

## CASE STUDY

Developing the world's first real-time underground mining tool



### The Customer

Newcrest is one of the world's largest gold mining companies with operations in Australia, Papua New Guinea and Indonesia. Newcrest owns and operates the Cadia Valley underground block cave gold mine in New South Wales, Australia. This site produces roughly 600,000 ounces of gold and 62,000 tonnes of copper a year.

ORB delivered a 20% improvement of tonnes to surface and a 43% improvement in draw compliance

#### Mining Method

Block caving

#### Module

Real-time

#### Product

ORB - [orb.polymathian.com](http://orb.polymathian.com)

### The Problem

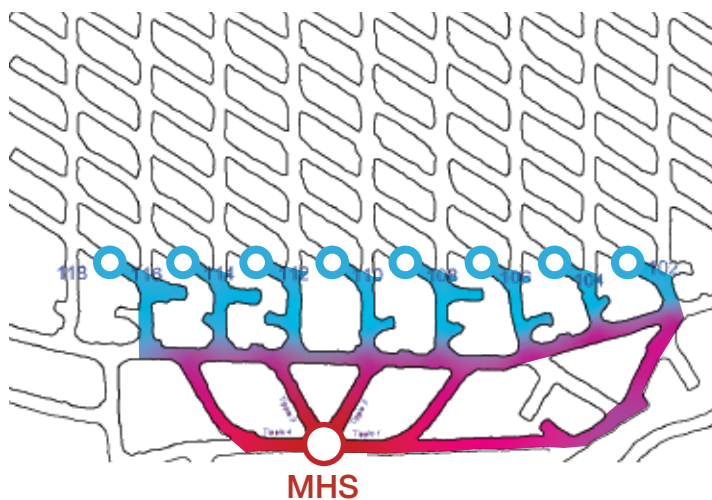
Underground mines, in particular block caves, are valuable assets that can be used for decades after their initial development. As a mine operator, it is critical that the productivity of these assets remain as high as possible, in order to maximise value and lifespan. This includes managing complex trade-offs between short term productivity and strategic long term cave growth.

Newcrest found that the fixed structure of a day-to-day planning process and the

short term priorities inherent to it could often run counter to their long term planning objectives and compliance goals. The variability of block cave operations would quickly mean defending outdated plans from the start of the day that hadn't taken into account inevitable changes that occur throughout the shift. Furthermore, underutilised data collected from mining assets and operations presented an opportunity to enhance the planning process to real-time reactivity.

Dealing with this complexity and the lack of appropriate automated tools made the manual planning process incredibly time consuming and open to inaccuracies. This often led to the Load Haul Dump (LHD) loaders becoming the operational bottleneck, resulting in a decrease in mining productivity and efficiency due to congestion and under-utilisation of the materials handling system, as seen in Figure 1.

Poorly Managed Draw Strategy



Optimised Draw Strategy

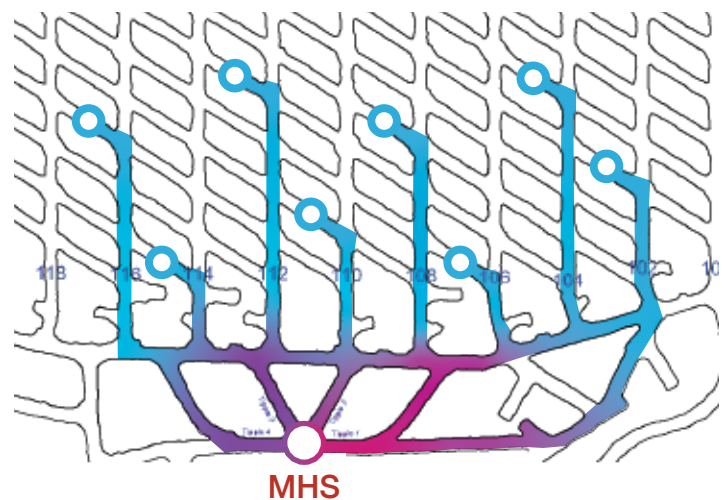


Figure 1. Draw strategies and their impact on drive congestion and effective MHS utilisation.

## The Solution

In close consultation with Newcrest, Polymathian designed and developed the Optimised Real-time Boggging system (ORB), as seen in Figure 2. ORB is the world's first and most advanced automated real-time optimisation and management tool for underground mines.

Utilising the latest in optimisation mathematics, ORB now manages Newcrest's Cadia block caves using the most recent data available to generate a continuously evolving plan for operations. Real-time equipment dispatch decisions are communicated directly to on-board tablets to be executed 'just in time', resulting in maximum productivity 24/7 while maintaining compliance to targets based on long/medium term objectives. Automated analytics on autonomously collected data result in a self-learning optimisation capability that responds to varying cave states. No daily planning or manual intervention required.

## The Benefits

With the introduction of ORB, Newcrest saw a 20% improvement in mining efficiency alongside a 43% improvement in draw compliance. ORB achieved these fantastic results with optimisation and by significantly improving their operational processes through the transition to a continuous draw strategy. Shift bosses are no longer required to make reactive scheduling decisions, reducing radio traffic and freeing them up to better respond to operational needs underground. Draw control engineers no longer focus on a manual daily process, allowing them to look at the bigger picture. Geotechnical engineers are able to ensure their best practices are implemented and enforced in a traceable way all the way down to the cab of the LHD. Data capture is centralised, cross-referenced, analysed, and most importantly used in real-time, which has greatly increased the accuracy, completeness, and value of historical operational data.

20%

Improvement to mining efficiency

43%

Improvement in draw compliance

World's most advanced real-time underground mining tool

Maximise productivity while maintaining compliance targets

Dispatch equipment autonomously and continuously 'just in time'

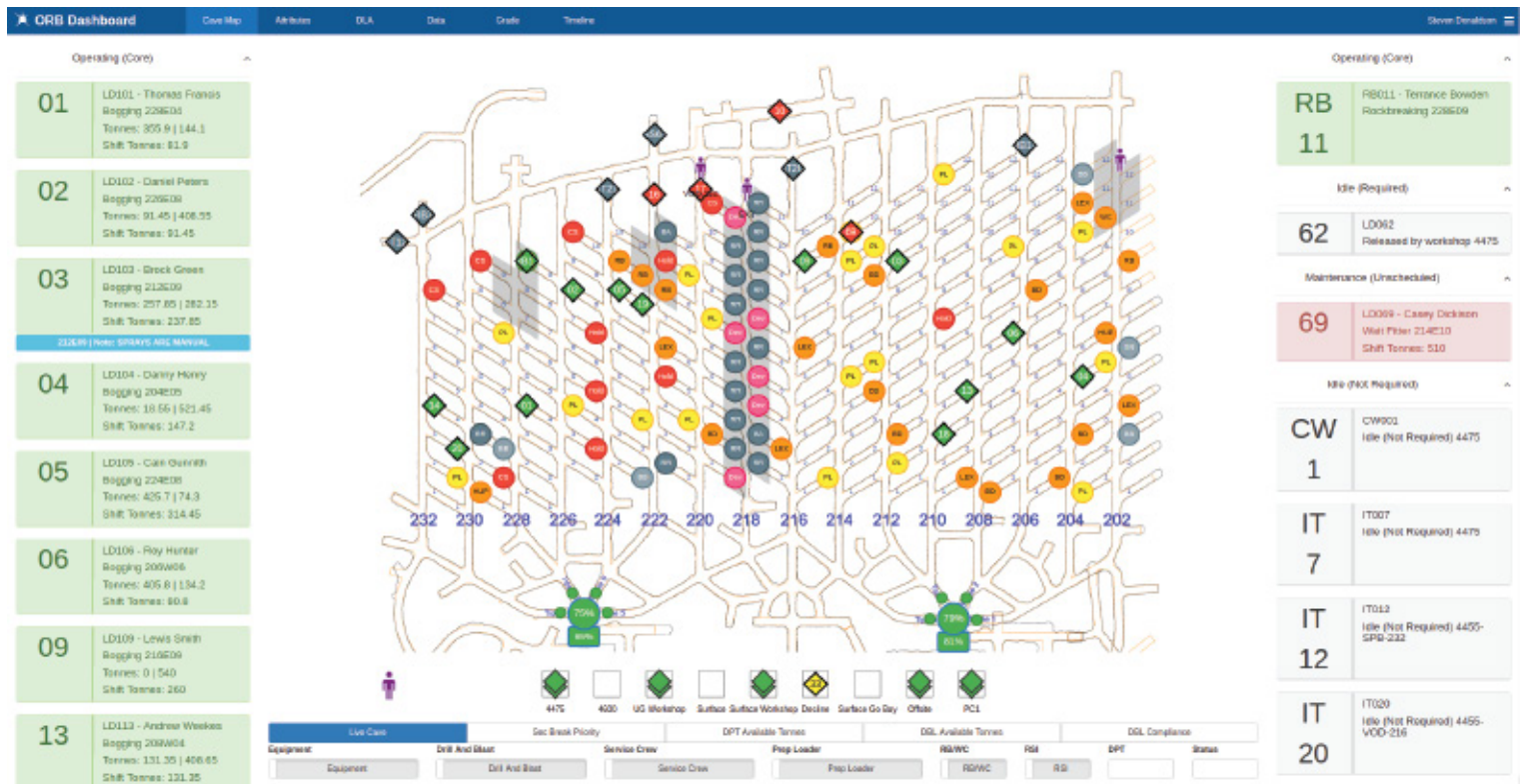


Figure 2. The ORB control view, which represents in real-time the active cave state and equipment dispatching system.

## Initial Design to delivery: 23 weeks

