Hexagon Smart Centre services combined with Safety Insights are helping customers to unlock new safety and productivity benefits, Hexagon says

Making connections

As more software solutions receive the AI treatment, the need for connectivity, context and integration increases, Dan Gleeson warns

There is no shortage of data in the mining sector with every bit of hardware – from drill strings to SAG mills – equipped with multiple sensors that provide readings on a regular basis.

Similarly, there are oodles of software platforms ingesting this data and displaying it in a meaningful way for interested parties to use in their decision-making processes.

Then there is the onset of artificial intelligence (AI) to consider; a development that has put the spotlight back on the data source, with any algorithm worth its salt requiring the right structure and the right context to provide value.

This environment means the mining sector has a real chance of achieving the transformation it has been looking to capture for decades, in the process creating the fully autonomous and digitalised mine of the future.

A knowledge-based approach

These trends also hold the potential to reinforce the siloed thinking that outsiders have observed over this same timeframe – it could be AI-backed grade control drilling not being linked to the relevant downstream metallurgical teams to tweak future mill configurations, for instance.

Therefore, the biggest challenge for mining companies today is establishing and leveraging a "good foundation", so all these various systems can integrate, according to Rudy Moctezuma, Chief Business Relations Officer at **Eclipse Mining Technologies**.

A truck payload metric is simply a number until connected with information about the operator, current weather conditions, haul route, the shovel loading it and the mine's downstream processing performance, for example. This context is a requirement for operators understanding performance variations and coming up with a plan to improve it.

The same is true for AI algorithms, as Gustavo Pilger, WW GEOVIA R&D Strategy & Management Director at Dassault Systémes, says.

"Algorithms need to understand not just the data, but their meaning and their purpose within the context of mining processes," he told ***IM***.

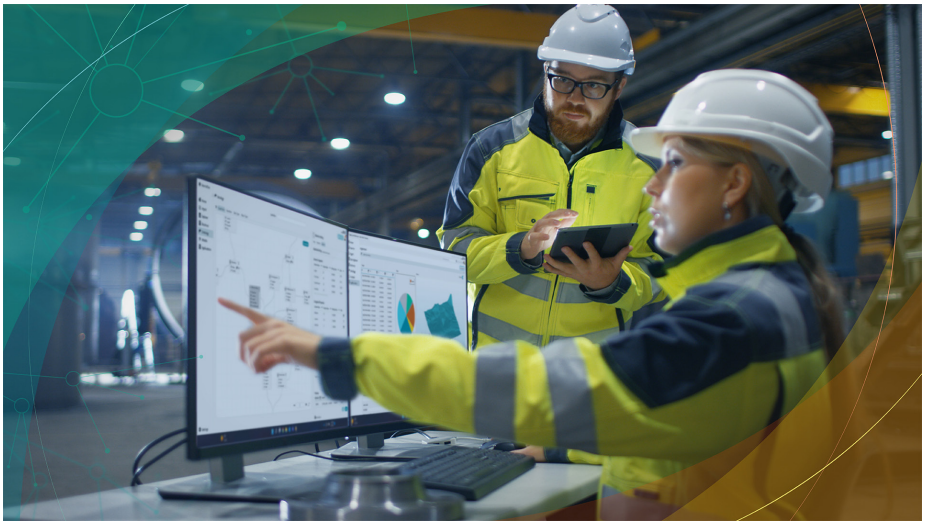
And these same algorithms require that data – often collected from different systems across the operation – to be consolidated, indexed and standardised even before context is factored in.

Eclipse spotted these potential pitfalls some time ago, unveiling its flagship SourceOne™ Enterprise Knowledge Performance System all the way back in 2020 at the *SME Annual Conference & Expo*.

SourceOne was described back then as a trailblazing solution featuring a collaborative platform to connect data from different sources, and a datahub to store historical and contextual data, rendering it serviceable for analytics and for adoption of tools, such as AI and machine learning.

Where most mining software platforms focus on data from a specific domain, such as fleet, spatial or financial, SourceOne is designed to link data across the entire value chain.

It does this with an ontology-driven architecture that creates and preserves relationships between different datasets, enabling the system to understand how data connects and make suggestions based on these relationships, rather than simply storing it.



Eclipse's SourceOne Enterprise Knowledge Performance System has "built in" mining intelligence, such as block models, haul cycles and reconciliation, to ensure up- and down-stream data provides full value chain context for clients

This is coupled with a built-in AI assistant that helps users set up projects, create data models, identify relationships and query their own operational data for insights. The assistant can ingest documents such as standard operating procedures, process notes, or technical reports and translate them into structured knowledge within the system, the company says.

Bobby Atkins, Technical Liaison at Eclipse, explained: "We wanted to give users a way to get up and running quickly without needing weeks of configuration or a team of data scientists. The assistant can help create a working model in minutes rather than months."

Such an approach is complemented by "built in" mining intelligence – such as block models, haul cycles and reconciliation – Moctezuma says.

Early feedback on SourceOne's latest release from pilot users and new implementations has been positive, according to the company, with Atkins noting that many customers are surprised by the clarity the system provides, alongside the shorter-than-expected learning curve.

Creating a digital bond

The 3DEXPERIENCE platform looks to offer mining companies a single, governed environment where traceability, version control and data lineage are inherent, with domain-specific data models combining with semantic dictionaries to carry data meaning across mining processes for that data to contribute to the overall knowledge base of the site/project, according to **GEOVIA**'s Pilger.

The "roles" on the 3DEXPERIENCE platform encapsulate this expertise and ensure that digital continuity is maintained from resource definition through to execution, according to the company. For example, in the context of mine planning and design, since the processes share the same data model and meaning, it enables GEOVIA to create a digital link – a bond – between processes, so that once a given parameter is modified, its impact is propagated down the chain.

"This ensures that mining scenarios are evaluated and optimised in their entirety," Pilger says. "For example, this means that hypotheses tested out within the ultimate pit shell optimisation and scheduling stage propagate through the chain to the mine design stage ensuring that options for the overall plan meet the criteria from geotechnical constraints, design practicality down to ESG targets, all the while maximising net present value (NPV)."

Pilger put forward the GEOVIA Mine Maximizer (GMX) for strategic mine planning as a good example of this domain-specific approach, explaining it is the fundamental

The GEOVIA Mine Maximizer helps teams to achieve near-optimal global scheduling outcomes in way less iterations than the original Bienstock-Zuckerberg algorithm, enabling companies and sites to dramatically improve strategic agility and reduce project risk, according to Gustavo Pilger

optimisation engine employed across its strategic mine planning solutions.

"It is an extension... specifically adapted to solve large-scale, complex mining optimisation scenarios," he said, with the engine exclusively available through the GEOVIA Strategic Mine Planner and GEOVIA Pit Optimizer roles on the 3DEXPERIENCE platform, where it is fully embedded within an integrated strategic mine planning and design workflow.

"Running on the platform, GMX helps teams to achieve near-optimal global scheduling outcomes in way less iterations than the original Bienstock-Zuckerberg algorithm, enabling companies and sites to dramatically improve strategic agility and reduce project risk," Pilger says. "By accelerating scenario optimisation convergence and supporting collaboration around key value drivers, it enables faster and more confident strategic decisions."

More informed modelling

The addition of spatial context to core imagery analysis is helping Leapfrog customers get more out of the 3D geological modelling solution, according to **Seequent**, The Bentley Subsurface Company.

The company recently expanded the capabilities of Leapfrog, introducing streaming of high-resolution core imagery directly into the modelling interface from its cloud-based image analysis product, Imago.

Ryan Lee, Product Manager, Geology, Seequent, said these advancements, collectively, deliver a step change for customers, maximising value from geoscience images for improved interpretation during modelling.

Imago, which covers the entire process of gathering, managing and using geological images, enables users to access, collaborate on and validate high-quality geoscientific images, adding value through functionality such as its machine learning-enabled AutoCrop, which automatically crops and linearises core tray imagery to show core as it was in-situ, Seequent says.

"With this geoscientific imagery directly accessible in Leapfrog 2025.2, users can seamlessly view images within the context of their geological model and examine core photos closely without needing to switch applications, supporting faster, more informed modelling decisions," the company added.

Caleb Bramwell, Product Manager, Imago, Seequent, says: "Over the past year alone, millions of Imago images have been taken from tens of millions of metres of drilling using Imago's Capture X technology. We're also seeing a growing trend towards satellite internet use by customers who use Imago in the field to enable cloud connectivity from remote locations. Strengthening Leapfrog's cloud capabilities with on-demand streaming from Imago ensures core images are captured and accessible for use in the modelling process."

Seequent added: "In Leapfrog 2025.2, seamless integration with this core imagery, enhanced by machine-learning insights, supports interpretation and modelling at every stage of the project, from exploration to grade control."

Open, secure, integrated ecosystems

It is a digital twin that is helping improve grade control outcomes for OREPro™ and Next Gen SHOTPlus™ customers, according to **Orica Digital Solutions**' Head of Software Products and Development, Matthew Craft.

He said the company's Model Through Time (MTT) digital twin tracks blasting activity, material movement and depletion across all blasts, not just individual ones. "This matters because blasts don't happen in isolation; each blast's material can be disturbed by a subsequent blast before it can be excavated," he told ***IM***.

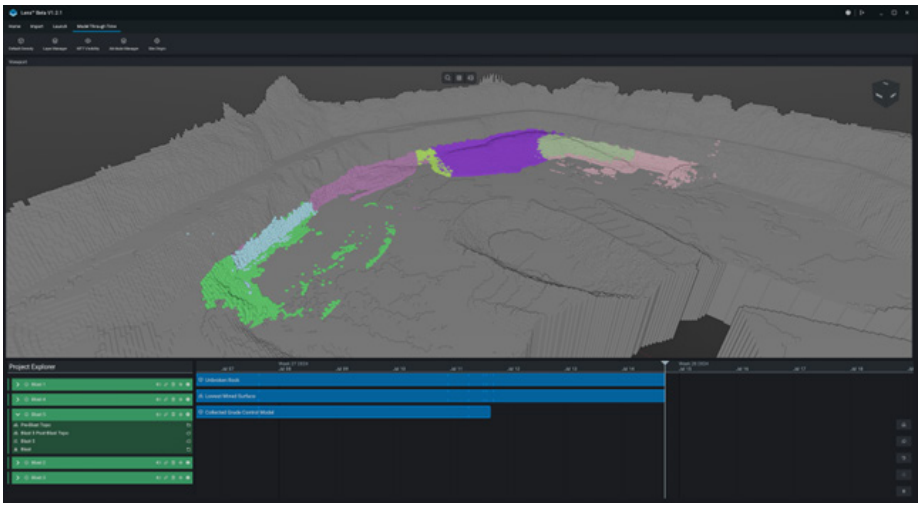
By maintaining a continuous spatial record, the MTT ensures blast designs and grade control decisions reflect the actual state of operations' blasted inventory, with the additional context improving the understanding of grade concentration after blasting and, ultimately, the recovery of valuable ore.

The MTT is tightly coupled with OREPro as the current version uses the pre- and post-blast models as its primary input.

"Our customers carry out their blast-specific modelling tasks before submitting the results to the MTT, which then provides contextual information for subsequent blasting and digging activities," Craft added. "OREPro and the MTT work harmoniously together to synchronise data within the Orica Digital Solutions (ODS) platform ecosystem, and we continue to incorporate more applications like Next Gen SHOTPlus."

He added: "The ODS Platform ecosystem is our ISO-certified, open, secure and integrated common data platform, enabling customers to adopt numerous digital products and share data between applications and workflows."

ODS' strength lies in its combination of



By maintaining a continuous spatial record, Orica Digital Solutions' Model Through Time digital twin ensures blast designs and grade control decisions reflect the actual state of operations' blasted inventory, the company says

hardware and software, enabling integrated workflows in all three core categories: Orebody Intelligence, Blast Design, and Execution and Geosolutions. This unique synergy, Craft says, allows the company to deliver hybrid solutions that connect physical and digital technologies, creating smarter, more efficient operations for customers.

Among the recent innovations highlighting this capability are the introduction of a new generation of MonitorIQ® to enhance GroundProbe's radar monitoring systems, delivering improved performance and analytics for geotechnical risk management.

Similarly, the next-generation SaaSuite for Measurand brings advanced sensor data into a streamlined, cloud-enabled environment – delivering precise geotechnical insights for monitoring ground and structural movement, mitigating failure risks and ensuring operational safety, Orica says.

"These advancements complement the earlier launch of ENVIROTrack, which integrates seamlessly with Syscom hardware to provide a vertically integrated solution for blasting vibration management," Craft said.

Furthermore, Orica expects complementary hardware to software workflows with the AXIS All-Gyro™ tool and BlastIQ™ Underground.

Craft concluded: "Together, these developments reinforce our commitment to building an open, secure and integrated ecosystem that transforms how mining operations plan, execute and optimise their processes."

Pointing to an end-to-end vision

The **Weir** Software Solutions business, currently spearheaded by Micromine, is looking to drive productivity in mining with a portfolio of best-in-class point solutions that offer operations improved efficiency, control and decision making, all while being prepared for an operationally integrated future, according to President, Kristen Walsh.

"What Micromine set out before our acquisition – and we're highly respectful of – is a focus on creating value during individual workflows within the mining value chain," she told ***IM***. "Customer feedback continues to point towards the need for this approach."

With 305 mine sites using these products, that customer interaction piece is a major strength of the offering.

Walsh added: "At the same time as this, we are committing in the long term to offer a platform that goes end-to-end as, ultimately, there is a huge opportunity for the mining sector to improve productivity and lower the operating footprint through tying all that data and those workflows together.

"If we can build trust and credibility with the customer and use our solutions to solve problems at these various points of their process, we know this will lead to further conversations about up- and down-stream opportunities that leverage a more integrated offering."

The company's vision – to provide the best feature-rich technical solutions on the market, while harnessing AI and the cloud for improved efficiency – is embodied across these point solutions, Walsh explains.

"We have three broad portfolios of products across the value chain: Explore, Evaluate and Design; Plan; and Operate," she said.

The products Geobank, Origin and Beyond fit into the first category, while there are two streams for Alastri and Spry under the Plan umbrella (catering to the different open-pit mining and underground mining needs). Operate includes MOTION METRICS™ and, as of November, Fast2Mine on surface, with Pitram for underground.

This is all underwritten – connectivity-wise – by the cloud-based Nexus platform.

Walsh singled out a few product specifics to solidify that 'feature-rich' vision when ***IM*** spoke to her in January.

"In Explore – with Geobank and Origin – we've been trying to connect data and inputs from the 'desk-based geologist' with those insights from 'field-based geologists' to improve end-to-end management of geological data. We've achieved this through offering easier workflows and data sharing through the Nexus cloud platform."

This improved geological workflow is further aided by Origin's ability to carry out accurate modelling and resource estimation calculations within the same platform.

"Some of our competitors in this space are very strong in geological modelling or resource estimation; we see Origin performing both functions with accuracy and efficiency," Walsh says. "This enables improved efficiency and data reconciliation across those two distinct stages of the

Weir Software Solutions is out to provide the best feature-rich technical solutions on the market, while harnessing AI and the cloud for improved efficiency

An IIoT, decision-making bridge

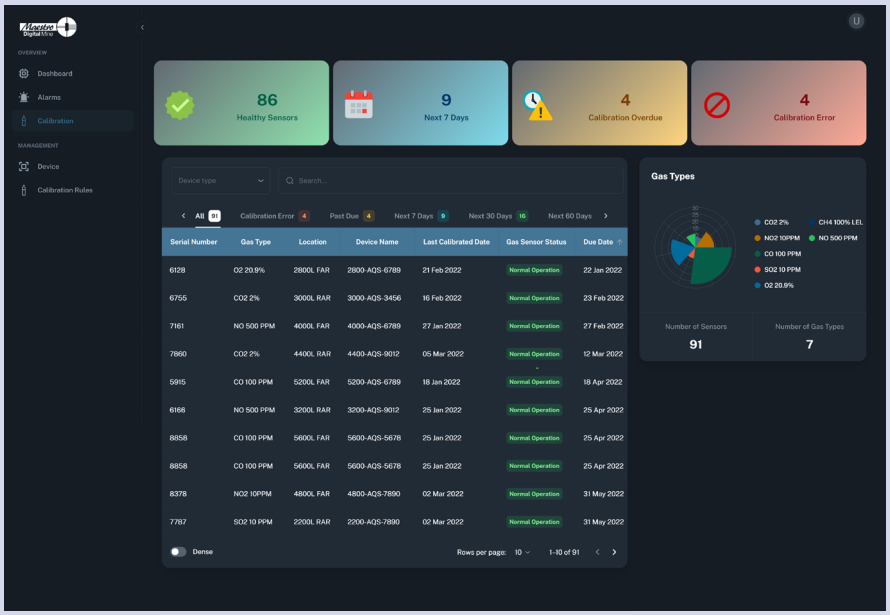
Having developed and rolled out sensing and monitoring solutions, as well as "last-mile connectivity" products, to help reduce the capital and operation expenditure burden associated with underground mine infrastructure over the past decade-and-a-bit, **Maestro Digital Mine** just recently strengthened its software offering with the release of Duetto Analytics.

Previously described as a bridge between IIoT devices and critical decision-making processes, Duetto Analytics is now in place at select underground mines. ***IM*** put some questions to Jacob Lachapelle, Chief Commercial Officer, to find out more.

IM: How has the launch of Duetto Analytics gone so far?

JC: Duetto Analytics has been commercially launched and is now available. It was introduced into Maestro's product ecosystem in September 2025 and is currently in use across underground mining environments.

Since launch, development has focused on continuous improvement informed by real operating conditions. This



Duetto Analytics works across Maestro's broader device ecosystem, delivering practical value at site level and remains straightforward to deploy and scale, according to the company

includes expanding functionality, refining the user experience and strengthening how Duetto works across Maestro's broader device ecosystem, so it delivers practical value at site level and remains straightforward to deploy and scale.

IM: Did the beta testing live up to your expectations? Are you able to share any feedback on how the solution is 'streamlining' maintenance?

JC: Yes, beta testing clearly lived up to our expectations. It validated that Duetto was solving the right problem and doing so in a way that aligned with how maintenance teams actually operate underground. Feedback confirmed that consolidating diagnostics, calibration status and device health into a single surface-level view improves how issues are investigated and how maintenance is planned. Just as importantly, beta testing gave us confidence that the platform performs well in real operating conditions and helped finetune how Duetto supports maintenance decision making ahead of full commercial deployment.

That validation was a key factor in moving Duetto confidently from beta into production use.

IM: Has the beta testing led to the development of any new algorithms that may go a step further in terms of aiding maintenance? Something like predicting cell degradation in a gas sensor, for instance?

JC: Duetto is already designed to provide predictive analytics and surface-level decision support for maintenance using extensive built-in diagnostics from Maestro devices. Beta testing did not change that foundation, but it helped clarify where additional intelligence delivers the most practical value for maintenance teams.

Beta discussions highlighted the realities of maintaining large sensor fleets in harsh underground environments, where temperature, humidity, calibration drift and environmental noise can all affect sensor behaviour over time. That feedback reinforced the need for analytics that interpret these factors together, rather than relying only on individual alarms or thresholds.

As a result, beta testing has helped guide development toward more contextual, diagnostic-driven intelligence, including improved differentiation between calibration-related issues, communications problems, environmental effects and early indicators of sensor degradation, with potential use of AI-assisted techniques. Predicting electrochemical cell degradation is one example that aligns with this direction, but it remains part of the ongoing development roadmap rather than a deployed capability today.

Duetto already provides the core foundation for this evolution through centralised diagnostics, calibration and maintenance records, and historical performance data. Beta feedback has ensured that future development remains grounded in real underground operating conditions and focused on delivering dependable, decision-ready insight for maintenance teams.

IM: Do you have anything else to add on the topic of mining software?

JC: One broader point worth making is that mining software is maturing. The industry is moving away from isolated point solutions and technology for its own sake, and toward software that is closely connected to physical assets, operational workflows and real decision making at site level.

What consistently matters is not the sophistication of dashboards or algorithms alone, but how effectively software helps people make safer, faster and more confident decisions in complex operating environments. That requires solutions to be grounded in high-quality data, designed around the realities of underground operations and able to integrate into existing systems rather than attempting to replace them wholesale.

There is also growing recognition that predictive and AI-driven capabilities need to be introduced responsibly. Mines want transparency, validation and control, not opaque or fully autonomous systems. The platforms that succeed will be those that build trust by supporting human expertise, simplifying complexity and delivering practical improvements over time.

From our perspective, the future of mining software lies in open, ecosystem-based platforms that connect sensors, networks, analytics and people. This approach allows mines to scale digital capability at their own pace while maintaining safety, reliability and operational confidence.

exploration process, all of which derives better outcomes for clients."

An individualised approach to the metals and soft-rock communities through tailored solutions for surface mining – Alastri and Spry – and underground mining – Advance and Spry – is another key differentiator, while the close alignment with these products and Fast2Mine/MOTION METRICS and Pitram in the Operate space adds another level of specificity that clients appreciate, according to Walsh, enabling reconciliation between the plan and actual operating data.

She also homed in on the mine management solutions (MMS) offering that Fast2Mine brings to the open-pit space, with four modules designed around a modern, web-native interface that prioritises ease of use while delivering advanced reporting functionality. "The solution is completely equipment-agnostic – covering all equipment on site – and can be implemented in a matter of minutes, with data feeding through within weeks," Walsh said. "This is a very different proposition to the traditional solutions in this market."

Even with this wide offering, Walsh and her team acknowledge that not all clients will use all the company's point solutions, going as far as helping with integrations into other vendors' platforms.

"The goal of our Nexus platform is very much to be a 'platform orchestrator' that allows others to use it," she explained. "What I have seen since Micromine came into the Weir fold is an acknowledgement from clients of how easy it is to work with our teams to enable the integrations they need."

With Weir's mineral processing OEM credentials still firmly in place, IM felt the need to ask a question about hardware synergies, with Walsh pointing to MOTION METRICS solutions within her answer.

"We recently made a decision to move MOTION METRICS into Software Solutions because we see a huge opportunity to aide the decision-making process and workflow by leveraging the data that comes off its sensor-based solutions," she said. "MOTION METRICS has made a significant investment in intellectual property when it comes to how that data is being collected and analysed, and we're confident that our software can use that data to support improved decision making."

Other sensor-based solutions could also potentially come into this software remit, such as ESCO and MOTION METRICS' ongoing ore characterisation work with hyperspectral imagery and advanced imaging. Fleet asset maintenance is another potential expansion area.

But this is where the hardware-software integration is likely to start and finish, according to Walsh.

"I anticipate that, as you see our business grow and develop, we will include more and more sensing and data collection opportunities that will provide and feed data to support the decision making in our software for efficient workflows, but I see that being totally equipment-agnostic," she said. "Our aim (Software Solutions) is to be a technology provider, as opposed to a seller of equipment or hardware."

She concluded: "So our ultimate end-to-end vision will see the Software Solutions business supporting improved workflows and decision making with, maybe, more data collection than we have today as Weir, more broadly, continues to support and invest in any technology that's going to make our equipment more intelligent to optimise the mining process, such as what the Minerals business is doing with NEXT Intelligent Solutions."

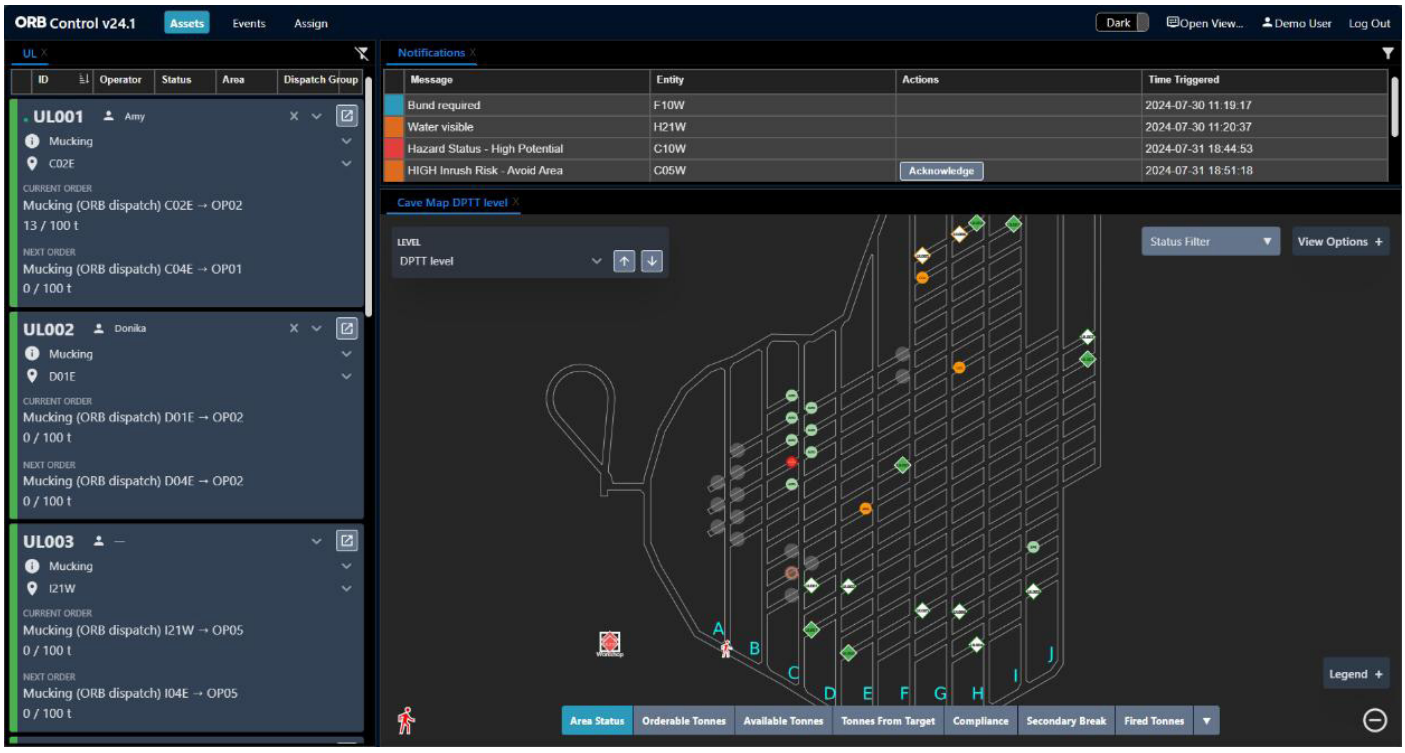
Information exchange in action

Integration has been top of mind for the **Digital Mining** Technologies division within Sandvik Mining in recent years, with the OEM making some bold acquisitions to expand its remit beyond its traditional mining equipment core.

Included within this division is the Deswik, Newtrax, Polymathian and AutoMine® businesses: an assortment of platforms able to provide data feedback and automated end-to-end process optimisation.

The former three companies all came into the Sandvik fold in a busy period from 2019 to 2023, providing significant opportunities for the company to add mine design, scheduling and planning, plus collision avoidance and proximity detection data, into its offering. These opportunities also came with the challenge of integrating the companies – some of whom had very different sales model to Sandvik Mining's traditional business.

Elen Toodu, Business Development Director at Sandvik Mining, told ***IM*** that the



Deswik ORB can provide automated dispatching in a production environment for autonomous equipment, according to Steven Donaldson, Technical Director of ORB

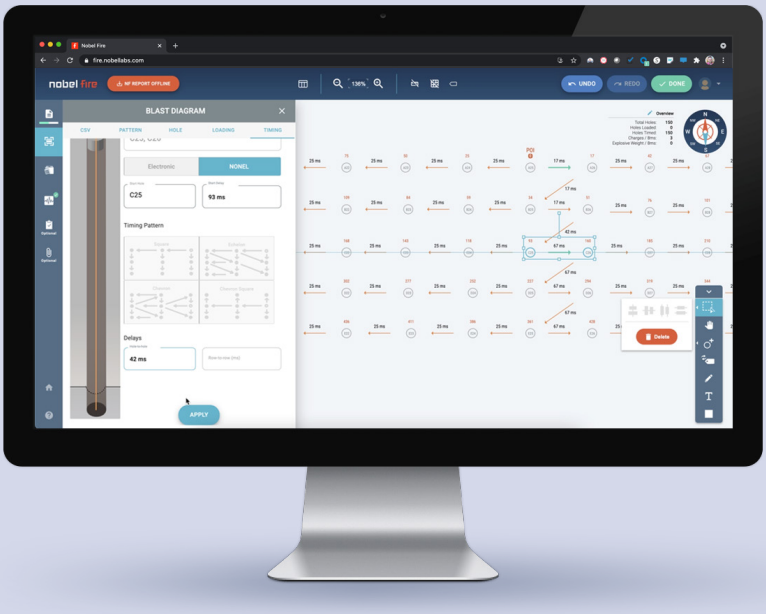
A digital platform for better blasting

In today's mining industry, the ability to predict and control blasting outcomes is a key value driver, with **Dyno Nobel** saying its Nobel Fire solution puts that capability right at miners' fingertips.

Nobel Fire gives operations the tools they need to design, refine, optimise and improve blasts, all in one central platform. It offers enhanced control over blast results using modelling tools to predict and optimise fragmentation.

Fracture Density Model (FDM) is a physics-based tool that models blast outcomes based on the specific geology at a site. FDM uses data, including drilling and loading designs, rock characteristics and explosive properties, to predict fragmentation. "Unlike traditional fragmentation models, which assume uniform geology and identical waveforms from every blast, FDM can be calibrated using particle size distribution from previous blasts for industry-leading accuracy," the company says.

Nobel Fire also gives operations the ability to predict heave and blast movement with its Geologic Element Movement (GEM) tool. GEM uses shapes that accurately represent rock fragments and leverages data inputs, including drill hole and loading designs, explosive properties, geological information and timing, to predict how hundreds of thousands of fragments will travel during a blast, as well as their final location. "This allows for unmatched predictions of overall blast outcomes, complex ore and waste rock dilution modeling, and cast-blasting optimisation," Dyno Nobel says.



Nobel Fire gives operations the tools they need to design, refine, optimise and improve blasts, all in one central platform, Dyno Nobel says

Using FDM and GEM, operations can simulate trial and error processes digitally rather than conducting them physically, saving time and money while simultaneously ensuring the desired blast outcomes are achieved, the company claims.

In addition to fragmentation optimisation, Nobel Fire offers two tools for vibration control: Advanced Vibration Prediction and Vibration Timing Optimization.

Advanced Vibration Prediction is designed to revolutionise the way operations approach vibration. It accounts for inherent variability in blasting, including confinement, charge weight, bearing to structure, geological differences, and destructive and constructive interference. Using a seed waveform as a starting point, Advanced Vibration Prediction generates thousands of synthetic waveforms to add variability to the convoluted blasting outcomes. A stochastic analysis then provides the likelihood of all potential outcomes to allow operations of all shapes and sizes to confidently predict vibration, Dyno Nobel says.

Vibration Timing Optimization also offers improved control over vibration. It quickly helps identify blast timing pairs to reduce vibration at a structure and can run thousands of scenarios in seconds to find the optimal timing for vibration mitigation, according to the company.

Vibration Timing Optimization works seamlessly with Advanced Vibration Prediction in the Nobel Fire platform for a holistic approach to vibration, Dyno Nobel says.

integration work has been progressing as planned, with numerous customers using its products for mine planning, operational management and automation in an integrated manner. "I am sure this work will never be finished, but we have delivered some great progress," she said.

Data can now be "seamlessly exchanged" between the AutoMine solution and operations management and short interval control solutions, Deswik ORB and Deswik OPS, she said.

Steven Donaldson, Former Technical Director of ORB, said ORB and AutoMine offered a "plug-and-play" integration with multiple benefits. "For instance, ORB can provide automated dispatching in a production environment for autonomous equipment," he said. "Data can also be pulled from Sandvik equipment and brought into ORB through AutoMine for reporting purposes."

Deswik OPS, a collaborative short-term planning and shift execution tool for monitoring and managing operational compliance across all mining methods, is also being integrated with both AutoMine and Deswik ORB. In block cave operations specifically, this integration enables dynamic management of cave execution and development. "In simple terms, assignments from the mine plan are sent directly to our automation stations, and progress updates are received automatically," Toodu explained. "This takes us one step closer to a future of fully autonomous mining."

At the same time as this product/solution integration plays out, Sandvik is designing its software to be capabilities- and data-driven, which, Toodu says, supports broader integration in a couple of ways – "Firstly, for customers delivering standard connections access points to our data, and, secondly, supporting faster time to market for solutions by leveraging common functional capabilities,"

She concluded: "These building blocks enable systems to communicate seamlessly and provide our customers with greater flexibility to customise and deploy solutions according to their own needs and timelines."

Optimisation across safety, operations and planning

It has been a big 12 months for **Hexagon's Mining division**, with James Dampney, Senior Vice President – Product, able to reel off several milestones that contribute towards the company's aim of delivering a

holistic, data-driven approach to integrating, automating and optimising critical workflows for the mining industry.

Among these are "world-first" integration of the company's OAS (Operator Alertness System) and CAS (Collision Avoidance System) for real-time visibility of predicted collision events and operator behaviour. Delivered through the launch of OAS 7.5, this enables finetuning of operations based on real-world event data, improving both safety and productivity, according to Dampney. The integration has been proven during a successful field deployment at Whitehaven Coal's operations in Australia, with the trial spanning an entire fleet and run for more than a cumulative 10,000 operating hours.

These safety insights, combined with Hexagon's remote CAS Smart Centre services, enables the company to work closely with customers to unlock new safety and productivity benefits, it says. "This approach turns raw data into actionable insights, enabling mines to move from reactive responses to proactive risk management," Dampney told ***IM***. The Hexagon CAS Smart Centre offers proactive safety management, with near real-time visibility of safety events and system health. Predictive analytics, meanwhile, are leveraged to prevent incidents before they occur, enabling a shift from reactive to preventative safety strategies.

On the operations side of the Hexagon offering, the latest version of its Fleet Analytics platform provides enhancements to fleet performance data and analytics, helping mines understand utilisation, cycle times and match factors within a more modern and simpler to use experience, the company says. Hexagon's Smart Centre teams work with customers using these analytics and data to identify further optimisation opportunities such as improving haul routes or reducing idle time.

The latest version of Hexagon Asset Health, launched in 2025, focuses on monitoring the condition of mining equipment to support better maintenance planning, using alarm snapshots, long-term sensor trends and GPS-based alarm

Global information management software company, **acQuire Technology Solutions** says it is simplifying and streamlining the way geologists capture, manage and scale their data across mining operations with the release of GIM Suite 5.5.

With version 5.5, acQuire says it has focused on strengthening data integrity and reliability, workflow consistency and system performance within its enterprise geological data management solution, GIM Suite. The result, it argues, is more intuitive and flexible geological data management.

The latest release introduces new pre-configured data capture tasks that are purpose built for a range of drilling and sampling methods, from RC and diamond drilling to face sampling and surface sampling.

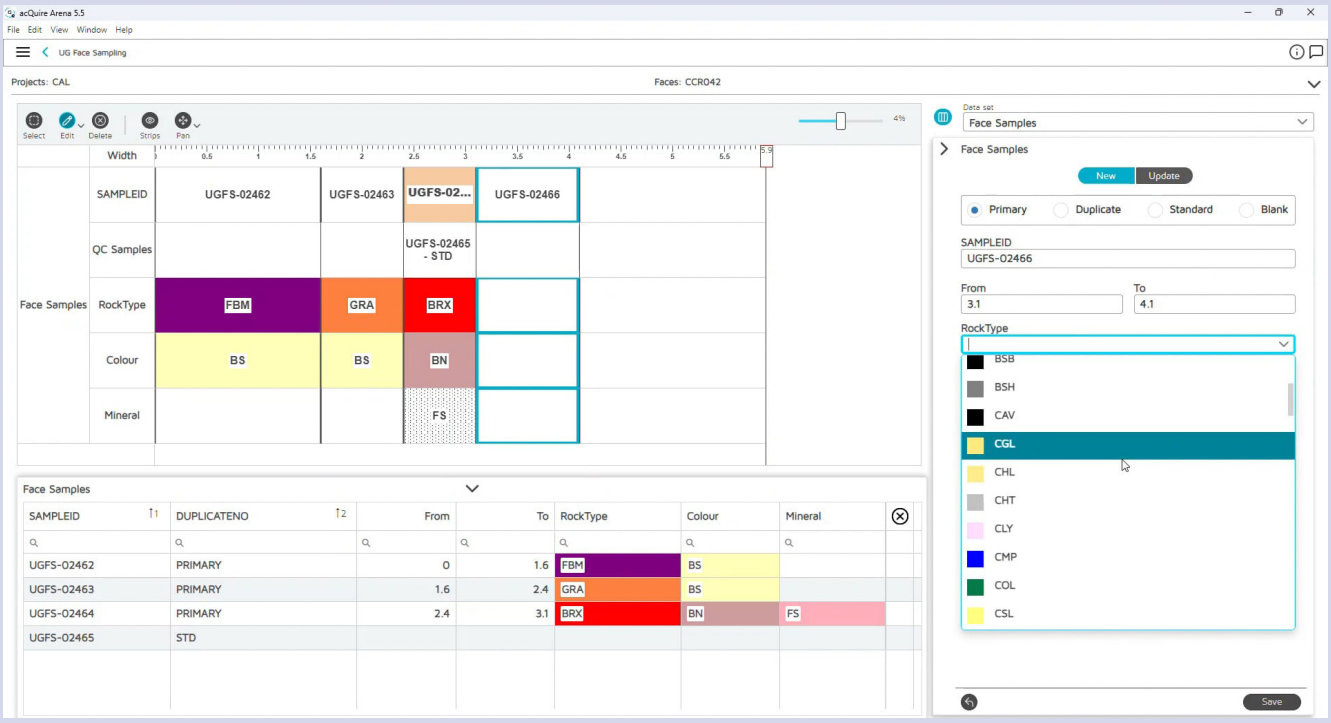
"With GIM Suite 5.5, our aim is to make data capture work the way geologists do in the field," Geoff Forbes, Product Group Manager for the Mining Portfolio at acQuire, said. "By tailoring tasks to specific logging and sampling methods, field teams can collect accurate data faster and with greater confidence."

Each task includes tailored templates that reduce administrator setup time while helping geologists and field workers log and sample drill holes more quickly and accurately.

"For a geologist conducting underground face mapping and sampling, you can now select the pre-configured template in GIM Suite 5.5 that features a horizontal graphical log scaled to provide clear visibility of your logging and sampling details," Forbes added.

Administrators can deploy these templates quickly, ensuring consistency and reliability in geological data across the organisation.

The company concluded: "GIM Suite 5.5 isn't just smarter on the surface, it's also faster and more secure behind the scenes. Under the hood, architectural upgrades in GIM Suite deliver faster performance, improved stability and greater data security. These improvements ensure mining company's geological data remains protected and accessible, even under the most demanding conditions."



GIM Suite 5.5 introduces new pre-configured data capture tasks that are purpose built for a range of drilling and sampling methods, from RC and diamond drilling to face sampling and surface sampling, acQuire says

mapping to highlight potential issues before they lead to downtime. The OEM-agnostic design, combined with machine-specific use cases, means it can work across mixed fleets while still providing relevant insights, Dampney says.

In the resource optimisation space, there have been enhancements to long- and short-term planning workflows focused on improving the way mines manage large and complex block models within planning workflows. Dampney said: "The capability supports efficient handling of high-volume geological data and introduces modern version control features, enabling teams to track changes and maintain data integrity across multiple iterations. Integrated across long-term and short-term scheduling workflows, these improvements ensure resource models remain accurate and aligned with operational plans." Additional API support means customers can connect this planning data with broader analytics environments for "deeper insights and advanced decision making".

This year, the integration of indurad radar solutions will take Hexagon a step further downstream from the crusher into processing, through solutions such as iBelt, iCrusher and iStockpile.

And, in the underground space, Hexagon is looking to build on recent investments in drill optimisation (Minnovare) and teleremote operations (through HARD-LINE) by leveraging the "real-world test environment" it now has access to through its partnership with Montana Technological University.

The university's Underground Mine Education Center, which Hexagon has access to through this partnership, is a full-scale mine environment that enables rigorous testing of sensors, algorithms and operator-machine interactions. Hexagon intends to use the site for simulation, validation, training and demonstrations, helping bridge the gap between laboratory development and operational deployment while strengthening industry-academic collaboration.

Dampney added: "This builds on Hexagon's broader commitment to field-based validation. For surface mining, we have partnered with KGHM's Carlota Copper Mine in Arizona, which serves as our Field Readiness proving ground for surface technologies. There, solutions are tested and refined in live operational conditions before broader deployment.

"Together, these environments ensure our technologies are not only developed in theory, but proven in practice – enhancing reliability, accelerating innovation cycles and ensuring solutions are ready for the realities of modern mining operations."

Committed to technological excellence

Datamine CEO John Bailey says the company's commitment to customers, focused on listening, innovating and delivering, has been on show during a busy 12-month period in 2025.

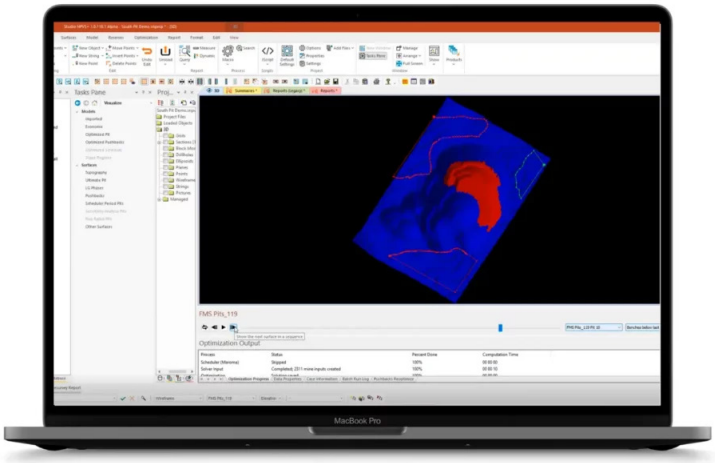
Among its developments was the signing of two landmark global partnerships that, Datamine says, demonstrate its ongoing commitment to smart mining solutions.

With Verbrec, Datamine now offers *StacksOn*™, a digital twin platform that transforms stockyard management by improving visibility, operational efficiency and sustainability. The partnership integrates Verbrec's engineering expertise with Datamine's mining technology to empower over 1,500 clients globally with advanced stockpile optimisation tools.

mining professionals interpret and use geological data. Built on more than 40 years of mining expertise, Studio Geo enhances collaboration, accuracy and efficiency across every stage of the mining lifecycle, the company says.

According to Anthony Cook, VP of Geology, the solution "leverages our industry-leading Studio toolkit, alongside our automation language, to deliver a modelling solution that can handle both the intensity and complexity of the mining environment". The workflow is fully flexible and allows for seamless integration with existing data sources, he added.

Complementing this, the release of Datamine's next-generation mine planning software, Studio NPVS+, introduced the market's most advanced strategic planning capabilities. Designed to maximise NPV and



Studio NPVS+ helps mine sites unlock the "true value" of their deposit with unmatched speed and strategic insight, according to Datamine's Joe Kraft

A collaboration with IntelliSense.io, meanwhile, allows Datamine to expand its capabilities deeper into the ore processing segment. This partnership combines Datamine's mining expertise with IntelliSense.io's AI-powered process optimisation tools, offering clients a one-stop platform that spans exploration through production, it says.

Datamine has also formed a global partnership with Aereo, a leader in AI-powered aerial intelligence, with the companies set to introduce an integrated, AI-enabled solution that aligns survey, planning and operations workflows. In the process, this will enhance precision, safety and sustainability across the mining value chain, Datamine says.

The 2025 launches of Studio Geo and Studio NPVS+ represent the company's commitment to help clients improve business outcomes, Datamine says.

Studio Geo, released in April 2025, is Datamine's premier geological modelling platform, designed to transform the way

streamline complex scheduling processes, the solution delivers faster, more accurate scenarios and optimised mine plans, according to Datamine.

Joe Kraft, Datamine VP of Planning, said: "Studio NPVS+ is an evolution of our established software Studio NPVS and doesn't just help you plan better – it helps you unlock the true value of your deposit with unmatched speed and strategic insight."

From strategic partnerships to continuous software innovation, Datamine says it continues to strengthen its position as a leading provider of mining technology.

"As part of this commitment to technological excellence, Datamine is preparing its laboratories for the next era of AI-driven performance," it explained. "Datamine is making labs 'AI-ready' by strengthening data foundations – standardising data, integrating instruments and removing manual bottlenecks that slow insight. This digital infrastructure paves the way for AI-driven scheduling, predictive maintenance and quality optimisation,

enabling customers to plug in and move fast."

Cloud-native integration for modern mining

Twenty-twenty-five was a landmark year for **ThreeDify**, marked by rapid expansion across the GeoMine platform and the introduction of a cloud-ready orebody knowledge solution, GeoBase.

The GeoMine platform, an AI-enabled, fully-integrated and all-in-one platform for rapid resource evaluation, reserve optimisation, mine planning and simulation, now has 20 modules to its name, spanning the spectrum of geological modelling, mine planning and mining operations. The latest additions include Short Term Blender, Stochastic Multi Pit Scheduler, Block Caving Simulator and Optimal Pillar Placement in Stopemizer (GeoMine-MSO).

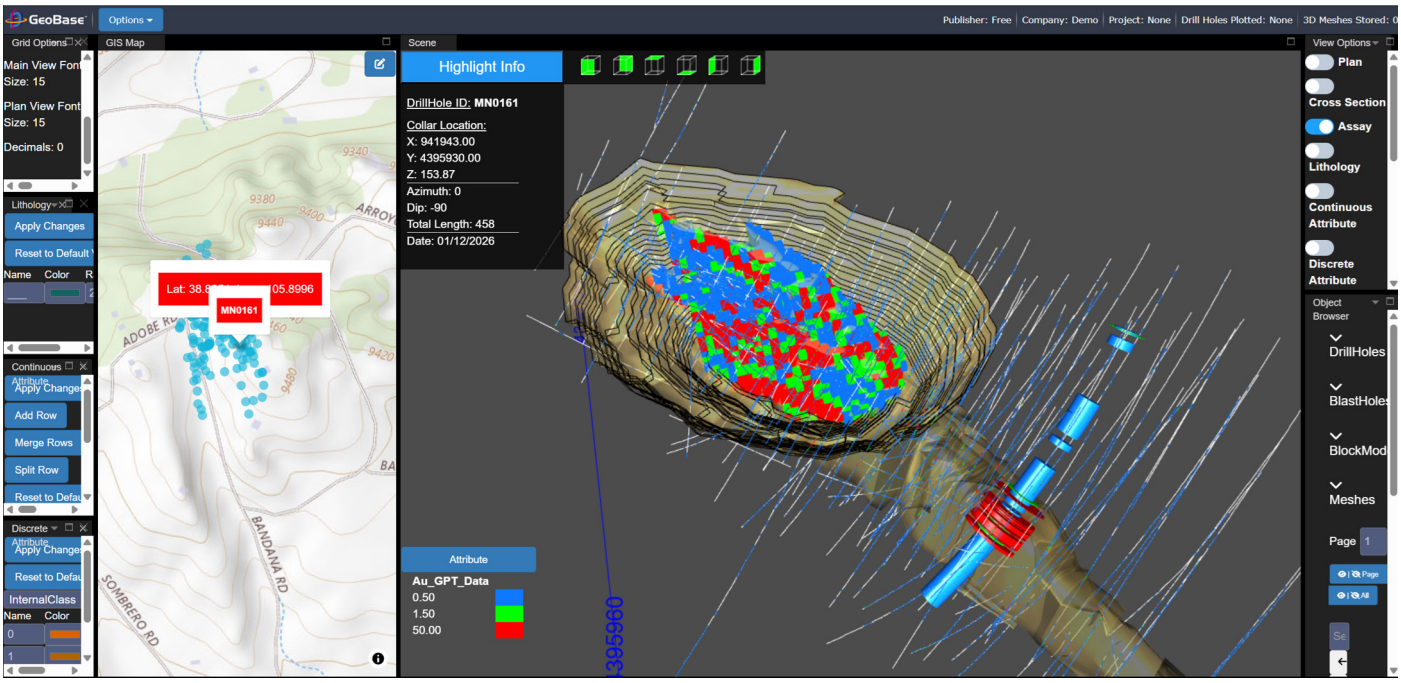
This growth is, ThreeDify says, complemented by a strategic move to a hybrid client–server architecture with flexible on-premise or cloud deployment, aligning with the industry's shift toward integrated, collaborative, and automation-driven digital ecosystems.

GeoBase, an online collaborative orebody knowledge platform with centralised cloud or on-premise storage, centralises geological, operational and production data while enabling advanced technical workflows across teams. Features include integrated QA/QC data integrity check, 3D visualisation, compositing, AI driven muckpile and stope dilution/loss prediction, plus measure-while-drilling support, all with version control and unlimited rollbacks. Real-time collaboration reduces latency, minimising manual handovers and version conflicts for faster model updates, planning iterations and operational responses. "GeoBase establishes a true single source of truth, breaking down data silos across the mining value chain and providing a robust foundation for downstream modelling and planning," ThreeDify states.

"Together, GeoBase and GeoMine deliver drill hole to model-to-operations integration in a hybrid, cloud ready environment, compressing decision cycles to improve time-value-of-money outcomes," the company says. The pairing creates "cloud-native geological twins" where real-time data flows from drilling and production databases into modelling, simulation and mine planning environments, resulting in continuously updated geological and operational "twins". Dynamic feedback loops reduce the cost of uncertainty by making scenario analysis and re-logging/infill drilling recommendations part of routine planning rather than periodic, offline study work, it added.

GeoMine facilitates stochastic optimisation at complex scale, accounting for geological, market and recovery uncertainties across multi-deposit, multi-processing-stream and multi-haulage alternatives to help maximise NPV. "Stochastic optimisation provides downside protection, not just upside potential. It tests strategy robustness across uncertainties, avoiding fragile plans and boosting confidence in guidance, capital allocation and commitments," the company explains.

The company added: "In an industry where value destruction often stems from delayed insight rather than poor engineering, GeoBase and GeoMine reframe planning as adaptive capital allocation. By synchronising orebody knowledge, uncertainty and operational feedback from drill hole to work face, ThreeDify can help reduce downside risk, accelerate value realisation and improve life-of-mine decision confidence."



ThreeDify's GeoBase is an online collaborative orebody knowledge platform with centralised cloud or on-premise storage, which centralises geological, operational and production data while enabling advanced technical workflows across teams, the company says

Software-driven safety

Hoisting is another area of underground mining where there is a greater need to integrate software and hardware, with Alonso Morey, Technical Product Manager, **ABB** Process Industries division, explaining how this integration greatly benefits functional safety at mine sites.

Mine hoisting has always been high risk. Today, that risk is increasing as shafts go deeper, conveyances become larger, and hoists move at greater speeds to transport the ore and personnel required to meet rising demands. At the same time, automation is replacing manual control, shifting safety risks away from the hoist driver and towards system design, software and control integrity.

"In this environment, safety must be engineered into the hoist as a complete system rather than treated as a collection of administrative controls and mechanical safeguards," Morey says. "This is where ABB's Safety Plus suite for mine hoists comes into play."

Traditional hoisting safety has focused on mandated protections such as overspeed and overtravel devices, hardwired interlocks and high reliance on manual actions by trained operators. These remain essential but are no longer enough for deep, high-speed and highly automated operations, Morey says. Modern hoisting, particularly at increased depths, relies on functional safety: safety functions implemented in control systems that automatically detect hazardous conditions and bring the hoist to a safe state.

"Functional safety introduces an objective, risk-based approach," he explains. "Instead of simply verifying whether protection exists, it assesses how effective it is. For deep mine hoists, this frequently leads to safety integrity requirements equivalent to SIL (Safety Integrity Level) 3, reflecting the high energy involved and the severe consequences of failures."

ABB, Morey says, has been at the forefront of applying functional safety to mine hoisting, and Safety Plus is built around this philosophy. He added: "Rather than bespoke, site-specific solutions, the suite uses configurable, predesigned, third-party certified safety functions that can be deployed consistently across sites and regions."

Safety Plus for mine hoists is a portfolio of integrated solutions that, together, protect the hoist from the shaft bottom to the headframe.

At its heart is the Hoist Monitor, a compact safety controller that includes 16 certified safety functions covering speed, position and direction. It is suitable for drum, friction and Blair multi-rope hoists, and can be installed in new projects or retrofitted to existing systems, including those with legacy controls. It can be used to detect hazards throughout the complete lifecycle, from shaft sinking to permanent operation. Importantly for deep operations, it provides continuous diagnostics and accurate position determination, allowing issues to be detected before they escalate into incidents.

Braking performance is another critical safety factor at depth. High speeds and long stopping distances demand precise, predictable control. The Safety Plus Brake System combines electrical and hydraulic brake control with SIL 3-certified protections and advanced diagnostics for all types of hoists. This allows controlled deceleration in both normal and emergency situations, reducing dynamic loads on ropes and mechanical components while maintaining reliable stopping behaviour, according to Morey.

Drive-based functional safety is delivered through Safe Torque Off (STO), which is integrated as standard in ABB drives. STO prevents unexpected movement by immediately removing torque generation and supports emergency stops while the hoist is in motion. Depending on the drive, this functionality is available up to SIL-3, adding a further layer of protection.

"These elements come together in the Safety Plus Hoist Protector, ABB's complete, end-to-end SIL 3 hoisting safety solution," Morey says. "The Hoist Protector integrates monitoring, braking, drives and the complete hoist installation's instrumentation to manage multiple hazard scenarios across the hoist room, shaft access levels and headframe, ensuring the hoist is brought to – and kept in – a safe state when required."

Predesigned, certified safety functions capable of being deployed globally create a powerful feedback loop, with lessons learned at one site rapidly incorporated into the same solution elsewhere. This, Morey says, raises safety performance across entire hoist fleets and safeguards consistent, predictable hoisting performance over the full operating life of the asset.

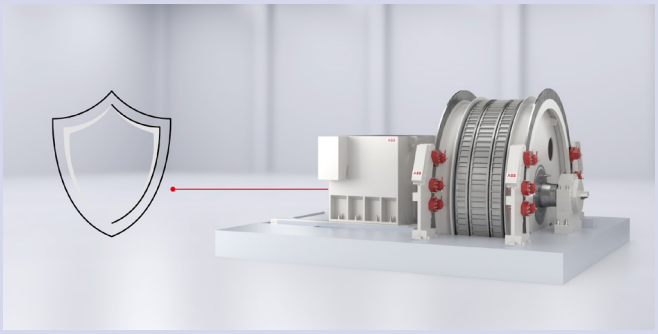
"This also simplifies compliance in a world where functional safety requirements are increasingly adopted into regional guidelines and corporate standards, often exceeding local regulations," he added.

While the Safety Plus portfolio is designed to respond instantly to hazardous conditions, safety at depth is increasingly about prevention as much as reaction. Condition-based monitoring and predictive analysis complement the capabilities of functional safety software by identifying slowly developing risk conditions, as is the case with ABB's Smart Hoisting solution.

"This approach reduces the likelihood that degradation in ropes, brakes or mechanical components reaches a point where emergency safety functions are triggered, improving both safety and availability," Morey says. "This is a crucial balance to maintain for deep, production-critical hoists."

He concluded: As mines continues to go deeper, hoisting safety will remain dependent on the integration of functional safety, digitalisation and cyber security. Greater connectivity and remote monitoring demand robust protection against cyber threats, while advances in analytics and AI are expected to further improve predictive maintenance and risk forecasting.

"With more than 50 independently certified safety-related hoisting control systems deployed across five continents, ABB's Safety Plus suite reflects a proven response to these challenges."



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