TREND 7

The path towards integrated operations

POSITIONING MINERS TO PIVOT IN THE FACE OF CHANGE

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THE RAPID PACE of technological advancement in the mining industry over the past decade has provided a significant increase in the amount of information available to support decision-making. This trend is expected to accelerate over time. To capitalize, more and more companies are driving toward integrated operations, but few have an aligned view of what they are or how to go about creating them. Why is this important? It not only facilitates a cost advantage, but also drives more predictable outcomes, which creates long-term trust with key stakeholders.

Digital initiatives and investments in automation have not yielded consistent results across the board. While some companies have realized widespread progress, others have experienced only incremental change. These variable results have raised the question of how to improve outcomes. On examination, it is becoming clear that before businesses can better respond to external events and internal variabilities, they will likely need to improve integration across all their functions by ensuring that people throughout the organization are empowered to make the best decisions for the organization as a whole.

Companies are heading down this path for a range of reasons. Some have recognized the inherent inefficiency embedded within the organization and see this as an opportunity to effect a step change in performance in the future. Deloitte worked with one organization that transitioned to this operating model, which saw unit cost reductions in excess of 25% and improved productivity by more than 10% with almost no capital investment.

According to Deloitte's internal research, the foundation of integrated operations thinking was built about 60 years ago, but the mining industry only began pursuing these concepts in the past decade. That means most organizations are still involved in early-stage efforts, with integrated operations focused on optimizing the productive value chain. The focus here is on enhancing decision-making by enabling people across the organization to determine the optimal decisions related to production execution or adjacent to production execution. As customer pressures increase, deposits become more challenging, operations become more dispersed, and market behaviors remain highly variable. However, some organizations are now increasing their scope of integration to improve their ability to manage this growing complexity and ambiguity.

This has seen some companies shifting their focus from integrating across the value stream to integrating across the asset. This is achieved either by operating a group of assets as a single collective asset or by focusing on the requirement for every team and employee to drive the collective aim of the asset. Some organizations on the leading edge of this thinking are casting the net even wider, redefining their value chain as their operating ecosystem—including communities, legislators, third-party providers, and customers. These organizations are actively looking to develop an organization that leverages every part of this ecosystem to respond more effectively and rapidly to internal and external events. This evolutionary perspective is outlined in figure 1.

FIGURE 1

Evolutionary development of integrated operations
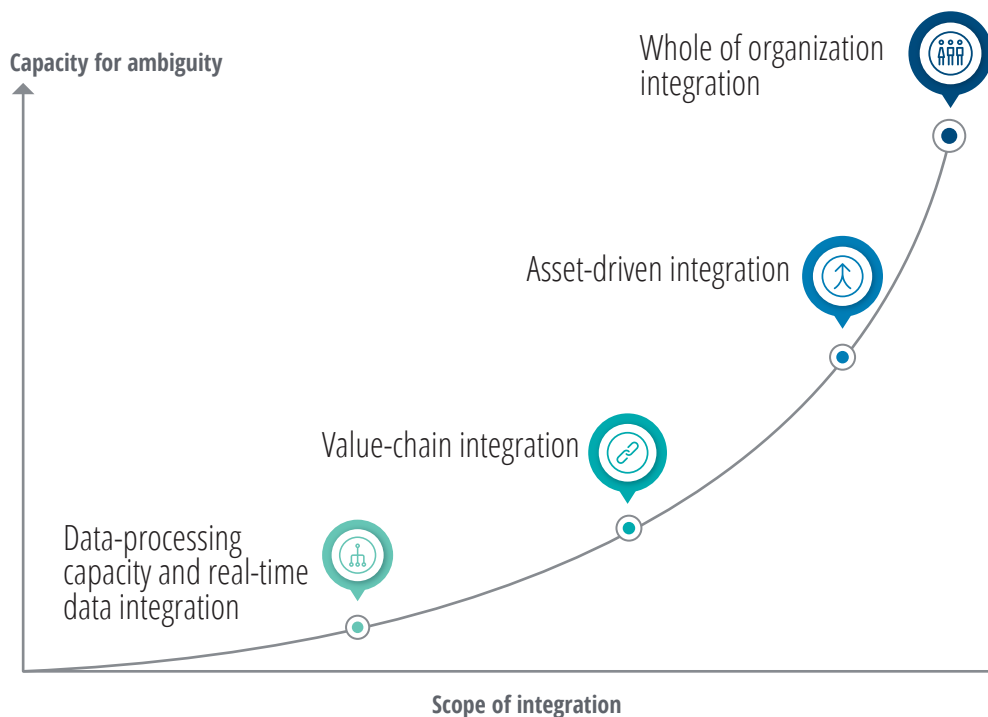
Source: Deloitte analysis.

Integrating the asset and the organization

As seen in Deloitte's Intelligent Mining vision (figure 2), this may result in accelerated technology investment in three domains: intelligent operations to improve the operational process through automation and digitization; nerve centers to bring data together from across the value chain; and intelligent enterprise to refine specific support processes.

Integrated operations provide a single source of truth built on real-time tracking of information. This positions companies to deliver step-change improvements in decision-making through advanced analytics, enable remote management of resources where feasible, and streamline workforce allocation and utilization.
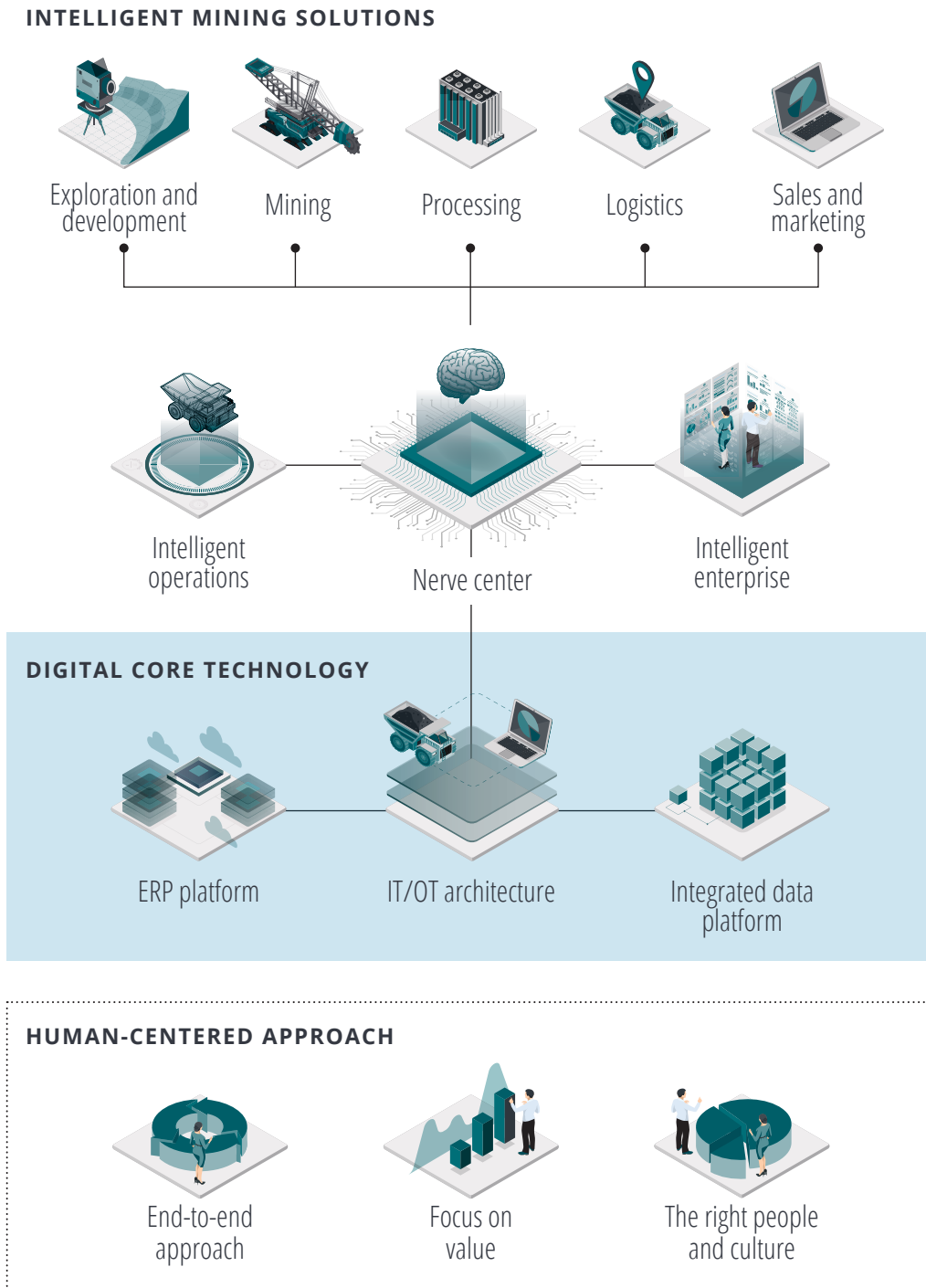
Ultimately, the aim is to optimize the entire asset value chain, asset, or ecosystem, rather than improving the outputs of individual isolated functions. This isn't merely a technology investment, however. Although centralization—such as the deployment of remote or centralized operations centers—is often part of the solution, that isn't always the case. Likewise, merely focusing on deploying a center, or attempting to replicate what other organizations have done, could yield few, if any, benefits. Ultimately, this change typically requires the adoption of an operating model that culturally embeds a coordinated and holistic approach to decision-making.

Successfully delivering these results will likely require a focus on the four key pillars that drive sustainable change: technology, process, workplace design, and people and culture.

FIGURE 2

Deloitte Intelligent Mining

The intelligent mine is connected and integrated, automated but human-centered

INTELLIGENT MINING SOLUTIONS

Exploration and development

Mining

Processing

Logistics

Sales and marketing

Intelligent operations

Nerve center

Intelligent enterprise

DIGITAL CORE TECHNOLOGY

ERP platform

IT/OT architecture

Integrated data platform

HUMAN-CENTERED APPROACH

End-to-end approach

Focus on value

The right people and culture

Source: Deloitte analysis.

PILLAR 1: TECHNOLOGY

As part of the digital journey toward organizational integration, companies need to understand the effort required to clean up their data, upgrade their technology infrastructure, and integrate data across the value chain. This includes consideration of their information technology or operational technology (IT/OT) and network requirements, as well as their advanced analytics capabilities.

"The main focus is on maintaining sufficient knowledge so the entire operation not only understands current constraints, but has the information required to resolve those issues and prioritize their actions," explains Dominic Collins, partner, Consulting, Deloitte Chile. "This type of situational awareness is necessary for the operation to act as one and consistently make the most valuable decisions for the operation as a whole."

"Situational awareness" is the ability to perceive the state and status of people, assets, and processes in real time so that companies can comprehend and project impacts across the entire value chain and create value through targeted interventions that optimize outcomes. This generally starts by improving perception by providing up-to-the-minute awareness of personnel movement, fixed and mobile equipment operation, and system health to help operators understand the impact of the current situation on the larger value chain. From there, companies can enhance their understanding by enabling personnel to deep dive into problem areas to solve deviations from the plan. At the highest level of maturity, situational awareness also permits projection, where advanced analytics allows data to be extrapolated forward to

determine how future states of the operational environment will be affected.

As a deeper understanding of the system is developed, organizations can gain significantly more clarity on points of tension, missed decisions, and where standardized decisions can be better leveraged. This enables the development of operationally informed and relevant robotic and digital process automation transformation. Organizations have used this approach to realize the biggest "bang for their buck" by delivering a significant return on investment.

PILLAR 2: PROCESS

Process is about creating workflows that link defined value cases to specific roles and activities. The idea is to "wire" the organization to directly target its biggest risks and priorities, as determined by analysis.

"This step is about developing an appropriate operations strategy supported by effective operating models," says Eamonn Treacy, director, Consulting, Deloitte Canada. "The aim is to integrate operations and governance by bringing planning and execution together in a closed loop system."

To do so, mining companies should develop effective rhythms and routines, procedures and standards, and process KPIs and performance targets:

• Rhythms and routines are used to track performance and direct accountability to the right teams. For example, companies might implement targeted meetings between relevant

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roles to discuss issues and recognize successes; develop handover routines to establish a culture of performance and accountability; conduct operational reviews to track performance against KPIs; and/or hold analysis and improvement meetings to generate ideas and respond to feedback.

- When it comes to procedures and standards, certain changes may be required to support integrated operations. This may include updating existing operational procedures and workforce instructions, as well as developing training packages for new and modified roles.

- For its part, the KPI framework ensures that KPIs are wired down to the role level. Rather than adopting traditional KPIs that focus on individual performance drivers, the aim is to identify those that measure systemwide performance. This encourages people to make decisions that drive the greatest overall value rather than acting in silos.

This approach to process encourages continuous improvement by soliciting ideas from many people and prioritizing those that require action. Designed effectively, this should enable active follow-up and communication. To embed new practices into day-to-day operations, people should also receive continuous training about the organization's main value drivers, the appropriate tools for problem-solving, how to manage bottlenecks, and systems for rapid improvement.

PILLAR 3: WORKPLACE DESIGN

Workplace design considers where the work should be executed by looking at things such as facility location and design, workplace design, floor design, and ergonomics.

"The mining industry has a bigger opportunity than most to tailor and redesign their workplaces so that technology and organizational change can empower the future organization, rather than restricting it," says Steven Walsh, partner, Consulting, Deloitte Australia. "For large parts of a mining organization, there is significant and increasing flexibility in where, when, and how their work gets done, if we challenge how humans can interact with technology and each other."

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In purposefully designing their integrated operating centers, mining companies should consider ways to encourage multidisciplinary collaboration. An open plan design, for instance, enables ad hoc interactions and can maximize the use of technology by giving teams access to the tools they need to effectively execute their work. Similarly, flexible workspaces, such as breakout rooms and quiet zones, can accommodate different work styles. However, it's important to remember that the workplace extends to the physical site, and recent advances in wearable devices, as well as the presence of ubiquitous connectivity throughout the field, are enabling organizations to seamlessly integrate workers with one another.

At the end of the day, the objective is to design workplaces that foster interaction, communication, and knowledge-sharing between individuals and across functions.

PILLAR 4: PEOPLE AND CULTURE

Even when organizations get their technology, processes, and workplace design right, their integrated operations initiatives can fail if they do not adopt an appropriate leadership and team culture. This generally means giving due consideration to issues such as decision rights, escalation protocols, and role accountabilities.

Consider decision rights, for example. To ensure people are responsible, accountable, supported, consulted, and informed (RASCI), some processes may have to change as network connectivity becomes ubiquitous across the mine. Perhaps mining companies will need to provide supervisors with access to information in the field and empower them to respond to deviations from plan without returning to the office. Or maybe they'll need to give workers down the line the authority to use this information to make operational decisions.

"The bottom line is that it's not enough to simply provide people with greater access to information," notes Pieter Lottering, director, Integrated Operations, Deloitte Australia. "Mining companies must also help their people understand how they're expected to use that information."

Laying the foundation for integrated operations

- **Understand the context of your value chain.** Spend time defining your end-to-end value chain. Although organizations often have clarity on their value chain from a production perspective, the reality is that "value" can be created or destroyed within a longer time horizon—for example, at mid-term planning—or throughout the ecosystem, such as with sales and marketing or third-party vendors. How would you think about your value chain differently given this context?

- **Understand your critical interfaces.** Once your value chain is defined, determine which parts of the chain provide the most opportunity, or potential loss, when variability events occur. Consider a risk-driven approach to this information and drive clarity on how the organization needs to collectively respond to these challenges. Although "net new" variability events occur from time to time, you can preplan collective responses to about 80% of events.

- **Determine what technology you really need.** Recognizing that the ability of the organization to respond is limited by its collective understanding of the current situation, what is the right technology investment required to provide this clarity? Taking an approach that considers the specific organizational outcomes before focusing on technology can be critical to controlling technology spend and delivering the targeted outcomes.

- **Think about a balanced approach to deploying the change.** Different groups in an organization are more ready than others to embrace change, and not all of the change needs to be deployed immediately. Think about three factors in determining how to get the ball rolling and establishing a reputation for success: 1. How much value might be realized from deploying a specific change? 2. How complex is the change from a process and technology perspective? 3. How culturally ready are the impacted teams and groups to effectively implement the change?

- **Be prepared to change the conversation on what success means.** What you're really asking teams to do is recognize that although functional excellence is critical to your organization's success, it must come from a perspective of consistently making the best, highest-value decision for the organization as a whole. How do you need to change the conversation on identifying and celebrating your successes to demonstrate that the organization is "walking its talk" on integration?

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