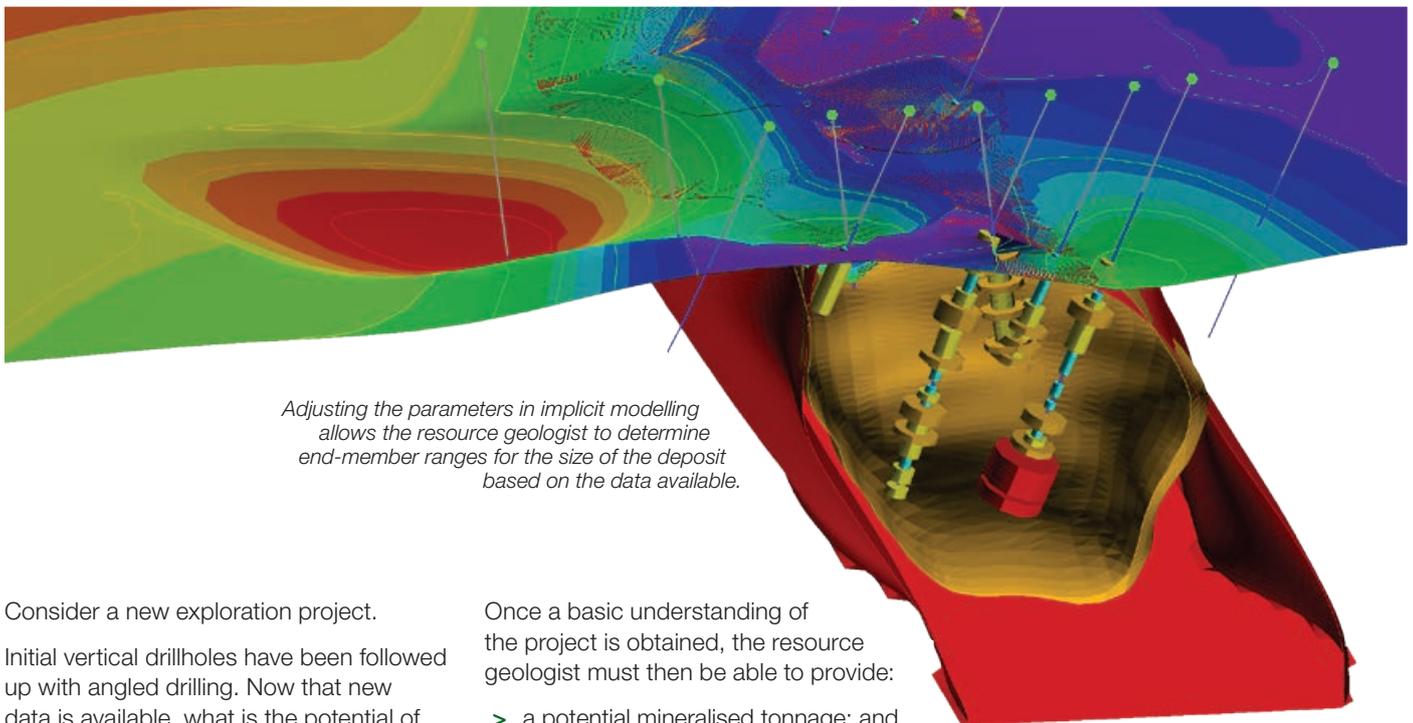




IMPLICIT MODELLING AND SUPPORT ANALYSIS

Implicit modelling combined with existing change of support analysis tools helps resource geologists to evaluate deposits.



Adjusting the parameters in implicit modelling allows the resource geologist to determine end-member ranges for the size of the deposit based on the data available.

Consider a new exploration project.

Initial vertical drillholes have been followed up with angled drilling. Now that new data is available, what is the potential of this project and did the drilling add value? How does it compare against other projects? Which project has the most potential to warrant spending your limited budget on?

COMBINING MAPTEK™ VULCAN™ IMPLICIT MODELLING AND CHANGE OF SUPPORT TOOLS, GEOLOGISTS CAN ANSWER THESE QUESTIONS, AND THEY CAN DESCRIBE PROJECTS IN A MEASURABLE WAY.

This is critical when including mine planning and financial modelling concepts into discussions.

An initial view of any project should start with analysis using Vulcan standard tools:

- > database validation;
- > advanced statistics; and
- > load drillholes as discs for displaying grade and geology.

Once a basic understanding of the project is obtained, the resource geologist must then be able to provide:

- > a potential mineralised tonnage; and
- > a potential tonnage and grade above an economic cutoff.

Implicit Modelling

Implicit modelling in Vulcan 9 allows solids to be created rapidly, straight from drillhole or composite data. Categorical variables such as lithologies can be modelled, as well as continuous variables such as grades. Implicit modelling can help to evaluate the potential range in the mineralised tonnage.

Support Analysis

Vulcan support analysis tools allow the geologist to map the change in the grade-tonnage curve between different drilling support to assess how much of the potential mineralisation could be economic.

As infill drilling is added, the shape of the grade-tonnage curve changes. Change of support maps this and allows the resource geologist to identify the potential grade-tonnage curve at the time of mining (grade control drilling).

This is important when comparing projects as it enables deposits to be measured on a like for like basis to show what could be expected at the time of mining.

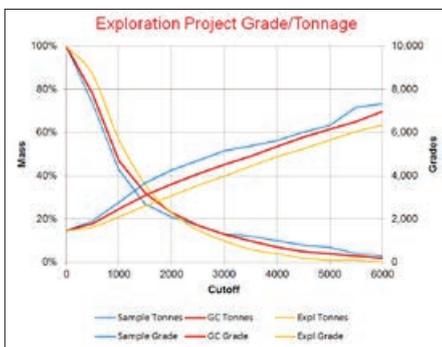
The realistic mining scenario lies somewhere between the theoretical grade-tonnage curves for the current exploration drilling and the actual samples themselves. The challenge is to determine where that really is, and how further drilling will affect the project.

The grade-tonnage curve output by change of support represents change as a proportion, not actual tonnes.

To report tonnage, the tonnes from implicit modelling can be combined with grade-tonnage curves from support analysis. This results in a potential range of size and grade for the deposit based on the current information.

Two real world projects identified situations where:

- > infill drilling would cost more than the potential incremental value of additional metal in the ground; and
- > a large low grade project which contained significant high grade ore shoot potential had significant upside as a high grade target.



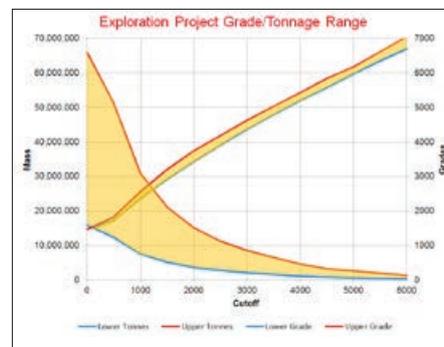
Support analysis outputs grade-tonnage curves, with the cutoff grade on the horizontal axis. The theoretical grade-tonnage curve based on exploration drilling can be graphed with a grade-tonnage curve based on samples; these are the two end members for selectivity.

Summary

This modelling process can all be done easily in Vulcan. There is no need to import and export data or run different programs. Everything is saved in specification files so it is documented, repeatable and reliable.

By combining the right tools in Vulcan, geologists can lift the lid on deposits to get a better view of what is there, before expensive drilling is undertaken.

Extract from paper presented at Maptek Users Conference, Brisbane, 2013



This example reveals only a small range in grade, with the grade only slightly above cutoff. This indicates a marginal deposit where the only upside is expected to come from additional tonnes. To add value to this project, the geologist needs to identify opportunities for higher grade, not merely more tonnes.

Vulcan Implicit Modelling and Support Analysis

1. Value projects and assess their potential.
2. Compare projects on an equal basis.
3. Identify value-adding exploration requirements, such as chasing grade to improve project viability.
4. Measure the effectiveness and value of exploration drilling programs.
5. Audit estimates and run alternative scenarios based on different orientations of the orebody.
6. Generate theoretical grade-tonnage curves to test the smoothing applied in resource estimates.