

Mining spotlight on: Remaking mining

Exploring the innovation imperative

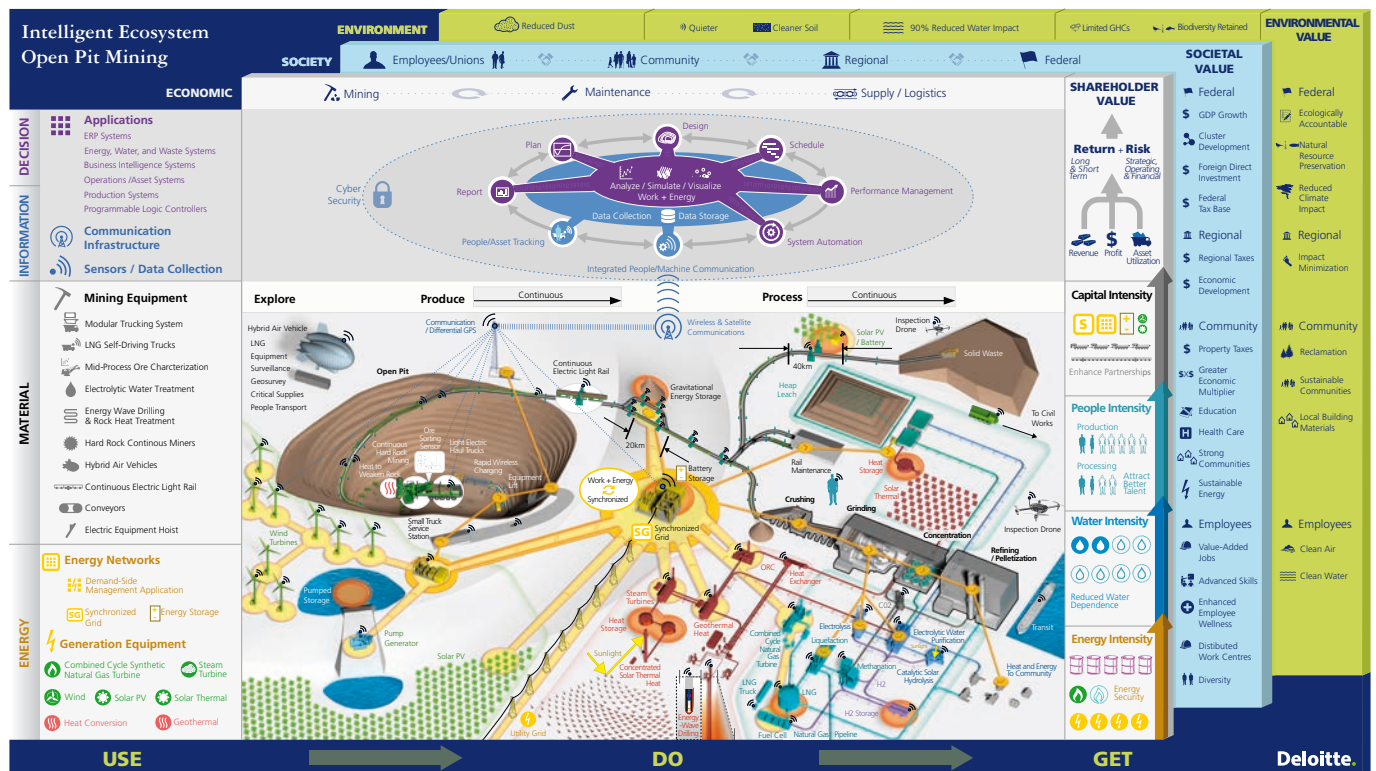


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Exploring the innovation imperative

Commodities may be broadly moving back into global market balance and even surplus, but the mining sector's challenges are far from over. In a world of deeper mines, more complex ore bodies, rising energy costs, social and geopolitical risks, infrastructure shortages and resource nationalism, mining companies remain under exceptional pressure to control costs, heighten efficiency and improve safety performance.

Although there are no easy solutions, it is becoming increasingly apparent that technology will play a growing role in the mine of the future.



Technology's transformative power

There are a lot of game changing technologies designed to improve productivity, safety and operational efficiency in the mining sector. Some of these include:

- **Technologies that make it safer to operate underground mines**, such as collision detection and atmospheric monitoring, driverless trucks, automated drills, automatic longwall shearers and ground control vibration tools.
- **Autonomous trucks and trains, advanced robotics and control systems, and remote operating centers.**
A number of mining companies are well-advanced with programs of this nature.
- **Data analytics solutions** that deliver real-time information on equipment activity, safety performance, asset utilization and other critical metrics to help miners uncover the true costs of their operations, improve efficiency and enhance on-site safety.
- **Mobile internet and cloud technologies** that allow workers to connect to enterprise applications no matter where they're located—enhancing data accuracy and worker productivity.
- **Intelligent software systems** that perform knowledge-work tasks, helping to improve mine safety and streamline operations.
- **Energy storage devices** and physical systems that store energy for later use, allowing miners to access power as it's required.
- **3D printing techniques** which can help miners solve the problem of sending replacement parts to remote mining sites.
- The use of **advanced materials** that improve equipment strength, conductivity, functionality and self-healing, which can extend the expected life and performance of mining equipment while reducing the downtime and costs associated with ongoing maintenance.
- The evolving **"internet of things"** designed to data-enable a myriad of devices. In addition to enhancing data collection and monitoring, this technological trend can help mining companies use resources more efficiently by, for instance, improving the way they control water and energy use.

Meeting the productivity agenda

Innovation, however, extends well beyond technology. As companies scramble to meet today's productivity agenda while delivering improved shareholder value, they find themselves under rising pressure to rethink their operational approaches.

Revisiting existing processes

Consider, for example, the manner in which the industry uses energy, which can represent 40% to 60% of a mine's operating costs. To meet their energy needs, companies typically invest in various forms of storage capacity and work to build portfolios of both renewable and traditional energy sources. Underpinning this approach is the belief that energy supply should follow demand.

As they lay the groundwork for the future, it may benefit mining companies to rethink their fundamental approach to energy use. Research shows that production in operating mines is virtually never continuous. Yet, because miners approach operations from a modular perspective—with functions like energy management, site design and fuel procurement working in silos—they aren't equipped to take this operating intermittency into account when scheduling production.

By taking a more integrated approach to mine design and planning, however, companies could arguably synchronize energy supply and demand from the outset—automating processes at the design phase to reduce reliance on fossil fuels while taking local renewable energy capacity into account.

In addition to delivering cost savings, this approach can help companies reduce diesel truck carbon emissions, minimize the supply chain challenges associated with getting fossil fuels to remote sites and use automation to reduce labor costs and enhance on-site safety.

More significantly, however, this represents only one way to embrace innovation. Myriad other approaches also exist. For instance, using tunnel boring as an alternative to conventional underground drilling and blasting, AngloGold Ashanti envisioned a way to mine as little waste material and as much metal as possible. Other companies are rethinking how to move ore around an open pit using hybrid technologies, such as Rail-Veyor, which have the benefits of conveyors without most of their disadvantages.

By applying ingenuity, miners can embrace the level of change the market currently demands.

The danger of inaction

This isn't to suggest that operational change will be easy. To save costs down the road, current investments may be required—a challenging proposition in today's market environment. The move towards an automation era will also require new talent. The ability to operate drill rigs, loaders, haul trucks and trains will give way to people with more advanced information and communications technology skills, mandating companies to retrain and up-skill their existing employee base.

Despite these challenges, inaction presents its own risks. As costs escalate, companies will need to embrace new forms of technology to gain greater insight into their underlying performance metrics. As safety risks rise at increasingly remote mining sites, they will need to use data-driven insight to protect their people. And as shareholders demand the adoption of new value drivers, miners will need to abandon the locked-in paradigms to which they have adhered in recent years.

Strategies that buck the trend

To turn the current tide of poor productivity and hostile sentiment, miners need to embrace innovation more aggressively. Some strategies include:

Rethinking energy management

While renewable energy sources are intermittent in the aggregate, they offer predictable output in certain countries at certain times of the day or year. As such, miners can:

- Improve their understanding of the real-time local availability of alternative energy.
- Optimize their systems to operate during times of greatest energy availability.
- Access reliable sources of renewable energy in real time, without resorting to storage.

Automation

Automation represents another way to optimize energy use by, for instance:

- Using conveyors and similar electric technologies, rather than trucks, to move ore.
- Harnessing gravity to move ore and waste down a mountain (at no energy cost) while at the same time generating electricity to power other processes.
- Using collision detection and atmospheric monitoring technologies to enhance the safety of underground mining operations.
- Adopting automated drills, automatic longwall shearers, autonomous trucks and trains and remote operating technologies.

Analytics

As the cost of data analytics falls, implementation benefits rise. Savvy miners are already innovating in this space by using data analysis to:

- Uncover the underlying cost base of their various processes and programs.
- Improve decision-making and asset performance by measuring both financial and non-financial indicators that affect overall profitability.
- Generate on-demand reports so they can improve asset utilization, minimize downtime, streamline mine planning and optimize fleet resources.
- Predict project outcomes to prevent budget overruns and project failures.
- Reduce the number and severity of serious safety incidents.

Borrowing best practices

Adopting an innovation mindset and implementing a process to leverage it allows for new approaches to a wide range of traditional processes. For instance, miners can:

- Borrow techniques like simulation, technical modeling and 3D and 4D seismology from the oil and gas industry to identify mineral-rich deposits more economically.
- Use techniques like remote sensing to localize ore deposits, which can alter the industry's ability to find deeper, more fragmented deposits.

Collaboration

Sharing resources and risks presents another way for miners to innovate by:

- Building shared pipelines, water plants, power plants, etc. to strengthen local infrastructure.
- Entering strategic technology partnerships to pool knowledge.
- Exporting native technology solutions to other jurisdictions or other industries.

How Deloitte can help

For more information, please contact a Deloitte mining professional: www.deloitte.com/mining

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