THE INTELLIGENT ENTERPRISE IN THE EXPERIENCE ECONOMY FOR THE MINING INDUSTRY

Making mining more agile and transparent – from the pit to the customer – with intelligent technology
WELCOME

Dear Mining Professionals,

Long characterized by physical labor, capital-intensive assets, and reactive operating models, forward-looking mining companies are turning to knowledge-based labor, automation, and predictive planning to uncover new opportunities for growth.

Driven by the global shift to sustainable energy, volatile market conditions, and profit margin pressure, mining companies must turn to robots, autonomous vehicles, and sensor-equipped gear to increase operational efficiency and develop new services and business models. At the same time, they face public scrutiny in keeping their license to operate, so they have to find new ways to engage with communities and go beyond minimum standards for safety and sustainability.

By 2025, we expect that mining companies will monitor safety conditions for miners and the consumption of resources such as energy and water in real time. Companies will have a holistic view of operations and a more agile way to plan the lifecycle of the mine, manage the supply chain, and gain visibility into long-term profitability. Operations staff will be able to select from various suggested scenarios that consider safety, feasibility, and profitability.

To bring this vision to life, however, mining companies must embrace dramatic business transformation driven by the adaption of technical, cultural, and organizational change. They must tie together siloed systems, often in remote areas with poor network connectivity. They must invest more aggressively in emerging technology. They must make their work environments more attractive for skilled workers. And they must do it all while meeting regulatory oversight and raising their own environmental standards. The path forward requires boldness from what has been a risk-averse industry.

We have identified four strategic priorities that will keep the industry moving forward:

• Make the business more predictable, agile, and productive through automation
• Collaborate with customers, suppliers, and workers
• Focus on customer needs
• Mine responsibly and sustainably

In 2025, industry leaders will become real-time enterprises with a more customer-centric focus. They will embrace new business models, such as blend to order, which will cater to specific customer needs and help companies produce materials closer to the customer locations. Because they will be able to deliver higher-quality material, mining companies will be able to charge a premium. With increasing use of sensors across equipment and environmental data, production will be more predictable. They will be able to make adjustments based on real-time information rather than guesses.

To take its place in the new experience economy, the mining industry must embrace dramatic business transformation driven by the adaptation of technical, cultural, and organizational change.

This paper takes a deep dive into the trends shaping the mining industry over the next five years and the path to innovation. In it we propose a set of priorities that will drive transformation and the tools that will make it possible.

Until recently, a lack of pressure on margins and, in some cases, a lack of competition has insulated many mining companies from the volatility that has driven business transformation elsewhere. Today, however, mining companies are as vulnerable to sweeping economic and societal change as every other industry. Those that learnt to “mine smarter” will lead the way.

Sincerely yours,

Ruediger Schroeder
Global Lead for Mining
SAP SE
TABLE OF CONTENTS

3 Welcome
5 Our Place in the New World
7 Paving the Way for Business Model Innovation
9 Four Priorities for Success
10 Make the Business More Predictable, Agile, and Productive Through Automation
12 Collaborate with Customers, Suppliers, and Workers
14 Focus on Customer Needs
16 Mine Responsibly and Sustainably
18 Top Experience Drivers Along the Mining Value Chain
19 Key Technologies
20 Getting There: A Phased Approach
21 SAP’s Framework for the Intelligent Enterprise in the Experience Economy
22 How to Plan Your Path to the Intelligent Enterprise
23 Comprehensive SAP Ecosystem: Orchestrating the Partner Ecosystem to Deliver Value Faster
24 SAP Is Committed to Innovation
25 Resources

YOUR FEEDBACK MATTERS TO US!
Please let us know how you rate this document.

Click here
The shift toward sustainable energy impacts mining companies not only on the demand side with a reduction in demand for energy commodities but also by the electrification of cars. There are new opportunities with the increased demand for rare commodities, needed in sustainable generation and storage of energy, where current demand outstrips supply. Increasingly, mining companies will become buyers of electrical cars and consumers of renewable energy, helping to reduce air pollution in the mines and make work conditions safer.

Global supply chains will become increasingly more connected. With real-time updates of status and capabilities, customers can react very quickly if circumstances change. Digitalizing the entire document exchanges through blockchain and portals eliminates non-value-added tasks. Customer-specific blending and local stocking points require better planning but provide higher revenue potential. The inbound supply chain improves with better tracking and avoidance of duplicate orders, which also has a positive impact on working capital. Mining companies that improve the customer experience will be the leaders.

Environmental, social, and governance (ESG)-related factors are increasingly becoming a cornerstone of decision-making by the public and investors, forcing mining companies to find new ways to engage and communicate with stakeholders, as well as to operate. This is driving an increased use of experience management tools and techniques.

Knowledge and work are valued, as the demand for high-skilled labor rises with increasing automation, high-tech equipment, and changing business processes. Mining companies continue to compete with other industries for a similar labor force.

Trust, safety, and security are essential as more equipment and sensitive data are exchanged between applications and equipment through wireless networks. Vulnerabilities can mean the loss of intellectual property or safety risks of miners and the environment.

Global “megathemes” are affecting the mining industry and are providing new opportunities for growth.
The mining industry is being reshaped by four major trends.

- **Customer centricity**: To escape wild price fluctuations of commodities and find new revenue streams, mining companies must improve customer services, offer value-added services such as special blends, and offer e-commerce platforms to engage more closely with customers and analyze customer behavior.

- **Agility**: Developing new mines in collaboration with junior miner contractors will speed up time to market and reduce risk and costs. More profit-margin-based production planning rather than volume-based production requires agile planning and execution.

- **Collaboration**: Collaboration is the key to transforming the mining business. It includes not only vendors, customers, competitors, and the workforce but also players outside the traditional value chain – such as technology companies and data scientists and the communities around mining sites.

- **License to operate**: The stakes for keeping the license to operate continue to grow. Just meeting legal requirements alone is no longer enough; mining companies are becoming more transparent, including providing information on money flows to government agencies. Increasingly, they focus on how to achieve shared value with local communities and operate as sustainably as possible with respect to their impact on the environment.

Being able to address the global megathemes and industry challenges will determine who will be among the winners in the next 10 years. Successful business model innovation, process optimization, and customer centricity are directly linked to delivering great customer and employee experiences. In fact, research indicates that the best-performing companies are pulling away from the rest, widening the performance gap. They are doing this by creating a landscape where they deliver great experiences and are the most profitable because they successfully adopt new technologies and deliver winning products and services more efficiently.

60% Of mining companies are piloting edge computing within their mining operations.1
In 2025, mining companies will be real-time enterprises with a more customer-centric focus. They will embrace new business models, such as blend to order, which will cater to specific customer requirements and help companies produce materials closer to the customer locations. Because they will be able to deliver higher-quality material, mining companies will be able to charge a premium. These changes will also enhance the experiences of their customers.
Robots, autonomous equipment, and better insights into production through real-time operational data will lead to significant productivity gains through better usage of equipment, better allocation of teams, and being able to do more with less. Direct collaboration with equipment manufacturers and shipping companies will allow for data exchange, quicker turnaround time for repairs, and improved customer service.

Collection of real-time data from operational equipment, autonomous vehicles, and drones from remote control centers and wearable technologies on workers will provide deep visibility into mining operations and improve safety and efficiency. Modeling mine operations as digital twins will enable mining companies to analyze and monitor data to prevent issues before they occur, avoid downtime, and even simulate future circumstances and events.

Mining companies will overcome innovation barriers such as legacy technologies, budgets, mind-sets, and traditional project approaches. Mining companies will become more agile by focusing on smaller projects that enable quick success. They will take advantage of digitalization by connected assets and applying artificial intelligence – for example, in predicting mineral grades and mine modeling.

Digital tools such as chatbots and robotic process automation for repetitive tasks, like invoice matching or procurement processes, will enhance and transform internal and external processes and drive even more productivity gains.

Successfully applying and deploying these new tools and technologies will help mining companies differentiate from their competitors by providing better customer service, attracting talent, and improving mining efficiency and sustainability.

50% Of major mining companies by 2019 will have initiated workforce transformation, focusing on automation, mobility, augmented reality, and cognitive abilities to increase productivity, safety, and collaboration²

50%–80% Reduced costs for terrestrial mines using 3D printing compared to standard manufacturing methods³

US$630 billion Annual savings as a result of predictive maintenance by 2025⁴

2.8% Increased productivity in mining since 2014; this is still 40% lower than the baseline in 2004⁵

82% Of mining executives said they expect to increase investments in digital technology in the next three years⁶

51% Of mining companies globally are expecting their spending on IT-related investments within IT and operations to increase in the next 12 months⁷
We have identified four strategic priorities necessary for mining companies to transform their business.

**FOUR PRIORITIES FOR SUCCESS**

- Make the business more predictable, agile, and productive through automation
- Collaborate with customers, suppliers, and workers
- Focus on customer needs
- Mine responsibly and sustainably
MAKE THE BUSINESS MORE PREDICTABLE, AGILE, AND PRODUCTIVE THROUGH AUTOMATION

Generally, the mining industry is characterized by volatile market conditions, capital-intensive assets, and rather reactive operating models.

Given this reality, it becomes clear that the most successful and profitable companies are the ones that can adjust quickly to changing market conditions, plan the outcome, and execute accordingly – while reducing their own resource consumption and operating safely. (See Figure 1.)

The Vision
In 2025, end-to-end planning of the outbound supply chain as well as the inbound supply chain will allow full visibility into changing conditions – including supply, demand, and operations. Companies will be able to perform agile adjustments based on real-time information rather than guesses. With increasing use of sensors across all equipment categories and environmental conditions, operations will be synchronized between equipment and workers for improved productivity. Production output will be more predictable. Smarter technologies, applied to geological models, will allow more targeted mining and reduce waste.

Real-time analytics from the pit to the boardroom will provide analytical capabilities, leading to faster and better decision-making.

The Journey
Mining companies will start by monitoring in real time safety conditions for miners and consumption of resources such as energy and water. Applying artificial intelligence helps to discover patterns and potential savings. Companies will then extend and integrate mine and business planning into a holistic view for a better and more agile way to plan the lifecycle of the mine, examine the supply chain, and gain visibility into long-term profitability. They can then start mining the plan. The business will be transformed, as operations are run in real time and today’s events lead directly to adjustments in planning and execution. Operations staff will be able to select from various suggested scenarios that consider safety, feasibility, and profitability. This will greatly change the experience miners have in the work space.

Figure 1: Make Mining More Predictable, Sustainable, and Agile

Disintegrated data flow and no decision support
Safe, connected, and real-time operations
Mining companies face challenging operational environments where the unexpected is the expected. Companies strive to make the unexpected more predictable and run the mine like a factory. Predictive analytics can help to predict the failure of an asset before it occurs. Operational insights from vehicle tracking and data collection to crew deployments and scheduling will enable agile planning and execution on the fly rather than days later.

**MAKE THE BUSINESS MORE PREDICTABLE, AGILE, AND PRODUCTIVE THROUGH AUTOMATION**

**RUN A MINE LIKE A FACTORY**

Mining companies face challenging operational environments where the unexpected is the expected. Companies strive to make the unexpected more predictable and run the mine like a factory. Predictive analytics can help to predict the failure of an asset before it occurs. Operational insights from vehicle tracking and data collection to crew deployments and scheduling will enable agile planning and execution on the fly rather than days later.

**TRADITIONAL SCENARIO**

- Siloed information between mine planning and commercial planning
- Spreadsheet-based planning and reporting
- No real-time visibility into operations from the mine to the boardroom
- Reactive operations based on random events rather than a planned approach
- Face difficulties to compare different plans with actuals in multiple, disparate spreadsheets
- Struggle under long planning cycles with limited visibility into actuals and manual transfer of data into spreadsheets
- React rather than be proactive with planned operations – due to lack of timely, accurate data

**NEW-WORLD SCENARIO**

- Plan updates in hours rather than weeks
- Make decisions based on commercial numbers and profitability rather than gut feelings
- Capture the actuals through drones and fleet, and act quickly when deviations occur
- Compare plans directly with actuals
- Analyze data directly through embedded analytics in real time rather than in spreadsheets
- Transfer to sales and operations planning for commercial planning and immediate replanning – in real time – to decide on optimal scenario
- Capture actuals from fleet and drones automatically, and compare directly with the plan in near-realt time
- Discover deviations from plan immediately and resolve issues quickly during the shift
- Run the mine like a factory by planning the mine, and mine the plan

**TOP VALUE DRIVERS**

- **Accelerated** planning cycle
- **Better** commercial outcomes
- **Faster** decision-making and agile reaction

Source: SAP Performance Benchmarking
COLLABORATE WITH CUSTOMERS, SUPPLIERS, AND WORKERS

Mining companies are part of a large ecosystem – from direct customers to suppliers, workers, contractors, and the communities in which they operate.

It is becoming increasingly important to collaborate more closely and directly with the ecosystem rather than using a linear, manual process with limited data flow. With a more collaborative approach, everyone shares the same data without losing important information, and they can make decisions based on the same data set. (See Figure 2.)

The Vision
In 2025, digital twins of assets, the supply chain, and business networks will allow direct interactions between all parties based on the same information. Capital project planning and execution will run collaboratively on joint platforms with better visibility and information sharing. Production and maintenance will be further automated, and workforces will focus primarily on exceptions. This will make processes more efficient and will change the way employees work. On the procurement side, finding, onboarding, and executing contract work will be largely supported by business solutions and will become increasingly self-service. Engaging with communities interactively can identify challenges to solve and improve satisfaction.

The Journey
Mining companies will start with managing the contract workforce more digitally, from hiring, onboarding, and training, to payroll. This digital management will extend to working collaboratively on planning and executing mine projects, which also will result in having a digital twin of the mine. The business will transform if digital twins mirror all assets and the supply chain networks, and business processes are automated across company boundaries.

Figure 2: Collaborate with Customers, Suppliers, and Workers

20% of manufacturing companies will have started to treat their assets as internal customers, leading to a 40% reduction in asset downtime by 2021.

Roy Hill was created with the vision of having an innovative operation that transforms the way that mining can be run. One area of focus is transforming the way assets are managed and maintained. Roy Hill set out to increase asset and spare part availability and optimize inventory by transitioning from a replenishment model to a demand-driven model for maintenance, repair, and overhaul.
COLLABORATE WITH CUSTOMERS, SUPPLIERS, AND WORKERS

DIGITAL TWINS FOR COLLABORATION

Mining companies can transform their operations and supply chain into a responsive network by building digital twins. Traditionally, mining operations and the commercial part of the business are run in silos, where collaboration is limited, which results in uncoordinated decisions. Bringing the different internal and external parties together to collaborate and have real-time insights on the same data set will make mining more responsive and efficient. Providing additional services to customers through collaboration will enhance the customer experience.

TRADITIONAL SCENARIO

- Disconnected departments and limited access to the business network, prohibiting responsive business
- Plans that are not consistently created and shared, impacting the quick flow of information
- Mining production and maintenance not aligned and reactive
- Reliance on manual communication with supply chain partners, resulting in limited visibility and collaboration difficulties – making delays inevitable and the risk of error high

NEW-WORLD SCENARIO

- Digital technology in operations and in the supply chain intelligently connects operations and supply chain networks to the rest of the enterprise, while technologies such as predictive maintenance help dramatically change the way operations run.
- Linear supply chains transform into digital supply networks through simultaneous collaboration of all relevant stakeholders.
- Alignment of procurement, sales, production, and delivery helps improve customer satisfaction.
- Connected enterprises can act quickly on any sudden change within the network.
- Digital twins enable real-time insights.
- Your company flourishes at the center.

TOP VALUE DRIVERS

Higher overall equipment efficiency
Better real-time decisions
Optimized inventory and supply

Source: SAP Performance Benchmarking
FOCUS ON
CUSTOMER NEEDS

Changing consumer buying behavior (business to consumer) will also impact business-to-business companies.

Today, to deliver value for their customers, all business-to-business companies must understand how their customers are making buying decisions and how they are using products – all the way to the end consumer. And if the end consumer’s expectations are changing, that creates a ripple effect all the way back to your business. True customer centricity means understanding the ultimate end consumer and how their behaviors are changing – and then make every business decision based on this insight through Experience Management. (See Figure 3.)

The Vision
In 2025, mining customers will be able to maintain close customer relationships with a focus on long-term value based on a 360-degree understanding of their customers, starting with a detailed understanding of requirements and needs. They will interact seamlessly with their customers on a constant basis through multiple channels, from Web to direct, including IoT connectivity.

The Journey
Mining companies will start toward this goal by establishing integrated sales and operations planning to better understand customer needs, plan and prioritize customers, and align the plans with the mine production plan. In this way, they can react more quickly in case of imbalances between supply and demand. This can then be extended to include a real-time view not only of the customer itself and all current transactions but also all materials that they bought in the past – so companies can align with the customers on providing the best individual material blends. These two perspectives will finally allow companies to transform the collaboration with customers into a 360-degree relationship, from sensing demand to delivering value through materials and services through an e-commerce platform that changes the customer experience.

Figure 3: Focus on Customer Needs

In 2020, human-digital interfaces will diversify, as 25% of field service techs and more than 25% of information workers use augmented reality.9

ArcelorMittal S.A. wanted to improve sales and operations planning for the more than 60,000 products that can be made from a steel coil. It wanted to optimize inventory levels, reduce the need for working capital, reduce unproductive lead time, and serve customers in the best way possible. The company implemented supply chain solutions from SAP, including the SAP Integrated Business Planning solution, and can now manage situations such as canceled or changed orders in a much faster and more practical way, because it has visibility into the whole picture and can decide promptly on the best action to take.
FOCUS ON CUSTOMER NEEDS
INTELLIGENT CUSTOMER INSIGHTS

Putting the end customer’s point of view at the center of every decision is a key prerequisite for success in the digital age, and Experience Management helps in capturing this. It does not stop in the sales department but also applies to which materials are mined and produced and what services are offered. As mining companies become customer-centric enterprises, the ability to focus on their most valuable customers is one of their key priorities. Providing relevant information independent of the channel used and knowing your customer from all angles contribute to a positive customer experience.

TRADITIONAL SCENARIO
Disparate information and data silos hinder the ability to have a clear picture of your customers’ data.

NEW-WORLD SCENARIO

- Put customer success at the center of all activities
- Enable a single point of truth
- Achieve a 360-degree view of past and current customer activities, leading to better decisions
- Collect all relevant marketing data in an optimized tool set
- Receive inquiry for customer information
- Access a 360-degree view of all customer-related information, such as history, complaints, shipments, and quality
- Offer products and services based on customer intelligence
- Improve customer relationship

TOP VALUE DRIVERS

| Improve customer satisfaction | Reduce sales and service cost | Increase revenue growth |

Source: SAP Performance Benchmarking
MINING COMPANIES ARE UNDER INCREASING PRESSURE TO COMPLY WITH PUBLIC, INVESTOR, AND GOVERNMENT DEMANDS ON ENVIRONMENT, SAFETY, AND GOVERNANCE (ESG) CRITERIA. NAVIGATING AND COMPLYING WITH THESE OFTEN-CONTRADICTORY REQUIREMENTS ARE BECOMING INCREASINGLY CHALLENGING. JUST MEETING MINIMUM LEGAL REQUIREMENTS IS NO LONGER ENOUGH. (SEE FIGURE 4.)

THE VISION
By 2025, the mining industry will make substantial use of sentiment analysis to gauge the acceptance of mining activities in communities around them and use that to prioritize improvement measures. Real-time monitoring of workers’ environmental condition will improve their safety, as immediate actions can be taken in case of critical conditions. Monitoring and managing tailings will be streamlined, and the most relevant information will be available from a single source and viewable everywhere.

MINING RESPONSIBLY AND SUSTAINABLY
Mining operations have an impact on the environment and the communities around them. Keeping and renewing the social and legal license to operate is the highest priority for mining companies.

Mining companies are under increasing pressure to comply with public, investor, and government demands on environment, safety, and governance (ESG) criteria. Navigating and complying with these often-contradictory requirements are becoming increasingly challenging. Just meeting minimum legal requirements is no longer enough. (See Figure 4.)

THE JOURNEY
Mining companies will start by automating the collection of environmental data and making it more easily accessible. They will build a reporting framework to be used as the basis for inside and outside communications.

Companies will engage with communities and stakeholders to gauge sentiments and collect ideas for improvement. Incorporating results in developing and expanding mines and having a circular feedback engagement loop are the ultimate goals. This will change the experience that communities have in working with mining companies.

48% of metals companies consider the top three use cases for the IoT to be energy efficiency, production visibility, and quality management. Going forward, production visibility and asset reliability will gather more attention and investment.

**Figure 4: Mine Responsible and Sustainably**

Manual data collection and disjointed communication with distributed responsibilities

Central data collection with clear workflow and easy information and status access

**Severstal** is using the Internet of Things and machine learning to minimize energy costs and combat electricity fraud by monitoring real-time energy use and analyzing energy consumption disparities.

“In a letter to our clients today, BlackRock announced a number of initiatives to place sustainability at the center of our investment approach, including: making sustainability integral to portfolio construction and risk management; exiting investments that present a high sustainability-related risk, such as thermal coal producers; launching new investment products that screen fossil fuels; and strengthening our commitment to sustainability and transparency in our investment stewardship activities.” Laurence Fink, Chairman and CEO, BlackRock Inc. Source: [BlackRock Corporate Investor Relations, 2020](#).
Failure of tailings dams creates a high risk to mining companies’ license to operate, and not having the right policies and procedures in place imposes an increasing obstacle to be considered by financial investors. Mining companies need to transform how they mitigate the risk of tailings, communicate and engage with outside stakeholders, and manage legal compliance. Bringing these diverse operational, legal, and experience requirements together successfully will help to secure the (social) license to operate.

MINE RESPONSIBLY AND SUSTAINABLY
MONITORING TAILINGS

TRADITIONAL SCENARIO
- Manual and automatic data collection in various system
- No central monitoring system for permits, audits and changing legislation
- Limited input from affected communities
- Manual workflows

NEW-WORLD SCENARIO
- Access all information directly
- Automated workflows and monitoring of expiring permits
- Engage proactively and early on with all stakeholder and communicate back to them
- Keep track of changing regulations and adhere to them

TOP VALUE DRIVERS
Faster reaction  Reduced risk and fines  Improved communication

Source: SAP Performance Benchmarking

Four Priorities for Success
© 2020 SAP SE or an SAP affiliate company. All rights reserved.
TOP EXPERIENCE DRIVERS ALONG THE MINING VALUE CHAIN

Commodity supply chain

Optimized customer buying experience
Increase the customer’s ability to buy through e-commerce platforms

Exceptional customer service experience
Improve customer service at every customer touch point through customer feedback

Mine operations

Efficient asset operations
Improve operational efficiency for asset management with real-time feedback on processes from technicians and operators

Engaged internal and external workforce
Increase workforce and contractor engagement with real-time insights into the operational work environment

Operational risk and compliance

Engaged communities
Embed community feedback on environmental impact in decision-making, and share the value you deliver to local communities
KEY TECHNOLOGIES

Each of these priorities will be enabled by emerging intelligent technologies.

Artificial Intelligence and Machine Learning
Machine learning enables algorithms to “learn” from existing data. Once the algorithm is trained, it can then predict future outcomes based on new data.

The Internet of Things
Although manufacturers have been using the Internet of Things for some time, now the entire value chain can be connected from design to production to supply chain. Data-driven insights of customer preferences can drive better designs, lower material costs, and reduce risk.

Data Platform to Manage Experience
Leaders are interlocking the operational performance data from companies’ business systems (what is happening) with the experience data coming from customers and employees (why it is happening) to get 360-degree views, generate actionable insights, and deliver better experiences.

Advanced Analytics
Empowered users can get real-time visibility into their changing environment, simulate the impact of business decisions, mitigate risk, and achieve better customer outcomes.

Blockchain
The blockchain model of trust, through massively distributed digital consensus, could reshape supply chains and commerce across the digital economy.

Virtual and Augmented Reality
Already in use to help workers with difficult or infrequent maintenance activities, this will become even more critical to attract and retain new talent.

Conversational AI
Voice interfaces will be the go-to technology for the next generation of applications, allowing for greater simplicity, mobility, and efficiency while increasing worker productivity and reducing the need for training.

Robotic Process Automation
Robotic process automation streamlines repetitive, rule-based processes and tasks in an enterprise and reduces cost through the use of software robots by replicating specific tasks or keystrokes.

90% of new enterprise applications will embed artificial intelligence by 2025.

30% of manufacturers will be utilizing blockchain and IoT (driven by increased requirements for sustainability) to provide reliable provenance, leading to a 90% increase in audit efficiency by 2025.

60% of G2000 manufacturers will address growing industry talent shortages by making significant investments in intelligent robotic process automation by 2023.

Half of all manufacturing supply chains will have invested in supply chain resiliency and artificial intelligence, resulting in productivity improvements of 15% by the end of 2021.
Companies will become intelligent enterprises on three distinct tracks as they evolve their strategic priorities to match their company’s vision.

1. **Optimize** what they already do by implementing a stable and scalable digital core to make processes more transparent and integrated.

2. **Extend** their current processes by connecting them to the real world using IoT technologies.

3. **Transform** their business using a constant stream of data enabling new service-driven business models (see Figure 5.)

**Figure 5: Strategic Priorities Across Lines of Business**

- **Optimize**
  - Make the business more predictable, agile, and productive through automation
  - Collaborate with customers, suppliers, and workers
  - Focus on customer needs
  - Real-time monitoring of environmental conditions

- **Extend**
  - Using machine learning to predict asset failure and automate the procurement process
  - Managing the contract workforce
  - Planning the sales and operations process

- **Transform**
  - Integrate mine and business planning to plan the life of the mine and gain better visibility into profitability
  - Collaborate on mine projects with all involved parties
  - Gain customer intelligence

**Vision 2025**

- Full real-time visibility of supply chains
- Synchronized operations between machines and workers with real-time analytics from pit to board
- Collaboration with customers to deliver optimal blends and tracking across the supply chain
- Collaboration with customers to deliver optimal blends and tracking across the supply chain

- Full digital twin of assets and supply chain network and automated business processes across company borders
- Use of e-commerce platform for sales
- Commitment to become carbon-neutral enterprises
- Real-time monitoring and alerting workers and communities to hazardous conditions

- Bring together operational data, community, and worker experience to improve safety
- 360-degree view of all safety and sustainable aspects of the business
- Full real-time monitoring and alerting workers and communities to hazardous conditions
Most organizations understand what is happening in their business but may not always know why.

They know what’s happening because they have systems that capture operational data (O-data) – about their customer transactions, supply chain, manufacturing, spending, and the activities of their workforce. They can see that data through reports and dashboards. They can see trends and predict what will happen next.

But to influence what happens next, companies need data about the interactions that people have with their products and their business. Experience data (X-data) captures beliefs, emotions, opinions, and perceptions – the “why” something is happening. And when companies know why something is happening, they can make an informed decision about the best way to respond.

To win in this experience economy, intelligent enterprises connect experiences with operations. They use both X-data and O-data to guide their business decisions. Intelligent enterprises collect insights from customers, employees, products, and brands at every touch point. They use powerful technologies to automate and integrate their data, processes, and applications, enabling them to sense risks, trends, and opportunities. And they act on this intelligence across every part of their business. (See Figure 6.)

Only SAP has the strategy, expertise, and solutions to deliver on this vision, enabling intelligent enterprises to turn insight into action.

Figure 6: SAP® Intelligent Enterprise Framework
To do this effectively requires an end-to-end plan for becoming an intelligent enterprise. This includes creating an intelligent enterprise road map and implementation plan with proven best practices and deployment options that optimize for continuous innovation with a focus on intelligent outcomes.

The End-to-End Journey to Becoming an Intelligent Enterprise

- **Plan**
  - well to manage expectations
  - Simplify and innovate
    - Reimagined business models, business processes, and work
    - SAP Intelligent Enterprise Framework methodology as a guide for digital transformation
    - Value-based innovation road maps
  - Standardize and innovate
    - Model-company approach to accelerate adoption with model industry solutions
    - Design thinking and rapid, tangible prototypes
    - Coengineered industry innovations delivered with agility
  - Run
    - all deployment models
    - Run with one global support
      - One global, consistent experience
      - End-to-end support – on premise, in the cloud, or with a hybrid approach
  - Optimize
    - for continuous innovation
    - Optimize to realize value
      - Continuously captured and realized benefits of digital transformation

To move forward with speed and agility, it helps to focus on live digital data and combine solution know-how and industry-specific process expertise with data analytics so that the right digital reference architecture is defined and delivered. In this context, a model-company approach is aimed at simplifying and increasing the speed of the digital transformation journey. Model companies represent the ideal form of standardization for a specific line of business or industry. They are built on preconfigured SAP solutions and based on industry best practices along with the business content to encompass our experience and expertise for the industry. They provide a comprehensive baseline and come with the accelerators to jump-start digital transformation projects.
Our comprehensive ecosystem for the mining industry offers:

- The Intelligent Enterprise as the overarching strategy to meet future requirements, providing:
  - SAP S/4HANA co-development programs for customers and partners
  - Industry co-innovation programs for industry-specific use cases
  - Delivery of enterprise-to-enterprise industry clouds
  - Thought-leadership, evangelism, and enablement by industry through events, councils, and regular customer exchange
- Integration into a wide range of business services (OEMs, suppliers, key vendors, and more)
- Open architecture, with a choice of hardware and software specifically designed to meet requirements
- Complementary and innovative third-party solutions to provide leading-edge and state-of-the-art technology

Our partner ecosystem includes, among others:
SAP is committed to innovation

10-Year Innovation Vision
SAP delivers fully intelligent business solutions and networks that span across company boundaries and promote purpose-driven businesses. These solutions represent the most empathic symbiosis between machine intelligence and human ingenuity.

- Self-running enterprise systems
- Self-organizing business ecosystems
- New markets and business models

Comprehensive Industry Coverage
SAP enables comprehensive coverage of the complete mining value chain across the enterprise. With its clear industry road map, SAP is the partner of choice for the mining industry.

- More than 700 mining companies innovating with SAP solutions
- 67% of diversified metals and mining companies in the Forbes Global 2000 as SAP customers
- Support for all lines of business on a single platform

Proven Services Offering
By bringing together world-class innovators, industry and emerging technology expertise, proven use cases, and design thinking, we help mining companies develop innovations that deliver impact at scale.

- Proven methodologies to drive innovation, from reimagining customer experiences to enhancing operations
- Innovation that is fueled through a managed innovation ecosystem from SAP
- Ability to build your own innovation capability and culture

SAP supports mining companies in becoming intelligent enterprises – providing integrated business applications that use intelligent technologies and can be extended on SAP Cloud Platform to deliver breakthrough business value.

Learn more
- SAP.com for Mining
- SAP Services and Support
Outlined below is external research that was used as supporting material for this paper.


Note: All sources cited as “SAP” or “SAP Performance Benchmarking” are based on our research with customers through our benchmarking program and other direct interactions with customers.