

ACCENTURE MINING

**PROCESS
REIMAGINED**

**Together, people and AI are reinventing
business processes from the ground up.**

MINING'S CHALLENGE: MOVING AUTOMATION FROM ASSETS TO DECISIONS

The excitement generated by self-driving vehicles is nothing new to the mining industry. For about five years, mining operations in western Australia have been using fleets of vast, autonomous trucks (many times the size of driverless cars).¹ Largely motivated by safety concerns, mining companies are removing humans from potentially hazardous sites and replacing them with machines.

While automation of assets has been prevalent for some time, new approaches that will have a potentially even more profound impact are also now emerging. Rather than replacing people, these new artificial intelligence (AI) and machine learning-driven approaches are augmenting people. In doing so, they're creating the potential for transformational breakthroughs in decision-making and performance.

In today's environment, most mining companies face challenges in creating and adhering to accurate plans and schedules that span the value chain—

from initial drilling and blasting to loading, hauling, crushing, milling and processing the final product. That's because circumstances can change so rapidly in mining operations. This makes it almost impossible to follow and execute a linear plan.

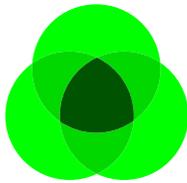
But with machine learning supporting new ways of analyzing data, it will be possible to create a new, more responsive and accurate way to plan and manage ongoing mining operations. By creating a virtual environment (or "digital twin") that updates itself in real time and recommends next best actions, it will be possible to realize enormous upside benefits.

DIGGING DEEP FOR NEW RESULTS

Harnessing advances in AI to automate assets is clearly just one side of the story. Even greater benefits await those mining companies that can combine machine learning with data and reimagined processes.

Let's look at what we mean by this. A relatively small number of forward-thinking organizations across all industries are now creating self-adapting, self-optimizing "living" processes that use machine learning algorithms and real-time data to continuously improve. In our view, this represents a quantum leap that unlocks entirely new roles and new ways for humans and machines to work together.

So how common is this phenomenon in the mining industry? Some companies, as noted above, are already making significant use of smart technologies like AI and machine learning. Recent Accenture research² puts this into perspective: in a cross-industry survey of more than 1000 process professionals, we found that 70 percent of mining companies are using machine learning in at least one business process.



THREE OVERLAPPING LENSES

As explained further in the book *Human + Machine: Reimagining Work in the Age of AI* written by Accenture's Paul Daugherty and H. James Wilson, our research also reveals that leaders across all industries—mining included—are harnessing three interrelated dimensions of AI. They:

Reinvent processes: applying AI to manage process change, rethinking standardized processes as continuously adaptive and using AI across multiple processes.

Utilize data: making use of AI and data to solve previously unsolved problems and reveal hidden patterns.

Rethink human-machine collaboration: shifting toward an AI-enabled culture and reskilling employees to work in alliance with machines.

Mining companies are leaders in this space. We found 15 percent of the mining companies we interviewed are bringing together these three lenses in a systematic way. But looking more closely reveals a more finely nuanced picture. They're developing these capabilities at markedly different rates:

28 percent are systematically applying AI to reimagine processes and process change.

34 percent are harnessing data plus AI to capture exponential improvements in agility and KPIs.

46 percent are rethinking how humans and machines work together.

In terms of reimagining processes, one mining company is harnessing big data-

based analytics and AI solutions across its organization to create a reimagined mine of the future. And, in doing so, it is increasing its cash flow by billions of dollars over the next five years.

Meanwhile, others in the industry are applying machine learning algorithms to their existing data to discover new areas of opportunity and to reinvent processes and drive process change.

The most widespread activity to date, however, is the application of machine learning to transform the human-machine work relationship. We're seeing a large proportion of mining companies using new machine learning-powered applications to augment their workers and change how work is done.

SAFETY FIRST: THE IRREFUTABLE ARGUMENT FOR AI IN MINING

Aside from the automation of assets, where AI has been in use for some time now, mining companies are increasingly investigating the safety benefits of embedding AI in the tools their people use. For example, instead of having to manipulate machinery and record data at the same time, clearly a hazardous proposition, workers can now rely on a chatbot instead.

Workers can communicate with a chatbot via a hands-free microphone, inputting valuable data without compromising their safety. So, what used to be a complex and risky manual process is now a seamless, distraction-free activity.

Of course, in many ways, this is an entry point for process reinvention. However, the real benefits will start to flow once decision-making can be automated. For that to happen at scale, a number of hurdles must be overcome.

CONFRONTING THE CHALLENGES

At a foundational level, a real challenge comes from the prevailing engineering mindset in mining, which is still very much a rules-based industry. As things currently stand, there's a reluctance to relinquish control of the countless interrelated processes and decisions on which effective operations depend. For a machine to be trusted, how it arrives at decisions has to be both transparent and understood. Black box solutions will gain little or no traction.

This is a common problem for all industries. In fact, establishing a trusted and productive relationship between machines and people is one of the key characteristics of what the authors of the book, *Human + Machine*, call the "missing middle." This describes six ways in which people and machines work together in a mutually beneficial way. People need to explain, train and sustain AI in order for it to become accepted and integral to the organization.

With most mining companies still at the strategy stage when it comes to AI, prioritizing the missing middle will be vital to secure trust and drive onward progress. Right now, few companies excel in this area. The standards, governance and due diligence around AI still often take second place to the excitement over cool new technologies. But while less immediately exciting, the framework within which AI operates is an area that can't be ignored.

Another challenge facing the industry is the enormously heterogeneous nature of mining locations around the world.

Whether a company is mining copper thousands of meters up in the Andes, at sea level in the United States or under the ground in Mongolia, will introduce a vast range of parameters. Developing an algorithm that can assimilate these is therefore a massively complex undertaking. In other words, in mining more than perhaps many other sectors, there's no one-size-fits-all solution.

Last but by no means least, there's a big question mark over the industry's ability to attract the digital talent it urgently needs. As things stand, most mining companies still find it hard to find, let alone recruit, data scientists with the relevant industry knowledge. Of course, it's possible to create joint teams of data scientists and industry experts. But these are inevitably harder to manage. Some mining companies are focusing on this issue intensely and developing programs that position them as viable competitors to the more obvious allure of Silicon Valley and the tech giants.



HITTING A NEW SEAM OF OPPORTUNITY

In mining, perhaps more than most other industries, there's an outstanding opportunity to move fast and harness the full power of AI. Fundamental processes, IT structures and architectures have, in many cases, changed little in the last 50 years. Equipment has gotten bigger, is more connected and collects a significant amount of data. That's true. But the possibilities for innovation remain huge: unencumbered by technology accretion, mining companies can leapfrog into a machine-learning powered future.

So how to get started? In the end, it all comes down to people. Right now, all of the experience, knowledge and understanding that machines need is stored in the heads of the workforce. Digitizing that wealth of knowledge is essential. What's needed, therefore, is a platform that's readily accessible enterprise-wide, making the collection, management and dissemination of that information as seamless and simple as possible.

With that foundational capability in place, companies in the industry will be able to give machines the knowledge they need to automate, define next best actions and, ultimately, make decisions that will drive real business value.

References

- ¹ “Driverless Trucks and Mining,” Sky News, YouTube video posted by Robot Workforce on April 21, 2013. Accessed December 18, 2017 and viewable at: <https://www.youtube.com/watch?v=IFe9JR51E0>.
- ² Daugherty, Paul and H. James Wilson. “Process Reimagined: Together people and AI are reinventing business processes from the ground up,” Accenture, 2018, www.accenture.com/processreimagined.

Connect with us

 **@AccentureMining**

 **Accenture Natural Resources**

Learn more at www.accenture.com/naturalresources.

Read our blog at www.accenture.com/naturalresourcesblog.



For more information, please contact:

GEORGE LONG

Senior Manager—Digital Mining Lead, Accenture

 Email George

 Connect with George

 Follow @grlonguk

About Accenture

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions—underpinned by the world’s largest delivery network—Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With approximately 442,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. Visit us at **www.accenture.com**.