Forge

In this issue

Welcome to our Forge newsletter September 2023

In this issue, we share advancements and collaborations that underscore innovation in the realm of geological and mining solutions.

A simulation study evaluating diverse methodologies for modelling a nickel sulphide deposit highlights the efficacy of machine learning in tackling the complexities of geological uncertainty.

A customer success story unfolded through a dynamic collaboration between PSM consultants and Maptek. The outcome was the delivery of meticulous structural geotechnical models, an invaluable asset guiding precision in open pit mining operations.

The high-end specifications of our latest ultra long range laser scanner cater to the growing demand for comprehensive surveying and monitoring solutions within expansive open pit environments.

Deformation mapping and modelling, essential in underground mining, find a remarkable ally in a suite of accessible tools for geotechnical and survey applications. A menu-driven workflow empowers users to navigate complex tasks with confidence.

A long-term Vulcan user reflects on the integral role of education in shaping the future mining workforce. His 'train the trainers' workshop bridges the gap between academia and industry and serves as a beacon of mentorship for aspiring mining professionals.

The annual Geology Challenge is currently underway, and we expect great results again. Meanwhile, the spirit of innovation and experimentation extends to our internal ecosystem and has invigorated staff to push the boundaries of software for domaining from drillhole data.

As we showcase Maptek's latest innovations and collaborations, we reiterate our unwavering commitment to redefining the landscape of mining.

Eduardo Coloma
CEO

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On the cover
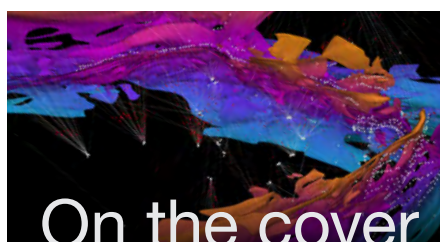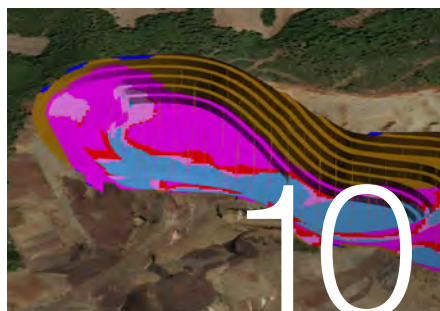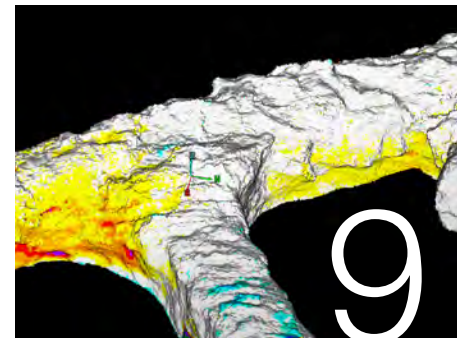
Mineralisation model produced using DomainMCF for the Maptek staff domaining dataset challenge

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Contents

Quantifying geological uncertainty

A simulation study that tested alternative methods of modelling intrusive pegmatites in a nickel sulphide deposit affirmed the value of Maptek™ DomainMCF.

The Odysseus Deposit is among the nickel sulphide deposits at the IGO Cosmos Project, about 50 km north of Leinster, Western Australia. Discovered by Xstrata Plc, a former owner of Cosmos, Odysseus comprises northern and southern domains.

Currently, Odysseus is undergoing pre-production development, including the installation of a 1 km deep shaft and materials handling systems, enabling close-spaced infill resource definition drilling and initial mine development activities.

One of the significant challenges in mineral resource estimation (MRE) modelling for the northern Odysseus domain (ODN) has been interpreting the 3D spatial distribution of nickel-barren pegmatites that have intruded and displaced the komatiite orebody.

Accurate interpretation of pegmatite geometries is crucial for estimating MRE tonnage and making dilution effect assumptions for the ore reserve estimate (ORE).

Additionally, some pegmatites have led to water ingress into underground workings, highlighting the importance of understanding their location for effective mine planning.

To assess geological risk in interpreting pegmatite geometries at ODN, IGO conducted a geostatistical simulation study using a categorical adaptation of the sequential indicator simulation (SIS) method. The SIS simulated data over a 1m × 1m × 1m grid, producing 50 equally probable realisations of the pegmatite geometry.

The study revealed significant variability in interpreting the spatial distribution of the pegmatites at Xstrata's drill spacing of approximately 40 m. Based on the findings, closer-spaced drilling was recommended before mining, with the goal of achieving an orebody drillhole spacing of 20 m or less to confirm the short-range character of the pegmatites that affect economic mineralisation.

Assessing uncertainty

To assess uncertainty, IGO tested three alternative geological modelling methods using commercially available software systems, comparing them with the bandwidth of uncertainty derived from the categorical SIS results.

The first model used a vein tool algorithm for modelling narrow and laterally continuous pegmatite bodies. The second alternative used an intrusion implicit algorithm, suitable for modelling the more rounded geometries of large bulbous intrusives.

The third model used Maptek™ DomainMCF, an application that had shown promising results in modelling various mineralisation geometries at IGO's Nova Deposit.

In the alternative models, the implicit vein modelling approach revealed relationships between pegmatites and water flow sites, but it was found to be time-consuming and subjective where continuity was uncertain.

The implicit intrusion modelling approach was valuable in challenging continuity, but it had limitations for thin veins.
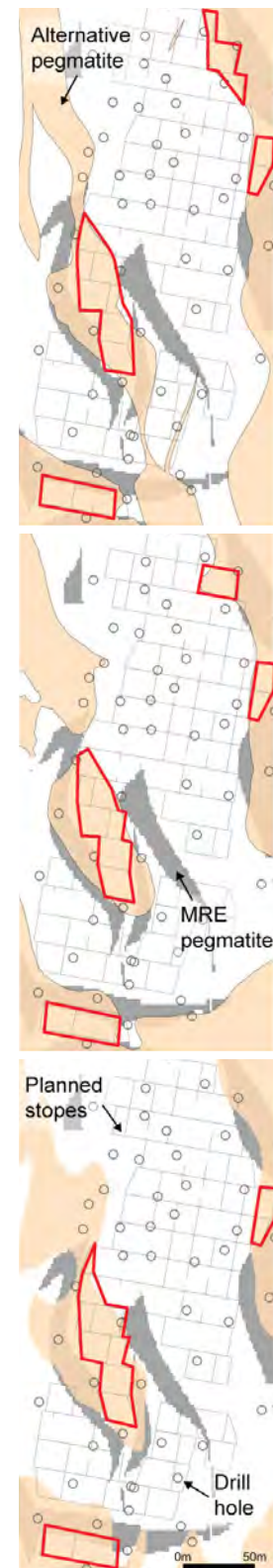
Plan sections of the vein, intrusion and DomainMCF models (top to bottom) highlighting in red the planned stopes that are affected by the alternative pegmatite interpretations

IGO found that the DomainMCF model was geologically reasonable and consistent with the data and had the added benefit of modelling other lithological units as well as grade trends.

IGO is currently conducting an infill drill program to better define the locations and continuity of the pegmatites. The goal is to quantify uncertainty and assign geological confidence scores to MRE blocks based on the agreement between alternative models and distance-to-data metrics, as well as to provide a probability metric for achieving planned stoping targets based on the pegmatite content.

In the simulation study, IGO generated 50 spatial models of pegmatites using categorical SIS. The precision of each alternative model was then evaluated by comparison with the SIS results using metrics like mean absolute difference (MAD) from the e-type and 90% confidence intervals.

Results

The results indicated that the DomainMCF model performed the best in terms of precision, closely followed by the intrusion model. In contrast, models produced using the vein tool had the highest MAD from the e-type and lower confidence in the estimated pegmatite percentage.

The DomainMCF and intrusion models required minimal human intervention and showed more reliable results. The uncertainty bandwidth in most planned stopes was wide, indicating significant uncertainty in pegmatite content at a drill spacing of 40 m.

In conclusion, this study employed various methods to address the geological uncertainty associated with pegmatites at Odysseus. The use of alternative modelling methods, including DomainMCF, has proven valuable in gaining a better understanding of the spatial distribution of pegmatites.

The study emphasises the importance of close-spaced drill testing to reduce risks and manage geological uncertainties effectively. Assigning geological confidence scores to MRE blocks based on alternative models will aid in communicating geological uncertainty.

Overall, the study underscores the value of sufficient drill data and effective geological risk management in resource estimation and mine planning.

Thanks to Cathy Barton, Senior Resource Geologist and Mark Murphy, Manager – Geological Services, IGO

From a paper presented at The Australasian Institute of Mining and Metallurgy, Mineral Resource Estimation Conference 2023
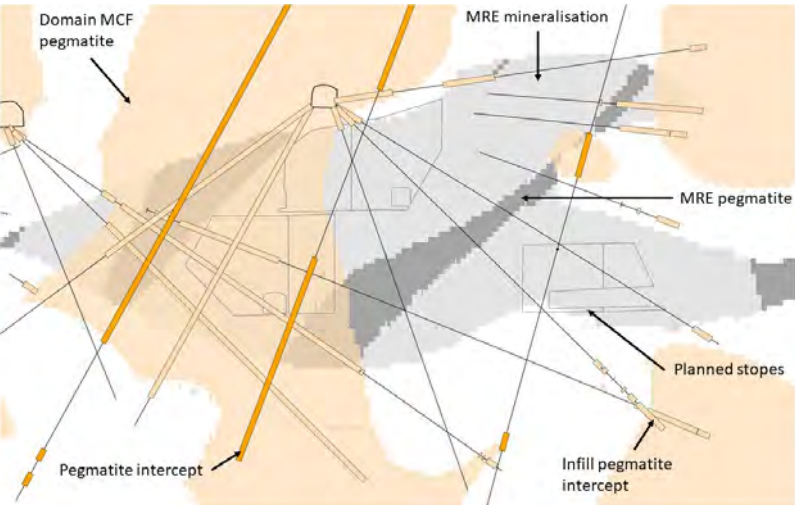
DomainMCF model created before the infill drilling had been completed, demonstrating the difference between the MRE pegmatite model and the alternative DomainMCF model

Model	Mean MAD% pegmatite from SIS e-type	Stope means in 90% confidence
2017 MRE	45.6	9
2022 Vein implicit	20.9	25
2022 Intrusion implicit	18.9	29
2022 Artificial intelligence	17.6	31

Customer success is multi-layered

Early access to new fault modelling tools and a supportive relationship with Maptek™ provided PSM consultants with an edge for a complex geotechnical design project.

PSM is a consulting company offering specialist geotechnical and water services for mining and civil industries globally. The team recently worked on a structural modelling project for the Ok Tedi mine in Papua New Guinea, where extreme climate and complex geology contribute to a challenging environment.

Located in a remote area of PNG, above 2000 m on Mount Fubilan, in a region of high rainfall and frequent earthquakes, Ok Tedi is probably the wettest mine in the world, receiving 8 to 10 metres rainfall on average per year.

The complex geology and pit walls approaching 800 m high mean that pit slope design and geotechnical engineering are very challenging. As part of their design and operational support to Ok Tedi, PSM continually develops the various geotechnical model components including the geology, structures, hydrogeology and rock mass models – and are currently delivering an update to the overall structural model.

PSM has enjoyed a long relationship with Maptek™, and contacting Maptek for help near the beginning was integral to the success of the recent geotechnical design project.

Brendon Jones, Associate Engineering Geologist joined the consultancy four years ago and was impressed when Henry Dillon, the newly appointed Maptek Global Customer Success Manager Geosciences, presented the latest Maptek modelling tools to the PSM team earlier in 2023. With ideas on how to proceed with the Ok Tedi model, Jones contacted Dillon for guidance as the natural first step.

'It's a good relationship, and you can always rely on the support that Maptek provides, even for the smallest of questions. When we knew that we had this deliverable to produce, our first port of call was to consult with Dillon on the best way to tackle it,' Jones said.

Maptek quickly ascertained that the in-development vein modelling tools would potentially provide the most efficient workflow and better outcomes for fault zones included in the PSM structural model.

Dillon provided a beta version of Vulcan GeologyCore with the specialist modelling tools to handle narrow veins and faulted structures. PSM instantly recognised that the Maptek approach would work.

'Early access to the modelling tools was key for us to get a take on the project, and the software workflow showed us the best way to achieve that,' Jones said.

'An indication that we were going in the right direction was when we were able to successfully integrate a specific set of mapping data.'

Value drivers for PSM included utilising all data types, ease of use and faster modelling turnaround time. Vulcan GeologyCore accepts all types of drilling and project data and models can be easily generated in a repeatable way. Visualisation is another significant advantage.

'The workflow was efficient, reducing technical processing effort in the modelling, allowing more time to develop an understanding and interpretation of the structural geology on the ground,' Jones said.

'Gathering all of the data at the start of a project is essential to the model development process. This translates to a comprehensive collection of information, which is subsequently collated, presented and interpreted to refine the final model.'

'Being able to model the data, produce images, plans and sections from that, initially for peer review, and then to present to our clients in an easily communicable way, is crucial.'

Based on the reachout within PSM, Jones can see how the workflow could have a broader impact on their business, with other smaller mining projects or civil tunnelling works also requiring modelling of structures and faults.

In terms of speed to create value from the data, Jones believes that the workflow helped them deliver on time, despite the project being affected by changing priorities to accommodate mine deadlines.

'It definitely helped us get the work done smarter and quicker and reinforced that we can rely on our relationship with Maptek.'

'In the consultancy market where time is money, the Maptek solution allowed us to be more focused and efficient.'

'If we're undertaking a study for a client and our team is unsure of the best tool or workflow straightaway, we know that we can go to the Maptek customer success team to help identify the tools and develop the most efficient workflow for the study.'

Ease of use of the solution is also important, especially if a project has to be handed over to someone else.

'The software skills are easily transferable. Someone who's worked with Maptek software wouldn't have an issue switching between projects.'

'The only thing they'd have to get up to speed with is the technical aspects of the sites. There's plenty of support available for the software through videos, webinars and the Maptek customer support team to help,' Jones added.

Dillon agreed that the willingness of PSM to reach out quickly evolved into an ideal opportunity to demonstrate an alternative way to model complex geology.

'PSM has a culture of information sharing – perhaps around a problem they've had difficulty solving previously or a new one – and of seeking help. For Maptek it validated our aim to ensure customers derive value from our software,' Dillon said.

> Jones emphasised that the relationships make the entire process enjoyable as well as worthwhile in terms of making their job easier.

'It's great to be working with people who share the same values and want to achieve the same outcomes from their specialty,' said Jones.

'If you've got a problem and are unsure where to start, contact the Maptek customer success team!'

Dillon agrees, with Maptek taking pride in a culture of Walking in Customers' Shoes and working collectively to be Smarter Together.

Maptek encourages customers to follow the lead of PSM and get in touch at the start of a project to discuss the best approach for success.

Thanks to Brendon Jones
Associate Engineering Geologist, PSM

Wide-angle overview of the Ok Tedi mine looking west
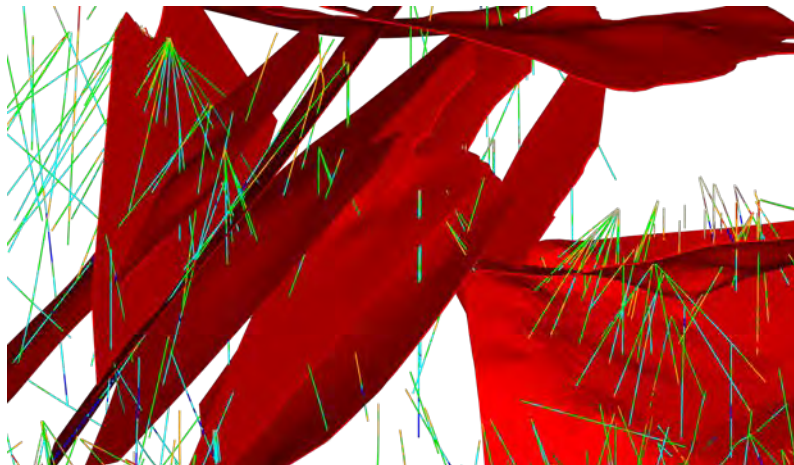
Generic screenshot of draft East Wall structures

New modelling tools

Fault modelling tools coming in Vulcan GeologyCore 2023.3 provide new automation regimes for geologists and engineers.

The Fault Manager provides a structured and automated framework for building an entire fault model, and defining how all the different units interact with each other to form the final fault surfaces and fault block solids.

CAD and structural data can be used to rapidly create implicit fault surfaces. These surfaces can then be truncated against others in a fault network by applying network relationship rules.

This enables complex faulting scenarios to be modelled in an intuitive, repeatable and auditable way.

The final fault block solids can then be used as inputs to a geology model in the Modelling Manager to enable veins and intrusives to be modelled independently within each fault block.

Ultra long range laser scanner

The latest Maptek™ laser scanner maintains high end engineering specifications as it responds to market needs for survey and monitoring in very large open pits.

The Maptek™ UR3 mkII laser scanner features the high end engineering specs of the R3 mkII series with an extended range ideal for larger pits. Sites can use the ultra long range scanner to monitor highwall, bench, ramp and tailings dams, and take advantage of its versatility for numerous mine survey applications.

'Implementing one piece of kit for site survey and monitoring is important in the current market,' commented Global Product Strategy Manager Jason Richards.

'Risks rising from staff turnover and fast-paced operational demands can be offset somewhat by a single system that acquires and generates value from data as quickly, safely and accurately as possible,' he said.

'The Maptek XR3 was designed for survey and geotechnical data acquisition. Stronger demand globally for monitoring over a longer range has driven our recent R&D effort, resulting in the first UR3 production units shipped to our international regions for field trials in April,' added Richards.

Mining operations can purchase the UR3 as a standalone laser scanner or bundled with the Sentry custom trailer. This includes a power and communications module, cellular and wifi networking, mounting bollard and Sentry software for data acquisition and analysis.

This transportable setup is ideal for accurate 24/7 continuous scanning and monitoring of multiple locations. Site personnel can manage the process entirely remotely and send real-time data to any device on a network for interpretation and analysis.

Mobile systems can be positioned anywhere on the edge of the pit for monitoring, with the laser scanner swapped onto a vehicle mount with

Maptek Drive for mobile site survey applications. Maptek laser scanners are also easily mounted on bollards for monitoring fixed locations.

Reliable operation and alarm capability are distinct advantages of laser scanning for monitoring.

The monitoring frequency and thresholds can be set to meet the demands of strategic design and operational planning. Accurate, timely reporting of rapid and gradual movements to geotechnical teams and management helps control risk and safeguard operational environments.
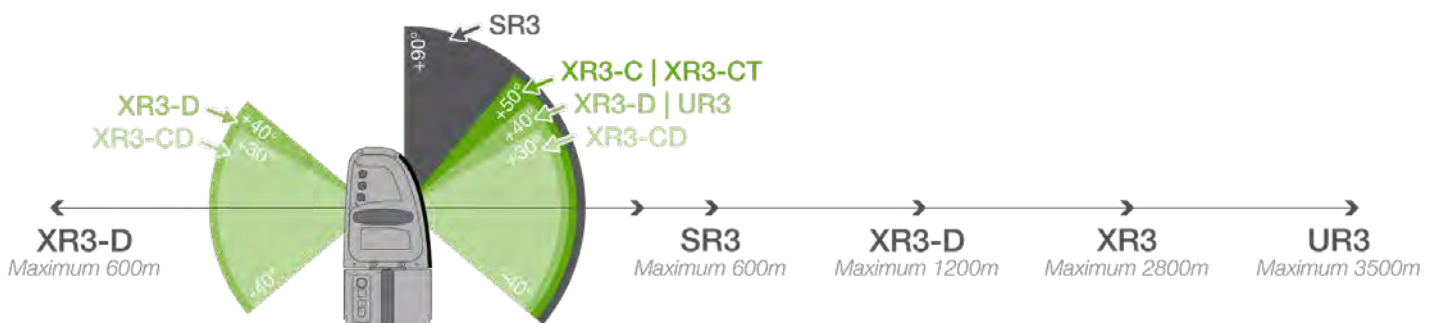
Since the early 2000s, Maptek has developed easy to use systems for spatial mine measurement applications, with a commitment to safety, data reliability and accuracy.

The UR3 is available in standard and cold climate configurations. In extreme climates, the system can be used to continuously monitor at temperatures from -20°C to +50°C, with limited operation down to -40°C.

Deformation mapping and modelling

Maptek™ has assembled a comprehensive suite of tools for underground geotechnical and survey applications within an intuitive menu-driven workflow.

The new Underground Tools add-on in Maptek™ PointStudio™ and PointModeller™ has evolved from our existing underground point cloud processing tools and a new dedicated Underground menu offers a faster and improved workflow.

Geotechnical and civil engineers know that deformation and relaxation as the rock mass adapts to an excavation over time can become a risk to equipment and personnel. The right information at the right time is crucial for site safety.

Capturing underground data from tunnels, drives and crusher chambers is time consuming for geotechnical engineers, surveyors and technicians. Post-processing can be just as arduous. Release of the new Underground Tools sees the whole process, including registration, cut down to a few minutes.

> With an intuitive workflow menu, the new Underground Tools add-on allows users to fast track deliverables, report to stakeholders, update production teams before shifts and allocate time saved to other tasks.

Point clouds are imported rapidly in the required file formats. Existing registration using the **matching point pairs** tool and survey locations has been the go-to choice for many years and registration is seamless. An alternative option uses **automated initial positioning** to register recently captured point clouds to those already registered. This is useful when scanning times are tight, targets have not been set up, or the level of deformation has significantly altered the survey locations of targets.

A highlight of the new tools is the ability to filter out services including cables, pipes, machinery and people – a once tedious manual process can now happen in seconds. In addition,

the new centreline option ensures complete tunnel coverage when generating smoothed surfaces. Both tools result in a single **hull surface** tool for a single click deliverable covering hundreds of metres of tunnel development in minutes.

Complex 3D surfaces can then be generated as representative surfaces to identify areas of deformation, key block risks and rates of deformation using velocity heat maps.

The **underground report** tool seamlessly compares the level of change between multiple surfaces at set intervals or cross sections. This is particularly useful for delivering reports to management, focusing their attention in 2D section to complement the 3D heatmap surfaces.

Survey deliverables include volume and tonnage from excavated tunnel surfaces, as well as overbreak and underbreak costs. This is essential for evaluating tunnel design to as-built surfaces, allowing operators to identify causes of overbreak/underbreak and potentially reducing costs for future development.

Game changing multi-grade **tunnel strings**, including sidewall strings with a customisable height, are available for 2D reporting. A new **plan view boundaries** tool for complex tunnel scenarios such as pumped-hydro multi-chamber and bord and pillar mines, is also essential for 2D reporting.

The new tools complement the PointStudio and PointModeller suites. Maptek solutions meet point cloud processing expectations at operations around the world, with seamless, modern platforms allowing users to efficiently and accurately complete daily tasks. Maptek aims to help make operations safer and enable them to make better decisions.
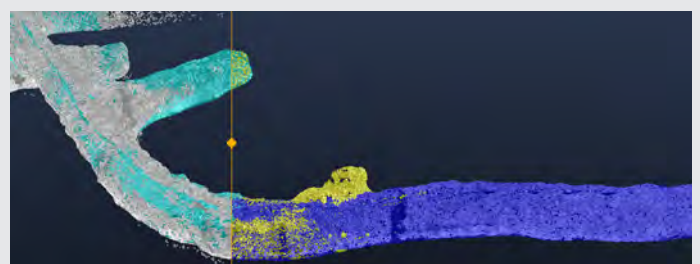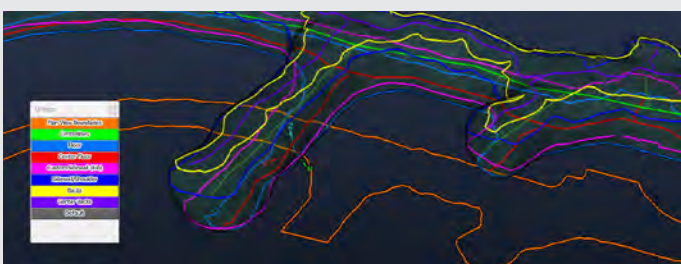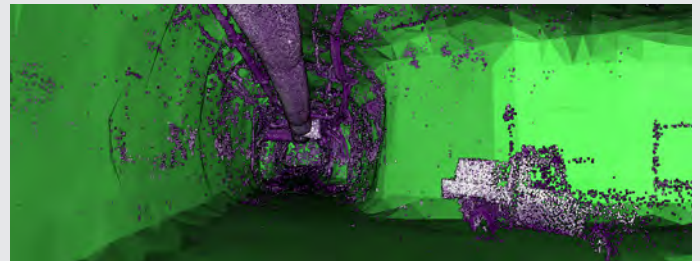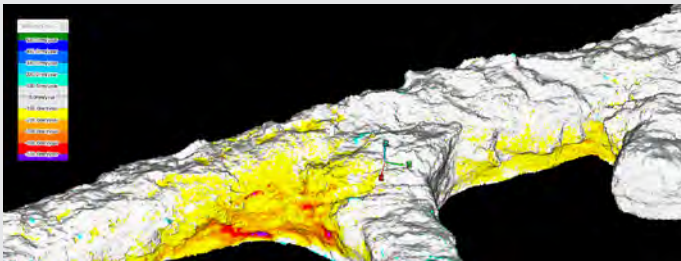
Train the trainers

A professional academic reflects on his long-held enthusiasm for Vulcan and drive to ensure new graduates are fully equipped to serve the mining industry.

In 1998, a keen PhD student at the University of Nottingham attended an introductory Maptek™ Vulcan™ training program. A few months later, Ioannis Kapageridis started in technical services at Maptek. That was the beginning of a long-lasting addiction to Vulcan!

Now an associate professor in Mining Informatics and head of the Department of Mineral Resources Engineering at the University of Western Macedonia, he considers the Maptek experience to have defined his professional profile.

Kapageridis recalled limited computing exposure during his undergraduate mining studies, with little content related to CAD or geological modelling applications. For his final year project in computer aided deposit modelling, he contacted mine planning software companies such as Maptek about their products.

'The software and algorithm terminology was completely new to us, which meant that I had to improvise while writing my thesis,' Kapageridis reflected.

The pace of technological change in the mining industry has escalated alongside the rapid uptake of new technologies. The academic community, which educates the people who will support the mining industry, must respond and adapt.

Systems for managing remote or autonomous operations have created new opportunities for people with special skills and knowledge.

'More effort is needed to ensure that mining related courses in Greek universities keep pace with technology. The lack of reference material in Greek also remains an issue,' Kapageridis said.

Expectations

While information and communication technologies are widely used in teaching and learning, this does not ensure that the actual course content matches the state of art in mining. Kapageridis noted the need to incorporate modern content as well as refreshing traditional subjects for engineers, geologists and other science specialties.

'Robotics and autonomous systems, artificial intelligence, smart grids and electric drive systems are important subjects, but equally important is the modernisation of classical mining and geology modules,' Kapageridis commented.

'Geological mapping, mining exploration and geostatistics, surface and underground mining, mine planning and mineral processing education must incorporate the latest techniques.'

Students are requesting exposure to more advanced content and access to modern Greek textbooks on mining subjects. They prefer project-based learning, and since Vulcan is ideal for this purpose, Kapageridis set out to bring other academic staff on board with a dedicated mine planning workshop.

Train the trainers

Aware of the challenges of adding to the teaching load, Kapageridis scheduled the workshop outside of term time. The aim was to learn more than the Vulcan menu structure and which boxes to tick, focusing on modelling processes and how to teach them effectively.

Kapageridis observed that lack of in-depth knowledge of algorithms and modelling procedures, as well as limited familiarisation with specialised software are known barriers to integrating mine planning software in courses. Workloads can also hinder experimentation with new technologies and packages.

Another common academic misconception was that digital mine planning can be learnt in the workplace, with no need for this topic to be covered during studies.

Kapageridis said his observations working in Europe and Africa showed that better employment possibilities arise from having practical mine planning skills before entering the workforce.

'With this workshop I wanted to encourage and inspire my colleagues – professors in resource geology, mine design and planning – to lead the way in undergraduate teaching,' said Kapageridis.

Six academics from four universities in Greece and abroad, involved in teaching and research in mine planning and resource geology, were invited to attend. The 28-hour workshop was split into 4-hour sessions. Attendees were given access to Maptek Account licences and could participate remotely.
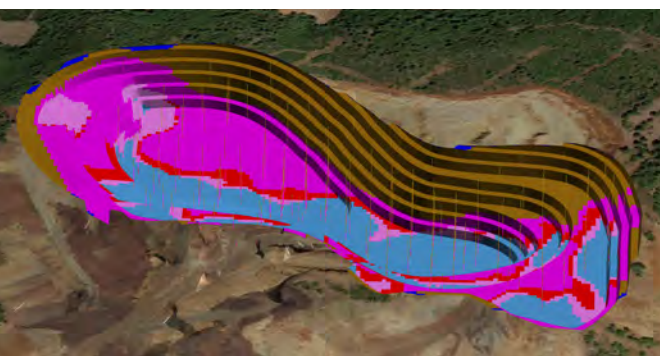
Kapageridis acknowledged that his program was probably over-ambitious but was pleased that attendees gained a good idea of how they could integrate Vulcan in their teaching workflow.

Collaboration and engagement were high – with the questions raised, issues reported and solved, and the results produced pointing to a highly successful workshop. Universally positive feedback was reflected from attendees.

'The inexhaustible energy, patience, humour and willingness to solve any questions helped us to get a good taste of the capabilities of Vulcan and the other software tools.'

'Before that, I had little experience in mine planning, but the workshop helped me understand design practices using Vulcan, which I look forward to applying in my work.'

'I'd like to express my gratitude to our amazing instructor for his expert guidance and engaging teaching style. His passion for the subject was contagious, making the learning process informative and enjoyable.'

A second train the trainers workshop with more focused content is planned for next summer.

Hands-on learning

Maptek and the Laboratory of Mining Informatics and Machine Learning Applications share a long history going back to 1999. Maptek has provided software updates and support, undergraduate licence access, guidance during mine planning workshops and certificates for attendees.

'Hands-on learning with an industry software package brings students closer to the issues and challenges that professionals face. A relatable
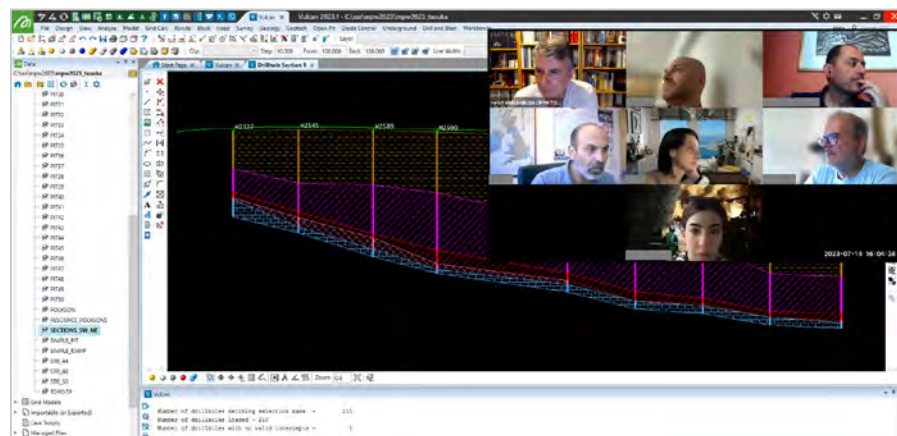
real-world training dataset, such as the Greek laterite nickel deposit used, greatly helps the teaching and learning process,' said Kapageridis.

> Vulcan is an ideal platform for a mine planning course and the best means to reinforce theoretical knowledge and transfer skills.

The balance between theory and practice is very important, as is allowing adequate time between sessions for attendees to repeat some or all of the steps. Video recordings of lectures also help.

Futures

The benefits of an integrated learning approach can be measured easily. Exposure to actual industry tools rather than simplistic software packages results in confident students. Graduates then have better employment potential and make more effective employees.

Tailoring undergraduate curricula to be responsive to technological developments means companies will be able to select graduates with the necessary skills to analyse, plan, maintain and monitor mining operations. People with knowledge, familiarity with technology, and a culture of continuous improvement and adapting to change, are positive signs for the industry.

About the trainer

Ioannis Kapageridis has been teaching undergraduate courses based on Vulcan for 22 years. His Laboratory can claim 30 Vulcan related publications in scientific journals and conferences, over 40 final year theses, a published textbook on mining informatics, and more than two decades of teaching geostatistics and mine planning to students.

'Train the trainers' enables instructors or subject matter experts to train others. Training is a process of acquiring knowledge, skills and attitudes needed to fill the gap between what people want to do, and what they are able to do now. A learning by doing approach is the best way to teach a trainer how to train well.

Discovering domaining

Maptek™ instigated the Geology Challenge in 2021 and has since run an internal program to inspire staff to experiment with our software.

The theme for the external Maptek™ Geology Challenge currently underway is controlling complexity in domaining. An internal underground dataset challenge is being conducted in four parts to generate domains, grade, mine design and scheduling assets from initial drilling information.

Participants for part 1 – domaining – selected from the range of Maptek modelling tools and here we publish reflections from three that reveal the different approaches.

The projects provided insights into issues faced by our customers, alongside outstanding results that will guide software development and automation tools.

Daniel Owen applied Vulcan GeologyCore to model a complicated narrow vein network.

I spent years manually wireframing narrow vein gold deposits – where it took weeks or months to even update existing interpretations with new drilling.

The Modelling Manager, with its baked in Vein Modeller, enabled me to model the 27 veins in the challenge dataset in a couple of days.

In the manual wireframing paradigm, ensuring your veins don't cross-cut or overlap each other when there's many veins in close proximity and varying orientations is painful and time consuming.

The Modelling Manager makes this painless, as you can easily define relationship rules to truncate veins against each other to ensure there's no overlapping veins.

I could not have come even close to making this sort of detailed model within this time span without the tools available in Vulcan GeologyCore.

The most exciting part is that it's an incredibly easy process if I want to update with extra drillholes or change the domaining in any holes.

Using the Flag Domains tool I can easily tag the desired domains in the holes, hit 'go' on the Modelling Manager and the veins will all be rebuilt to match the data and the relationship rules I've defined.

> These are the modelling tools I dreamed of having when I was on site doing this work all day everyday.

During this project I realised that the Vein Network relationships panel in the Modelling Manager could be improved when defining lots of truncation rules for multiple veins at a time.

I was able to mock up a far more streamlined panel design to guide our software development team to improve it for future releases.

I look forward to recommending the repeatable, auditable vein modelling approach to our customers!
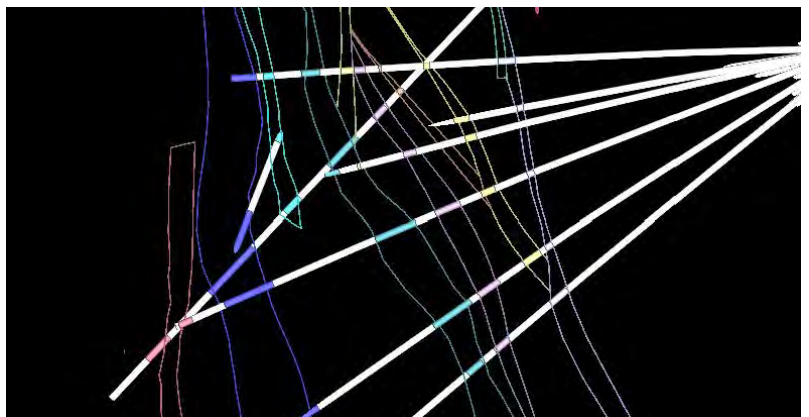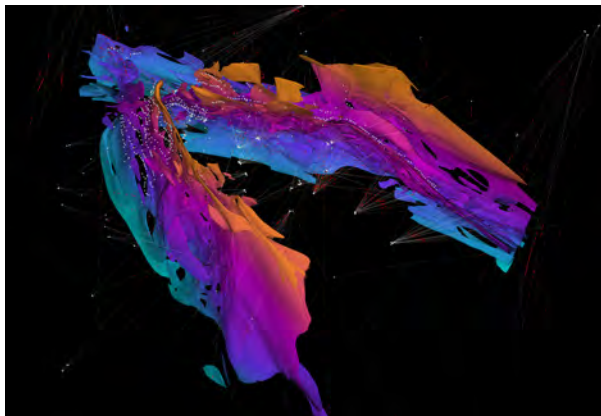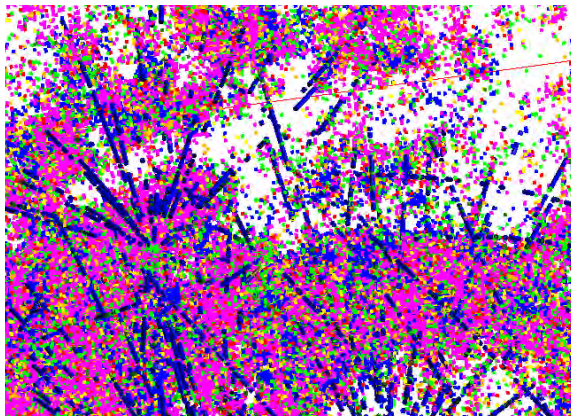
Geordie Matthews used Vulcan Data Analyser to create theoretical veins from existing drill data.

Any interpretation of a geological entity from a limited dataset will create a lower resolution outcome than the resolution of the input data. By using conditional simulation, images of potential vein and mineralisation trends can be created at a resolution in excess of the sample dataset. The resulting model can then be used to build a wide range of 'what if' scenarios.

A node mesh of 1m x 1m x 0.5m was interpolated with Au grade within broad structural domains using a tight, local search. Five realisations were considered together to create a probability map of possible grade and vein trends for the deposit.

A key constraint is the model size and the number of nodes requiring interpolation. An ID1 estimate was used to identify the region proximal to the drilling, and this volume was then informed by simulated grades.

This project covers the first part of generating a domain model for the distribution of gold bearing veins within the deposit. Further work is required to synthetically drill and sample the simulation model, and then create various permutations of the deposit given a range of assumptions. The results provide insight into deposit variability and how spatial relationships change as drill density and spacing alters.

Rob Slade took a pure data science approach to orebody discovery using a binary indicator domain and DomainMCF.

In complex geological systems of structural discontinuity (faulting, intrusion and metamorphosis), lithology, geochemistry (alteration) and mineralisation (grade) are usually the most consistently recorded and accurate data.

This is especially true where combined exploration and production (grade control) data populations are present. An initial view of mineralisation 'flow' can be an excellent guide to the entire system in building up a final model.

All 2564 holes were reviewed for intervals above and below the indicator cut-off, defining the binary domain as ore and waste. The data was prepared for training a DomainMCF prediction machine using a 1m x 1m x 1m parent with ¼ sub-blocking definition (0.25m x 0.25m x 0.25m).

Training sample data was 'densified' to ⅕ of the sub-block dimension, a composite run length of 0.05m. An isotropic approach to the DomainMCF block model definition allowed the mineralisation data to 'take us where it will' to see what mineralisation data tells us about orebody geometry.

All holes were adjusted with a waste beginning and end to ensure that holes ending in ore were not used in training the DomainMCF machine to predict beyond recorded data. This, of course, is a conservative mineralisation assumption, declared as such in this early orebody discovery exercise.

The problem was solved!

Two block models were predicted under the goal of taking the data as presented and assumed to be the best information available. As a secondary goal, I determined to only spend one hour per model on data preparation and input to DomainMCF.

The final mineralisation model enlightens us to the geometry of the orebody, within the specified model volume. This model is perfectly suited for use in modelling anisotropy and continuing the challenge of estimating grade.

Engineering customer success

Building a strong community of Customer Success specialists ensures Maptek™ delivers on our commitments to create value for customers.

Scott Britton, Global Customer Success Manager – Mine Engineering describes how a mining industry background helped focus his enthusiasm for helping customers.

Tell us about your mining industry background and the focus of your new role.

With more than three decades of practical experience in coal and hard rock mining, I bring a wealth of knowledge in sales, exploration, technical evaluation, management and product support.

I'm thrilled to join the Global Customer Success team to provide superior guidance to our customers. My time will be dedicated to identifying

Scott Britton began his professional career in 1993 as a Junior Engineer at an open cast coal mine in Lanarkshire, Scotland

opportunities that align our products with customer needs and foster cross-discipline integration.

I accepted this position on the same day I celebrated my 30th anniversary working in the mining sector! Before joining Maptek, I worked in various UK-based open cast coal operations. I've also provided consulting services related to project feasibility studies and mineral reserve estimates.

> Relationships are absolutely crucial in ensuring that customers use the products they purchase from us and receive the value promised.

By investing more effort in relationships, Maptek is working to help our customers maximise their return on the investment on the products they purchase.

I'm now responsible for ensuring that customers using our BlastLogic, Evolution and Vulcan design products achieve their objectives. I firmly believe in a customer success approach, which helps our customers get what they need from our products.

This means fostering proactive engagement and building closer relationships with customers to maximise product use and align with their strategic goals.

How do you describe the goals of the Maptek Global Customer Success team?

The Global Customer Success team primarily aims to ensure customer satisfaction and retention.

Our mission is to facilitate effective technology adoption, proactively meet or exceed customer expectations and enhance customer lifetime value.

We're aligning our efforts with the Maptek Strategic Roadmap and collaborating with other teams to roll out necessary deliverables.

How will the structure work and what can customers expect from this approach?

We will focus on establishing journey mapping during customer adoption. The regional Maptek Customer Success teams will play a key role in successful onboarding, monitoring product use and driving proactive engagement.

Our Technical and Professional Services teams will provide user-centric product expertise. Additionally, Regional Customer Development Managers and Renewal Specialists will work with our customers to define and provide the best solutions to meet their goals.

We're adopting a consultative approach to better understand our customers' business needs.

Maptek will harness data analytics and use both qualitative and quantitative metrics to monitor and support product adoption.

By coordinating engagement across all Maptek regions, we're building a strong community of Customer Success specialists to ensure we deliver on our commitments and create value for our customers.

Woman in Technology award

Joana Sousa, Lead Data Scientist for BMA has won the 2023 Maptek Woman in Resources Technological Innovation award hosted by the Minerals Council of Australia.

All the winners from the 2023 Women in Resources National Awards and Joana Sousa, Technological Innovation category

Joana Sousa, Lead Data Scientist for BMA, has emerged as the shining star of innovation in the mining industry by winning the prestigious 2023 Maptek Woman in Resources Technological Innovation award. The ceremony took place in Canberra on September 5, marking a significant milestone in her career.

Sousa's path to success is inspiring. Her entry into mining came through BHP's Female Talent Acceleration Program (FTAP), an initiative designed to diversify talent pipelines within the minerals industry. She exhibited immense determination to learn English and grapple with complex programming languages like Python.

In her role as a Data Scientist, Sousa recognised the importance of establishing robust connections with customers and conveying her work effectively. Solid support from leaders, combined with mentorship, allowed her to graduate from the program and take on the role of a Junior Data Scientist within a year.

Sousa showed a willingness to step out of her comfort zone by taking on a secondment and becoming BMA's youngest-ever Product Owner. This was a pivotal moment, with responsibilities including product roadmap delivery, stakeholder engagement, prioritising functionality and budgeting. These experiences earned Sousa the role of Lead Data Scientist at BMA, where she spearheads the pursuit of machine learning and data science excellence.

Other finalists for the 2023 national award were Eva Lebedeva (Glencore McArthur River, Northern Territory), Samantha Langley (BHP, Western Australia) and Joanne Henry (WesTrac, New South Wales).

Sousa's achievement reflects exceptional contributions and dedication to pushing the boundaries of technological innovation in the resources sector.

Reflecting on her journey, Sousa said her enthusiasm for digital innovation blossomed during her tenure at Portugal's first-ever digital-only insurance company, where she witnessed the transformative power of data-driven decision-making.

Sousa credits her mentors and role models for providing valuable guidance, fostering confidence and promoting a sense of belonging for women in technology and mining.
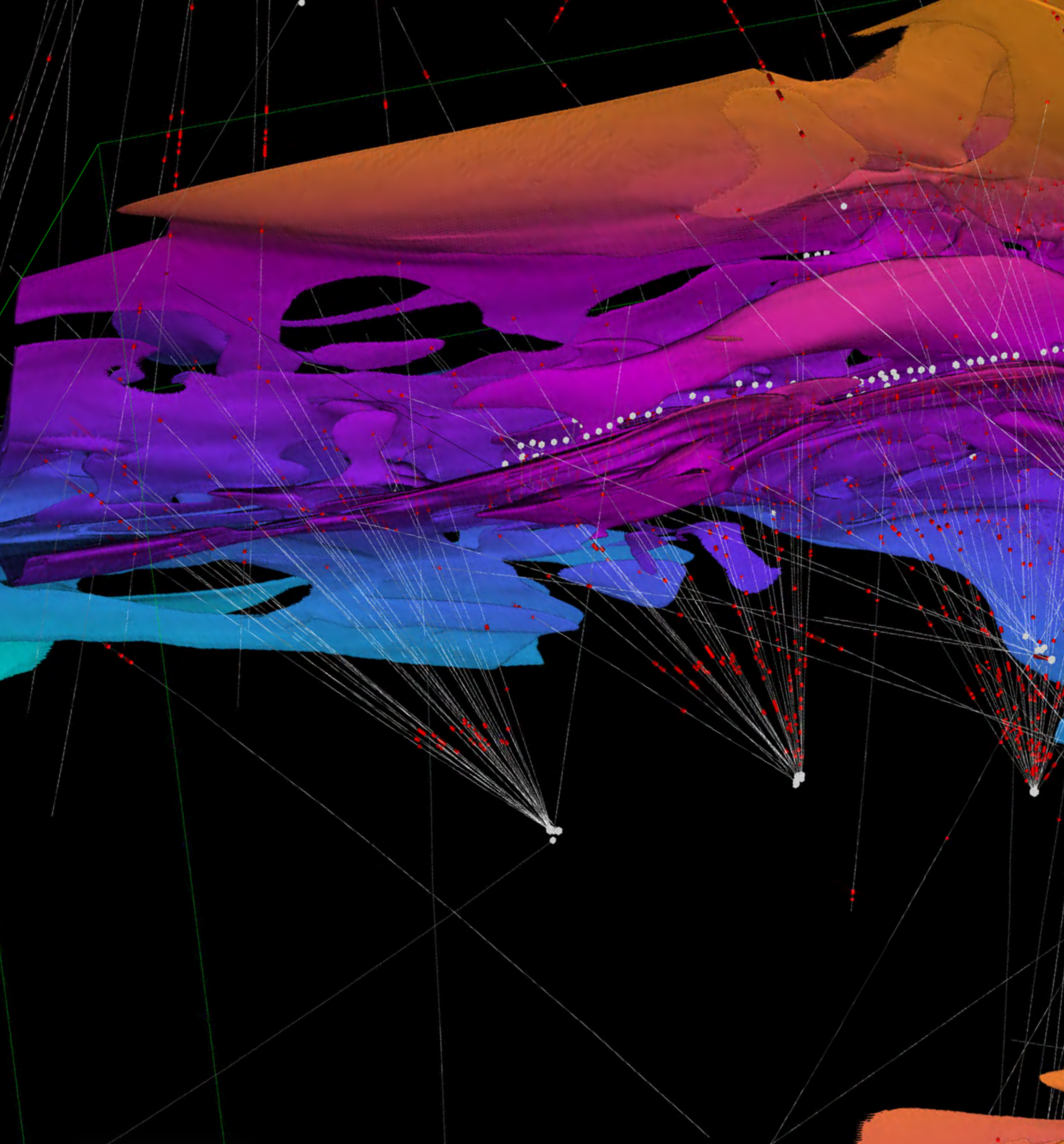
Sousa remains committed to nurturing the next generation of women in STEM roles and is a mentor for the BHP FTAP and SheCodes, an Australian program aiming to inspire women to pursue careers in technology.

Sousa's ongoing career prospects are promising. She is enthusiastic about tackling new challenges and harnessing the full potential of machine learning to make positive contributions to her teams, BHP, and the communities she serves.

Maptek CEO Eduardo Coloma congratulated Sousa on her success and drive to apply data science to address unprecedented challenges and create innovative solutions.

'Joana's journey is a personal triumph and an inspiration for women aiming to make their mark in the world of technological innovation and resources,' Coloma said.

'Her dedication to elevating women in the industry showcases her determination to create an inclusive and empowering environment and Maptek is proud to support her with this award.'

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