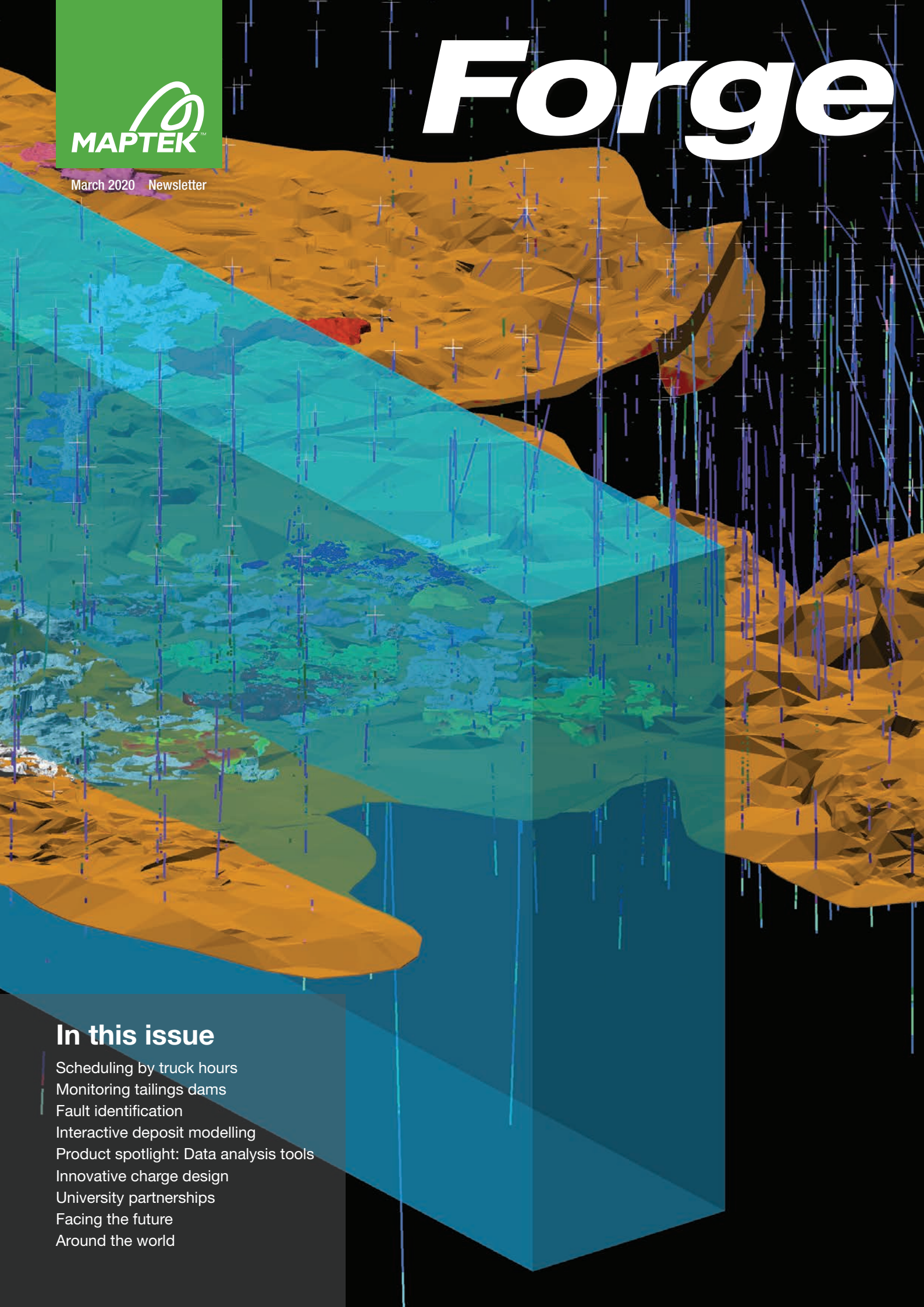
MAPTEK™

Forge

March 2020 Newsletter



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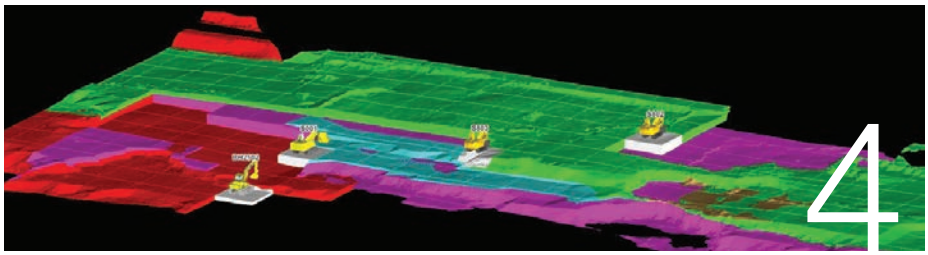
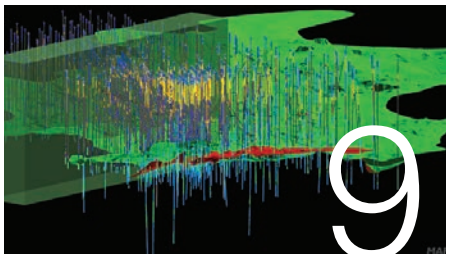
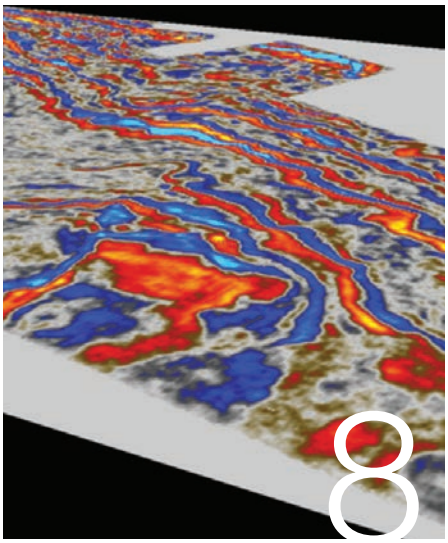
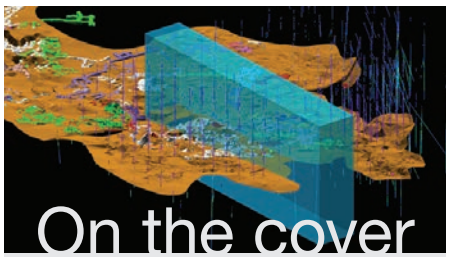
Welcome to our first edition of Forge newsletter for 2020









Vulcan offers state-of-the-art viewing and interpretive tools for geostatistical modelling and analysis

Today's mining professionals expect a higher level of enablement from technology in their jobs. We are working in an exciting time with huge advances on diverse technological fronts – the difficulty lies in unifying these technologies.

Attention to workflows, automation and artificial intelligence is a key aspect of helping industry manage the increasing speed and sophistication of digital change.

The rapidly growing area of complex systems science can analyse and simulate live systems comprising many interacting components. Realising the full potential of real-time data gathering and computing power will facilitate intelligent autonomous decision making. Miners will be able to react to events as they happen and alleviate adverse impacts on their operation.

Maptek is uniquely placed to implement technologies that pull together individual aspects of the mining and processing cycles. We are developing new approaches to solving challenges that exploit extra value and drive productivity gains.

In this issue, we explore how a new paradigm in short term scheduling better aligns mining activities with productivity goals. And a new workflow allows operations to recalculate charge rules based on pit conditions, targeting corporate objectives of continuous improvement in safety, efficiency and profitability.

We hope you enjoy this issue and welcome your feedback.

Eduardo Coloma
CEO

Contact us: forge@maptek.com

Paradigm shift in mine scheduling

Maptek™ has worked with mine planners to establish a new approach to scheduling that helps meet operational productivity goals.

Over the last five years, Maptek™ Evolution has been facilitating a rethink in traditional scheduling philosophies.

The power of the new short term planning module, Epoch, allows engineers to manage multiple mining activities, tasks and equipment, and apply different types of dependencies to define mining sequences.

The benefits of multi-objective scheduling have been revealed during a recent trial at a North American open pit mine.

The overall productivity of truck–shovel mining is largely determined by the availability and productivity of its haulage fleet, rather than the capacity of its loading fleet.

In general, the size of a truck fleet is a compromise between the number of units required to meet a budget or the average productivity when hauling material to a combination of the longest and shortest haulage paths.

> In reality, haulage demand is dynamic, changing as loaders move from one location to another and trucks are dispatched to various ore and waste dumping locations.

Ore destinations are usually static, with a fixed crusher and predictable stockpile locations, whereas waste haulage distances and truck cycle times can vary widely and are difficult to predict accurately.

The common scheduling method in a truck–shovel environment is to set productivity as a constant, with a rate often assigned to each loading unit. However, when a fully trucked assumption is made, theoretical productivity calculations are found to be significantly higher than the assigned budget rates.

This process is an educated guess at the effect of a predicted blend of haulage paths that will be encountered during the schedule. There is a strong argument for a different approach and Evolution now makes this possible.

The constant input to the scheduling problem should be the total fleet truck-hours available.

From this constant, loading equipment productivity at the mining face should be calculated as a function of available truck-hours to meet targeted production tonnes, ore grade blends, and the mix of cycle times encountered in hauling to the various destinations.

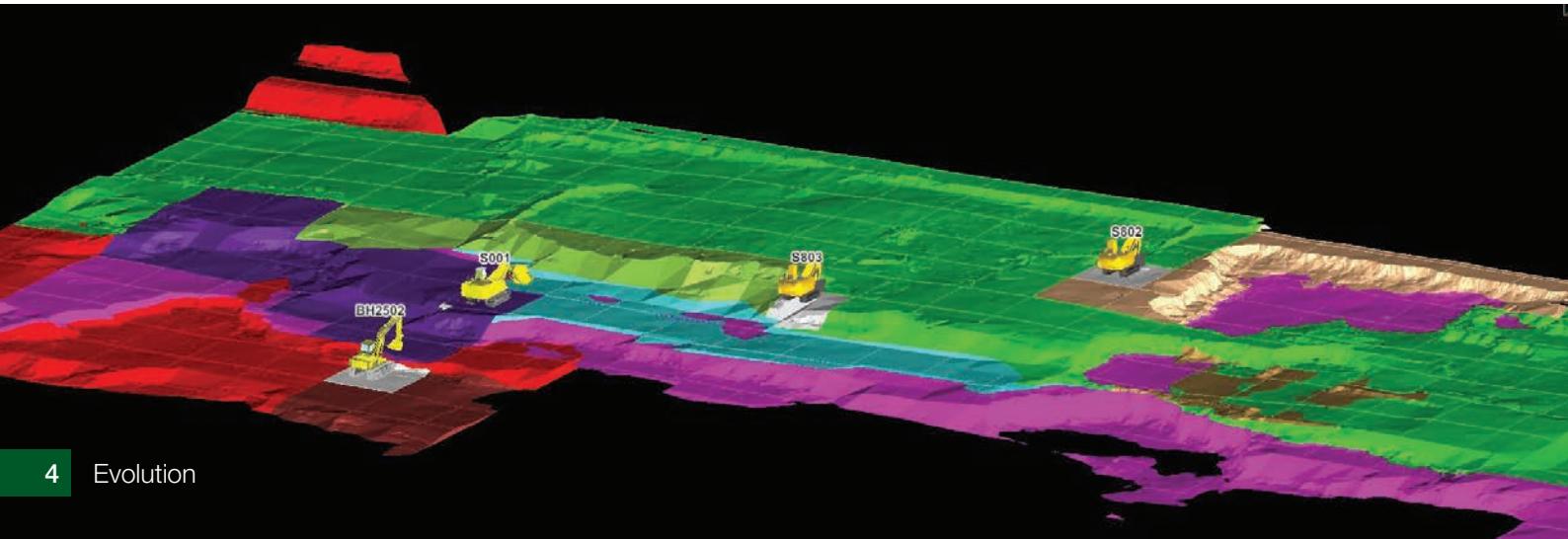
> Control over the scheduled quantities and grades allows schedulers to manipulate shovel rates within a period, in effect applying a total pool of truck-hours in pursuit of the planned targets.

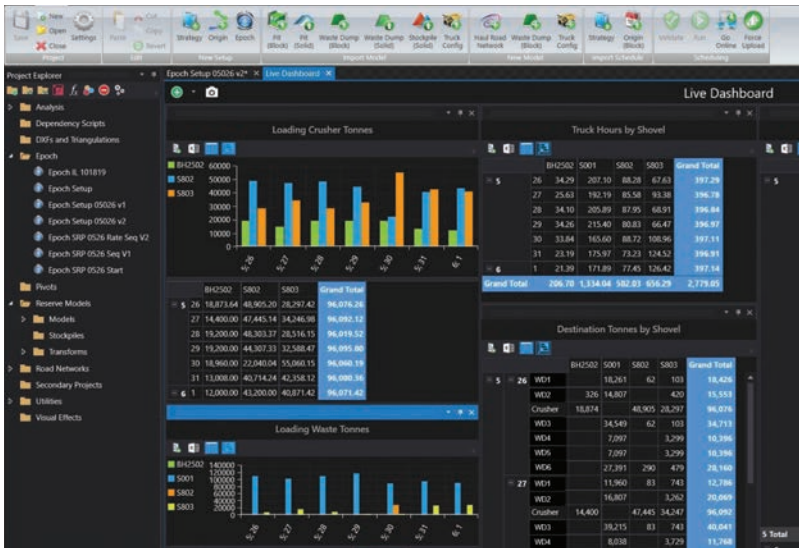
The recent trial tested the new short term planning functionality released in Epoch at the end of 2019.

The scheduling scenario involved a series of designed, non-conforming benches in a trial section of the mine to be scheduled in 14 daily periods to meet ore, haulage, grade blend and dumping targets.

A mining block database was created from the bench surfaces and intersecting reserves block model. The run-of-mine ore was to be delivered to an in-pit crusher capable of 96 kt per day and conveyed from the pit to the processing plant.

Four production diggers were scheduled to meet the primary demand of the crusher capacity, with waste loading according to the available remaining truck hours. Twenty-one large haul trucks (360 t payload) were available with a total fleet capacity of 397 truck operating-hours per day.





Evolution Epoch dashboard showing configurable charts and tables; the key objectives of the schedule have been achieved and are displayed live

		Diggers				
		S001	S802	S803	BH2501	
Day 1: 0526	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	4,550	2,055	1,500	800	
	Truck Hours	207.1	88.3	67.6	34.3	397
	Truck Numbers (Total 21)	11.0	4.7	3.6	1.8	21.0
Day 2: 0527	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	4,250	2,000	2,080	600	
	Truck Hours	192.2	85.6	93.4	25.6	397
	Truck Numbers (Total 21)	10.2	4.5	4.9	1.4	21.0
Day 3: 0528	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	4,550	2,055	1,550	800	
	Truck Hours	205.9	88.0	68.9	34.1	397
	Truck Numbers (Total 21)	10.9	4.7	3.6	1.8	21.0
Day 4: 0529	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	4,825	1,895	1,500	800	
	Truck Hours	215.4	80.8	66.5	34.3	397
	Truck Numbers (Total 21)	11.4	4.3	3.5	1.8	21.0
Day 5: 0530	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	3,715	2,055	2,465	790	
	Truck Hours	165.6	88.7	109.0	33.8	397
	Truck Numbers (Total 21)	8.8	4.7	5.8	1.8	21.0
Day 6: 0531	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	3,930	1,700	2,825	542	
	Truck Hours	176.0	73.2	124.5	23.2	397
	Truck Numbers (Total 21)	9.3	3.9	6.6	1.2	21.0
Day 7: 0601	Budget Rate (t/OpHr)	4,550	2,055	1,500	800	
	Planned Rate (t/OpHr)	3,790	1,800	2,885	500	
	Truck Hours	171.9	77.5	126.4	21.4	397
	Truck Numbers (Total 21)	9.1	4.1	6.7	1.1	21.0

Daily plan showing the classic digger rates applied as constants (in red) with the actual planned rates according to the multiple schedule objectives

An ore grade blend had to be met from the mining faces. Waste dumps were scheduled to receive suitable material types in various proportions according to the in-pit dumping goals.

One complicating factor in this trial was that both ore and waste were produced from certain mining blocks, requiring a selective mining operation.

Each of the four diggers was sequenced through the available mining benches with consideration for the broad mix of ore, waste and split-blocks (ore and waste).

Haulage profiles were digitised to the centroid of each dumping location estimated for the two-week planning horizon.

Each mining block in the database was coded with the haul distance to each of the seven dumping locations. From this data, historically calibrated truck productivity was calculated using a formula that included seasonal effects.

> Epoch provides total control of the digger rates as a mechanism for meeting all of the production and grade targets while not exceeding the total available truck-hours.

The engineer sets the digger rates and steps to the end of the scheduling period (in this case the first day) to observe the result of changing rates on crusher tonnes, grades and total truck-hours.

Balancing these three objectives is traditionally complex but can be done quickly and easily in Epoch.

In this trial, productivity was found to differ considerably from the constant budgeted rate initially assumed for each digger.

The rates achieved by each digger in the fleet were determined period by period as the schedule objectives were met within the constant fleet haulage hours available.

Maptek continues to collaborate with mining customers to develop integrated mine planning and scheduling tools that align with their short, medium, long term and strategic life of mine goals.

Monitoring tailings dams

Mine sites around the world are successfully employing Maptek™ Sentry systems as an integral part of their tailings dam management and monitoring regimes.

One operation that originally rented three Maptek™ Sentry systems for continuous monitoring has now implemented five continuous systems alongside another Sentry system for periodic monitoring.

Sentry is used in conjunction with seismic sensors, geodimeters and visual inspections. Using multiple sensors provides confidence that any movement will be registered.

Sentry combines a Maptek laser scanner with sophisticated software and allows operations to cost-effectively monitor, analyse and report on rapid and gradual movements on tailings dams.

Heatmaps coloured by displacement or velocity clearly show movement. Alarms are triggered when movement exceeds set thresholds.

Sentry handles 24/7 continuous monitoring and is available in a custom trailer with a power and communications module, and cellular and wifi networking. Periodic monitoring uses the laser scanner set up on a tripod or bollard.

Early in the site implementation, a third-party was engaged to supply alarm thresholds, and Sentry operates within these parameters.

Deploying additional mobile systems gave the operation greater continuous coverage across the walls. The site is now looking to acquire a further system to extend monitoring applications.

Maptek has implemented automatic data backups to a network server as well as the sending of alarms to the site control room. Notification of movement to a dedicated centre avoids the risk of mobile or email alerts being missed.

Sentry data is retained and can be used to identify long-term trends or for back-analysis of any failures.

Sentry's simple setup and mobility make it easy for the site to alter monitoring frequency and change location between highwalls, tailings dams and underground sites.

Continuous monitoring to identify movement relating to subsidence and convergence helps manage underground risk. Remote control is vital where personnel access is prohibited or limited.

All Sentry settings can be controlled remotely, including starting and stopping, setting zones and alarms, and archiving data. Real-time data can be streamed to any location on a network for analysis.

The same Maptek laser technology can be deployed for mine and stockpile survey, geotechnical analysis and inter-ramp compliance reporting, making this a cost-effective solution.

Machine learning for fault identification

The revolutionary Maptek™ DomainMCF machine learning engine for orebody modelling is helping identify faulted geology in record time.

Identifying and predicting faults is vital in both open cut and underground operations. Engineers who prepare operational mine plans need to ensure the stability of walls, drives and stopes. When using methods such as block caving they must understand the natural geology to safely and efficiently control the undermining process.

Maptek™ DomainMCF provides geologists with tools to bypass cumbersome manual processes. Applying cloud processing and machine learning to drillhole and other data enables output of a geological model in minutes to hours, rather than weeks to months.

Maptek Technical Specialist, Steve Sullivan says the testing and implementation of DomainMCF has revealed an unexpected strength.

'Fault identification wasn't the top priority when we began working on this product,' Sullivan, a geologist himself, said.

DomainMCF looks at the local and surrounding data, taking into account the orientation, width and other characteristics, and automatically works out where two intervals are not continuous and have been displaced.

No manual intervention is required, unlike with grid-based and implicit modelling that wrap a continuous surface between geological data intersections. Modelled fault breaks in DomainMCF are easily visualised and provide a red flag for geologists to further analyse the model.

Traditionally, geologists would laboriously identify and interpret fault traces from drillhole data, a sometimes difficult task where faults could be overlooked with potentially disastrous consequences.

'Faults can range from a couple of millimetres to hundreds of kilometres. Some can be fairly subtle and not easily recognised, nor built into usable entities for mine planning,' Sullivan said.

'Implicit modelling shows veins with smooth curved boundaries between drill data. Only when you're underground or in the open cut do you see the actual fault dislocation. The interpreted position of the orebody or coal seam then changes and if you haven't adjusted for it you could put machinery in the wrong place.'

DomainMCF results correlate well with clients' interpreted fault models for precious metal veining, iron ore deposits and breccia. However, DomainMCF models are created in a fraction of the time.

> Machine learning gives geologists more time to analyse results, change settings and run multiple iterations to refine outputs to provide engineers with the best possible models.

'Traditional techniques have required a lot of manual intervention, time spent drawing CAD lines, making modifications, wireframing and implicit modelling. There's not a lot of geology thinking involved – it's mostly what you might call hack work,' Sullivan said.

'DomainMCF puts geology back into the geologist. Computers do the heavy processing and geologists use their investigation skills, which is why we took up the profession in the first place.'

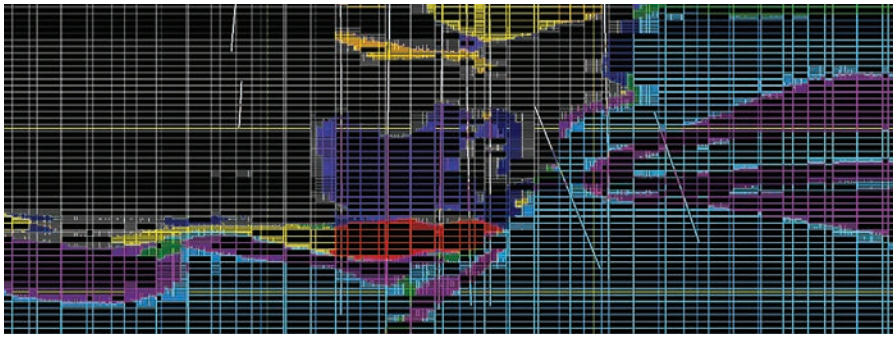
DomainMCF is easy to use. Once data has been validated, users can drag and drop the required component files into the interface for processing.

Machine learning consumes the vast amount of data collected daily on mine sites. A recent model with 2.5 million pieces of information was processed in a couple of hours.

'DomainMCF digests drillhole data, underground mapping, assays, lithology and open cut spot samples. The more data you've got, the better,' Sullivan said.

Maptek is working to incorporate more types of data, including geophysical and measurement whilst drilling (MWD), into the DomainMCF modelling process.

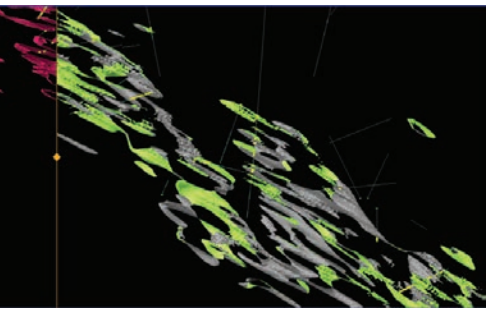
Maptek is looking for beta testers to provide critical feedback to steer product development and gain early access to new capabilities. Contact steve.sullivan@maptek.com.au

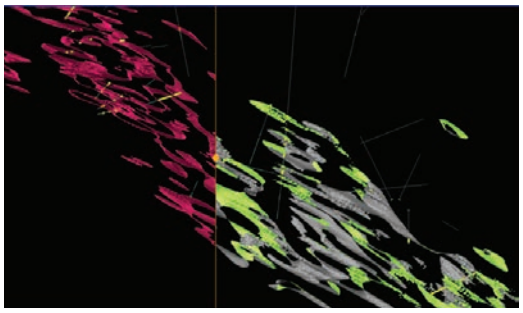


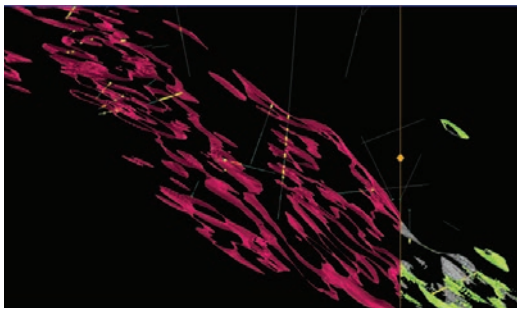
Cross section showing drill data and DomainMCF model of an orebody (red) which has been truncated by faulting, autogenerated based on relationships within the drill data

Interactive deposit modelling

As the world transitions rapidly to data processing and workflow automation, properly validated data is recognised as key to unlocking the real benefits.







Maptek™ Eureka helps geologists obtain a more complete picture of their deposits. New information is being constantly received, and needs to be reconciled with historical data to create a coherent model that is the best possible representation of factual data.

Eureka's intuitive mode of operation increases the efficiency of viewing, understanding, editing and modelling of all available data, and Maptek continues to add capability without sacrificing usability.

Eureka facilitates visual validation, providing a quick and easy way to spot data discrepancies or geological anomalies. Models can be tested and problems addressed in a streamlined iterative process.

Enhanced Lithology Targeter rapidly models multiple rock types – a major leap in functionality for automating borehole logging. This tool expands on its predecessor, which modelled a single rock type at a time. Now, as logs are built rock type by rock type, users can combine multiple targeting runs that can be quickly accumulated to produce a final logging report.

New viewing options provide an additional column of labelled intervals displayed adjacent to the drillhole trace, instantly doubling the information available to geologists for correlation and editing.

A new Thin Vein Modelling tool allows automated and/or interactive data picks to be modelled into valid vein solids, solving the challenges of thin vein-style deposits with varying orientations and sporadic correlation.

Traditional implicit modelling is unable to model such thin horizons, and stratigraphic modelling cannot handle the orientations of steep or vertically dipping veins.

The new tool combines the power of implicit modelling to deal with orientations and overturns, with the stratigraphic approach of modelling hanging wall and footwall surfaces to make a single solid.

> Thin Vein Modelling allows interactive creation and editing of closed, valid vein solids directly from drillhole intercepts, CAD data or both.

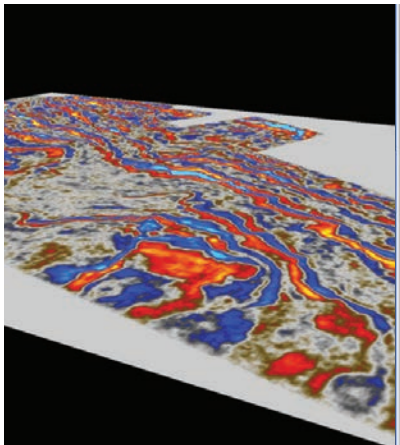
Solids are immediately available for use in downstream block model creation or volumetric analysis.

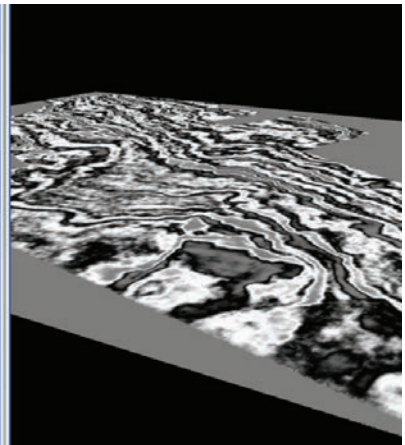
Block Model viewing introduces two new modes. Synchronised dynamic sectional slicing operates across multiple windows and juxtaposition viewing uses a dynamic slider to compare two datasets in the same window.

The development roadmap will bring workflow improvements to further automate the vein modelling process, and improved visualisation of results for geological analysis. Ultimately, machine learning will be applied to achieve faster modelling and interpretation, auditability and repeatability.

Thin Vein Modelling will be able to handle minimum vein thickness limits and more complex structural capabilities such as splitting and faulting.

Eureka demonstrates Maptek's commitment to helping geologists stay at the forefront of geological interpretation and modelling without sacrificing simplicity and usability.





Data analysis tools

Maptek™ continues to extend the capability and usability of geostatistical tools to accelerate geological analysis workflows.

Maptek™ Vulcan™ has always delivered industry-leading tools to analyse data and create variograms. The introduction of Vulcan Data Analyser (VDA) in 2016 presented resource geologists with a better user experience. The intuitive tool brought 14 menu items into a streamlined interface for generating variograms from geological databases. Variogram parameters were dynamically adjustable, and settings such as lag size, range and orientation were adjustable on the fly. Geologists could generate high quality graphical outputs for resource reporting.

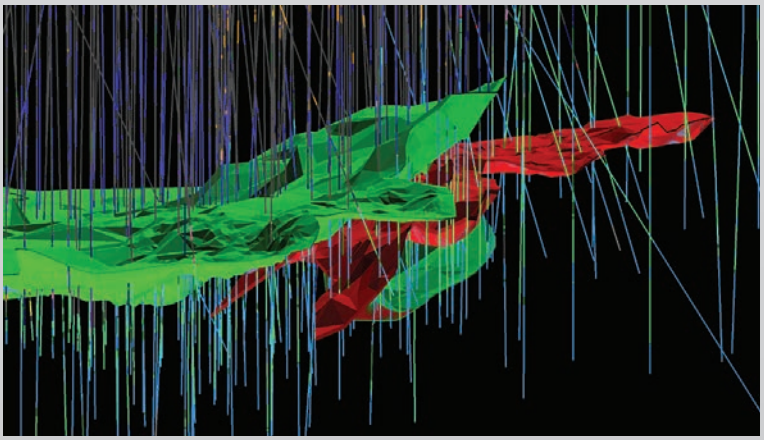
In 2019, box plots, log normal probability plots, correlation and covariance matrices, full 3D fan variography, back transforms, swath plots and scatter graphs joined an improved toolset.

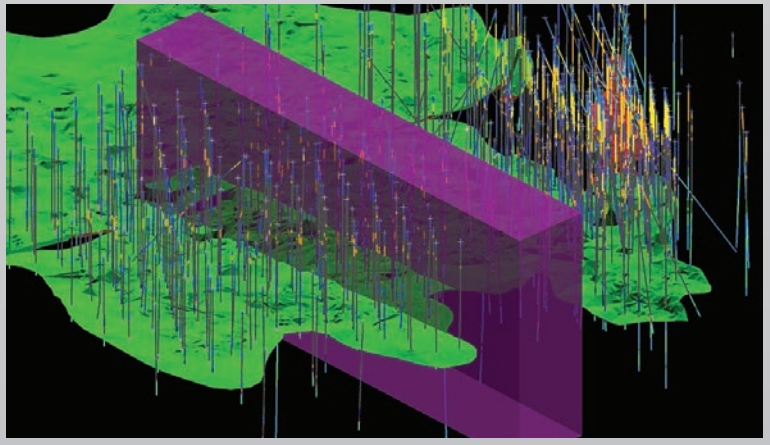
Variogram properties can now be saved between variograms and projects, and cloud charts show variations between all samples at each lag. Block variography, Vulcan data highlighting and upgraded annotations and legends have also boosted geological analysis.

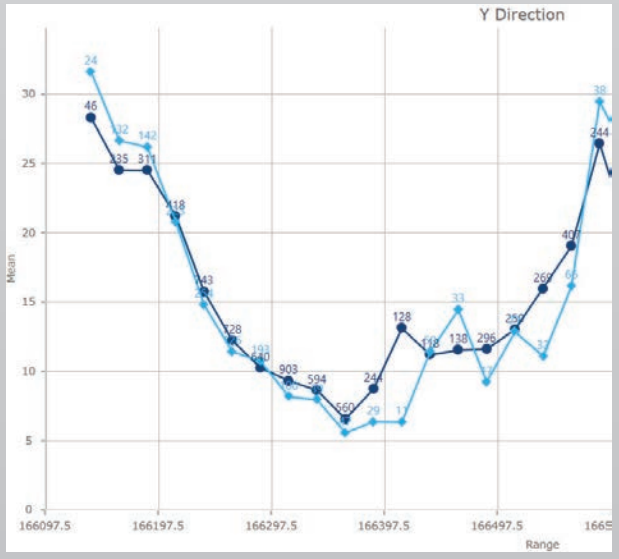
The latest update sees more flexible data viewing and reporting through custom domaining and right-click copy and paste from charts or annotations into documents and emails. Users can now input the initial plane for orthogonal variograms, create multiple histograms in the same VDA chart, and display bar or line charts.

Automatic creation of common data filters, such as positive and normal score values, is being developed for the next release, along with options for advanced integration.

Development guided by geology experts and input from users sets VDA apart as the go-to tool for geological data analysis.







Innovative charge design

Maptek™ BlastLogic™ provides a tailored workflow that allows operations to quickly recalculate charge rules based on pit observations.

Maptek™ BlastLogic™ drill and blast design and reconciliation solution provides a workflow that allows operations to recalculate charge rules based on pit observations. Connecting blast designs with changing pit conditions enhances mine safety and productivity.

Blast crews are the eyes and ears of the drill and blast engineer in the field. Engineers use the information crews provide to create and update practical, achievable plans for them to carry out.

In the absence of digital modes of sharing information, paper maps are sometimes used. Frequently, engineers rely on verbal communication that can be subject to misinterpretation and leaves no audit trail. At times, charge designs are created based only on the modelled information, excluding field observations.

Without BlastLogic, any variance or change in pit conditions (such as wet holes or signs of reactive material) requires crew members to wait until new paper-based charge plans are issued and sent to the pit. With up to 10 changes commonly required per shift, an average crew can lose several hours of productivity per week.

The BlastLogic digital workflow is helping customers reduce downtime and reap the benefits of a data-driven decision-making approach.

Geotechnical engineers, geologists and shotfirers use the BlastLogic Tablet for digital capture of hole-by-hole field observations. Combining these expert mine observations with the latest QA/QC and drilling data, BlastLogic automatically recalculates the required charge amount.

This recalculation is done on the bench while the tablet is online or offline regardless of network connectivity. Crew members are not required to travel to the engineering team to receive the new charge plans. This can save an hour or more in downtime whenever conditions change.

Most sites have geotechnical and geology teams that inspect the drill cuttings post drilling and correlate real-world observations against the modelled information. Any differences between actual and modelled information inform decision making.

Information lost due to paper-based communication can lead to major safety and cost risk. BlastLogic has broken down communication silos between different groups and enabled an integrated digital approach that produces safe and productive drill and blast outcomes.

BlastLogic allows effective digital capture of such information, using the tablets for blast reconciliation.

All information is stored in a central server and can be directly fed into automated reports or charge plans. For example, BlastLogic can be configured to allow mine geologists to note the presence of reactive material per hole. The charge plans will be automatically recalculated on the tablet and show the planned explosive product under reactive conditions.

Similarly, geotechnical engineers can capture fault or shale information per hole. The tablet charge plan is automatically triggered to recalculate and show no or reduced charge.

Automatic recalculation has solved another common issue for mine sites, where the loading mechanism is chosen based on blast crew field observations. Areas with steep slopes typically require blast crews to drag the explosives hose from the trucks or Mobile Processing Units (MPU). Sections with flat terrain can be loaded using the MPU auger and generally result in less manual handling of the hose.

As shown in Figure 1, drill and blast engineers can generally approximate the loading requirements using BlastLogic in the site office. However, this depends on the accuracy of the survey data and actual ground conditions.

Most mine sites rely on the blast crew in the pit to make a final decision whether to use auger or hose, based on personnel and equipment safety. This fundamental requirement to change charge plans often leads to crew members manually calculating the charge amounts, since the hose and auger loaded explosive products have different densities.

Occasionally, areas where the maximum explosive amount per hole is capped due to vibration require the crew to wait until new charge plans are issued by the drill and blast engineers with another round of vibration checks.

BlastLogic recalculates the required charge amount based on blast crew observations, as shown in Figure 2. This allows conformance to vibration limits and avoids manual calculations or potential miscommunication. All this with the click of a button!

Whether an observation recorded on the BlastLogic tablet leads to an automatic change in charge plans is ultimately a site decision.

The digital data flow supports engineers to respond appropriately to the need for changes in real time, knowing that the decisions are founded on actual pit conditions.

Consideration of practical constraints and a user-friendly and stable interface makes BlastLogic a global leader in blast innovation.

- BlastLogic has proved to be compatible with various global explosive loading practices across different commodities such as coal, gold and iron ore.
- Maptek specialist mining engineers assist customers by understanding their needs and configuring BlastLogic to suit the mine workflow.

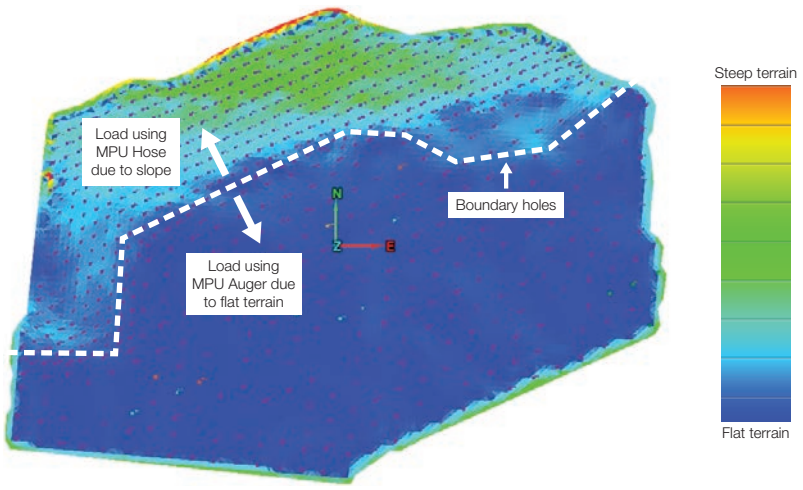


Figure 1: BlastLogic terrain slope heat map assists the drill and blast engineer to choose the explosive loading method – Hose loading (steep terrain) or Auger loading (flat terrain)

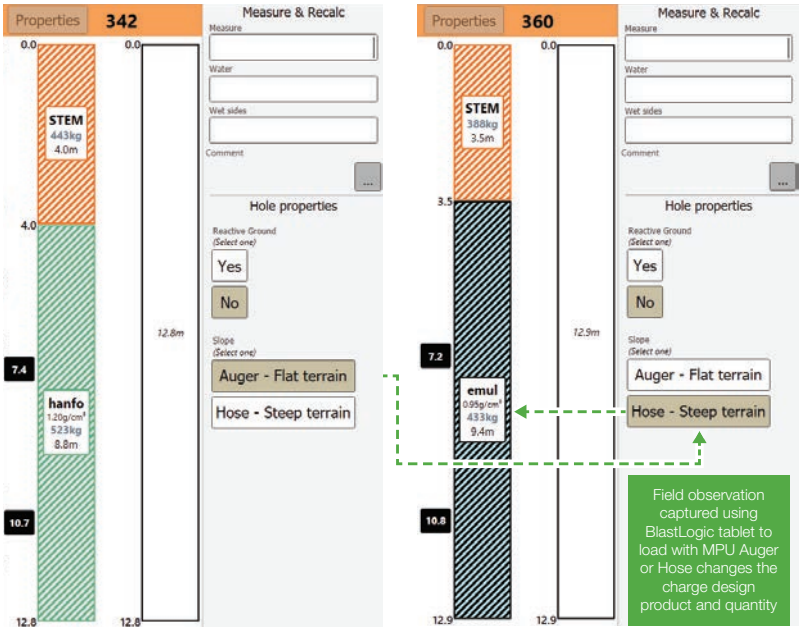


Figure 2: BlastLogic tablet dynamically recalculates the design explosive product to be loaded by the MPU based on the blast crew's observation of the actual terrain

University partnerships

Maptek™ provides educational licences, training and internships to students and graduates to equip them with tools to serve their mining careers.

2019 NExUS summer school at Strathalbyn, South Australia

NExUS

Early career geologists explore nexus between summer school and their future careers

Thirty-five geoscience students took part in the fourth annual National Exploration Undercover School (NExUS), held in Strathalbyn, South Australia during December.

After four days of fieldwork at the Wheal Ellen deposit, the 2019 cohort used Maptek™ Vulcan™ to integrate various datasets including historical drilling and assay data, surface geochemistry, geophysical surveys, structural mapping and DTM/image data, and develop a 3D block model for the deposit.

For many participants it was their first experience using 3D software, giving them an understanding of the modelling process and exposing them to the capabilities of industry-standard software such as Vulcan – a key goal of NExUS.

Feedback was extremely positive, with participants calling out the practical nature of the program, exposure to Vulcan and having the opportunity to network with like-minded people.

Maptek is proud to support the program by providing state-of-the-art geological and mining software.

NExUS is funded by the Minerals Council of Australia and Minerals Tertiary Education Council. Coordinated by the University of Adelaide and supported by geoscience industry, government and academia, NExUS aims to fill the gap between university education and the skills required by the modern minerals industry.

2019/20 Maptek Adelaide summer interns

Internships

Trading a summer break for work experience pays off for interns

During the Australian summer, seven computer science and software engineering students worked across a range of projects in Adelaide office, gaining valuable new skills, insights and experience.

Putting theory into practice was a key highlight, helping interns bridge the gap between studying at university and working in industry.

Being surrounded by people equally excited about software development has solidified their desire to pursue careers in the field – a positive outcome for the annual program.

Head of Development, Mine Operations at Maptek, Will Reid continues to be impressed by the quality, passion and drive of interns.

'Students are completing industry level projects and taking on the experience of working full time in their field. They wouldn't have done this before and have approached it with enthusiasm.'

'Maptek has been offering internships for some time. We've continued to see the benefits of supporting universities by providing real-world scenarios for students to apply their learning,' Reid said.

2020 Mine Design challenge winners

Mining games

Vulcan helps mining students meet practical challenges

Students from across Canada gathered at Dalhousie University in Halifax, Nova Scotia to compete in the 30th annual Canadian Mining Games in February. They were able to demonstrate their knowledge of various areas of mining in a series of industry-sponsored challenges.

In the Mine Design challenge, teams must create a full mine design based on a block model using their chosen software.

Each year, Maptek makes Vulcan available for this highly competitive challenge. Teams from University of British Columbia and Polytechnique Montréal using Vulcan placed first and second.

Université Laval, also competing in the Mine Design challenge with Vulcan, placed second in the Mining Games overall, with Polytechnique Montréal placing third.

Evan Robson, a 4th year student at the University of British Columbia, commented, 'This was an amazing opportunity to pull together everything we have learnt working with Vulcan over the last four years. Building a mine in just eight hours was challenging but it was extremely rewarding to see a design come together from block model to stope creation to final design.'

The Maptek University Program gives students a competitive edge through educational licences and practice with Vulcan to meet the challenges of entering today's mining industry.

Maptek staff at SME 2020 in Phoenix, Arizona

University training

Online and personalised training helps students and professors

In the 2019 North American fall semester several schools took advantage of discounted Maptek Online Training for university students.

Professors used this platform to directly integrate the datasets, case studies and documentation into their lab sessions. New schools to the program, such as Dalhousie University, have been enabled to implement Vulcan in their courses.

In January 2020, new professors who are starting to use Vulcan in their course work and research attended the annual Train the Trainers Workshop in the Maptek office in Golden, Colorado.

Maptek staff at SME 2020 in Phoenix, Arizona interacted with professors and students who were preparing presentations and working on curriculum development.

Facing the future

New global CEO Eduardo Coloma has appointed a team that puts customer experience front and centre within Maptek's 5-year strategic roadmap.

A reorganised structure under the new Chief Product Officer will allow Maptek to improve the value proposition for customers. Strategic global customer-facing roles align with Mine Planning, Mine Operations, Mine Measurement, and Core Technologies product management groups. The leaders will collaborate with industry, identify needs and help customers navigate the complexities of the digital workplace to improve their business.

Chief Product Officer – Mike Husbands

In this new role for Maptek, Mike will lead product managers, sales and marketing, and technical services teams to provide exceptional customer service globally. Mike has more than 30 years experience in mining software, and says his customer insights have been shaped by his previous role as Australasian Technical Services Manager.

'Maptek has appointed a dynamic team to interface between customer and product development,' said Mike. 'The four Group Product Managers will be tasked with gathering feedback from our customers at technical, managerial and executive levels. They will then leverage the in-depth knowledge of our staff to drive development and delivery of quality solutions in line with market needs. Maptek values helping our customers to solve problems, and this new structure will facilitate that.'

Mine Planning – Jesse Oldham

Jesse joined Maptek technical services as a mining engineer, consulting on underground mine design and stope optimisation. He also has technology experience in operational areas such as blasting, monitoring and data collection, and most recently filled the role of Product Market Manager for North America. Jesse's portfolio encompasses current Vulcan and Eureka products, with new machine learning-driven domain modelling and grade estimation solutions on the horizon.

Mine Operations – Mark Roberts

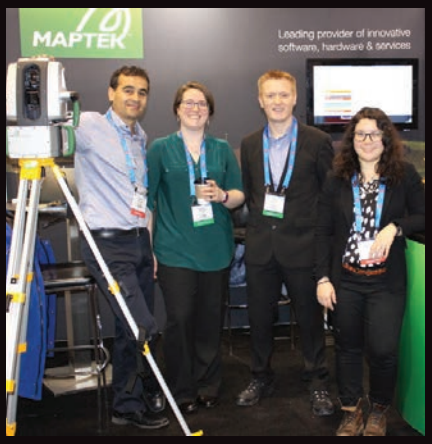
Mark joined Maptek with a background in technology, business development and sales spanning the agriculture, veterinary and mining industries. He developed and commercialised the successful BlastLogic drill and blast management system. Mark will continue to lead development of innovative tools in drill and blast with an eye to integration, automation and digital workflows, and adds ongoing development of the Evolution scheduling solution to his portfolio.

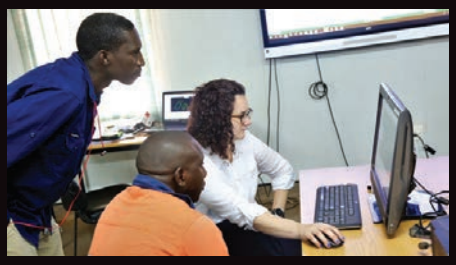
Mine Measurement – Jason Richards

Jason joined Maptek in a technical services role, and gained expertise across our geological and spatial measurement applications. He will apply this to the Mine Measurement group, with a focus on spatial data workflow automation across operations and organisations. Jason will identify where laser scanning hardware and allied software solutions, PointStudio and Sentry can drive the greatest value throughout the mining value chain.

Core Technologies – Jeremy Butler

Jeremy joined Maptek in a technical services role with a surveying background and rapidly turned his talents to technology and solution innovation. As Product Manager for Core Technologies, he is responsible for customer-focused product interoperability and software SDK strategy. Jeremy will also oversee the integration of new technologies into Maptek products and solutions that respond to industry needs for agile digital systems.





Around the globe

Maptek Calendar

March 9-27
XVIII Citation de Geoestadística
Maptek, Viña del Mar, Chile

March 19-20
ACG Tailings Management Seminar
Perth, Western Australia

April 20-24
Expomin
Santiago, Chile

April 21-24
XIII Conferencia Internacional de Minería
Chihuahua, Mexico - Booth 078

April 28-30
Discoveries 2020
Guadalajara, Jalisco, Mexico - Booth 61

May 3-5
CIM
Vancouver, British Columbia, Canada

May 12-14
Slope Stability 2020
Perth, Western Australia

May 21-22
Mexico Polimetalico
Hermosillo, Sonora - Booth 53

May 26-30
Congreso Internacional Minero Sinaloa
Mazatlan, Sinaloa, Mexico - Booth 65

June 4-5
Elko Mining Expo
Elko, Nevada, USA

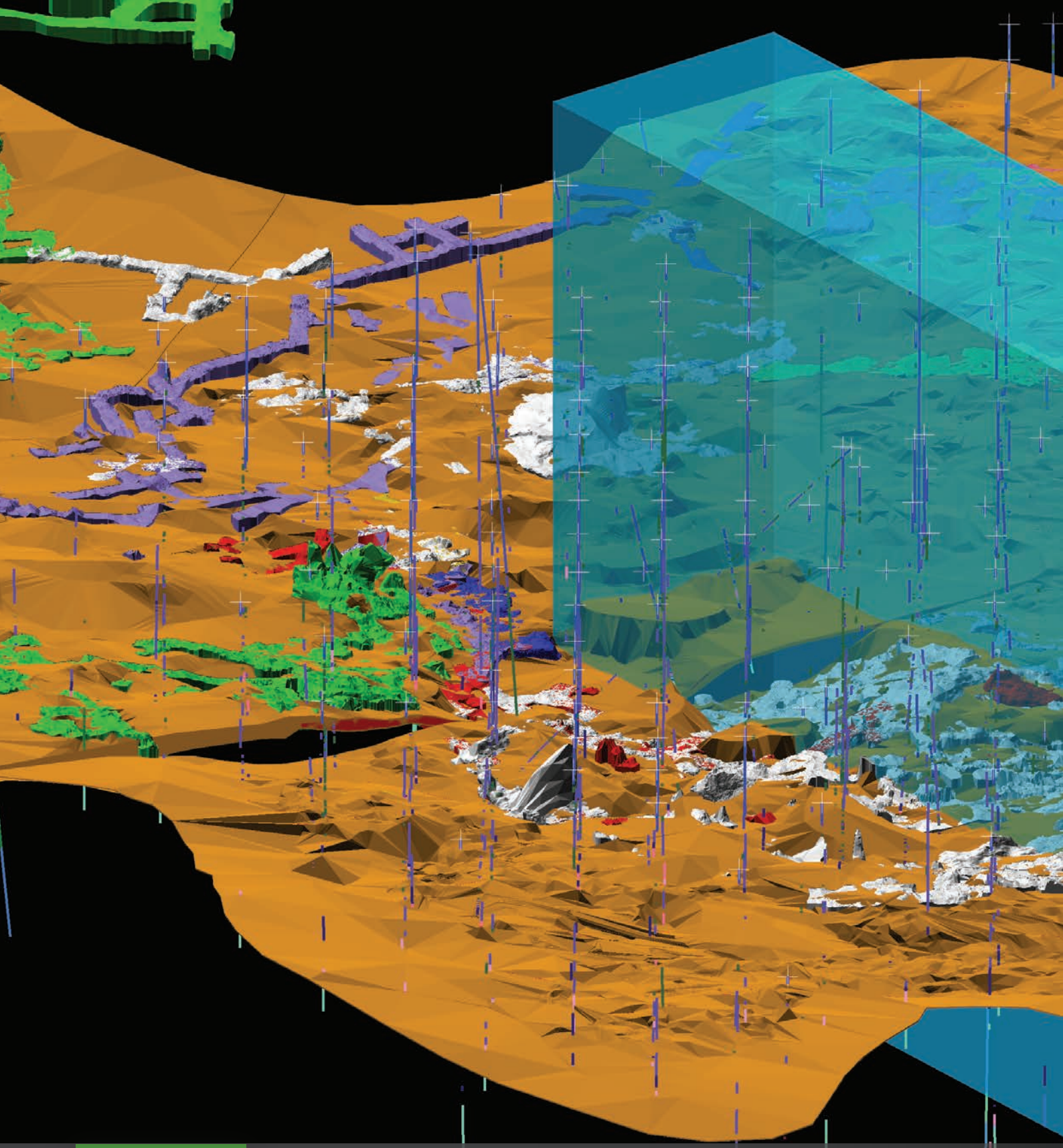
June 10-12
RIM
Zacatecas, Mexico - Booth 304

June 22-23
Copper to the World
Adelaide, South Australia

August
Magíster en Modelamiento Geoestadístico de Depósitos Minerales
Viña del Mar, Chile

August 18-20
Minerals Week
Canberra, ACT, Australia

September 8-10
Bowen Basin Geology Group Symposium
Mackay, Qld, Australia



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