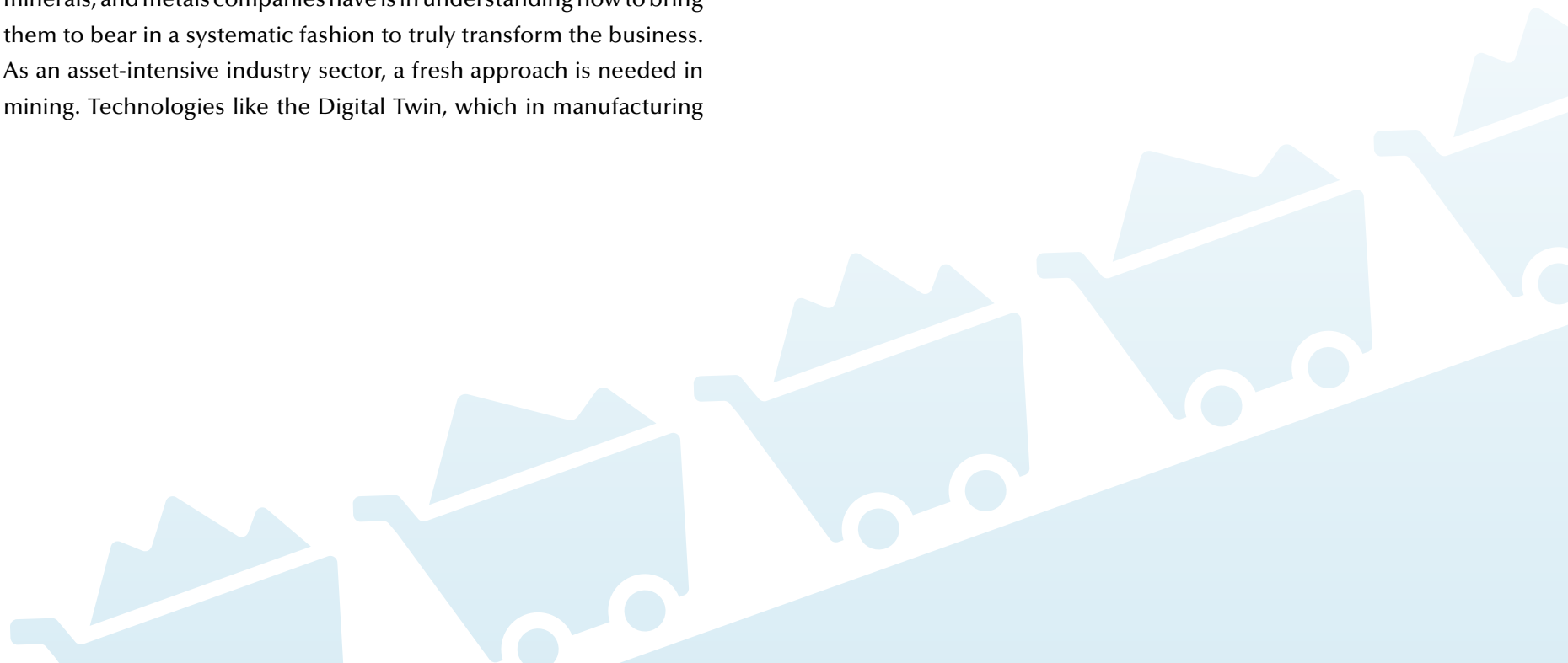
Executive Summary

Mining More Than Ripe for Industry 4.0

Now seven years old, Industry 4.0 (first known as Industrie 4.0 and led by the German government) originated in the manufacturing sector and concentrated on cyber-physical systems. Often overlooked by mining, minerals, and metals organizations because of its focus on smart products and engineering-driven manufacturing, Industry 4.0's principles have much to offer the mining sector. The four fundamental principles of Industry 4.0 are:

- **Interoperability**
- **Information transparency**
- **Decentralized decision making**
- **Technical augmentation**

The reality is that the mining sector is already applying all of these principles in many different ways. The challenge many mining, minerals, and metals companies have is in understanding how to bring them to bear in a systematic fashion to truly transform the business. As an asset-intensive industry sector, a fresh approach is needed in mining. Technologies like the Digital Twin, which in manufacturing generally applies to the products, translates into the Digital Twin of the mine, process or value chain. The role product lifecycle management (PLM) plays in product design in manufacturing is filled by geotechnical and plant design software in mining. Technologies like the Industrial Internet of Things (IIoT), mobile solutions, and Big Data and analytics are just as relevant. With the turbulent economic environment that mining now operates in, Digital Transformation isn't just an option; it is imperative for long-term survival. The good news is that the lessons learned in other industries can be successfully applied by mining enterprises, and a well-motivated mining company can accelerate Digital Transformation by following a systematic approach and partnering with the right vendors.



SECTION 2

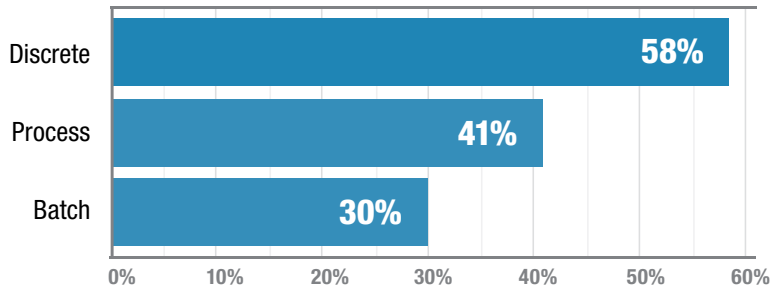
Demographics

Demographics

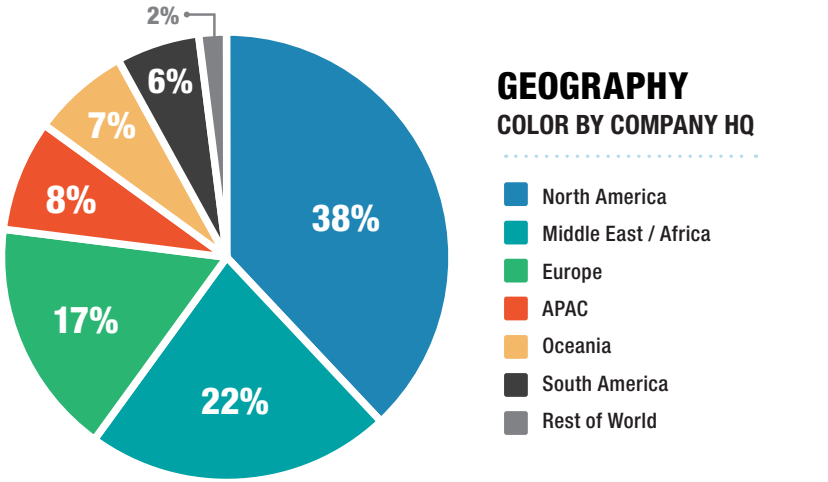
The data represented throughout this eBook was gathered from several ongoing surveys by LNS Research throughout 2016 and 2017. For this report on Industry 4.0 in mining, the number of respondents per question ranged from a few dozen to several hundred, depending on the specific question.

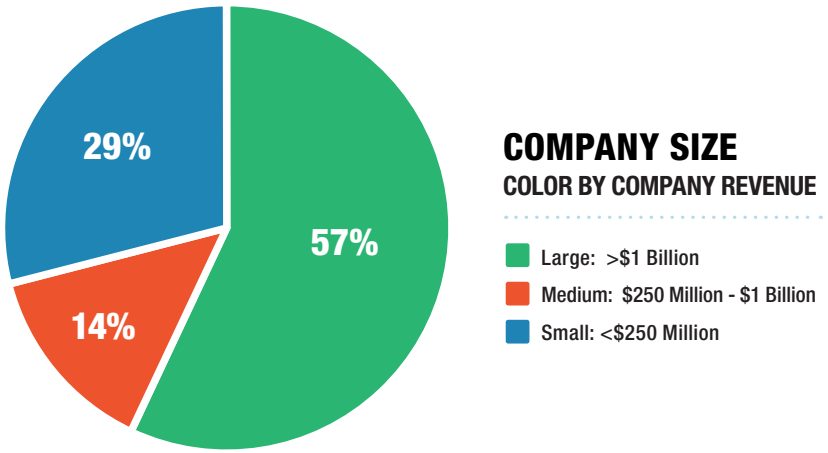
In general, mining segment responses align with overall industry responses, which represent several thousand across a variety of industries, split roughly between process and discrete manufacturers. When the responses from the mining sector differ drastically from the industry average, this report examines the differences.

Industry



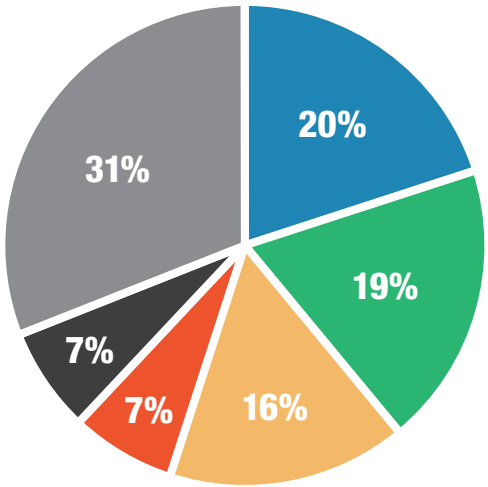
The mix of geography, revenue, job responsibility and company size change as LNS Research receives more responses from the Middle East, due to a surge of interest in best practices for IIoT and asset performance management (APM). As expected, most survey respondents reside in North America, with virtual tie in responses from Europe and the Middle East. The Asia Pacific region rounds out global participation.





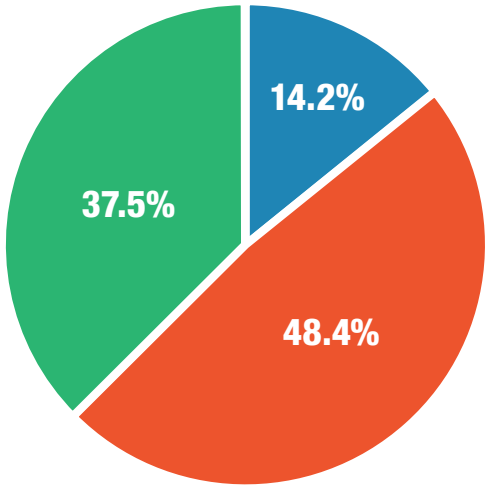
Demographics *(Cont.)*

Consistent with LNS' focus on the business leader, surveys show a strong mix of engineering and operations level responses. As companies consider the effects Industry 4.0 will have on the metals, minerals and mining industry and their enterprise specifically, all levels of the organization should be involved. This will ensure successful alignment of people, process, and technology.



ROLE
COLOR BY AREA OF RESPONSIBILITY

- Engineering
- IT
- Operations
- Quality
- Maintenance
- All Others



COMPANY SIZE
COLOR BY COMPANY REVENUE

- Large: >$1 Billion
- Medium: $250 Million - $1 Billion
- Small: <$250 Million

SECTION 3

Mining, Minerals and Metals Challenges

Challenges Hit Harder in Mining

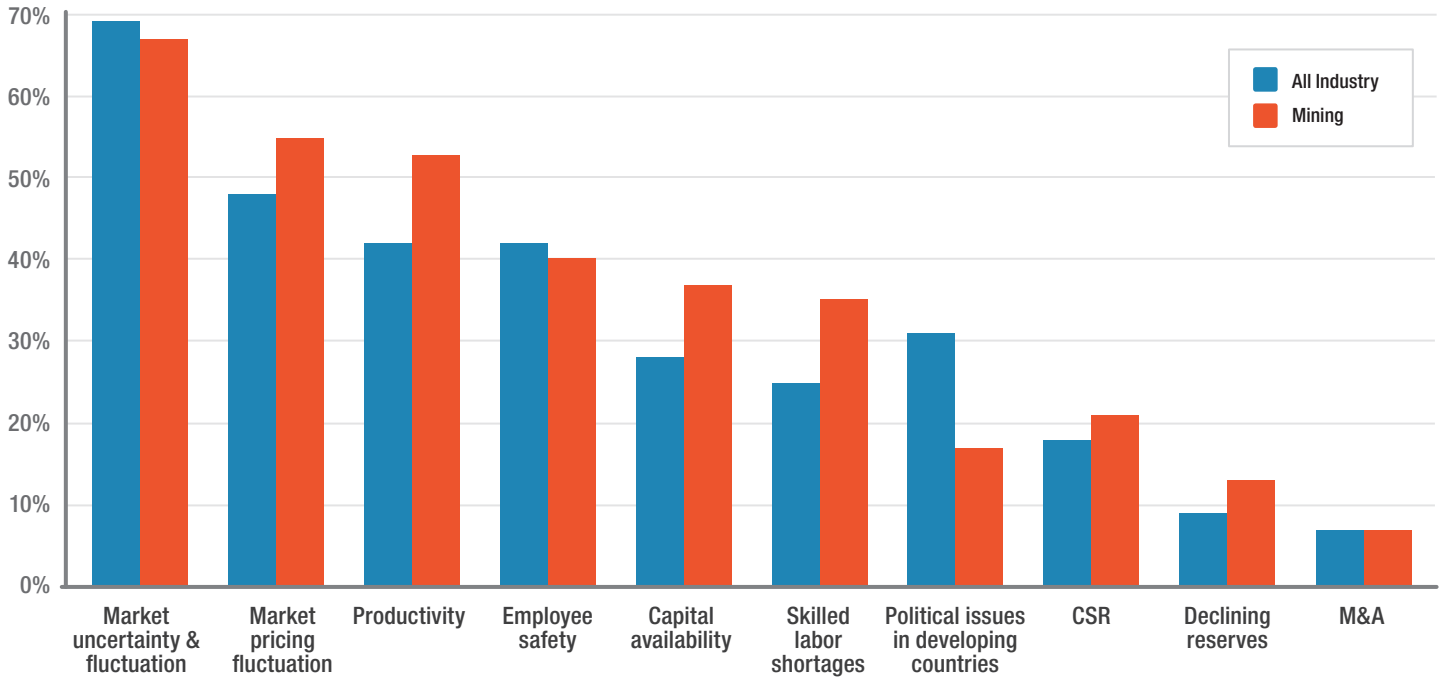
Today, the mining, minerals and metals industry faces some of its greatest challenges ever:

- **Environmental impact issues**
- **Raw material supply**
- **Critical labor shortages in some regions**
- **Energy costs and greenhouse gas emissions issues**
- **Shifting use to alternative materials**

Many industries worldwide depend upon the output of the mining, minerals and metals sector; consequently, the mining is critical to world economy. While a few mining sectors anticipate some growth over the next five years, a significant portion of the industry expects moderate to flat growth, despite global population increases coupled with a growing economic consumer class. As a result, the industry must change and adopt new operating modes and technologies, or face a very uncertain future.

When we examine survey responses from the mining industry compared to overall industry respondents, it validates generalized industry reports from industry sub-sector organizations and regional groups representing the industry globally. Adding to their challenges the mining industry is also under economic pressure. Over 35% of mining enterprise respondents identify growing revenue as the top financial objective.

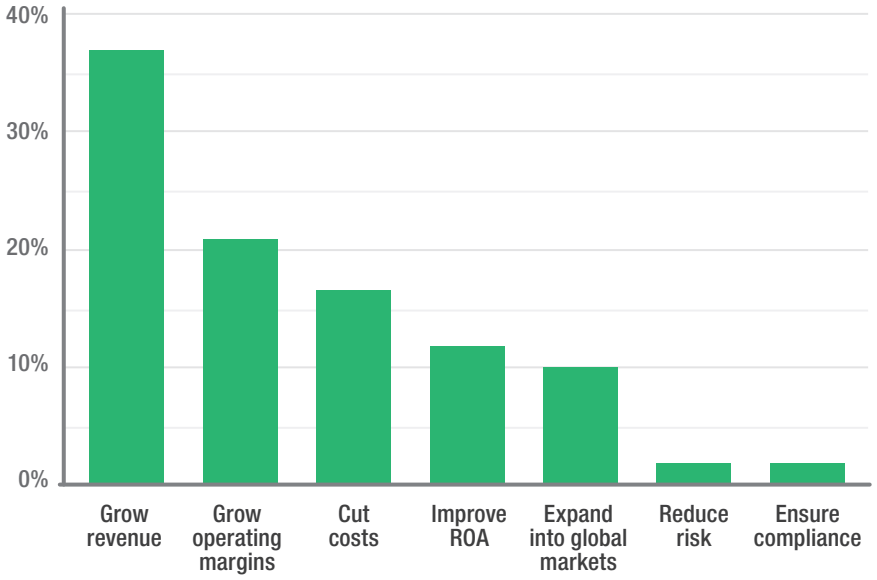
Industry Challenges



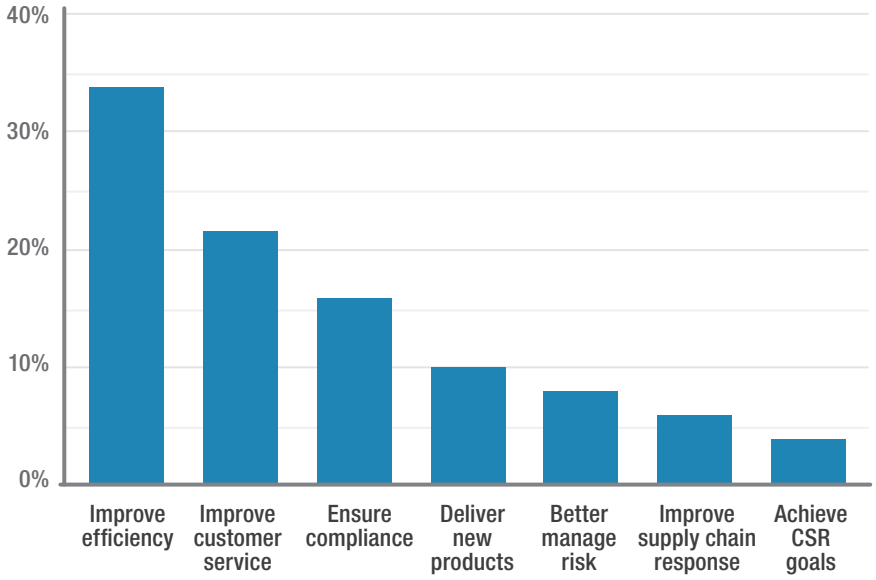
Mining Eager for Revenue and Efficiency Gains

To succeed, mining, minerals and metals companies identify growing operating margins, expanding their markets, cutting costs, and improving return on assets as the top priorities. Operationally, the top objective is improve operating efficiency, with 34% identifying it as the top priority; improving customer service follows at 22%. The remainder of operational objectives centers on more effective new product introduction (NPI); mitigating risk; and improving supply chain performance.

Mining Enterprise Top Financial Objectives



Mining Enterprise Top Operational Objectives



SECTION 4

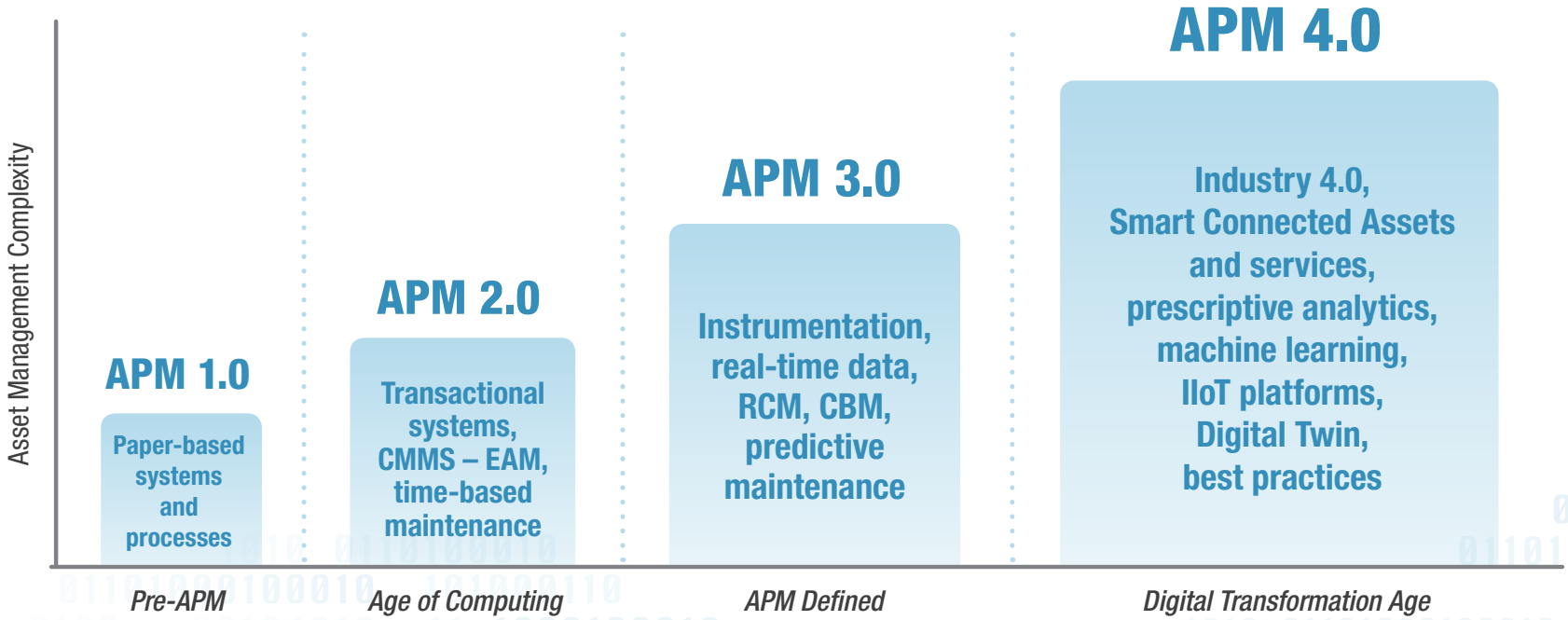
Considering APM

APM 4.0 Key to Hit Targets

The mining, minerals and metals industry is highly asset-intensive, making asset performance management (APM) critical to achieving profitable and optimum operations.

We're headed into a new age of opportunity and value creation with Digital Transformation. Industry 4.0 has emerged as the catalyst to bring together cyber-physical systems, the Internet of Things (IoT) and Cloud computing to create the smart factory, facility, or plant. If organizations are going to invest in elements of Industry 4.0 — whether a complete transformation or partial investment— APM is a critical component of the strategy. Existing APM thinking and solutions are evolving to support these efforts giving us the next generation of APM, APM 4.0 – an evolutionary step that will bring together many components we see now and that have the potential to make an impact in the future. At its core, APM 4.0 includes:

- **Prescriptive analytics and machine learning**
- **Smart connected assets and services**
- **IIoT platforms**
- **Industry best practices**
- **Digital twin as a mashup**

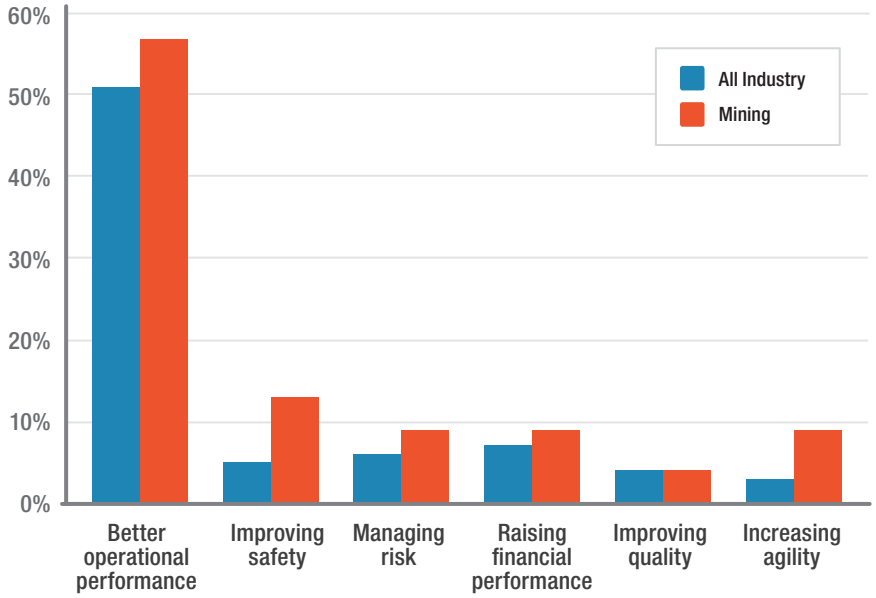


APM 4.0 Key to Hit Targets *(Cont.)*

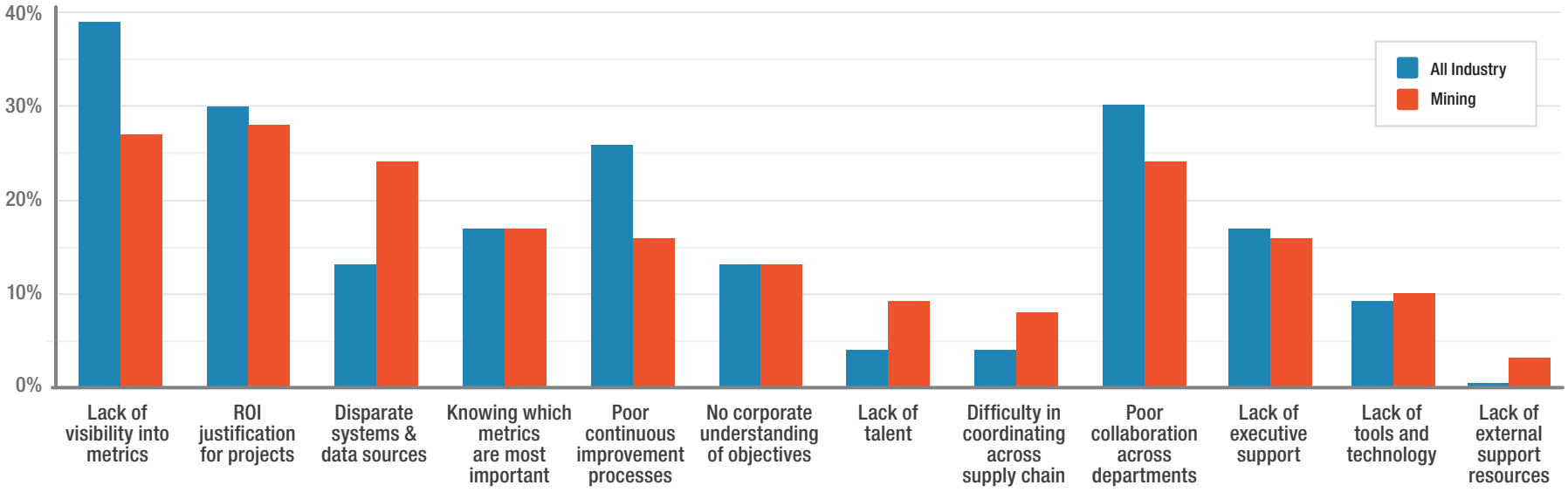
Among asset-intensive companies, "better operational performance" is the top reason for investments, and the mining industry is no different. Mining also turns to APM to improve safety, improve financial performance, and increase overall agility.

The impediments to achieve APM objectives is somewhat different for mining than industry in general. Mining's top two challenges are lack of visibility into operations and ROI justification for investments, followed by poor collaboration among workers. Manufacturing has focused on asset performance issues for many years, so it's not unusual to see the mining, minerals and metals industry now grappling with these issues. Luckily technology has considerably advanced in visualization, analytics vis a vis Industry 4.0.

APM Objectives



APM Challenges

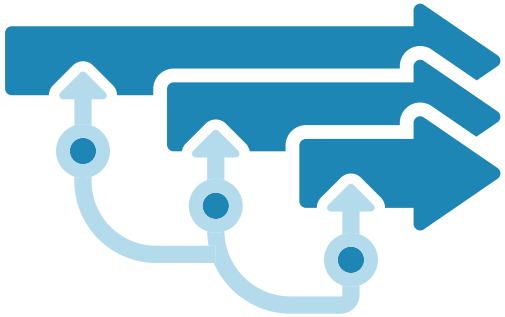


SECTION 5

Digital Transformation Framework

Digital Transformation Framework

In making Digital Transformation a reality, what many companies are missing is a systematic approach to effecting change. The LNS Research Digital Transformation Framework is designed to help industrial companies understand how to connect all of these simultaneous and interconnected initiatives.



DIGITAL TRANSFORMATION FRAMEWORK
by LNS Research describes a systematic approach to simultaneous and interconnected digital initiatives, in order to manage transformation across all levels and functions of the organization.

Click to learn more about the
Digital Transformation Framework

STRATEGIC OBJECTIVES

At the highest level, mining companies today have to be thinking about how many of these new technologies, like the IIoT, can disrupt and transform products, value chain business processes, and connected service delivery. At the strategic level, mining companies should be doing 5, 10, and even 20-year planning; often these transformative visions are:

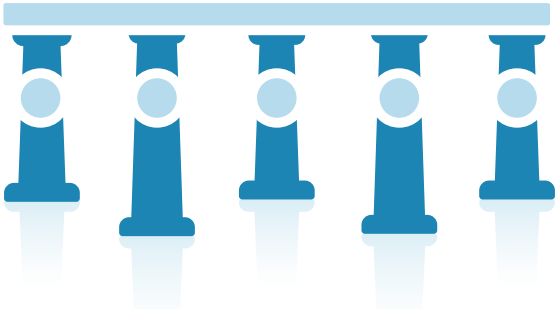
- **Driven by the CEO and COO;**
- **Built around the competitive differentiators of the firm; and**
- **Changing the very nature of service delivery by building upon existing models like Industry 4.0, Smart Manufacturing, or smart connected assets.**

OPERATIONAL EXCELLENCE

People, processes, and technology are the underpinnings of Operational Excellence initiatives, and the senior-most line of business functional leaders in the organization typically own these initiatives. Leading companies today have developed maturity models to help set goals and growth plans for people, process, and technology capabilities along with metrics programs to evaluate performance across all areas of operations. Most companies have had Operational Excellence initiatives in some form or fashion for ten years or more. Often, these initiatives incorporate the multiple management systems and continuous improvement capabilities of the enterprise, like

Digital Transformation Framework *(Cont.)*

Lean or Six Sigma. Not only do mining companies need to continue to evolve Operational Excellence initiatives to be the official continuous improvement engine, but also the company's innovation engine. Often, this means moving to more of a 'Lean Start Up' mentality with a mantra of 'fail fast and fail often,' and pilot projects that have the potential to deliver much more than the 1-2% benefit typical with most continuous improvement initiatives.



OPERATIONAL EXCELLENCE PLATFORM

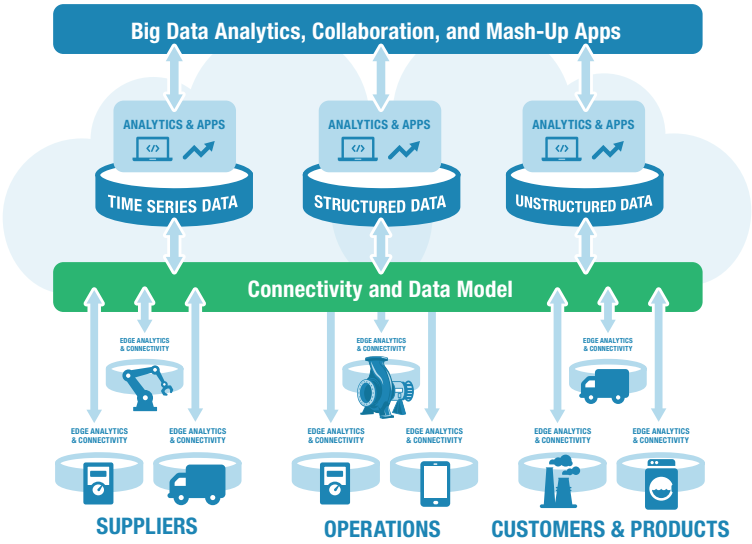
by LNS Research is the alignment of people, process and technology capabilities to create a culture of continuous improvement; supported by metrics and organized in the functional pillars required for full stability. Measured in terms of maturity, shortfall in one pillar causes vulnerability; shortfall in more pillars risks catastrophic failure.

Click to learn more about the
Operational Excellence Platform

OPERATIONAL ARCHITECTURE

Traditionally the enterprise architecture has been owned by the IT organization and has typically focused on establishing robust processes for evolving the enterprise application landscape and supporting IT stack. Separately, automation, corporate engineering, and or advanced manufacturing (often now referred to as operational technology (OT) owned the technology architecture for plant-level technology. With the emergence of IIoT, LNS Research recommends mining companies adopt an Operational Architecture approach that applies the formalized rigor and process of enterprise architecture to the entire IT-OT stack. For this to be accomplished effectively, mining companies should create supporting and collaborative groups that include resources from both IT and OT. As the Chief Digital Officer emerges, the enterprise will see greater success with new collaboration as a fundamental part of their charter.

OPERATIONAL ARCHITECTURE



Digital Transformation Framework *(Cont.)*

BUSINESS CASE DEVELOPMENT

Often mining companies begin technology solution selection or even business case development without establishing a connection to enterprise Strategic Objectives, Operational Excellence, and Operational Architecture. Typically, developing a business case is most successful when driven by deep subject matter experts that understand the processes and the related technologies. Identifying these experts can be a challenge, but often they are located in advanced manufacturing, hybrid IT/OT roles, are a leader within specific business functions, or are a technical fellow supporting the organization. Although these other elements of Digital Transformation don't need to be complete before starting to build a business case, it's important to understand that they are interconnected. As such, mining companies shouldn't view technology investments as a one-off business case but rather as a business case journey that aligns with system architecture goals, depends on increasing Operational Excellence maturity, and supports long-term Strategic Objectives.

SOLUTION SELECTION

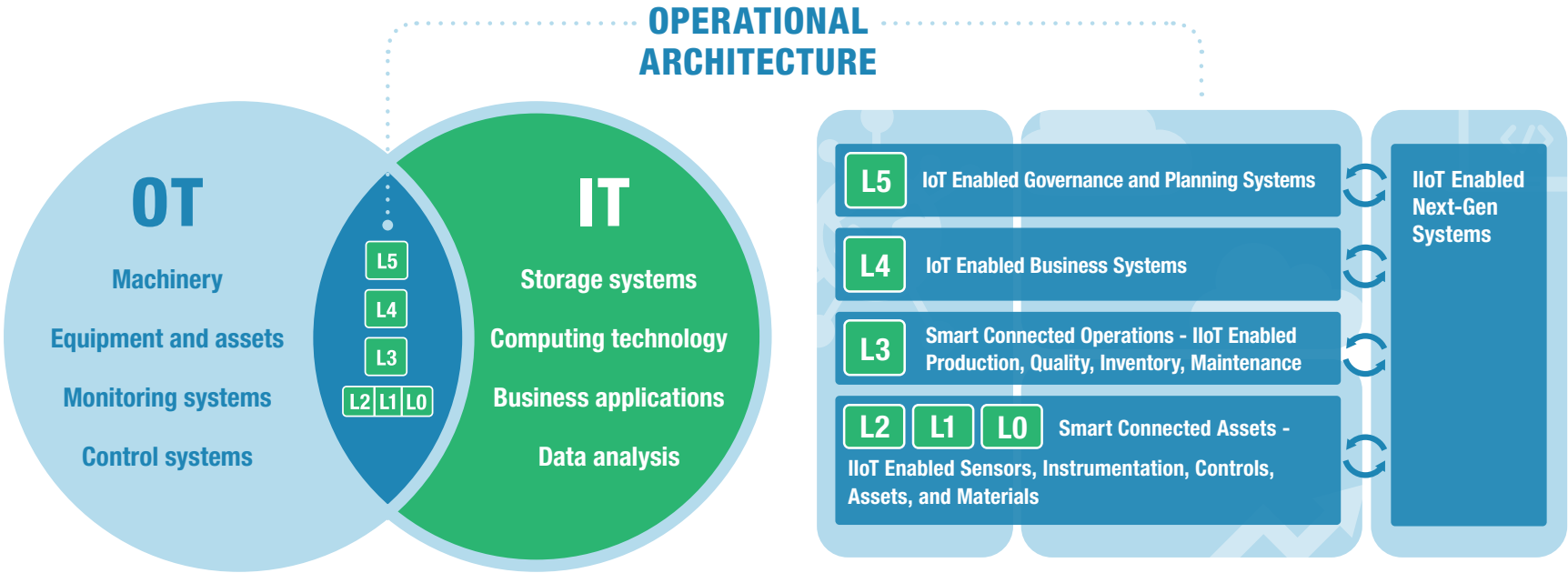
Often mining companies view Digital Transformation in somewhat of a reverse order -- starting with solution selection, which then drives all other portions of the framework, rather than vice versa. Again, with solution selection, it is important to put activities within the context of the broader initiatives. Solution selection is never successful in a vacuum, and that approach causes change management to become an insurmountable challenge and adoption wains. For success, conduct an effective solution selection process that is quantitative to eliminate bias and includes a cross-functional team that incorporates all relevant portions of the organization, including IT, OT, and functional business leaders.

By using a structured framework that connects initiatives and roles across all levels of the organization, mining companies will be in a much better position to capture the full value of Digital Transformation.

Digital Transformation Framework *(Cont.)*

OPERATIONAL ARCHITECTURE

LNS strongly believes that Operational Architecture is critical to successfully implement APM 4.0 within a mining enterprise. Like any initiative, there are strategic and tactical elements. The Operational Architecture exercise helps clarify and separate strategy from tactics so that the company understands where its APM capabilities are today and defines where it needs to be to accomplish goals. This is the roadmap of how to get from the as-is to the desired state.



SECTION 6

Mining 2020 Achievable Today; Not “Just” Futuristic Vision

Key Technologies for Mining 2020

There are key technologies that are transforming Mining today: the Industrial Internet of Things (IIoT); Big Data and Analytics; the creation of the Digital Twin; Smart Connected Assets; and Mobility.

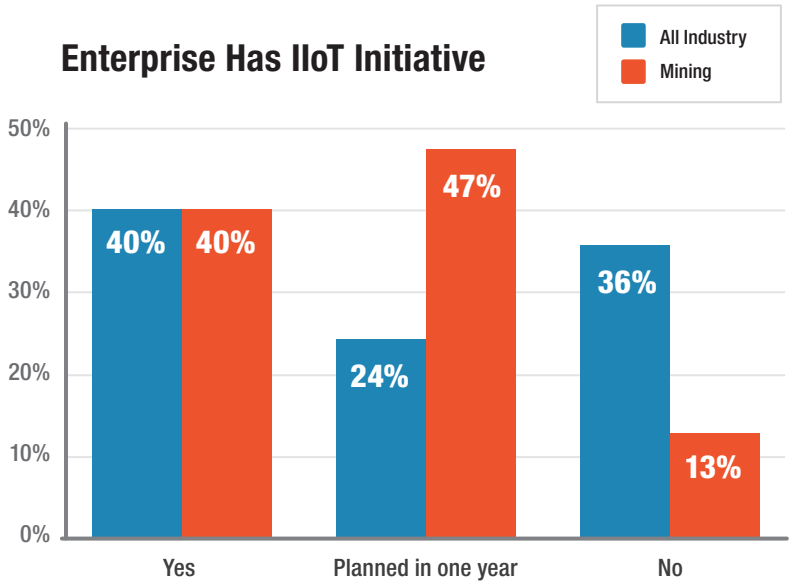
IIoT Not Optional

The Industrial Internet of Things (IIoT) broadly refers to the concept that as scalable computing, ubiquitous connectivity, and pervasive sensing becomes a reality for industrial environments, companies will need to embrace modern technology architectures and platforms that enable more flexible and user-centric mash-up applications with Big Data analytics. In support of this new vision, LNS Research defined the IIoT platform to bring together connectivity, Cloud, Big Data analytics, and application development capabilities. Starting in 2014, many industrial automation and software vendors invested heavily to deliver on this vision of "platform as a service offering," and in turn, industrial companies responded.

Over the past several years, interest and intention to invest in IIoT platform technologies have steadily increased. We have now reached the point where a majority of mining companies have either already invested in IIoT platform technologies (40%) or plan to do it this year (47%). This growth represents an impressive increase in market momentum; just two years ago nearly as large a share of companies didn't even know what the IIoT was.

INDUSTRIAL INTERNET OF THINGS PLATFORM by LNS Research describes the connectivity, network styles, and application frameworks to support smart connected operations and smart connected assets; within and across a plant, facility or production network in a manufacturing or other industrial operations setting.

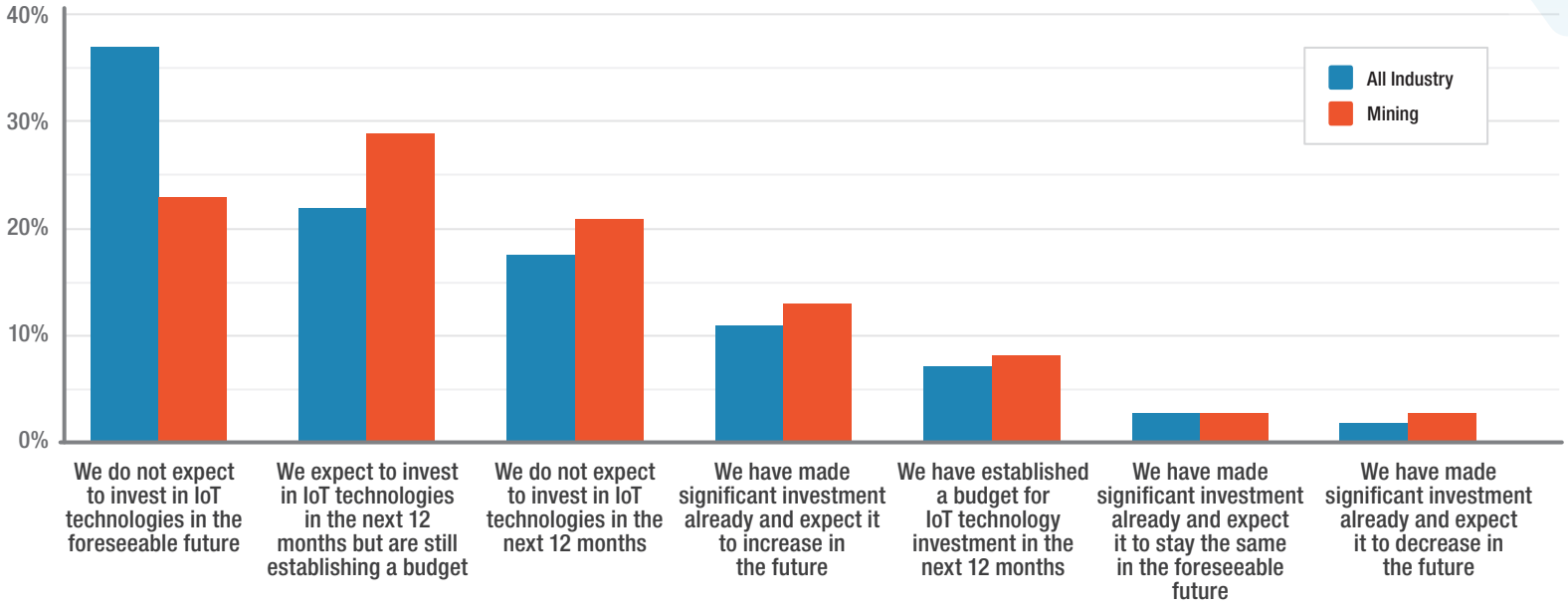
Click to learn more about the
Industrial Internet of Things Platform



IIoT Already Top of Mind in Mining

The mining industry leads investments in IIoT, recognizing the contribution the initiative can have on performance and operations safety. Mining is definitely setting an example for other industries. The top two use cases are production visibility and energy efficiency. Going forward, these will remain the top use cases but the value propositions that drive other industries to adopt IIoT technologies, like business model transformation and asset reliability and tracking, will gather more attention and investment.

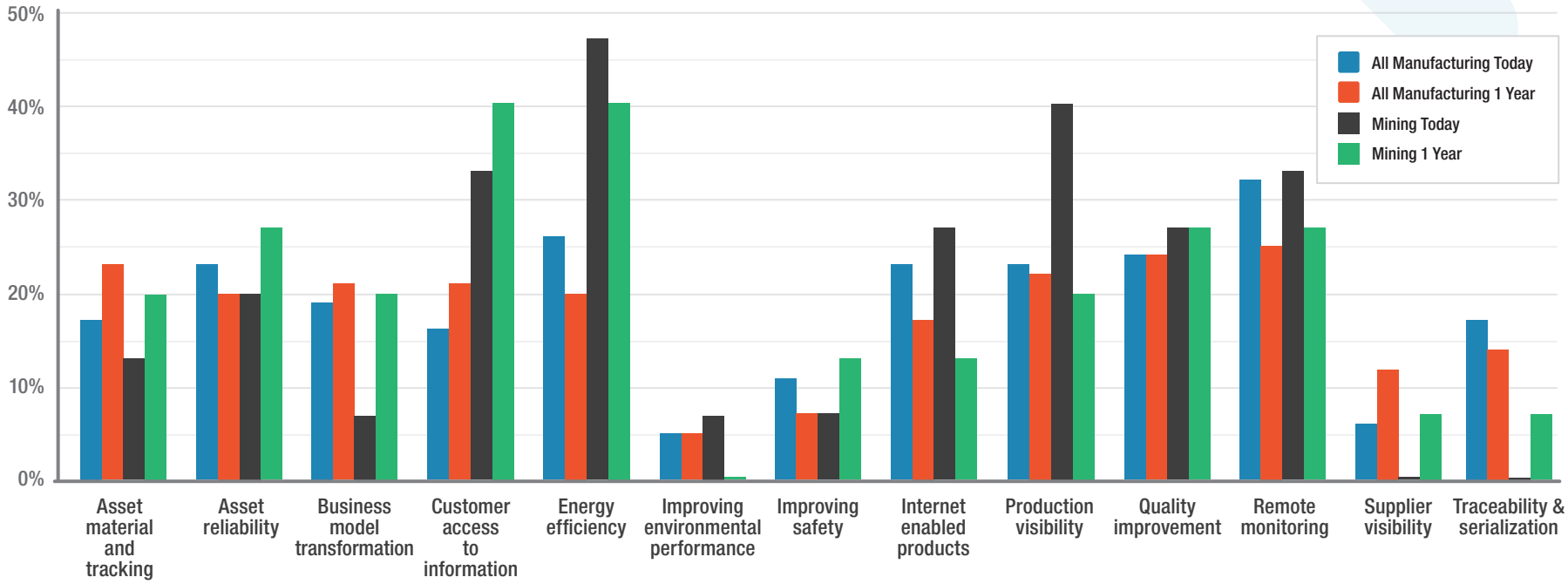
IoT Investment Plans



Use Cases Not New, Just Better With IIoT

One IIoT use case for mining is safety, identified as the number two priority for investment. Go to any plant cafeteria and the boldest metric displayed is time since last lost time accident (LTA). Over the past 20 years, safety has moved from being an afterthought to a core value for most industrial organizations. During that time, mining companies invested heavily in building sophisticated risk-based models for managing both machine and process safety. The challenge most companies have faced with these models in practice is that there hasn't been any way to easily compare actual results to those anticipated by the models. This difficulty dramatically shifts with the deployment of IIoT technologies and Digital Twin mash-up applications.

IIoT Investment Plans

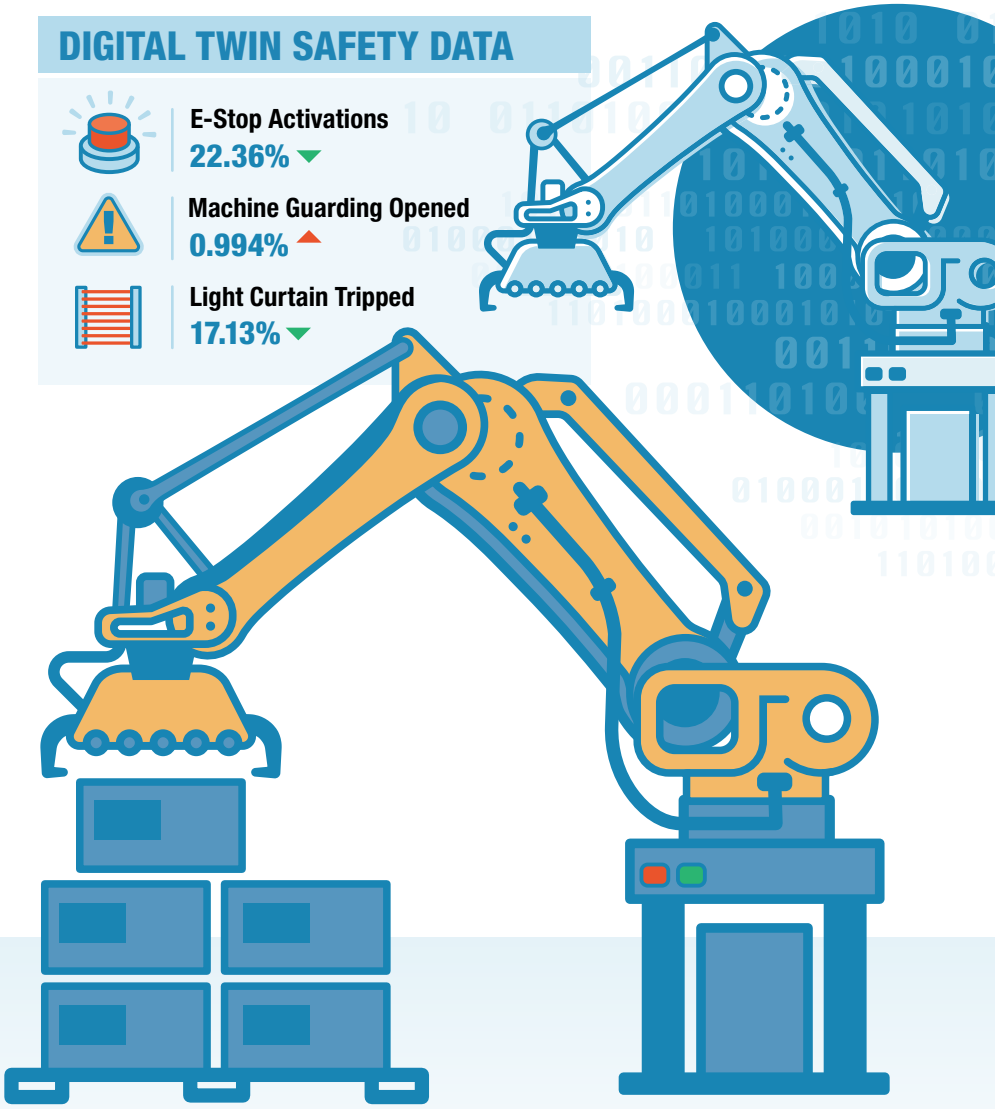


Digital Twin Features Prominently

LNS Research is now aware of multiple machine builders that are enabling Digital Twin applications to compare predicted and actual safety performance of machines, i.e., e-stops, machine guarding, light shields, operator alarms, and more. Such applications allow industrial companies to identify when safety systems are e-stops used significantly more or less than anticipated, both of which dramatically increase the risk of injury.

- **When safety systems are being under-utilized**, it typically indicates that operators and or supervisors have found a way to disable or short-cut around safety systems, typically to increase productivity, ease of use, or both.
- **When safety systems are being over-utilized**, it usually signals maintenance, operator, or calibration issues; causing the machine to exceed engineered operating conditions.

By using Digital Twin, industrial companies quickly identify these operational issues, but more importantly, they can establish a method to address them with offline training in mixed reality applications that don't suck up capacity from the "real" machine.



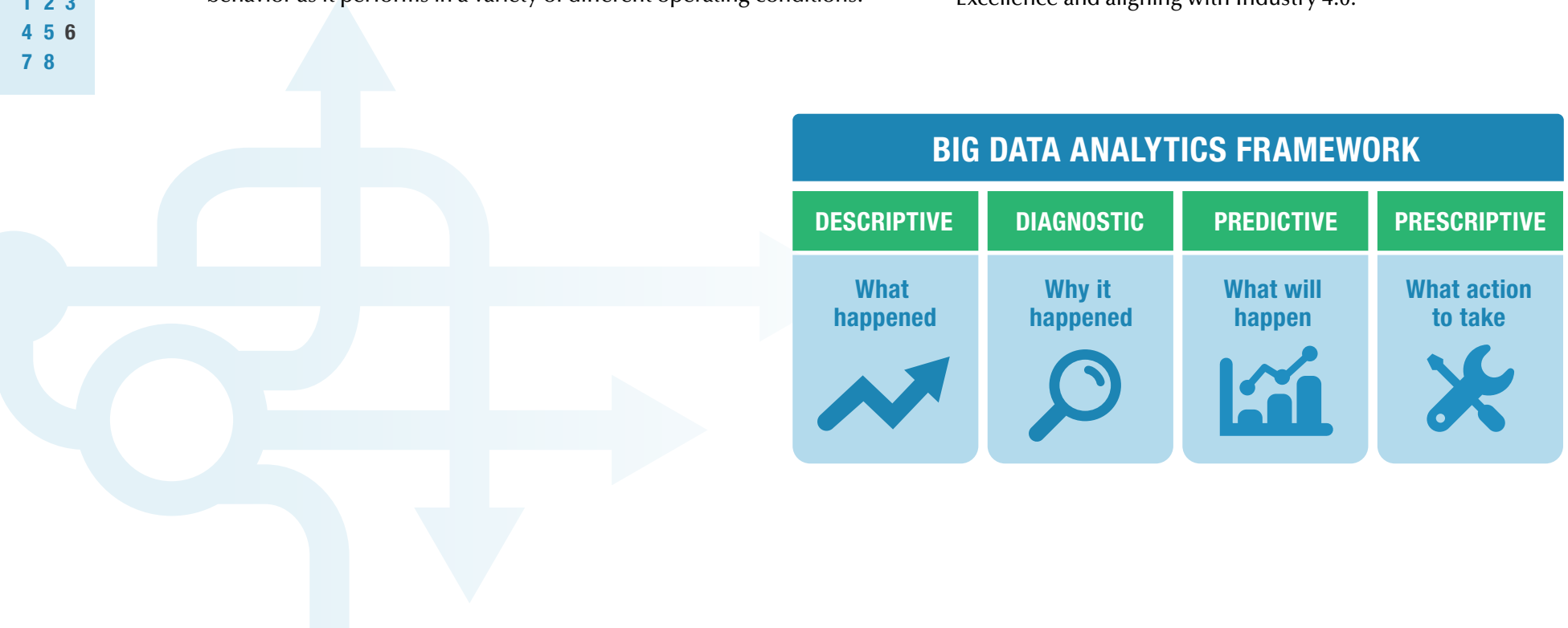
Big Data and Analytics

There's a changing world in manufacturing software. At the center of this change is data—Big Data, more data, and different data—and along with that data is opportunity. A recent survey by LNS Research uncovered that only 14% of respondents use manufacturing data in analytics. Industrial companies can address this gap in the use of manufacturing data by incorporating analytics into ongoing Operational Excellence and other programs. Companies should build a common framework to include both, much as Lean and Six Sigma were combined some years ago.

Mining companies are characterized by data-driven performance—their processes, people, and equipment all generate a plethora of data. Mining OEMs are now building 'Big Data' capabilities into the equipment themselves, to detect variances in uptime (for OEE), performance, and prevent issues to increase worker safety. Collecting data from the actual equipment can be invaluable for calculating machine behavior as it performs in a variety of different operating conditions.

PRESCRIPTIVE ANALYTICS

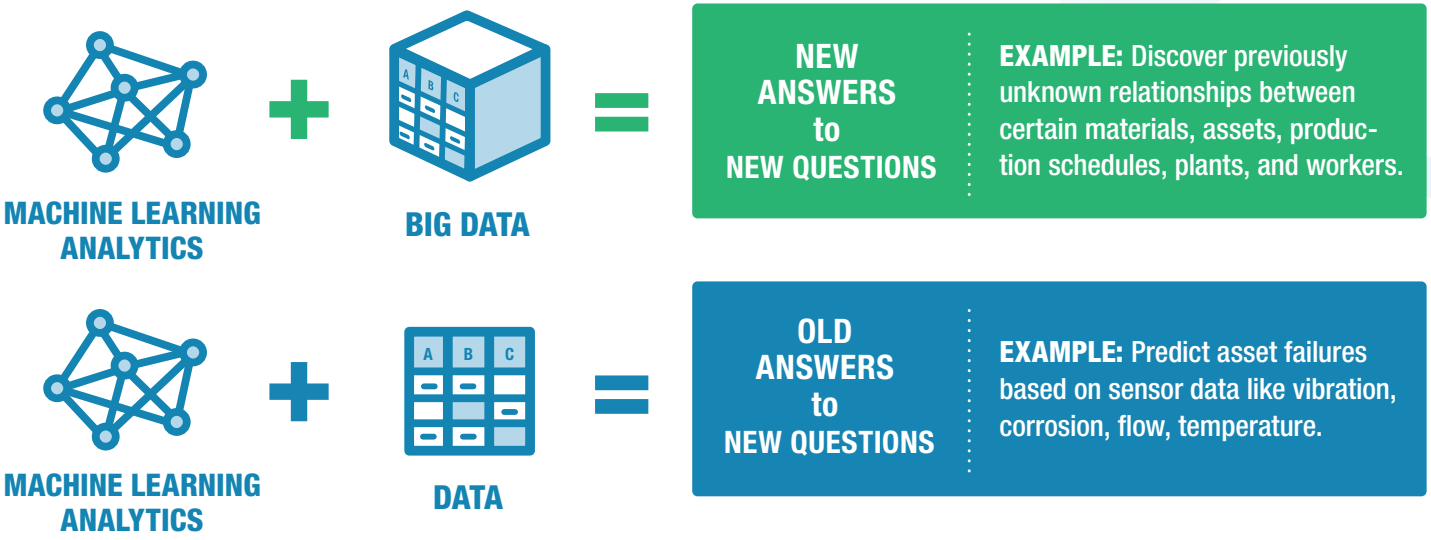
Big Data is the enabler behind APM 4.0 and the move to prescriptive analytics. Maintenance has evolved from reactive to condition-based maintenance (CBM), that's not enough to match the Digital Transformation paradigm shift maintenance organizations face. The APM 4.0 program needs to include predictive (minimally) and ideally prescriptive analytics to achieve an entirely new level of maintenance value. The greatly reduced cost of sensors and network connectivity makes it attainable. There are two levels of prescriptive analytics organizations should consider with APM 4.0. The first is prescribing maintenance activities to postpone or prevent failure. The second is more sophisticated; it is the ability to prescribe operational changes to alter how the equipment performs. The level means becoming maintenance smart; the second enables Operational Excellence and aligning with Industry 4.0.



Big Data and Analytics *(Cont.)*

MACHINE LEARNING

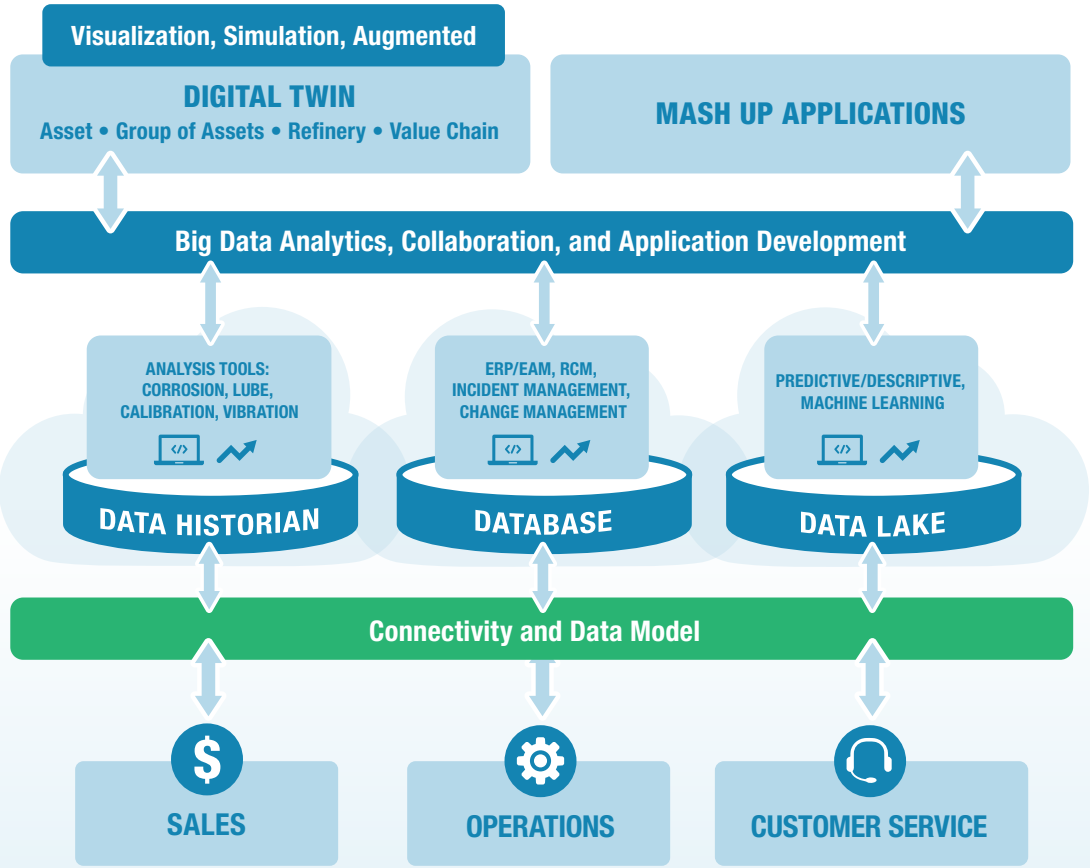
Machine learning (ML) is a type of artificial intelligence that provides the ability to learn and gain insight into operations and maintenance without being specifically taught how to do so. It enables an automated search through data to look for patterns and is the basis to adjust and improve APM processes and actions. For APM 4.0 for mining, consider two types of machine learning. The first is low hanging fruit: applying it to old data sets to predict failure. The second is applying machine learning to Big Data to discover answers to questions maintenance organizations didn't know to ask.



More About the Digital Twin

One of the first "killer apps" of value to maintenance is the Digital Twin; it's at the top of the food chain for APM 4.0. LNS defines the Digital Twin mashup as an application that can connect the data from assets and the services they provide, to anyone in the workforce, suppliers, manufacturers, sales and marketing, operations and maintenance, together on one platform, one application. The interface is more than just a digital copy of a physical asset; the Digital Twin mashup offers virtual and augmented reality models that users can edit, manipulate and put into a larger set of context with other assets operating around them.

Consider petrochemical refining: the digital twins of the distillation tower, cracking units, reformer and alkylation units can be combined to simulate, visualize and monitor the performance of the entire system throughout the asset lifecycle. Where the digital copy of the physical asset is concerned, use cases are unlimited in APM 4.0. As an example, a company can use these twins to view and understand the status of an asset, use the sensor data from the asset to update the digital twin in real-time, and support operational decision making.



Smart Connected Assets is a Given for Mining

Industry 4.0 includes cyber-physical systems, IIoT platforms, and Cloud computing; the outcome for maintenance is smart connected assets. From an operations perspective, the information and potential for these assets to enable Digital Transformation initiatives are critical for success. APM 4.0 takes advantage of the information and insights these assets provide to maintenance organizations. For many years, companies spoke of wanting to expand monitoring of assets. Two barriers stood in the way: sensing technology was prohibitively expensive and delivering the data to people who needed it was quite difficult. Today, assets lay the groundwork by providing an essential data source to do more real-time and predictive analysis, and the future promises the potential for autonomous operation.

USE CASE: Re-Defining Critical Assets – Pumps, Valves, and Motors

Conventional wisdom in maintenance and reliability advises companies to take a risk-based approach to maintenance strategies. In other words, it prescribes managing critical assets with condition-based maintenance (CBM or CbM) and managing less-critical assets with time-based maintenance, or run to failure.

Often, criticality of an asset is determined simply, through impact on operations if the asset fails, or to a lesser extent, cost of the asset.

For someone interested in challenging conventional wisdom, an interesting question might be, "Why aren't CbM strategies applied to all assets, since every asset has some cost and impact on operations?" Grizzled veterans will quickly point out that it doesn't make financial sense to spend $10,000 on sensing, wiring, data collection and analytics software to manage a $2,500 asset with limited impact on production downtime, which is the original genesis of the conventional wisdom.

However, by taking an IIoT platform approach, the marginal cost of applying CbM (extending to predictive or prescriptive maintenance approaches) to additional assets drops to nearly $0. Subsequently, as this cost falls to perhaps pennies or single-digit dollars for each additional asset, the share of assets that now have a positive ROI for applying CbM practices goes to almost 100%!

Because of this phenomenon, we have seen early adopters of IIoT platform technologies applying CbM to many assets in operations that they previously never applied the benefit of such an approach, and the results are impressive.

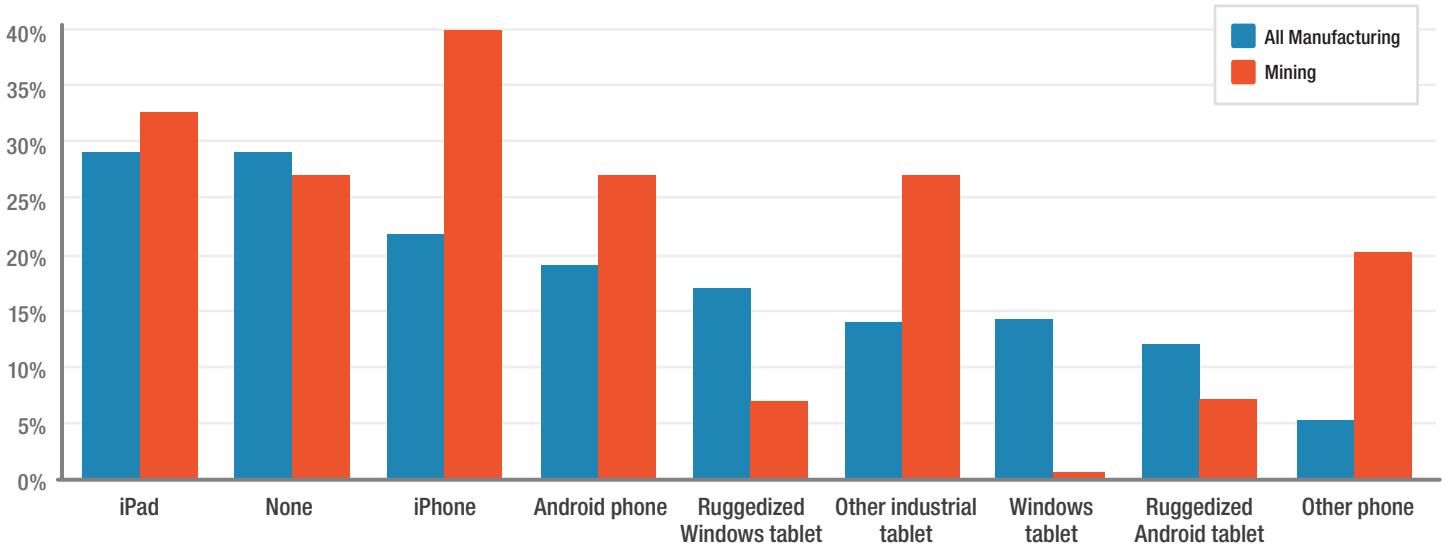
Mobility

Mining companies are dependent on the mobility of their workforce—either due to transient ad-hoc housing for worker communities, or workers living off-site and driving in long distances. Productivity, safety, and knowledge transfer are critical worker issues. To use technology to enable and facilitate the mobility of their workers while keeping operational goals in place is key.

Today's generation expects their mobile solutions to be AR/VR enabled. World-class mobility platforms provide a rich user environment with these technologies to speed adoption, particularly among millennials.

Not surprisingly, the adoption of mobile devices in the mining sector is ahead of industry in general. Since mobility is a critical element of Digital Transformation, the mining sector is better positioned to reap benefits sooner.

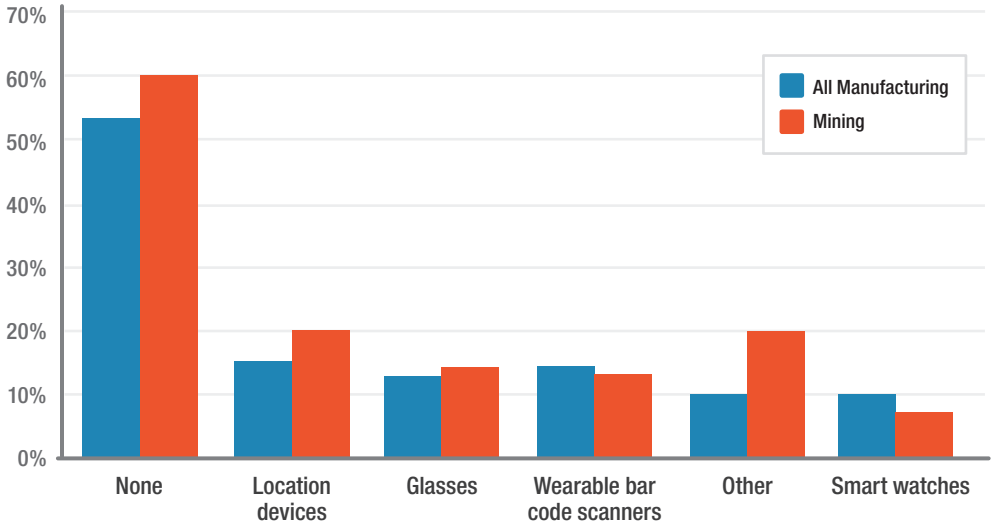
Mobile Devices



Mobility *(Cont.)*

The shift to wearables as another avenue for mobility is consistent with industry in general, so mining companies only need to follow the market in this area from a technology perspective. There certainly is a business case for location device deployment in the sector from a safety perspective, but no specific technology has proven capable of dominating the market. Consider a selection of providers with a history of fast adoption of emerging standards as the best path.

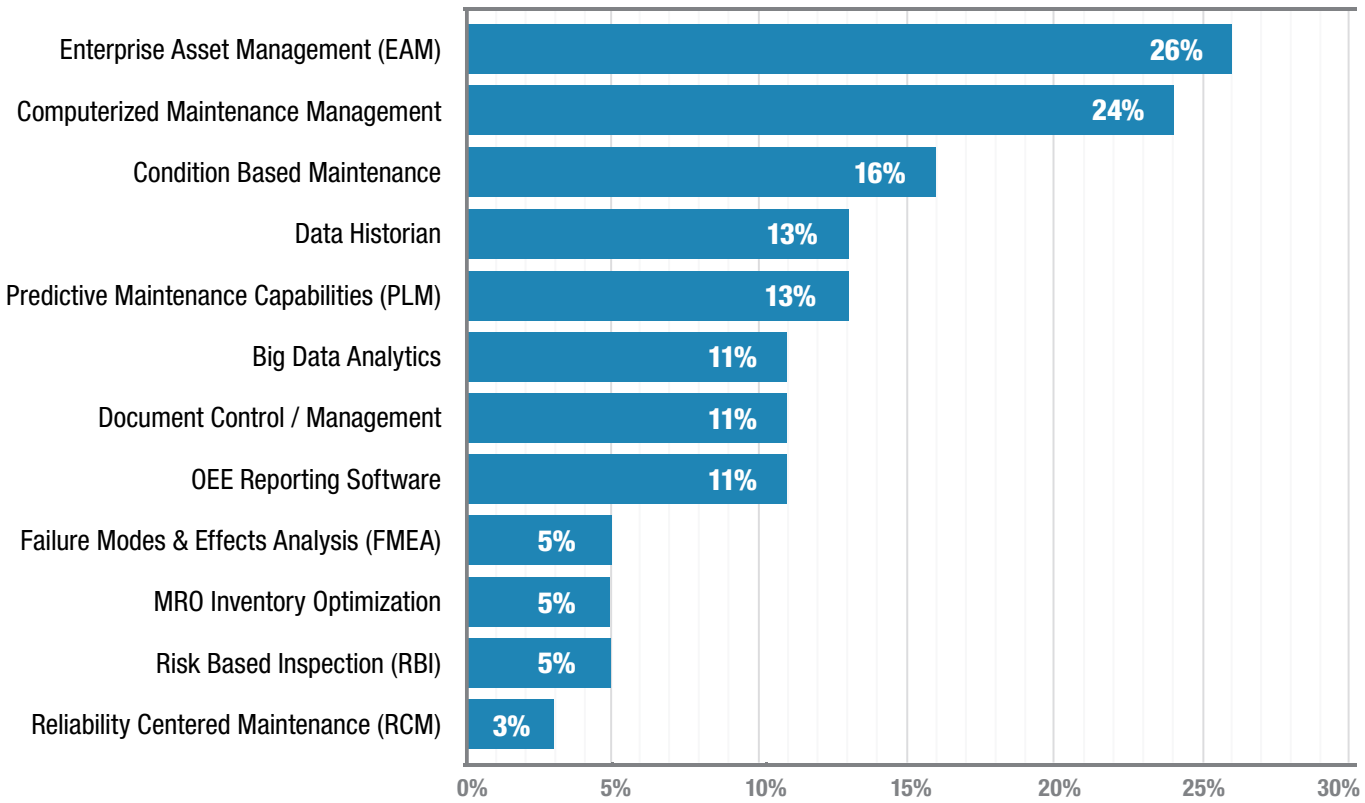
Smart Wearables



Applying Mobility in Mining Operations

A survey by LNS Research in 2016 uncovered a multitude of uses for mobile technology in applications that can boost a mining company's overall performance. The results showed an opportunity to incorporate mobile applications that provide data collection and accessibility at the asset. Currently, most APM applications that determine asset criticality enable insight and understanding of asset strategies have the least amount of mobility applied to it. Not using advanced tech this way is a significant missed opportunity for organizations pursuing Operational Excellence. In fact, this is exactly where IIoT platforms can potentially have a big impact, focusing on mobility solutions at the point of performance for data collection and analysis.

State of Mobility (2016)



SECTION 7

Why Now: Mining's Ability to Attract NextGen Workforce

Today's Workers Want Modern Tech

The metals industry is finally experiencing resurgence: 2017 saw the first annual increase in exploration budgets for nonferrous metals after four years of declining expenditures. Additionally, the market value of the industry's leading companies rose to twice the level of 2016. Just over half-way into 2018, the global economic environment appears strong, buoyed by growth across key economies, a strengthening US economy, and increased merger and acquisition (M&A) activity.

These strong economic indicators foretell the need for talent acquisition as essential to operational productivity and the leadership pipeline across the mining industry. Forecasts show that over the next decade at least one-third of the current mining workforce will retire.

Current trends show that:

- **Over the next ten years, the mining industry's projected hiring requirements exceed 145,000 workers—over half the current workforce, according to the MIHR Council.**
- **The mining industry will need to hire over 67,000 workers in the next ten years to replace retired workers.**
- **Over 40% of the mining workforce is older than 50 years, according to Statistics Canada and the MIHR Council.**

A big question mining companies ask today is, "How can we start attracting and retaining a new workforce?" One contributing factor is by promoting and proliferating the technology that generation has already adopted, targeting new workers who may be entranced by the use of Industry 4.0 and the Digital Transformation that's occurring.

Newer workers (the Millennials) are 'digital-savvy' in contrast to older mine workers, who were 'process-savvy.' Enabling cross-collaboration of these individuals, whether physical or virtual, allows the mining enterprise to leverage the strengths of each type of worker. Therefore, the more a mining company is digitalized, the greater chance it has of attracting and retaining the next generation worker.

Technologies for attracting the next generation workforce can include:

- **Mobile applications:** enable users to view data and KPIs on mobile devices/tablets for real-time decision making. Deliver consistent execution of best practices for data collection during safety, maintenance, and environmental inspections.
- **Digital collaboration:** use technology to digitalize standard operating procedures (SOPs) and workflows, and enhance worker collaboration/satisfaction.
- **Augmented reality:** use innovative augmented reality software on mobile devices to recognize equipment and process areas, superimposing real-time data and virtual objects onto them.
- **Operator training:** use AR/VR to provide a richer and easier-to-use training environment that makes it safer and faster for operators to test start-ups, learn new skills, or recreate responses to real-world events.

SECTION 8

Recommendations for the Mining Industry

Recommendations

There are five essential steps the mining industry should take to secure their future in the digital world:

1. **Start now.** Define success by how the company wants its business to look five to ten years down the road. Digital Transformation is a journey that requires a vision. Setting Strategic Objectives that will transform the business is the first step.

2. **Define success.** Know what Operational Excellence looks like and understand what factors will drive customer satisfaction, enable maintenance and the ability to produce products in a sustainable fashion, and create the profits that shareholders demand. It also means defining the metrics for success in these areas, and ensuring appropriate sharing of metrics and information.

3. **Create an Operational Architecture that defines the technology people will use to support the business processes that create value.** Mining companies need to make sure that existing technology is integrated into their architecture if it is capable, and if not make appropriate investments in the right technology. It is all about getting the right information to the right people at the right time — that need hasn't changed in over 30 years.

4. **Select partners that share the Digital Transformation vision and can provide a platform upon which to build.** Choose vendors that understand the challenges of APM 4.0 and are moving away from selling products and instead delivering platforms upon which the mining enterprise can build the right solutions to help meet Strategic Objectives.

5. **Start investing today in both infrastructure and technology.** Mining has several advantages in that it is highly automated, and mobility solutions are common. However, for most mining companies, the underlying infrastructure, applications and IT need a refresh to pursue Digital Transformation.

Technology is changing industry and time is running out. Digital Transformation is accelerating across all industrial sectors, and mining is no exception. Early adopters in mining are showing that there are real, measurable benefits from leveraging technology. Those companies that have yet to pursue things like the IIoT, Cloud-based solutions and Big Data with its associated analytics risk falling so far behind the competition that they become the victims as consolidation and business model changes reshape the entire mining sector.

GETTING TO MINING 2020 TODAY

Capturing the Industry 4.0 Payoff

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