Driving improvements to underground diamond drilling effectiveness through real-time implicit modelling at Olympic Dam

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Effective use of live data informing real-time decision making is becoming increasingly prevalent within the mining industry, however there can be challenges when users seek to leverage value through the integration of new and existing geological data sets. This remains the core of Olympic Dam's project to maximize the use of all available data for effective monitoring of underground diamond drill programs and improving geological control during execution. This paper describes the Olympic Dam Mine Geology team's transformation from reliance on the use of 2D paper sections for making end-of-hole decisions in the field towards 4D-live geological modelling, enabled by innovative database solutions informing locally constrained implicit models.

As Olympic Dam rapidly expands into the Southern Mine Area (SMA) the Mine Geology team has concurrently ramped up underground diamond drilling to sustain rates of above 175 km/a. With >10 underground rigs double-shifting, traditional paper sections used for the management of drill programs were no longer practical due to scale of operations. An opportunity was identified to modernise the monitoring of all underground diamond drill programs through the integration of logged copper sulphide estimates with Olympic Dam's recently completed first-fully integrated deposit scale geological model in Leapfrog Geo. There were significant computational challenges with the implementation of implicit modelling at Olympic Dam and initial testing of live gradeshells and sulphide domains required in excess of 12 hrs to run.

The enabling solution was to optimise the interfaces between the AcQuire database, Deswik MDM and Leapfrog Geo to create a dynamic, streamlined workflow that could be easily completed by Mine Geologists in accordance with daily production duties. Geologists now build rapid implicit models for a range of variables from an integrated dataset of logged estimates with existing assays, spatially constrained by 150m buffers around active drilling using a unique drill fan identifier flagged during the planning phase. Once the live-implicit models are updated, they are exported for visualisation on field tablets during logging and core checks at the start and end of every shift. To manage the risk of *'going digital'* interpretation remains at the forefront of the drill section close-out process, with Mine Geologists critically reviewing the finished sections on a standardised template with new learnings wireframed and communicated to stakeholders.

The Live Field Model has enabled a step-change in the geological effectiveness of diamond drilling, reducing over- and under-drilling ore-waste at Olympic Dam. Risks and opportunities identified during the proactive management of drilling execution can be rapidly capitalised or mitigated. The transformation from reliance on the use of 2D paper sections for making end-of-hole decisions towards 4D-live geological modelling has improved drill effectiveness by increasing geological understanding and context for every single underground drillhole and has enabled proactive communication of geological risk and opportunity to stakeholders.