



# THE DATA MANAGEMENT CHALLENGE

MAXIMISE DATA VALUE THROUGH  
NEW INVESTMENT STRATEGIES

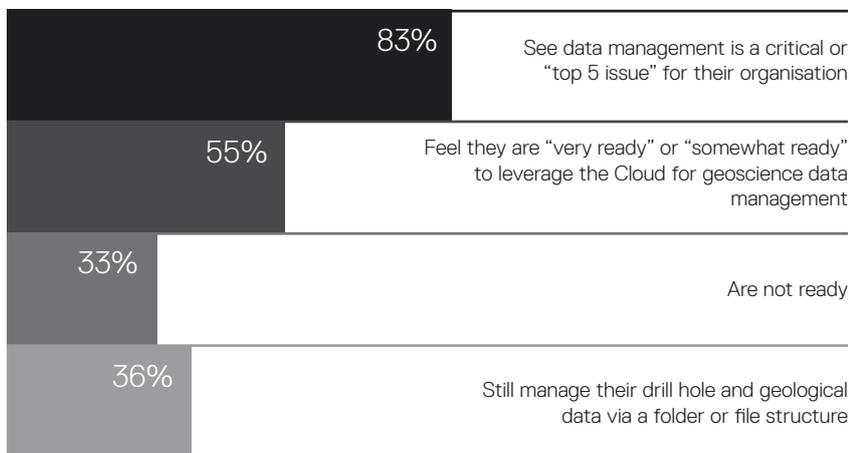


# Introduction

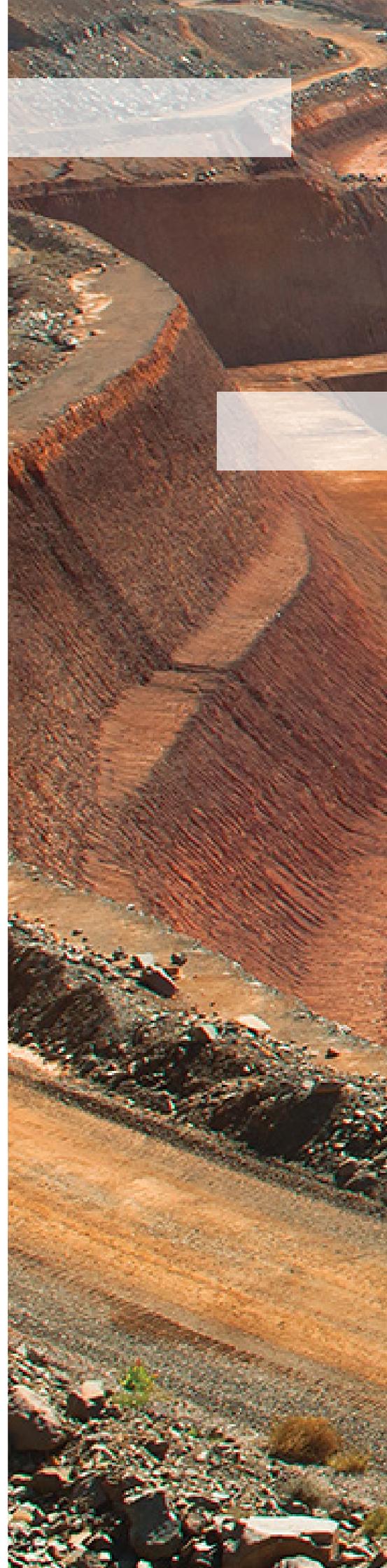
**Geological data underpins the most critical business decisions in the mining industry, but the data that backs these decisions can be poorly managed, adding risk and leading to significant inefficiencies, which ultimately affect the bottom line.**

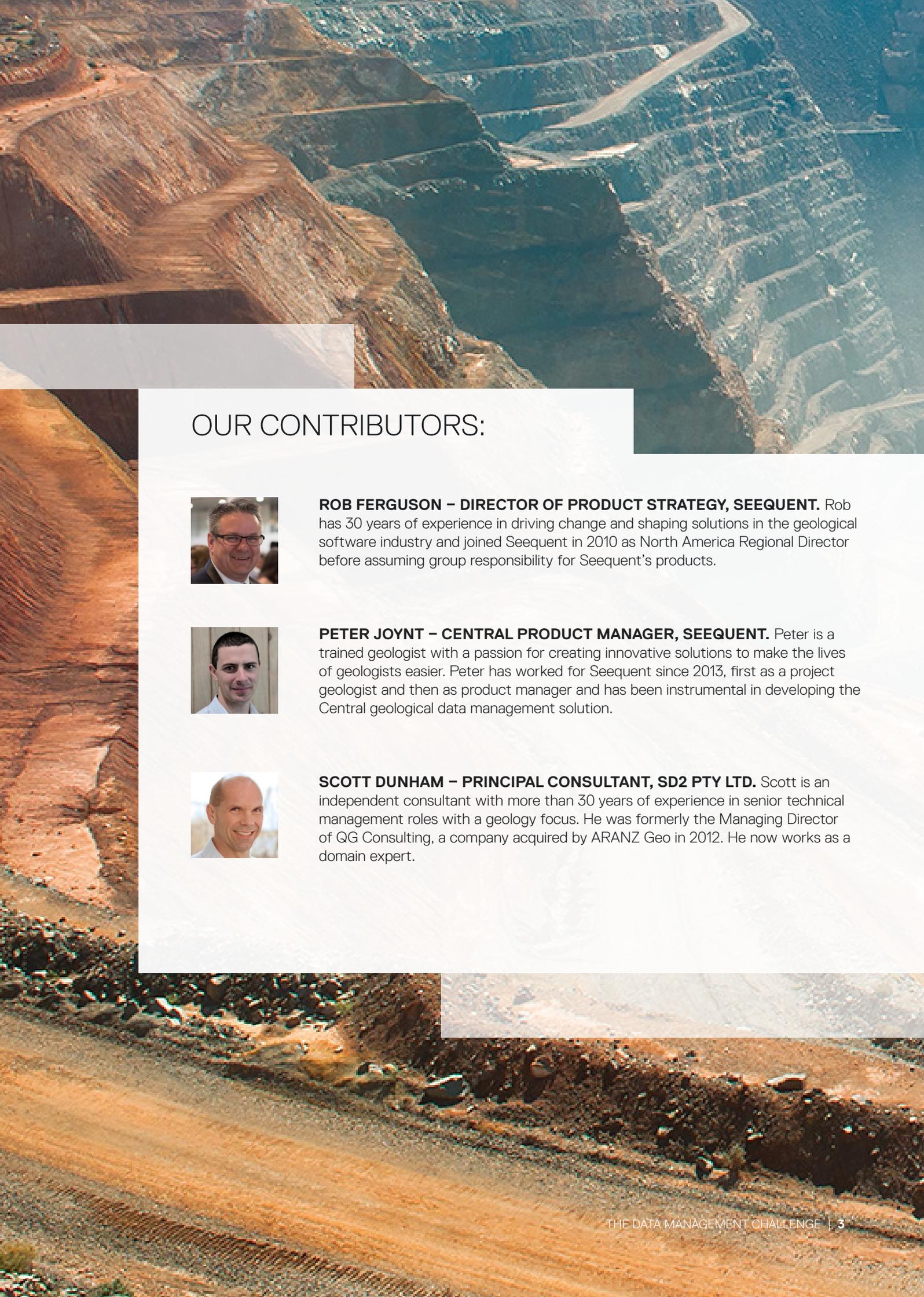
In the recent Geoscience Data Management survey conducted in 2017 by Geosoft [1], 83% of respondents (mainly geoscientists) stated their belief that data management is a critical or “top 5 issue” for their organisation.

## KEY FINDINGS AMONGST RESPONDENTS:



So, what can be done to solve the geological data management challenges? Seequent give their point of view on the issues the industry is facing, how technology needs to enable change and what essential developments are needed to solve this multi-million dollar problem.





## OUR CONTRIBUTORS:



**ROB FERGUSON – DIRECTOR OF PRODUCT STRATEGY, SEEQUENT.** Rob has 30 years of experience in driving change and shaping solutions in the geological software industry and joined Seequent in 2010 as North America Regional Director before assuming group responsibility for Seequent's products.



**PETER JOYNT – CENTRAL PRODUCT MANAGER, SEEQUENT.** Peter is a trained geologist with a passion for creating innovative solutions to make the lives of geologists easier. Peter has worked for Seequent since 2013, first as a project geologist and then as product manager and has been instrumental in developing the Central geological data management solution.



**SCOTT DUNHAM – PRINCIPAL CONSULTANT, SD2 PTY LTD.** Scott is an independent consultant with more than 30 years of experience in senior technical management roles with a geology focus. He was formerly the Managing Director of QG Consulting, a company acquired by ARANZ Geo in 2012. He now works as a domain expert.

# What challenges are mining companies facing in managing their geological data?

The last 10 years has seen an explosion in the volume of data that is being produced by organisations and geological data is no exception. Technology has progressed significantly, making it much easier to collect and transfer large quantities of data. But whilst technology may have progressed, mining companies still face the same ongoing challenges in managing that data and subsequent outputs. Having huge amounts of information at one's disposal is great but only if value can be extracted from it. Most mining companies are still struggling with the process of meaningful data acquisition, retention and integrated application, which will heavily impact on any company's bottom line. How do they know which insight to trust and which can just be discarded? How can they create more robust data insight that can be used further down the value chain?

It is a complex problem and geological data management still remains to be a critical issue for companies and CEOs, according to the Geosoft Geoscience Data Management Survey. The survey also uncovered a number of common barriers to success that need to be overcome. These range from a lack of resource for data management and the perceived high cost and difficulty in selecting the right kind of technology solution.

## **GEOLOGISTS ARE NOT DATA MANAGERS**

The Geodata Management Survey further revealed that 60% of respondents noted that their geoscientists spend more than 20% of their time on data management. In addition to these findings, the latest Global Mining Guidelines (GMG) Group's survey results [2] state that geologists spend more than 10% of their working week just performing file conversions. Put simply, geologists are struggling to do their job effectively, when they are required to give up a large portion of their day doing something they are not trained to do. Industry expert and Principal Consultant at SD2 Pty Ltd., Scott Dunham comments, "It isn't a fundamental part of their discipline and not something they generally embrace well. They do know how to collect data, but they really don't understand how to go about managing that data in the best possible way." Peter Joynt, Central Product Manager for Seequent, "This is a major challenge that most organisations will recognise and it isn't helped by the increasing number of software companies that are fragmenting the market. With the right tools and

technology, data management should be much more intuitive and should free up geologists' time to do what they were trained for – analysing and interpreting the geological data to make better decisions, rather than being glorified data administrators."

## **RIGOROUS DATA COLLECTION, AD-HOC DATA MANAGEMENT**

Couple the lack of understanding and knowledge of data management with a lack of rigorous processes and real inefficiencies remain. It is widely accepted that drilling data is a key asset for mining companies and high standards are applied to the safe and secure storage of drilling data in relational databases. However, when companies look to extract value from this data through interpretation and modelling there are no best practices being followed.

## **BUILDING A HOLISTIC VIEW TO TACKLE WORKFLOW EFFICIENCY**

With the availability of more and more specialist solutions for data storage, geologists face mounting issues on how to connect and ultimately correlate different types of data to achieve a holistic view. Building an interpretive model becomes an overwhelming task as geologists are faced with too much data to easily bring into one place and make accessible.

Peter Joynt comments, "What we are seeing is a growing necessity to safely transfer data between packages, a trend which is at odds with the design and desire of the major mining software providers to provide a 'complete solution'. Current practices for management, storage and handling of modelled outputs are causing a bottleneck and limiting users' ability to take advantage of these technological developments."

There is also the risk that technology leads rather than enables the practitioner. Rob Ferguson, Director of Product Strategy for Seequent, cautions "As an industry, we need to help the geological teams to find smarter ways of accessing the right data, at the right time and make sure geologists continue to trust their own interpretation and decision-making skills."

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## **WORKING IN ISOLATION**

Mining companies have always had to contend with the challenges of being based in remote geographical locations with geologists commonly working and managing their data independently. Collaborating across teams and regions doesn't come naturally. Technology has certainly played a part in helping break down this cultural issue of working in isolation, but it hasn't provided the complete answer. The majority of participants in the aforementioned 2017 survey continue to manage their drill hole and geological data via a folder or file structure on a centralised server versus using a commercial data management solution.

Scott Dunham comments, "A lot of the larger organisations have good standards and policies in place for data management but their ability to implement these standards across all of their mining operations isn't an easy task. Particularly in the exploration space, which tends to be made up of smaller teams, working at a more rapid pace with a higher turnover of projects."

## **ASSIGNING BUDGET**

A separate issue is how planning and budgets are applied to such key aspects as data management. Scott continues, "One of the fundamental flaws that geology faces, is that we don't incorporate data management into our data collection plans. We will go out and design a drilling programme and put a budget towards that, but not enough thought is given to how the data will be managed once it is collected. Companies don't assign budget or resources specifically to manage the data. Even with the companies who are seen to be doing a good job, if there is no budget or resource attached, then we can't expect to have a quality data management programme in place."

## **LOW CONFIDENCE**

Most mining companies are still battling with their 'digital strategy'. There is an assumption that all data management is digital and 3D, but in some organisations there can still be a culture of 2D paper sections and plans. This legacy makes it very difficult for companies to implement effective geological data management. Respondents to the 2017 Geoscience Data Management survey said they had the lowest level of confidence in managing 3D data. In fact, modelling processes and outputs are often critically dependent on the stewardship of individuals and if an employee leaves the business, then they take their knowledge with them, leaving a significant and unaccounted loss to the business.

## **VALUATIONS OF MINING COMPANIES SHOULD BE BASED ON INSIGHT FROM TRUSTED DATA**

Extracting the quality and value from the raw data and building up a set of trusted interpretations and insights is what counts when it comes to making investment decisions. Conversely, this is not currently the basis on which companies (or mining projects) are valued. Peter outlines the example; "The value that the stock market gives to a mid-tier listed mining company is a complex mixture of factors including: the assets that they own, estimates of remaining resources, the company's history in delivering production forecasts, and the level of confidence in the management team. Raw data does not feature in this list; however, the models built off the raw data that allow reliable mine plans to be developed and delivered do."



# Seequent's approach to solving the geological data management challenge

Seequent's approach is to make geological data open, accessible and intuitive and bring geologists together to do what they love best and are trained in – analysing, interpreting and making decisions about the geology.

Seequent has focused on solving mining industry challenges since 2004, with the introduction of the first 3D implicit modelling solution, Leapfrog. Since then, Seequent has evolved into a global leader in the development of visual data science software and collaborative technologies. Delivering solutions that enable geologists and organisations to create rich stories and uncover valuable insights from geological data, and ultimately make better decisions and reduce risk.

As Director of Product Strategy, Rob Ferguson says, "What's really important to us as a company is allowing geologists to think more about the geology and less about the software. We have promoted this for a long time. Think geology first and software second."

## CENTRAL MANAGEMENT SOLUTION

In pursuit of this ethos and in response to demand from key customers, Seequent has already begun to tackle the issue of how to better manage a company's entire geological data. Central was developed to help geology teams and managers to visualise, track and manage their geological data from a centralised, auditable environment.

Seequent Central Product Manager, Peter Joynt, comments, "Companies were faced with the basic issues of trying to locate the latest version of a model but we could see with The Central model management platform we had an opportunity to take things a lot further. We want to help mining companies drive cost efficiencies by having data readily available, so that geologists can quickly and confidently make decisions about, for instance, costly drilling programmes. We also wanted managers to be able to see easily how decisions were made and also be more actively involved in that process. Rather than going through three layers of people to understand what one person's doing it's the click of a button."

## COMPLEXITY TO CLARITY

Seequent take the view that it is the geologists who use and manage all of the geological data and they need to be able to easily make that data tell a story. It's therefore important that processes are as easy as possible. "In every solution we create," says Rob Ferguson, "we focus on making data accessible and aid the visualisation process to make the understanding of data easier."

Seequent's solution, View, is an example of this advanced and flexible visualisation. View's intuitive tools help geologists make geological models much more accessible to wider audiences, often those without geological knowledge, such as different groups of stakeholders in a mining company. These stakeholders are making decisions about investments and production and need to rapidly understand what they are basing their decisions on. Once analysis is complete, a variety of output tools allow ready sharing and communication of findings. These solutions help give investors the confidence that the analysis work has been done and then visually demonstrate that the geology is buttoned down.

## OPENNESS AND INTEROPERABILITY

Openness and interoperability are driving forces at Seequent. And of course, any data management solution needs to facilitate interoperability and provision of flexible tools for data import/export.

Rob Ferguson comments. "We want geologists to have the most holistic view of their data as possible. We are working to consume even more generational data sets and working with other industry leaders on new technologies and advances." A recent example of this is Seequent's collaboration with IMDEX to provide real time 3D visualisation for mining drilling projects. The integration allows live field data synced to IMDEXHUB-IQ™ to be linked in near real-time to the same project in Central, enabling 3D visualisation of drilling progress and structural data in the relative context of a 3D geological model.

Seequent is also heavily involved with GMG Group's Open Mining initiative, which is working to create an open standard for mining information. "There are a number of software companies who all have their own file formats, which makes the exchange of that data in its current form, very painful. We have been at the forefront of their steering committee and are helping them drive the acceptance and utilisation of the Open Mining Format (OMF)," says Rob.



# The Future of data management

Technology is constantly and rapidly evolving and Seequent strives to remain at the forefront to ensure interoperability is achieved to the best advantage of the end user, not individual software companies. The data management challenge will continue to grow as the availability and collection of data becomes even more prolific. As an example, LIDAR data – point data generated from laser scans of surfaces provides data in the form of tens of millions of points. Companies need to ensure they have flexible and robust solutions in place to manage these complex and varied data sets.

“Be prepared for an ongoing avalanche in the amount of data and how we get value from it. Everyone needs to take responsibility and ownership of this problem,” Scott Dunham remarks.

The entire mining process will become increasingly automated and Seequent’s solutions will continue to evolve as the integration of Machine Learning and Artificial Intelligence (AI) becomes more mature.

Rob Ferguson comments, “Machine learning and AI are now being introduced into the industry and this could change the game around managing processes. You could run machine learning on core photos which can facilitate the core logging process and potentially a subsequent interpretation. There are already lots of machine learning start-ups out there that are used for targeting. Algorithms have been around for years, but what has changed is the computing power or distributed computer power. Calculations are running in the Cloud and thousands of CPU are doing highly intensive computations on large data sets.”

However, there is a need for caution with such solutions as the role of the geologist remains critical to grounding truth, validating and refining. Although there could be a push towards the use of machine learning to carry out geological modelling and resource estimation in the future, it poses some clear risks. Firstly, data isn’t necessarily fit for purpose and how will this be picked up? Secondly, there’s the issue of data bias. The need for the expert who understands the data chain and decision-making processes from early data acquisition through to interpretation remains integral.

Scott Dunham explains, “A geologist can see if a piece of data is missing and know where to go find it. The machine learning algorithm won’t know if it’s buried on someone’s desktop. And geologists and resource modellers intuitively account for the bias in data. As a rule, they tend to over-drill areas of high grade and under-drill low. If you expose that sort of bias to a learning algorithm it will affect the models and you could end up with bad predictions that create a high level of uncertainty in decision making.”

## MANAGE YOUR DATA BETTER, MAKE BETTER DECISIONS

Seequent will continue to strive to make geological data open, accessible and intuitive with the belief that if the right resource is put into managing geological data, then better decisions will ultimately be made.

This ‘right resource’ means properly resourcing the management of geological data both in terms of dollars and people with the right skills. This is where an industry data management platform, such as Central, which allows all geological data to be held in a single system, provides the ideal solution.

Scott Dunham comments, “Wouldn’t it be great to have a cloud-based data structure to which all your instrumentation talks directly without having to intervene; that automatically catalogues the data, describes the quality of it and makes it accessible to everyone involved in a project. But in order to get near to achieving this sort of value, mining needs to invest in their data management capability as other industries do.”

Peter Joynt concludes, “Fundamentally, we want to help mining companies drive cost efficiencies by having data at their fingertips. Central provides for easily accessible and manageable data, so geologists don’t have to worry about the challenge of data management but can focus on the geology, creating resource estimations or helping to reduce costs in drilling programmes, for example. Geologists are also able to collaborate more as a team, rather than working in isolation - another means of improving decision making and reducing risk. To get to this point though, requires a cultural change in understanding the real value that can be derived from such a system and assigning critical resources to its implementation.”

Learn more about what geologists are saying about their data management challenges and how to solve them.

## The Data Management challenge

## Best practices for managing geological data

Seequent continues to collaborate with the industry leaders to help overcome data management issues. Central has been evolving now for some years and mining companies have already adopted it, not just as a means of data management efficiency, but also as a way of using innovation to continue to build competitive advantage.

Seequent has identified five practices mining companies could adopt to better manage their geological data, which Central already supports.

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1. **3D:** Mining by nature is a 3D problem. Spatially located data needs to be stored in such a way that it can be easily visualised in a 3D context alongside other data.
2. **PERSISTENCE:** Mining projects operate for many years, and data and knowledge are cumulatively built over time. It is said that an exploration project is owned on average by three companies before it progresses to a mine, making it even more critical that centralised data management should persist over the life of a project and capture all data and decisions made.
3. **VERSION CONTROL:** Version control should be at the heart of the system. This is particularly important where data collection and model iteration is ongoing. Geologists need to be confident that data and model revisions are securely preserved at points in time, that updating does not damage prior versions and that it is possible to return to an earlier version if necessary. Version control also provides an audit trail and ensures that all producers and consumers of the model can be confident that they are working from the correct version.
4. **COLLABORATIVE:** Increasingly, mining and exploration projects are large and complex and require team-based effort. The organisation and structure of data storage should allow and enable all users to access and work with the information.
5. **CENTRALISED, ACCESSIBLE AND SECURE:** Teams working on projects are often geographically spread, so location should be no barrier to access or contribution. Cloud hosting can ensure this, as well as provide assurance of security. If connectivity is a challenge in the sharing of large models then Central provides a solution by being capable of uploading the incremental changes and still providing universal access to the complete up-to-date model. By uploading megabytes rather than gigabytes, you will save time and lots of server space.

If you would like to talk to Seequent about how we can help better manage your geological data and book a demonstration of Central, then get in touch.

[info.central@seequent.com](mailto:info.central@seequent.com)



## COMPLEXITY TO CLARITY

Seequent is a global leader in the development of visual data science software and collaborative technologies.

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