Goldilocks: An application of Value of Information in geoscience planning for bulk mineral mining

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ABSTRACT

Difficulty in comparing resource knowledge across mineral assets, combined with complexity in the decisions and processes supported by this knowledge makes it difficult to prioritize geoscience programs in a multi-commodity portfolio. Value of Information (VOI) is a well-known concept in decision science, with potential to quantify a comparable value of geoscience programs across different assets and time horizons for use in planning and prioritization.

Calculating VOI for candidate geoscience programs has two main steps. First, representation of resource uncertainty by multiple equi-probable realizations of the resource. This is achieved through utilization of previous reconciliation data and application of geostatistical techniques like conditional simulation. For each realization we create a plan optimized to that realization, simulating how that scenario will play out in our current base plan. Comparison of these results shows which decisions will deliver more value with better resource definition. By examining which decisions are resource knowledge dependent and when they have to be made, we feel it is possible to gain insight into the optimum timing of geoscience activity. This is enabled by both the ability to generate a representative distribution of resource scenarios and internally developed mine planning platforms capable of running multiple mine plans in compressed timeframes.

We have been able to calculate VOI for strategic and tactical geoscience programs, and show the effect of uncertainty on individual mine planning decisions such as orebody sequencing and fleet estimation. We argue that quantification of resource definition through application of the VOI method to bulk mineral mining has potential to (1) drive efficiencies in geoscience planning and (2) increase mine plan value and reduce outcome uncertainty to an acceptable level.