Datarock and the case for bespoke solutions and AI in mining

Since launching in 2020, Datarock has delivered more than 250 data science projects for the mining industry. The company has built a reputation for creating bespoke solutions to tackle the increasingly complex geoscience challenges the sector faces and the enormous surge in data its geoscientists are expected to cope with.

Here, Brenton Crawford, Chief Geoscientist and Technologist, and co-founder of the business, discusses the growing importance of AI and automation within the industry, why Datarock believes the custom approach of its products is essential to success, and the synchronicity of thought that led to their recent acquisition by IMDEX.

Brenton's inspiration and the beginning of Datarock

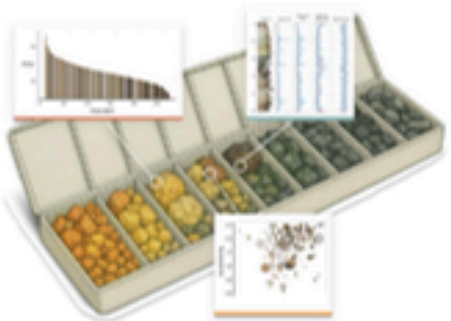
In 2017, three years before Datarock was founded, several of us were part of a company that was pure consultancy, applying machine learning to solve exploration and mining problems. But we found that we were basically doing the same types of projects over and over again, which wasn't hugely rewarding. What we really wanted was something that could help us do those things at scale, and that ambition led to the creation of Datarock.

With the confluence of Machine Learning and the Cloud, it just seemed like a good time to put those things together and solve the problem of how we interpret rocks visually, instead of having people stare at them for hours and make choices that are often subjective.

That first product—Datarock Core—is still around now, and it's used for analyzing core photography. Datarock Core is a way of automating and augmenting many different types of data collection from the drill core imagery. There's also Datarock Chip, which replaces manual chip logging with an automated machine learning workflow that detects trays, segments compartments, and extracts measurable attributes, providing analytics-ready data within hours.

Since 2020, we've analyzed more than 30 million meters (over 98 million ft) of core and delivered significant time and cost reductions at the sites that use the software.

We aim to help the industry replace outdated models and fragmented workflows with production-ready, explainable AI and automation that reduces interpretive risk. Essentially, it's about extracting reliable insights from your core imagery and getting them into the hands of your modelers faster than ever before.



Datarock Chip

The unique Datarock philosophy

I think we'd say our philosophy is to create solutions that are bespoke and custom, rather than out of the box and one size fits all. But they're also solutions that are scalable and rapid to deploy. Which I suppose is having your cake and eating it... It's an approach we are passionate about, creating models tailored to the specific geoscience problems of just one mining company.

In our experience, that approach almost always delivers better and higher value. The difficult bit is how you make lots of those custom solutions, at scale, while ensuring that each one is excellent and solves the business problem at hand. That is something we do that I don't think anybody else does quite like us.

The strength that helps companies solve problems

We have been working in the areas of Machine Learning and AI for mining longer than many people, especially in the geoscience space. And even though Datarock is a product company, we have a very large consulting and applied science group. There are a lot of expert geoscientists and geotechnical staff hovering around our software offerings.

When you're delivering solutions to complex, difficult-to-answer questions, you need a best-in-class team working alongside you. That element of consulting is still at the heart of what Datarock is and does. Today, we call it our Applied Science Team, and they are an amazing group of technical experts we put into companies to help us understand their problems and develop products to solve them.

One of our biggest areas of development now is what we call Managed Solutions, which is a productization of consulting or applied science. We build you a custom or bespoke solution, but we monitor it, maintain it, deploy it, and are responsible for its existence. So rather than carrying out a consulting job and then saying 'ok, see you later, good luck', we make sure the value we're delivering is ongoing. We're watching these complex algorithms to make sure they're not going wrong, and that they're still doing the job customers need them to do.

'Machine Learning models are like Tamagotchis. You have to keep feeding and looking after them to make sure they stay alive!'

On Datarock's acquisition by IMDEX

Ultimately, we went with IMDEX because we believed in the set of technologies they were assembling, and that we would plug into that well. IMDEX also has some real 'rock star' geoscientists to work with! People like Dave Lawie and Michelle Carey are famous in our field.

I think IMDEX's appetite for the digital side of geoscience is exceptional, and we very much feel aligned with that.

There are many tools from different groups that have either been acquired or built from within by IMDEX that create valuable synergies, for instance, in the structure and geotechnical space. Starting at the drill hole, there's ACTx, which provides the orientation that is crucial for structural measurements, then LOGRx uses the orientation line from ACTx to get the structure from the drill core. Datarock Core then analyzes drill core imagery to automate elements of structural and geotechnical data. Then WellCAD from Advanced Logic Technology looks at the borehole, providing in-situ information that can't be obtained from the core. Together, they offer a very complete ecosystem of data that is unique in the industry.

Datarock's bespoke approach in practice

Two projects always come to mind. The first touches on our data fusion approach to domain and predict rock properties, a very common high-value workflow. The second showcases how we collaborate with our clients to build solutions on top of our software to maximize value.

Data fusion for a Canadian gold miner

One of our customers in Ontario was looking for a more consistent, scalable way to get value out of a big legacy dataset. With over 200 000 m (656 170 ft) of drilling across more than 400 holes, there's heaps of data sitting there, and the goal was to pick out the combinations of alteration, lithology, and vein types that host gold mineralization, faster and more consistently than relogging it all by hand.

Realistically, no single dataset gets you there. Geochemistry tells you about elemental composition, but can't see vein density or alteration intensity. Core photography captures texture but doesn't have composition. And manual logging geology, useful as it is, varies between loggers. The information you need is in the fusion of all this data.

We built a bespoke solution that paired our Datarock Core software with our Applied Science workflows. Datarock Core processed the core imagery at scale, and the Applied Science team fused those image features with the co-located geochemistry to produce a single feature set sensitive to both composition and texture.

The project has helped them better understand the domains in their deposit and which data types matter for defining them. These outcomes deliver real value downstream when it comes to prioritizing future data collection and designing how new programs are run.

Over the longer term, this is what unlocks automated classification models for the site. New drilling data gets ingested as it comes in, the model outputs the required classes and predictions, and that feeds straight into their broader orebody knowledge and geometallurgy programs. Rather than each new infill or exploration campaign needing a manual relog before the data can be used at scale, classification keeps pace with the drill rigs.

Geotechnical analysis for a West Australian gold miner

At Sunrise Dam in Western Australia, AngloGold Ashanti realized they needed a reliable discing dataset to characterize potential high-strain zones in their rock mass.

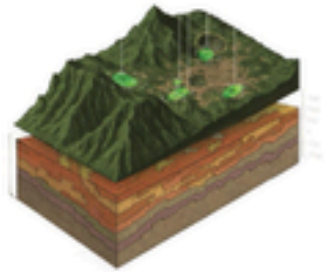
Discing is a phenomenon where diamond core fractures into thin, disc-shaped segments that can be an important visual marker in high-strain zones in the rock mass. Discing is tricky to log manually and is commonly only done sparingly (if at all) at most sites due to it being a tedious, labor-intensive process that is prone to inconsistencies. Very commonly, it is only logged in resource drill outs when problems arise.

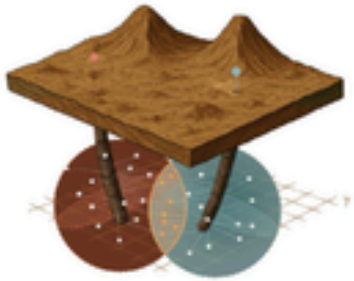
The Sunrise Dam site was already using our Datarock Core product for other geotechnical outputs, but to log discing we needed something we didn't have an established workflow for. So we developed a new discing analysis solution for them within Datarock Core, again leveraging computer vision to extract much more detailed data from drill core photography. The workflow we established included depth registration, angle-based analysis, and region-based detection, before combining all the results.

Ultimately AngloGold Ashanti were able to log discing in 85 000 m (278 871 ft) of drill core imagery, not in months, which a traditional manual approach would have taken, but literally in hours.

The study also revealed many discing regions that had not been logged. It improved the accuracy of discing zone detection, standardized logging data to help avoid inconsistencies, and enhanced geotechnical risk management. Just as importantly, they were able to create a standardized discing definition, giving them greater confidence in their data going forward.

This discing solution is now being used by geotechnical engineering consultancies and mining companies on projects globally.





† **Datarock's solutions include Prospectivity Modeling, Vectoring & Near Miss analysis, Automated Logging, and advanced solutions for collecting structural & geotechnical data.**

On AI and automation

If you had to say one thing to geologists about their future in the industry, what would it be?

Human geologists are remarkable at many things. We're creative. We see processes playing out in the rocks that nobody told us to look for. We interpret data in context, weighing history, structure, alteration, and a dozen other factors at once. That's the heart of the job, and it's the part that's genuinely hard to replicate.

To be clear, geologists need to look at rocks for the right reasons. That's not in dispute. But we're often expected to behave like consistent, repeatable data-collection machines, and we're just not built for that. Different people see things differently. Attention drifts. Repetition makes errors creep in. And it's neither rewarding nor a great use of someone with the training to interpret and work further downstream.

And look, the worry about AI isn't unfounded. What it means for geology careers over the long term is a genuinely open question, and I'm not going to pretend otherwise. But right now, the best move I can see is to embrace these tools and use them to be better at your job. If we let AI sensors and automation handle the high-volume, repetitive data work, geologists are freed up to do exactly what they're best at: the creative, interpretive, scientific thinking. The job gets more interesting, more engaging, and more rewarding, and the data quality goes up at the same time. That's the best play right now.

How will AI impact the role of geoscientists?

Honestly, I don't think anyone can predict exactly how AI is going to reshape geoscience careers, and anyone telling you they can is probably overselling it. There's genuine uncertainty, and I'd rather be straight about that than pretend otherwise. But if there's one thing I am sure of, it's that getting in front of this change is far better than getting blindsided by it.

What I see coming is geoscientists moving up the value chain. We'll be less involved in the day-to-day data collection, since that's where automation, sensors, and AI agents will do the heavy lifting, and we will be far more focused on the higher-level tasks. Interpreting, integrating, making the calls that matter. We'll become the keepers of the models and algorithms, the people who understand not just what the data says but whether the models we've built to read it are still doing their job correctly. That's a more interesting role for most people, and a more important one, than logging the ten-thousandth meter of core.

The geoscientists who lean into this, who get curious about the tools, understand their limits, and shape how they're deployed, are the ones who'll thrive. The ones who try to ignore it are taking the bigger career risk, in my view. Either way, the industry needs us. The job just looks different.

And one last word?

Everybody loves a new robot, don't they? Machines are cool, and everyone gets excited about them. But all the data in the world won't help you unless you interpret it correctly and act on it intelligently. This is often the much more difficult part of the equation than buying a new sensor; it requires complex data flows, algorithms, and teams that know how to build and manage them. The companies that are doing this well understand that puzzle and realize that geoscientists and our other SMEs need to be at the heart of them.

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