



September 2020 Newsletter

Forge

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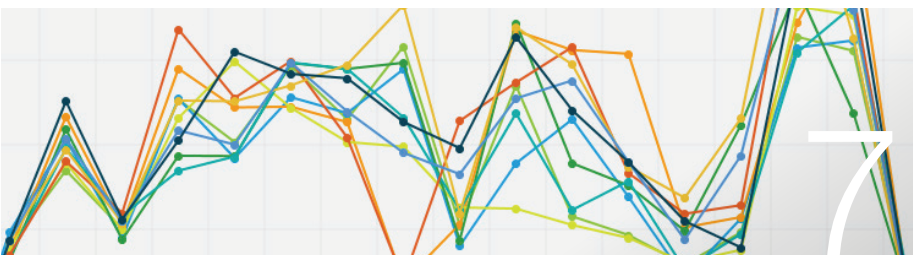
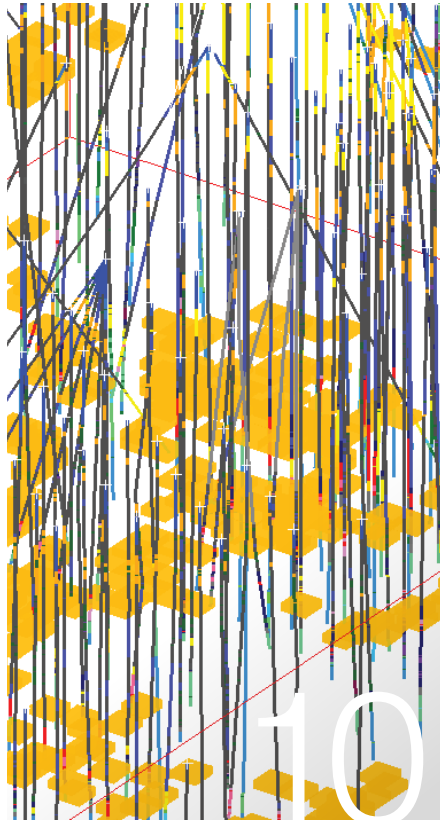
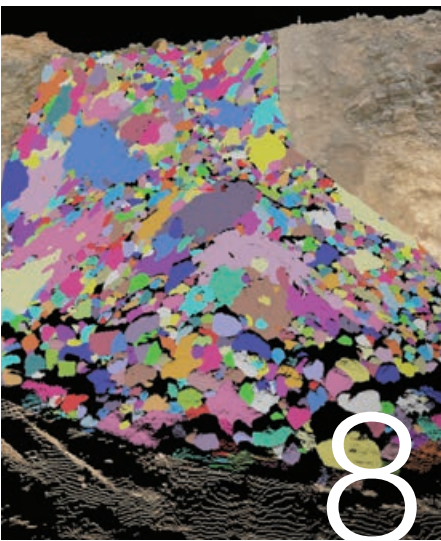
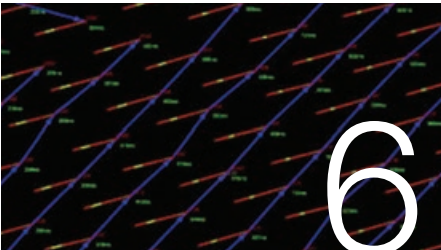
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Digital innovation, remote learning for school students and access to Maptek scholarships

Welcome to our Forge newsletter September 2020



*Maptek survey technology improves
productivity and safety at Gruyere
Gold Mine in Western Australia*

Recently I was invited to address students in Chile around the challenges of digitalisation. In preparation, I reflected on my technology and mining journey and several themes emerged.

Disruption is not new. It affects our industry and pervades all aspects of life. I have spent my entire career in the mining industry. It is a complex environment and our customers continually look for innovative solutions to deal with complexity and change.

Secondly, there are no do-overs. You can't go back and re-blast or re-excavate a wall. Moving material inefficiently costs time and money and impacts the mill feed or ROM process.

And thirdly, any technology developer must be in tune with customer needs. As a CEO the key challenge is to meet expectations by focusing on innovations that streamline mining operations and create business value.

Our new paradigm for mining centres around the orebody and the resource model created from it as the single source of truth. This translates into integrated, specialised applications, supported by predictive modelling and machine learning.

In this issue we share customer stories and articles that outline how digital processes and increased automation are key enablers for success.

The outcome for miners is greater confidence in their designs and schedules, efficiency and productivity gains for the mining business and better value for shareholders.

We hope you enjoy this issue and welcome your feedback.

Eduardo Coloma
CEO

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Survey joy at greenfields gold mine

The Gruyere gold mine is increasing productivity and safety by adding Maptek laser scanning, point cloud processing and stability monitoring to its technology mix.



The Gruyere gold mine, 200 km east of Laverton in the Western Australian goldfields, is a 50:50 joint venture between the operator, Gold Fields and Gold Road Resources, who discovered the project in 2013.

Mining commenced in November 2018 and first gold was delivered in the June quarter of 2019.

The 140 mt deposit has a grade of 1.3 g/t for 5.8 m oz of contained gold, making it one of the largest virgin gold discoveries in Australia.

Gold Fields began using Maptek™ PointStudio™ point cloud processing software at Gruyere in 2018 to handle the large-scale data captured by UAVs. It has since acquired two Maptek XR3 long-range laser scanners with a vehicle mount and a Maptek Sentry stability monitoring system for the site.

Senior Surveyor Mining at Gruyere, Hamish Pryde has helped champion innovation at the site.

'I drive survey innovation and as a new mine everyone who's come on board understands innovation is one of our core values,' he says.

'Once we identify new technology that improves the efficiency of the survey team and allows us to

operate in a safer environment, we look to implement it. The benefits of this new technology are shared beyond the survey team.'

Faster results

As a new operation, Gruyere began with a new survey team. Many came from outside the mining industry – such as engineering construction – and were keen to work with a fresh approach.

Pryde says surveyors were able to immediately start using the hardware and software because it was so intuitive and straightforward.

'My team were new to scanning technology. Within two or three hours they were able to be up and running with the XR3 and PointStudio. Having a system that the user can feel comfortable operating sooner, leads to greater production efficiencies.'

Surveyors use the UAVs together with laser scanners for wall conformance, twice weekly pit face updates, drill floor topographies, ROM stockpile reconciliations, and end-of-month runs across the 12 sq km active mining area.

Pryde highlighted the marked difference in the speed of data processing in PointStudio compared to other packages.

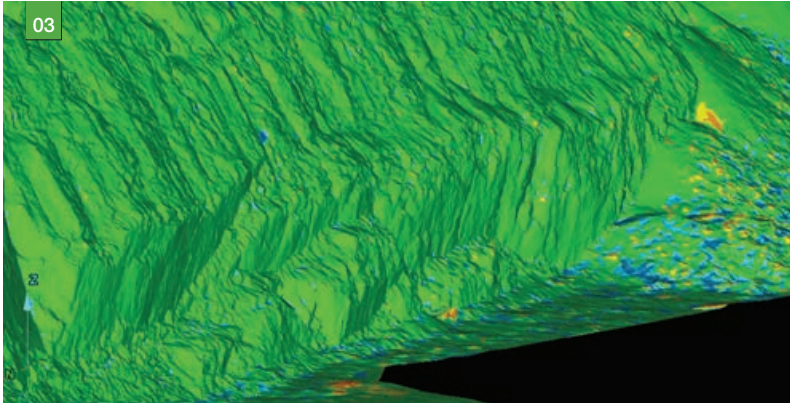
'Using the PointStudio conformance module when completing wall sign-offs is a 20 minute job versus three hours. The conformance reports are consistent, have an understandable format and include heatmaps for visual representation.'

Stop-go scanning using the vehicle-mounted laser scanner has expedited capturing the surface of the tailings storage facility.

A process which previously required eight UAV flights, taking two days, now takes less than half a day.

'Our tailings storage facility is 1.6 km in diameter. We can drive around the perimeter with the roof mounted scanner, process in PointStudio and have a final surface in less than half a day. I enjoy using the software – the fast editing, creation and merging of surfaces is just fantastic.'

- 01 Sentry trailer set up to monitor pit wall
- 02 UAV captured waste dump surface in PointStudio
- 03 Wall conformance heatmap
- 04 XR3 laser scanner set up on pillar to scan pit surface



Made for mining

Maptek hardware is designed and built in Australia, which was an attraction to Gold Fields.

'We like the fact it's designed for our conditions,' Pryde says. 'The workflow in the field and the office is so easy. Once a mine has a scanner you can't do without it.'

The long-range scanner and vehicle mount, combined with the UAV, are keeping surveyors away from potential harm.

Pryde says this safety aspect is invaluable. 'There's no reason surveyors should be on the ground or put themselves in potentially hazardous positions now.'

The Maptek Sentry system, which uses a scanner to monitor surface movement, is adding to site safety.

Deployed in a custom trailer with power and communications module, cellular and wifi networking, Sentry was purchased following a six-week trial and is used alongside radar at Gruyere.

'The team were impressed by the details shown in the movement graphs and heatmaps. The benefits the system provides to the safe operation of the pit are invaluable.'

'Like the scanner and PointStudio, Sentry is well made for our environment and you can see that thought has gone into the design.'

Unrivalled support

Maptek National Technical Services Manager, Simon Johnston has worked to help ensure the mine is getting the best out of its technology.

This communication benefits Maptek too, says Johnston.

'We're constantly trying to improve and getting real-world feedback is incredibly important,' he says.

'We want to ensure the technology is being used, and being used properly. We need to know what works well and what doesn't, so we can help people get full value from their Maptek systems.'

'We delivered on the suggestion of adding a camera to the Sentry system to give a real-time video feed of the pit. We may now be able to implement this for others.'

Maptek has been pleased to work with a forward thinking company that embraces innovation. The survey team at Gruyere thinks outside the box and, by pushing mine measurement technologies to their full potential, is able to ensure continuous improvement in their operation.

*Thanks to
Hamish Pryde
Senior Surveyor Mining
Gruyere Gold Mine*

Digital explosives inventory management

Proper tracking and handling of explosives is crucial to mine safety and efficiency, and going digital is key to ensuring operational improvement.

Maptek™ BlastLogic™ tablet-based explosives inventory management takes this important process into the digital sphere – allowing engineers, blast crews, IT teams and mine management to benefit from data-driven decision making.

Stock levels can be updated dynamically in the field using the wireless BlastLogic tablet, removing the need for potentially confusing paper-based record keeping and minimising the chance of manual calculation errors.

Tablet data is synchronised with the BlastLogic desktop application and central server, and reports can be created and printed for regulatory sign-offs. Live dashboards give a real-time view of inventory, and allow flagging of data discrepancies needing further investigation.

Digital record keeping is neater, provides greater clarity and aligns with the industry trend of moving towards paperless operations.

A security PIN allocated to users improves accountability and data confidence. Information can be filtered by blast name, product name or operational crew member.

If no network is available the tablet still functions offline. Once the network connection is available, data can be synchronised and the BlastLogic system will automatically merge it with data from other tablets.

Maptek Specialist Mining Engineer, Rahul Suhane has been working with the digital tool, and considers it would make a great impact on drill and blast operations.

‘You can have multiple tablets collecting data at the same time and it is all merged into the central server at the end of the day,’ Suhane said.

Digital inventory has huge potential to improve the industry through better explosives oversight.

The tablet-based process removes the need to deal with reams of paper and all the manual work is completed in a simple, efficient workflow.

Engineers can make more informed plans by being able to easily view product availability and make proactive decisions about ordering stock.

‘The tablet-based tool and Power BI dashboards enable you to view inventory levels dynamically and make quick decisions without having to sift through paper,’ Suhane said.

Management can better track and audit product usage and costs, and the blast crew can use real-time data to inform their work practices.

Before travelling to a magazine to get required stocks, blast crews can check stock levels in advance, potentially saving a trip of 30 km or more to an understocked magazine.

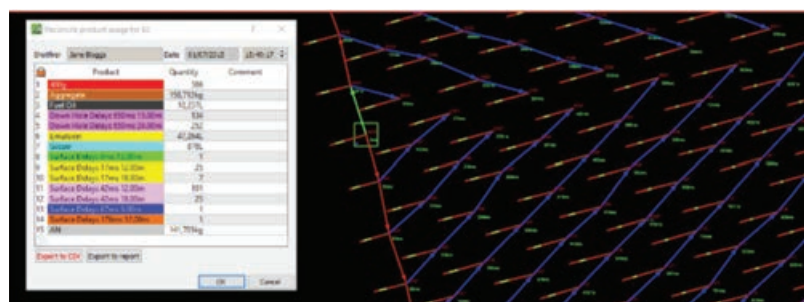
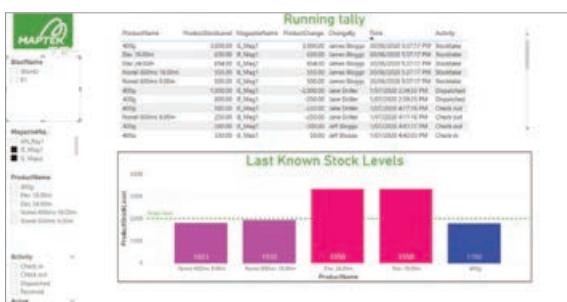
IT teams have traditionally been reluctant to install network and electric power in magazines, which has constrained digitalisation. BlastLogic overcomes this challenge, as the tablet can function out of network in the nearest permitted area to the magazine.

A digital workflow helps with easy reconciliation of important explosive stock. It saves double handling and time spent on reconciliation, speeding up the blast process.

‘The crew becomes more efficient and more productive as they can spend more time loading and less time on paperwork. Engineers also have more time for data analysis rather than data capture,’ concluded Suhane.

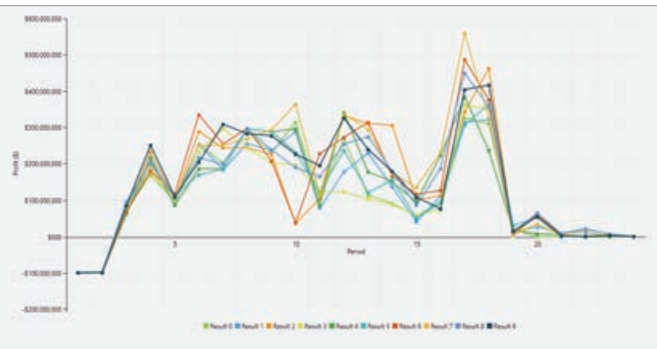
BlastLogic tablets can integrate with a handheld Bluetooth barcode reader to gather scanned data. This gives mines the ability to scan inventory barcodes, store on the system against the transaction and further enhance digital stock management.

Digital inventory management feeds into the single source of truth that BlastLogic provides.



Unlocking complex resources

Maptek™ applies advanced statistical techniques to provide practical solutions to mining challenges, reducing uncertainty around long term mine scheduling.



Per-period profit variability is a direct consequence of geological uncertainty

If you ask a geologist or engineer how certain they are about their model or schedule, they might be confident or say 'it's economically viable'. But have you tried to quantify that certainty or uncertainty?

Reducing uncertainty around long term mine scheduling is the aim of a project that is currently in development in partnership with the University of Adelaide as part of a South Australian research and industry program.

The Uncertainty Modelling project uses several new technologies, the first being Maptek™ DomainMCF.

'Using machine learning to predict geological domains is highly efficient, requiring little in the way of input parameters. This generates models that include a measure of uncertainty, which can then be used to make informed decisions,' commented Steve Sullivan, Technical Lead for DomainMCF.

An aggregate model is generated by averaging multiple DomainMCF runs that naturally exhibit variability where the geology is uncertain. This aggregate model is used to create an ultimate pit and stage design, and provide the basis for a long term schedule using Maptek Evolution Strategy.

Optimisation on the aggregate model creates a net-present-value-optimised strategic mine schedule. This is where conventional analysis stops. However, by evaluating the schedule on each run in turn, insight is gained into the economic impact of geological uncertainty.

Ten runs from the same composite data using DomainMCF were processed through the Evolution Strategy optimisation engine. Preliminary results show that uncertainty in the geology can affect profit by up to \$300M per period.

Schedules can be analysed to judge how sensitive a project is to changes in geological interpretation, an aspect that has been overlooked in the past.

This alone is a powerful decision making tool for drilling programs and pit design. An aim for the next stage of the project is to adjust the optimisation to reduce the gap between the best and worst result for each period. This should inherently reduce uncertainty and improve confidence in the result.

Dr Frank Neumann, Group leader for Optimisation and Logistics, and Dr Aneta Neumann from the University of Adelaide have been assisting with the uncertainty modelling project.

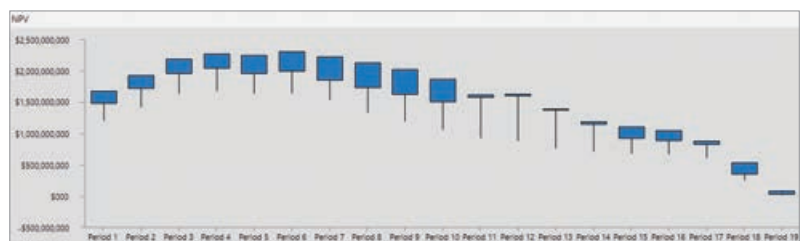
'Mining involves a large variety of uncertainties that have significant impact on the profitability of an operation,' said Dr Frank Neumann.

Profits achievable in different years are uncertain due to the quality or grade of ore mined. Constraints such as milling processes must resolve the stochastic and uncertain components.

'Dealing with these stochastic components is crucial for an efficient and profitable operation,' continued Neumann.

Stochastic constraints enable modelling of uncertainties, and limit failures or unwanted unprofitable events. This modelling can be achieved with machine learning techniques such as deep learning, which predicts outcomes based on previous learning.

After modelling the uncertainties, optimisation methods such as evolutionary computing in Evolution software can produce profitable plans that minimise the uncertainty around critical components.



Visualisation of uncertainty around profitability

2020 vision for the future

With almost four decades of commitment to technology research and development, Maptek™ continues to deliver practical solutions that add value to mining operations.

Desktop tools that enable mining professionals to interact with their data are the building blocks of Maptek™ solutions.

Today's focus is on technologies that help acquire, manage and process data efficiently to generate value. This translates into integrated, specialised tool sets for applications across the mining life cycle as well as productivity gains to the mining business as a whole.

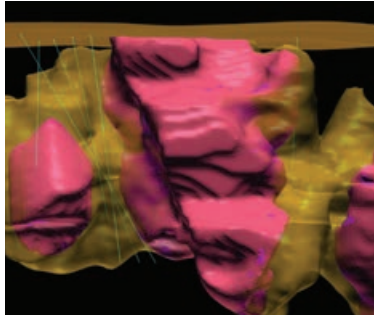
Maptek 2020 software releases deliver increased efficiency and confidence around assessing multiple scenarios, enabling informed evaluation of the effects of different variables on a geological model, mine plan or schedule.

Digital processes and increased automation are key enablers for success in the current economic climate. Interoperability between applications ensures access to functionality that represents the most effective, integrated approach to tackling a problem.

Centralised data plays a fundamental role in connecting information to find the 'signal within the noise'. The digital approach allows hidden data relationships to be identified and exploited to refine resource models and mine plans.

'We're excited to help customers transition to our 2020 releases, and we can all look forward to further developments on the Maptek technology solutions roadmap,' said Jesse Oldham, Group Product Manager Mine Planning.

New and enhanced features in BlastLogic, Vulcan, Eureka and PointStudio are available now, with Evolution 2020 to follow, and we value your feedback.



Optimised infill drilling

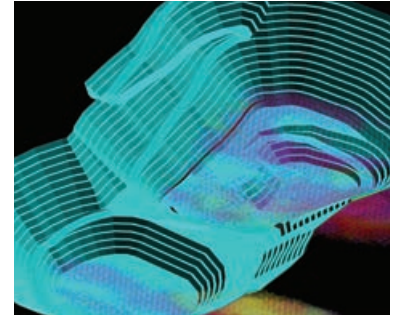
Vulcan Drillhole Optimiser helps exploration projects, open pit and underground operations to confidently develop infill drilling plans that maximise resource recovery.

With Drillhole Optimiser, geologists can accurately assess multiple scenarios and budgets taking into account existing drilling and resource classifications.

The tool uses an intelligent randomised search algorithm to test multiple configurations that meet site constraints.

Inputs include: drillhole locations; block models flagged with areas of interest and recoverable ore by block; and potential drill pad locations, drill rig constraints and available drilling budget. Optimisation handles regular and sub-blocked models.

Operations see tangible results in greater orebody confidence, fewer wasted drillholes and improved cost-effectiveness.



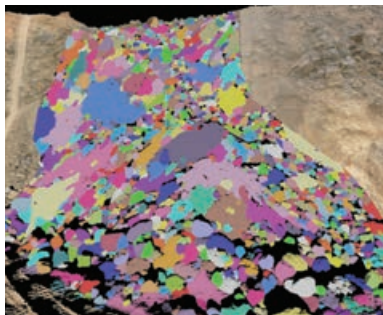
Dynamic pit design

Dynamic pit design is the focus of the Automated Pit Designer enhanced in Vulcan 2020. The dramatically improved pit design process reduces the time for engineers to proceed from pit optimisation outputs to an actual pit design complete with ramps.

The ability to dynamically move pit walls on-the-fly and have all of the associated strings and data structures move in tandem is exciting. Engineers can move a pit wall and morph the associated benches above. Ramp insertion is supremely dynamic.

Automated Pit Designer avoids common pitfalls such as bizarre shapes occurring as a result of sharp edges. The streamlined setup process allows users to select block model variables with phases or pit numbers for interactive contouring.

Upcoming addition of automatic generation of pit solids as well as surfaces, and reserving on-the-fly will complete a dynamic engineering process that reduces manual work and results in optimal pit designs.



Analysing fragmentation

Better understanding of fragmentation can account for impressive downstream cost efficiency in excavation and haulage, crushing and processing.

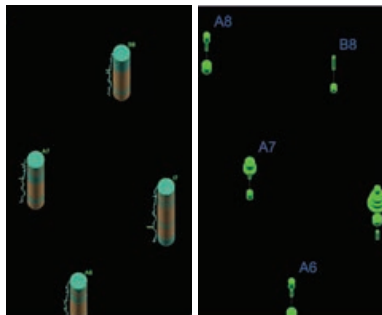
PointStudio Fragmentation Analysis allows KPIs to be achieved consistently. The new tool allows blast engineers and surveyors to quickly assess the condition of blasted rock, ideally before the material heads to the crusher.

Fragmentation analysis on 3D data is considerably more powerful and intuitive than methods that rely on analysing imagery. The digital output can be used to compare actual to predictive fragmentation in the BlastLogic drill & blast system.

A visual representation provides a way for material outside of specification to be identified and dealt with before reaching the plant. A unique feature allows editing of rocks or fines in the 3D view to characterise any that are not correctly defined.

Individual rocks can now be modelled from scanning of muck piles and draw points to provide accurate fragmentation S-curves from blasting or caving operations.

Fragmentation Analysis is available as an add-on to PointStudio 2020.



Measurement while drilling

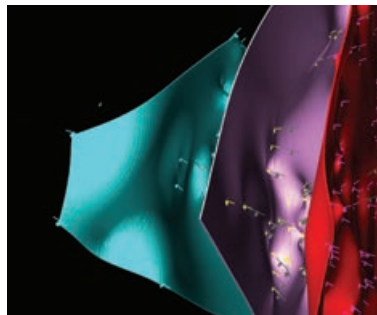
Bringing downhole drilling data to life enhances geological modelling and improves drill & blast outcomes. Matching blast design to validated geology allows accurate charge placement, which provides more uniform fragmentation.

BlastLogic provides a direct interface to drill navigation data and allows users to validate and associate the as-drilled information to design holes. Raw Measurement While Drilling (MWD) data is noisy by nature, and using the as-drilled data has often been overlooked.

Streamlining data interoperability between BlastLogic and Eureka is important in the dynamic mining environment where holes are loaded within hours of drilling. Geologists use Eureka to visualise downhole geophysical data and automatically assign lithology boundaries based on changes in the geophysical properties.

Intervals created in BlastLogic are passed through to Eureka together with the MWD data. Eureka interprets and updates the intervals. Validated data is brought back into BlastLogic and the charge plan and timing design can be automatically updated using the latest geology.

Better geological understanding helps mitigate potential dilution and leads to improved safety.



Vein modelling

The nature of narrow vein deposits has traditionally made modelling a challenge. Veins can be extremely thin and extend in any orientation from horizontal to vertical and may exhibit faults, folds and overturns.

Enhancements to Eureka make it easy to rapidly build valid vein solids that can be used in block models for mine planning and reserving.

The approach builds on existing implicit model functionality to create hanging wall and footwall surfaces from drillhole and CAD data. Eureka automatically determines the best plane for modelling. Data selection and editing tools dynamically change the correlations and values before remodelling.

Eureka can handle less than ideal real world data, modelling with CAD data only, and single or multiple drillhole databases as inputs. Roof or hanging wall imagery from face mapping can be incorporated in the process. Solids can be created based on the hanging or footwall surfaces within a defined extent.

Hundreds of thousands of points can be modelled in minutes. The Radial Basis Function engine can read samples that start, end or are the hole. An iterative approach allows geologists to continuously refine their vein model until they are satisfied with the interpretation.

Uncertainty in domain modelling

Maptek™ DomainMCF generates models that include a measure of uncertainty, which can be used to make informed decisions and compliant resource statements.

To report a resource from a geological model requires three components – volume, density and grade or quality.

This model should portray the best understanding of geological processes and observations. However, a volumetric interpretation of geological observations is only as good as the knowledge, experience, biases and patience of the geoscientist building the model.

In reality, several possible interpretations could be generated by multiple geologists, and as such geological uncertainty is just as important as grade uncertainty.

This geological uncertainty often gets overlooked, primarily because unlike grade uncertainty, there is no easy way of capturing or communicating it.

Often, model revisions are generated only every three to six months. This limits the ability to test geological hypotheses, or quickly embed new learnings globally and develop new models for short term implementation.

Using DomainMCF to predict geological domains is a highly efficient process, requiring little in the way of input parameters. This approach generates models that include a measure of uncertainty, which can then be used to make informed decisions.

Drilling budgets can be targeted at areas of high uncertainty, rather than drilling out on a grid basis in a zone of geological homogeneity. Drillholes can be designed to hit these targets using the new Drillhole Optimiser available in Vulcan 2020.

Lisheen case history

A case history using data from the Lisheen base metal mine in Ireland shows several possible interpretations for geological domain boundaries made from the same drilling data.

Just as three different geologists can interpret the data in three different ways, machine learning can emulate the same process but with several orders of magnitude in speed improvement.

All solutions honour the data, highlighting the underlying uncertainty that exists in most geological settings that have been interpreted from subsurface data such as drilling and downhole geophysics.

Each model generated for this case history took 10 minutes to complete using DomainMCF, compared with a week of effort by the mine geologist during the mine operation, according to Colin Badenhorst, former Mine Geologist at Lisheen.

Uncertainty can also be used to better quantify confidence when assessing resources and reserves stated compliant to the JORC code, reducing the subjectivity around the process.

The models were used to quantify volumetric uncertainty for the geological domains generated from the widely spaced exploration drillholes.

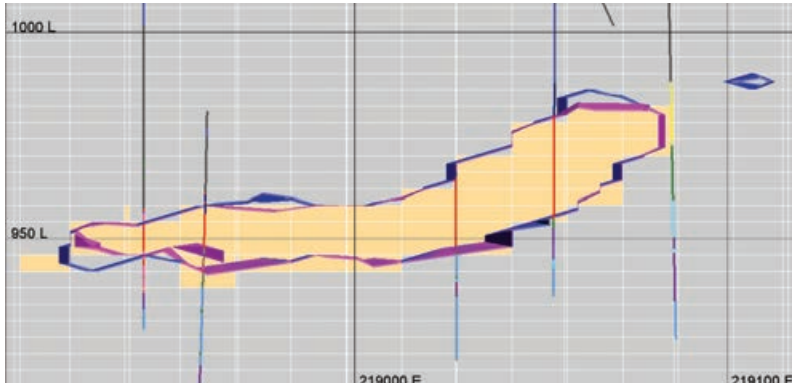
The models of the main mineralised body exhibited a volumetric variation of 12% between the most optimistic prediction of the geological domains and the most pessimistic interpretations.

This is an important observation, as a variation of this magnitude will affect the resource statement.

Instead of a statement such as '1 million tonnes at a grade of x', the more appropriate wording would be '1 million tonnes (+/- 6% or +/- 60,000 tonnes) at a grade of x'.

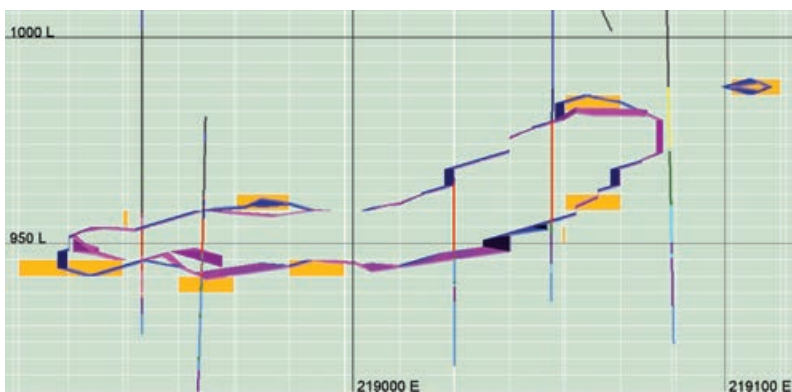
The alternative statement provides mine planners and potential investors with a quantitative assessment of the risk due to geological uncertainty.

Acknowledgements to S. Sullivan, C. Green, D. Carter, H. Sanderson and J. Batchelor 'Deep Learning: A New Paradigm for Orebody Modelling' and Colin Badenhorst Mine Geologist at Lisheen, 2004-06



This cross-section through exploration drilling and wireframe outlines of two DomainMCF predictions of one of the Lisheen orebodies is shown against a background of a third DomainMCF domain prediction.

Subtle differences appear between the three models, each representative of the lithological drill logging.



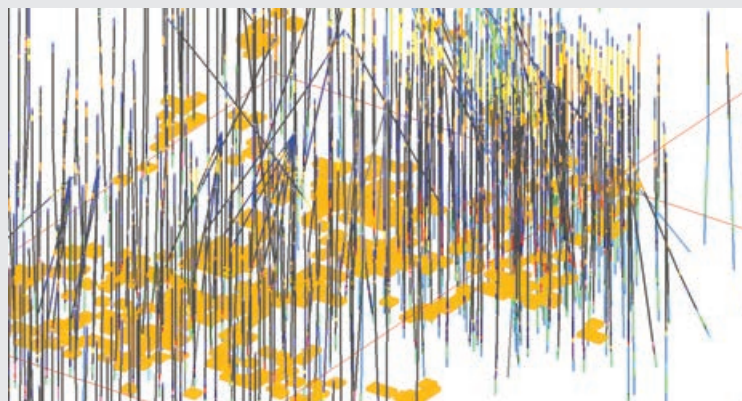
The two DomainMCF predictions from the top cross-section image are shown against a background DomainMCF block model with spatial uncertainty in orange.

The domain uncertainty, based on three interpretations of this orebody, occurs largely on the contact margins between ore and waste.

This 3D perspective view of the surface drilling for the Lisheen orebody provides clues to the challenges inherent in interpretation.

Even though the drilling appears closely spaced, the rapidly changing geological contacts in each hole provide a level of uncertainty as to the interpretations between adjacent drillholes.

In this deposit the majority of the geological uncertainty is related to terminal margins of the mineralised horizon.



The yellow-orange blocks show spatial distribution of the areas of uncertainty. These result in an overall +/- 6% variation in volume within a suite of DomainMCF predictions

New, improved Sentry systems

Sentry FMS is a versatile monitoring solution for surface and underground operations.

Sentry combines a Maptek™ laser scanner with purpose-designed software to accurately monitor, analyse and report on rapid and gradual movements that have the potential to interrupt mining.



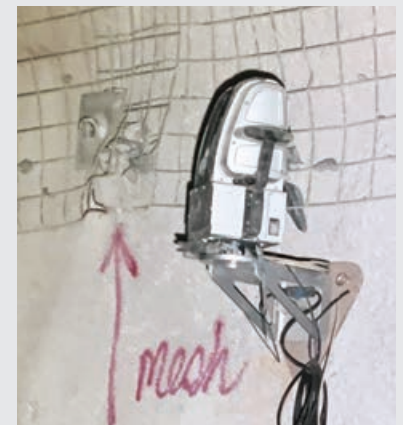
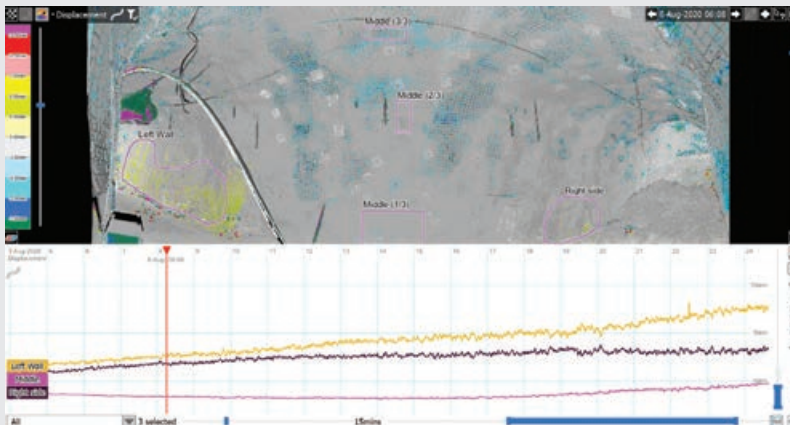
Sentry FMS (Flexible Monitoring System) is ideal for quick deployment to analyse potential movement in open pit, underground and tailings dam scenarios.

Features of **Sentry FMS** include

- AC & DC power input capability
- Weather station connectivity
- Built-in LTE & WiFi connection capability
- Built-in 10" rugged touch screen for site setup and quick visualisation

Advantages for open cut applications include fast, repeatable deployment, remote operation and no requirement for targets or survey control. Sentry FMS is an all-in-one portable solution that can be easily moved to different locations around the pit.

Convergence and subsidence monitoring are ideal underground applications. Users can monitor and alarm on any surface movement or instability as well as monitor infrastructure. Monitoring is commonly done around crushers, safety chambers, within development drives and pre-post shotcrete.



Reasons to monitor with Sentry

- Critical risk management that combines 3D measurement and imagery with visualisation and analysis tools
- Scan and monitor several zones concurrently without the need for targets or survey control
- Identify movement that can lead to failures such as landslides, rockfalls or subsidence
- Easily define alerts and send critical notifications directly to geotechnical staff or mine managers for action
- See morphology of changes over time and gain insights to predict movement in other areas before failures occur
- Customise monitoring frequency and thresholds to meet strategic design and operational planning needs

University partnerships

Mining Engineering students at the State University of Minas Gerais in Brazil learnt about Maptek™ Vulcan™ mine planning tools.

Universidade Federal de Minas Gerais (UFMG) is a public higher education institution in southeast Brazil. The oldest university in the state, founded in 1927, UFMG is a regional leader in research and patent generation in several areas of knowledge.

The UFMG community brings together 72,000 people in the cities of Belo Horizonte, Montes Claros, Diamantina and Tiradentes, with around 77 undergraduate courses, 80 graduate programs, and more than 750 research centres.

UFMG created a Metallurgical Industrial Engineering course in 1945. This morphed into the Mining Engineering and Metallurgy course in 1966, from which the Mining Engineering course emerged.

Mining Engineer, Ricardo Fernandes from the Maptek™ Belo Horizonte office conducted an online training course for 20 students as part of their final year studies.

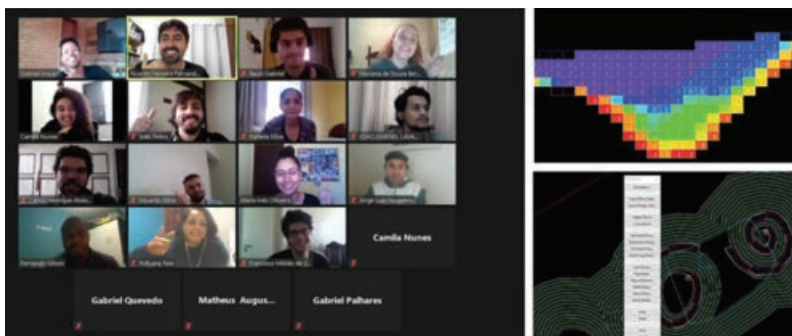
The course in July was designed to complement the students' academic work.

Topics included the manipulation of triangulations, block models, economic evaluation with Pit Optimiser, pit design, load optimisation and fleet productivity in mine operations through the haulage profile module.

The training approach focused on ensuring that all participants gained a thorough understanding of the tools being presented.

Although this was their first contact with Vulcan, all expressed satisfaction at being able to improve their knowledge. They expect that skills in a world-leading software solution will enable them to find careers in the most important companies in the industry.

Maptek values being able to contribute to the educational community, with the sole purpose of better preparing future professionals in the sector. The course was provided free of charge for educational purposes.



Competent Mining Engineer, Ricardo Fernandes shared his mining experience with final year UFMG students through the online platform

Hear from the students about the highlights of their experience

'The Vulcan streaming course was an excellent opportunity to learn more about mine planning. It was great to improve my skills in open pit design and optimisation. We learned how to make surfaces and solids, create block model sections, generate an extraction sequence, and create an operational route.

We could analyse the results and obtain a route cycle estimation and a model route calculation. Ricardo's teaching abilities, personality and knowledge were fundamental to our comprehension.'

Maria Inês Oliveira

'I'm very satisfied with what I learned. The course covered a very important hot topic: a practical way of working with tailings dams. Block modelling and open pit mine design were also taught; this second one was my favourite since I can see many uses.

It was interesting to learn and practise how to use the software productively. I'd like to highlight how the focus on learning was essential to me and made me very interested in all the classes and in working with software.'

Gabriel Felipe Oliveira de Araújo

'This truly relevant opportunity helped the students to learn a little more about mine planning software such as Vulcan. The facilitator, Ricardo helped us to develop important mining skills, from geology parameters, topography and drilling through to a real open pit mine optimisation.

Everything will be useful in the future not only at the university but also in industry. Despite the quarantine and homework, we did an excellent job together and I am thankful!

Camila Nunes dos Santos

Technology vision

The Maptek™ 2025 strategic vision relies on engagement with industry customers.

Chief Product Officer, Mike Husbands reflects on his role.

I oversee the full customer experience, not just product development and direction – from identifying needs through product definition and strategy, to marketing, sales, implementation and support.

Our products have led the market for almost 40 years and we want to maintain that position. It's a matter of assessing product relevance against our strategic vision and the ever-changing technology spaces.

What can customers expect?

We're hearing strong demand for automated solutions. Maptek delivers tools for decision support. The paradigm we are working with means more automation and less manual manipulation.

Machine learning and artificial intelligence learn from data, and as more data goes in the knowledge or training bases become stronger and stronger. These tools will become more embedded and more consistent, with traceability of what's guiding the outcomes.

As we adopt new technologies and directions we must engage even more closely with our customers.

Our products have proven themselves over four decades and the challenge now is to keep relevant in the new digital paradigm, managing change. As we move to web-based solutions and cloud compute and data stores, we want customers to be driving us forward as much as us leading them.

Customers will be using our deliverables to make decisions rather than spending all their time manipulating data.

What is your technology vision?

We are pursuing multiple initiatives including machine learning, cloud computing and connected data systems. Taking advantage of the cloud has already proven really positive. Our web-hosted licensing has enabled customers to work remotely, provisioning licenses quickly without traditional dongle or hardware requirements.

Cloud computing and storage means that users don't need to constantly increase their hardware specifications, because the high performance work is happening securely in the cloud space.

Our Evolution scheduling software has been using cloud computing for years, BlastLogic databases can be hosted in the cloud and web-based applications are development priorities.

Automation can eliminate the inconsistencies of human interpretation. We can more easily quantify and understand the uncertainty around the data, the mathematics and the underlying algorithms, than the uncertainty around human emotions.

Scripting solutions see Python and workflows chaining processes together to enable automation. The future will push those automation and workflow processes onto the cloud while opening integration for other providers of data and software.

How does customer demand inform Maptek strategy?

Our customer base is always a priority. We have extremely high tech users, and some in remote locations or with poor connectivity. A fully automated cloud solution that relies on stable internet access won't meet all needs.

That's why our 2025 strategic vision involves a hybrid solution which engages everyone.



We evaluate new technology and work with our customers to explore what's relevant. When they are adopting advanced technology we need to architect our solutions to be able to integrate and adapt as well.

What about safety?

A lot of our solutions are around safety – there's a big play to have fewer people on site in areas of risk, in the pit and underground. We have laser scanners mounted on vehicles for continuous survey and Sentry monitoring for capturing and reviewing data to guide decisions.

Data handling and sharing becomes a big issue when people are working remotely. Tools are needed to analyse data and make informed assessments about operational efficiency.

For example, BlastLogic is an enterprise solution providing a single data source across the corporation, enabling management to consider information from multiple sites within the context of the operation as a whole.

What inspires you in your role?

It's exciting to work for a company that influences global mining technology, and to know that Maptek can make a difference.

The challenges of the last six months have confirmed our strategic direction. It's been rewarding to see that initiatives we had already implemented helped keep our customers connected.

Community initiatives



Maptek CEO talks digital innovation

Maptek CEO Eduardo Coloma spoke about the impact of digital disruption as part of the Universidad Técnica Federico Santa María's Mining Month Talks.

'Being disruptive challenges expectations and enables solutions that foresee needs rather than merely react. Maptek creates solutions that help our customers increase competitiveness and future proof their business,' Coloma said.

'As mining professionals of the future, you will expect, actually you will demand, a high level of enablement from technology in your careers.'

Coloma said it was useful to bear in mind that technology did not automatically connect to greater productivity.

'Applying technology to increase mining productivity and performance depends on management quality and appropriate restructuring of the workforce. That workforce is your destiny!'

UTFSM Civil Engineering of Mines student Nicolás Cortés, who helped coordinate the event, said it was valuable to hear from prominent industry figures.

'Getting to hear experiences, advice and how to face challenges is priceless,' he said. 'The most relevant aspect was the opportunity to directly interact with the leader of one of the most used software technologies in the mining industry.'



Remote learning for Elko students

Students affected by school closures have gained an insight into the mathematics and science behind the mining industry.

Maptek worked with Elko City Council and Elko County School District (ECSD) to deliver an online session showing real-world applications of geometric concepts.

Students in years 7-12 learnt about using LiDAR scanning to collect the coordinates making up geological features, generate a topographic surface from the data points and calculate its surface area.

'Strong curriculum integration with real-world applications will allow our students to forge ahead in these unprecedented times,' said ECSD Superintendent, Todd Pehrson. 'We look forward to a continued partnership with Maptek.'

General Manager of Maptek North America, Rob Hardman said Maptek was proud to be part of the Elko community.

'With so many Elko families involved in mining, we hope that these additional learning resources will inspire students to explore how math and science are used at mining operations globally and close to home.'

'Maptek reached out asking how they could help the community during the shutdown,' Elko Mayor, Reece Keener said. 'The idea of creating video learning content for homebound kids came up, and Maptek took the ball and ran with it.'



Access to cutting-edge education

Two Colorado School of Mines undergraduates are excited to win 2020 Maptek Student Scholarship Awards, saying this will help them follow their career dreams and alleviate financial stress during tough economic times.

Elise Renwick and Chloe Poindexter were each awarded \$2000 scholarships towards degrees in Mining or Computer Sciences.

Computer Science and Data Science Junior Elise has loved statistics since high school and dreams of working on space technology.

'This scholarship means the opportunity to learn and pursue my interests with support from a company whose values and technical goals align with my own,' Elise said.

'I am fascinated by the visualisation technologies Maptek has developed. Graphics are the best way to present and consume information.'

Mining Engineering Senior Chloe is taking a minor in Explosives Engineering and is interested in industrial minerals, base and precious metals.

'We use so many minerals every day. I want to contribute to extracting them to advance our quality of life,' she said.

We need smart people who can help make the world better by making mining better,' commented Maptek's Rob Hardman.



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