



Shaping the use of technology in mining

How leading companies leverage
AI for opportunities in productivity,
safety and compliance

A special report by Mining Magazine on behalf of OSIsoft

Mining Magazine

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Introduction and Executive Summary

Nobody today should understate the active and influential part information technology plays in the mining sector, nor the potential of new waves of technology. Of these, Artificial Intelligence (AI) is perhaps the most business-changing technology we see today but there are others too. Cloud computing platforms are changing the way we deploy, access, query and consume information, while many enterprises have embarked on the Industrial Internet of Things (IIoT) and digital transformation projects that will reshape fundamentally the ways they operate.

To take a snapshot of the state of the mining sector's use of IT today, OSIsoft commissioned Aspermont Media and Mining Magazine to survey companies and analyze their responses to a poll on how they are using and viewing technology today.

We surveyed a total of 115 respondents across metal and non-metal mining sectors, together with those involved in mineral processing. Almost one third (32%) of our base came from companies with at least 5,000 employees, and over 50% were from organizations with more than 1,000 staff. Nearly 45% were in C-level roles, providing us with a very strong executive sample. Respondents came from all over the world: Europe, Asia, the Americas, Australasia, the Middle East and Africa.

Our questions probed areas such as their usage and perceptions of key technology areas; what they hope these tools will achieve for them; how advanced they felt; the challenges they observed; and their recognition and perception of technology vendors. Our survey sample pointed to a business sector with reasonable levels of recognition of the importance of new technologies and what they wanted to do with the new capabilities.



Poll Highlights

New technology

The mining sector is taking advantage of new technologies and digital processes and is quite bullish with almost half (46%) of respondents saying they are leading, or at least utilizing, the new capabilities.

Data collection

About half of respondents (50%) collect real-time operational data, either to increase productivity or to improve operations' results. The rest may be missing out on big opportunities to drive efficiencies and make operations smarter.

Major works

Health and safety, productivity, environmental/compliance and digital transformation are viewed as the most important goals of current projects.

AI's big footprint

An extraordinarily wide range of areas are seen as ripe for AI and Machine Learning, including everything from finding minerals for extraction and helping autonomous vehicles and equipment to creating virtual testing models and production planning. Almost nine in 10 (87%) agree or strongly agree with the proposition that AI will significantly change the future of mining.

AI roadblocks

Management buy-in, cultural aversion to change and access to skills are seen among many obstacles to deploying AI successfully. As ever with technological change in older industries, inertia is a risk and change management can be tough.

Cloud

There is very wide applicability for cloud platforms (and significant expansion planned) across testing, backup, storage, productivity, communications, security and productivity applications. This suggests that, as with other verticals, cloud in mining is a mature, but still growing, model.

IoT

Almost a quarter of respondents (24%) feel fairly advanced or pioneers in the Internet of Things (IoT), but over a fifth (22%) have no plans to use it. With so much opportunity for exploring, de-risking and automating, those who have not embarked on their IoT projects will be viewed as laggards.

Vendors

OSIsoft has high levels of recognition and healthy ratings in helping mining firms with storage needs, data contextualization for asset management, data visualization and data analytics. More than four in five (84%) of respondents believe the firm's PI System will help in data contextualization for asset management.

“Nobody today should understate the active and influential part information technology plays in the mining sector, nor the potential of new waves of technology.”



New technology adoption is a mixed bag

First, we wanted to gauge how, generally, our base of respondents felt about where they stand when it comes to making use of new technologies. When we asked our audience about how mature they felt in their adoption of new IT and digital capabilities, the answer that came back was a spread that underlined the eternal fact that, when it comes to trying out new waves of innovation, organizations span the gamut typical of IT usage, from laggards to early adopters.

About one in seven respondents felt that they were among leaders in leading the way with new tools and trends. But over three-quarters of our panel said they were making at least some use of the 'shock of the new'. These are not negative or surprising statistics, especially for a sector that is usually not associated with being first-movers in technology. What we see here is a broad acceptance of the usefulness of the latest innovations with a small posse spearheading the charge.

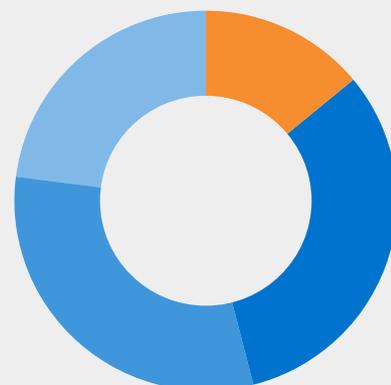
The fact is that as mining, like all industries, digitizes and where technology gets regarded as one of the few competitive weapons within reach, it is crucial for firms in the space to examine at least what the new tools, trends and processes offer them.

1 in 7

Leader or pioneer in the adoption of new technologies



To what degree do you think your organization is making use of new IT technologies and digitizing processes?



- 14% Leader or pioneer
- 32% Make good use of...
- 31% Make some use of...
- 23% Could increase use of...

Many are missing the boat on collecting data

‘Digital transformation’ has become the buzz-phrase of our generation when it comes to using technology to enable new opportunities. To test how far companies in the mining sector have come in their transformation journeys we asked a question we hoped would yield indicative answers and was centred on what our audience was doing with data. After all, mining data to seek insights is at the heart of what we use IT for.

A third of respondents could be said to be lagging in this respect because they are not even laying down the table stakes of data analytics: collecting the raw information that can later be leveraged for strategic insights. Add the 16 per cent who are collecting but not analysing data, and we see that about half of respondents are currently not doing a lot with the data at their fingertips.

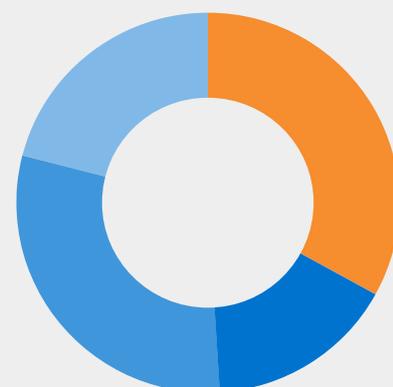
But look at this through a ‘glass half full’ lens and we see that over a fifth are using their data banks to perform fairly advanced tasks and over a half are making active use of data. Every company needs to realize that even if ‘data is the new oil’ is a bit of cliché, the phrase nevertheless speaks to a general truth. If you’re not collecting and mining data, you stand to ignore potentially powerful insights and lose out to rivals that do so.

33%

Not collecting real-time operational data



[How advanced are you in your digital transformation journey?](#)



- 33% Not collecting
- 16% Collecting
- 30% Collecting and analysing
- 21% Collecting and advanced analysis

Health-and-safety in 'live' projects

So what are our respondents hoping to achieve with their use of technology in live projects? The answer can be broken into two parts: defensive and attacking approaches.

On the one hand, the leading response was helping to improve health-and-safety records and this is understandable given that mining has always been and remains a dangerous sphere of activity. Mining is an occupation where maiming, illness and death remain constant risks, so any use of technology to log, analyse and mitigate those risks will be welcomed.

In the same bucket we saw such answers as environmental and other compliance goals, asset health and energy efficiencies. But our poll also pointed to lots of positive, 'upside' improvements, from productivity enhancements to transformation exercises, access to real-time key performance indicators and the ability to query and report based on that most elusive of platforms: a single source of the truth.

The fact is that technology has always offered a two-edged sword: cutting through challenges to make enterprises smarter and carving out efficiencies that tidy up activities and help tick the checkbox compliance projects that reduce risks and keep regulators, insurers and lawmakers happy.



Rank the following in terms of importance to you in current projects

-
- 01.** Health-and-safety
 - 02.** Productivity improvements
 - 03.** Environmental /compliance
 - 04.** Digital transformation
 - 05.** Asset health
 - 06.** Quality improvement
 - 07.** Energy and water efficiency
 - 08.** Access to real-time KPIs
 - 09.** Reporting from a single source of truth
 - 10.** Other
-

AI will enable smarter plans, deeper customer insights

Artificial Intelligence is not new but it has emerged to become perhaps the most influential and talked about technology of our time as algorithms have evolved, research and development has been ratcheted up and the skills base has grown. But why should we care about AI to begin with? With that in mind, we asked our audience what they saw as the most important opportunities... and the answers were instructive.

What was notable was that for all the science-fiction-style talk about AI, at least for now our respondents actually view AI as primarily useful to help fix the traditional challenges of making smarter decisions, knowing customers better and finding minerals.

-
- 01.** Improved decision making and error reduction
 - 02.** Understanding customer trends
 - 03.** Finding minerals for extraction
 - 04.** Autonomous vehicles and drillers
 - 05.** Automated checking for health-and-safety risks
 - 06.** Optimizing for productive activities
 - 07.** Production planning
 - 08.** Maintenance planning
 - 09.** Automated compliance with rules and regulations
 - 10.** Rescheduling shift plans after unexpected occurrences
-



What do you see as the most important opportunity for using AI and Machine Learning? (Leading answers shown.)

But they also see some more futuristic opportunities. Robotics to reduce human risk has always been a pursuit but autonomous vehicles and drilling equipment, when guided by AI software, could offer new leaps in productivity. And using AI to automate the complex process of compliance and risk management or to reschedule plans on the fly and handle exceptions are also seen as great opportunities.

AI remains hard to predict but we can be confident that not all of the positives it offers will be world-changing; some will merely be hugely advantageous tweaks to the ways we work today, helping operators identify the best operating parameters to improve yields or removing human inputs to save costs and reduce the count of expensive and often dangerous errors.

“AI will be world-changing, helping operators identify the best operating parameters to improve yields or removing human inputs to save costs.”



AI will change mining, says the vast majority

Continuing our querying of AI and its implications, we have already said that mining is not usually regarded as being at the avant garde of new technology adoption. With what degree of confidence does our base of respondents see AI changing the future of mining?

What is notable here is the bullishness of the responses we garnered. Almost nine in 10 agree with the proposal that AI will significantly impact the future of mining. And what's more, not a single respondent said they either disagree or disagree strongly with the notion.

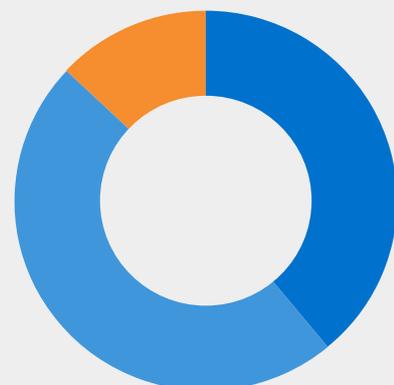
The picture that emerges is one where there is a strong faith in AI as a disruptive force that will play a (possibly major) role in competitive differentiation. This only reinforces the idea that those companies that aren't at least exploring and trialling the use of operational data and AI are ignoring the lessons of history where laggards have lost status and been disintermediated by smarter, more technologically aware firms.

87%

Strongly agree /agree AI will significantly change mining



What do you think of the notion that AI will significantly change the future of mining?



■ 39% Strongly agree
■ 48% Agree
■ 13% Neither agree nor disagree

Senior execs must back or sack AI

For the last of our trio of questions about AI we wanted to understand barriers to entry: what are the obstacles that stand in the way of people who want to capitalize on the promise of AI?

Here, the answers were largely among those that spring eternal in any major change programme: ensuring senior management understand the opportunities and will spend and accept the risks of embarking on a new road; conquering inertia; getting data into shape; and finding and retaining the in-demand people who can make it happen.

AI will be an acid test of CEOs and their lieutenants. Who has the bravery to make systemic and strategic changes? Who will prize budget for speculative investments? Who can persuade naysayers and take the chances when the prizes are so big? And who will succeed in bringing operators on board to work with AI?

A certain amount of letting others go first is understandable and there is bound to be a certain immaturity among tools and vendors. But that should not stand in the way of mining firms at least taking strides towards the future.



What do you see as the most important challenge in deploying AI? (Leading answers listed.)

-
- 01.** Getting management buy-in
 - 02.** Cultural aversion to change in organization or sector
 - 03.** Data clean-up and organisation / contextualization
 - 04.** Access to skills
 - 05.** Lack of budget
 - 06.** Access to operational data
 - 07.** Understanding a fast-changing technology landscape
 - 08.** Technology immaturity
 - 09.** Vendor choice isn't clear
-

Cloud is the mining sector's testbed

AI is far from being the only big opportunity provided by technology today. In fact, this is a golden age for technology, with blockchain, virtual and augmented reality, 3D printing, data analytics and many other opportunities knocking at the doors of CIOs.

Not new but still evolving among these is the biggest IT deployment shift in decades: cloud computing. Therefore, we asked our panel where they are using the cloud. Some answers were fairly predictable: cloud backup and storage is an obvious adjunct and complement to on-premises options while security protects the perimeter of organizations and emails can be scanned before they enter the corporate network.

But testing is the number-one cloud usage model today for our panel and it's clear that in mining, as elsewhere, cloud platforms have become the testbeds of modern IT. Also notable is the 68 per cent of respondents using cloud for communications; we already see high demand for remote operating centers running online.



Where do you use cloud technologies?

73%

Testing



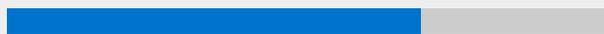
68%

Communications



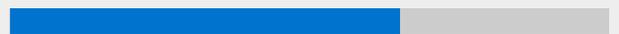
69%

Backup



65%

Security



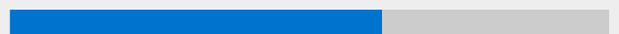
68%

Storage



62%

Productivity applications



Mining companies—even those that have traditionally been conservative—need to get on board with the cloud and accept that even in the cases of sources of the traditional fears, such as those surrounding security and governance, cloud service providers actually provide a superior solution to running IT on-site. But for remote Mining sites, the cloud remains a connectivity challenge which telecom network companies are currently addressing.

“...it’s clear in mining, as elsewhere, cloud platforms have become the testbeds of modern IT...”



Where do you plan to expand cloud technology usage?

61%

Productivity applications



47%

Backup



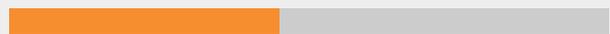
51%

Security



45%

Communications



48%

Storage



40%

Testing



Few pioneers are willing to risk arrows in their back but plenty are keen to make tentative investigations

Finally, we looked at another hot technology area, the Internet of Things (IoT), where sensors and communications networks are tapped to make 'dumb' objects 'smart' so they can relay status information to data hubs for more efficient processes and the accretion of valuable data.

In mining, the applicability of the IoT is clear. Drilling equipment, other devices and mining environments themselves can quickly be equipped with intelligence and provide a means to make mining smarter and safer. But how far has the mining industry come? In truth, the answers were a little disappointing for those of us who see technology as game-changing.

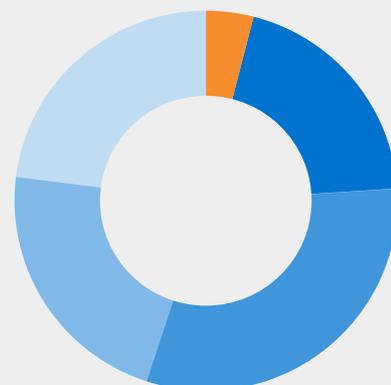
Just one in 25 of our base polled describe themselves a pioneers while almost a quarter say they have no plans to make use of IoT. But a bell curve of over 70 percent have plans or have made some steps, suggesting this is a technology deployment area that is still on the move.

73%

Have plans or have made steps with IoT deployment



[How advanced are you in your IoT deployment?](#)



- 4% Pioneer
- 20% Fairly advanced
- 31% Deployed but not advanced
- 22% Planning to use
- 23% No plans

Of course, not every area of mining activity represented by our audience will have the need or capacity make use of IoT but for those that do, the implications for health-and-safety, analytics and exploration are vast. And once again we would suggest that the early birds will have the best chance of getting the worms.

“In mining, the applicability of the IoT is clear. Drilling equipment, other devices and mining environments themselves can quickly be equipped with intelligence and provide a means to make mining smarter and safer.”



Conclusion

Our research suggests that whether we are talking about AI, cloud, IoT or other technology areas, the mining sector remains only partly vested. It's understandable that the sector does not want to indulge in a full-on embrace of risk and everything that is shiny and new. But it's also a fact that those companies that fall behind in exploring the new opportunities are setting themselves up for a potential loss of competitive differentiation.

There is a clear need for real-time operational data infrastructure to collect data from sensors, IoT devices and to clean and contextualize data so that it becomes meaningful and provides a view for operations leaders and management.

“...companies that fall behind in exploring the new opportunities are setting themselves up for a potential loss of competitive differentiation.”



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